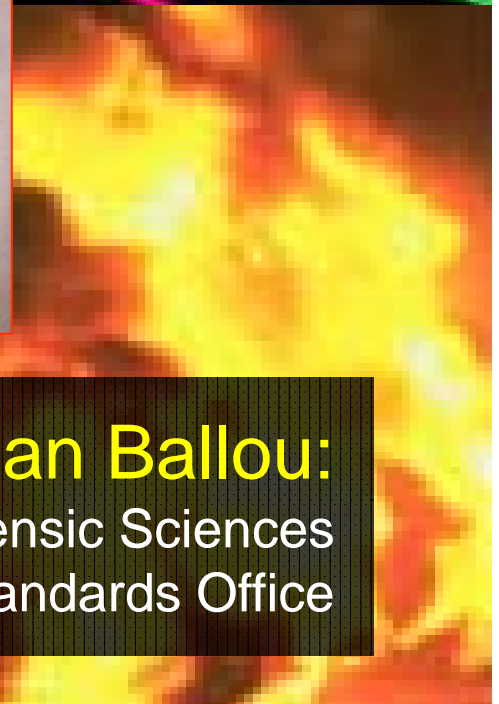
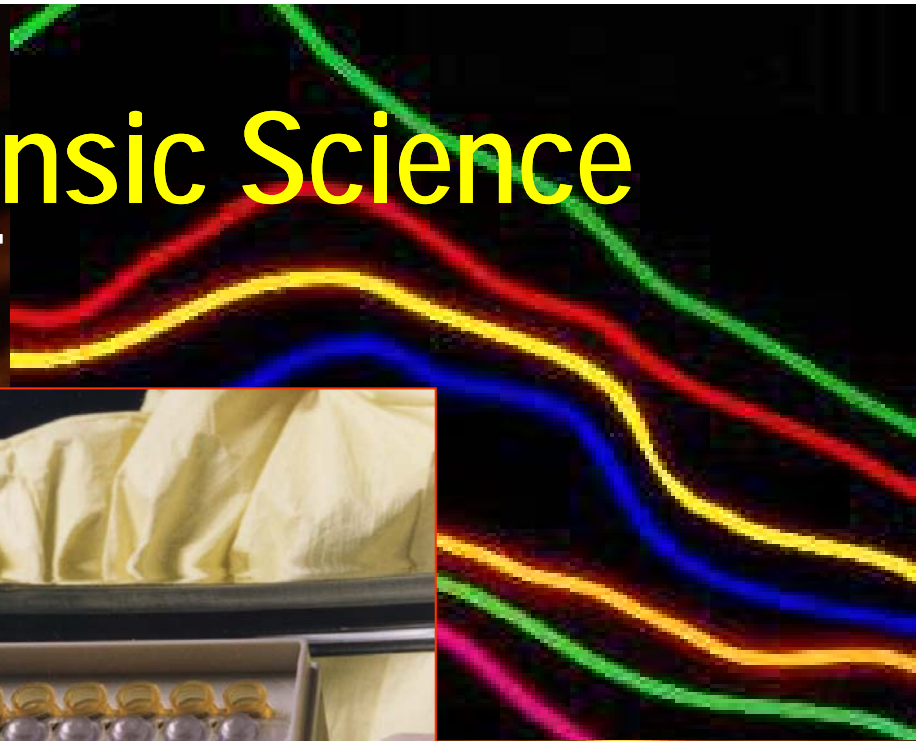


Overview of Forensic Science Activities at NIST



Susan Ballou:
Program Manager For Forensic Sciences
Law Enforcement Standards Office

Wilmer Souder

1913

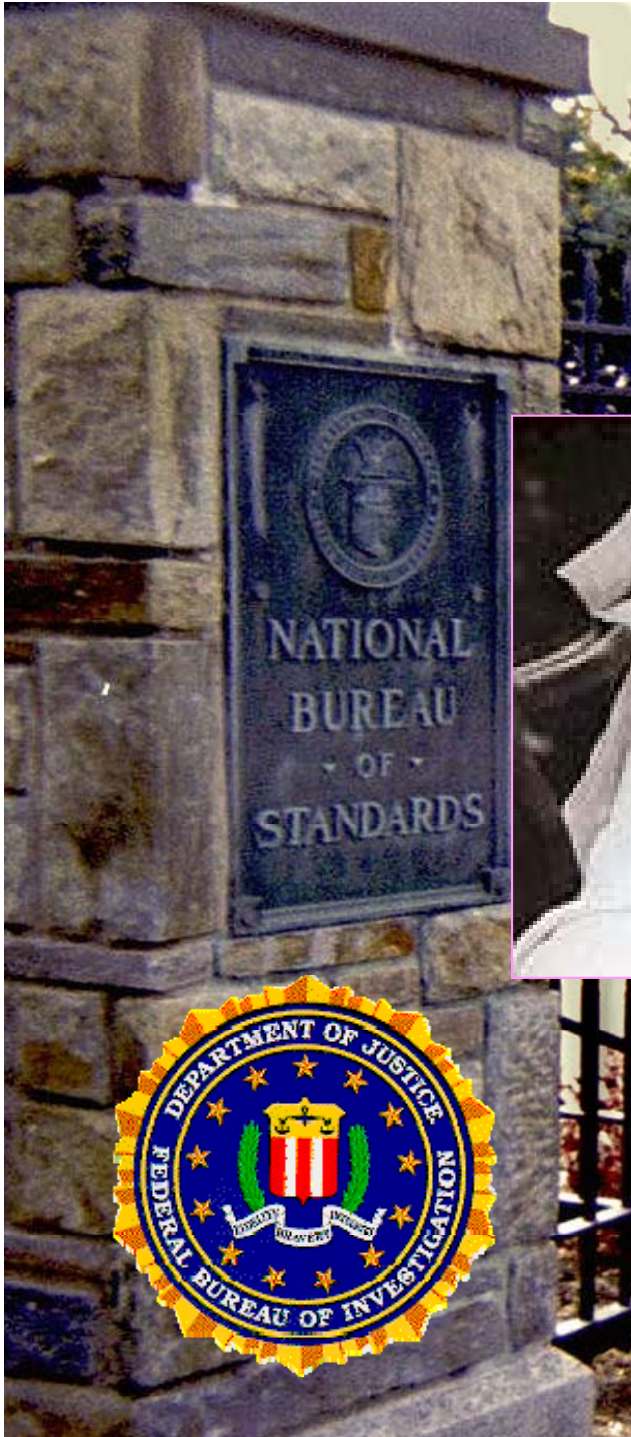


Handwriting Pros Nail Bruno

January 17, 1935

“... one of the nation’s best and least known criminologists.”

The Washington Post, 1954



Color Test Reagents/Kits for Preliminary
Identification of **Drugs of Abuse**

Standard Reference Collections of
Forensic Science Materials

Sampling Simulator for Qualification Testing
of Breath Alcohol Measurement Devices

Molecular Biophysics of **Olfaction**

Statistical Evaluation of
Blood Alcohol Measurements

Full-Scale **Room Burn Pattern** Study

Evaluation of Analytical Methodologies for
Non-intrusive Drug Testing

Trace Evidence **Analysis of Human Hair** by
On-line Supercritical Fluid Extraction -- Gas
Chromatography/Mass Spectrometry

Flammable and Combustible Liquid
Spill/Burn Patterns



The Innocence Project

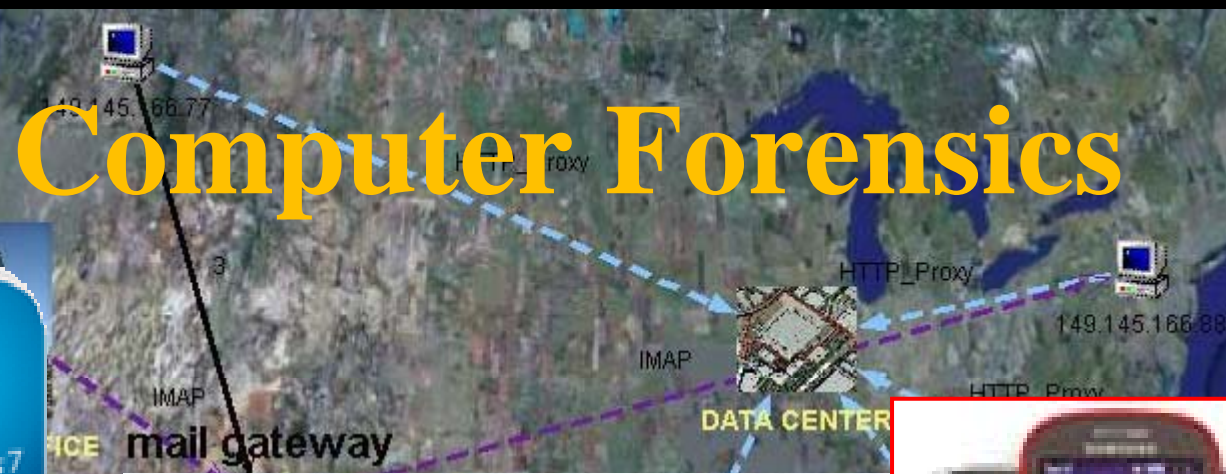
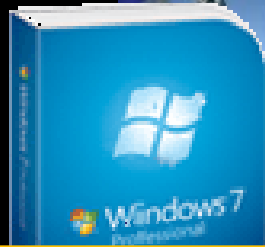
The National Academy of Sciences

The profession is lacking –

- Standards
- Validated methods
- Statistical based scientific research
- Conformance and compliance testing

Forensic Sciences

Computer Forensics



CFReDS; CFTT
Mobile Media
NSRL

NIST Special Database #28

National Software Reference Library



Reference Data Set
Version 2.19 12/1/

NIST



NIST



Building Fire Research Laboratory



Fire Investigation

- Technical Support for evaluation of crime scenes
 - Building structure response to intentional fires
 - Fire Reconstruction Modeling software program
 - World Trade Center October 2005 (*NIST NCSTAR 1*)
 - The Station Nightclub Fire June 2005 (*NIST NCSTAR 2: Vol. 1*)



ARSON
or not...?

IMS – Trace Drug Detection

- Analysis to characterize efficiency of the IMS method for detecting contraband drugs
- Development of methods to characterize and standardize swipe-based and portal-based collection efficiencies of drug particles
- Calibration procedures and NIST-Traceable SRMs for IMS detection

PUBLIC LAW 110–143—DEC. 21, 2007

SEC. 7. METHAMPHETAMINE DETECTION RESEARCH AND DEVELOPMENT

PROGRAM.

The Director of National Institute of Standards and Technology, in consultation with the Administrator, shall support a research program to develop—

(1) new methamphetamine detection technologies, with emphasis on field test kits and site detection; and

(2) appropriate standard reference materials and validation



Unobtrusive Testing

Detecting Drugs of Abuse

Incorporation of Drugs into Hair

Use Enantiomeric Composition to study the incorporation of drugs into human hair



Evaluation of Mistral Security Field Test Kits

Assess sensitivity and specificity of aerosol field test kits for narcotics detection and identification, marketed by Mistral Security, Inc.



BIOMETRICS

The ANSI/NIST-ITL Standard and Forensics

NIST Special Publication 500-271

ANSI/NIST-ITL 1-2007
Revision of
ANSI/NIST-ITL 1-2000

Information Technology:

**American National Standard for Information Systems—
Data Format for the Interchange of Fingerprint
Facial, & Other Biometric Information – Part 1**



NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

NIST Special Publication 500-275

ANSI/NIST-ITL 2-2008
XML Version of
ANSI/NIST-ITL 1-2007

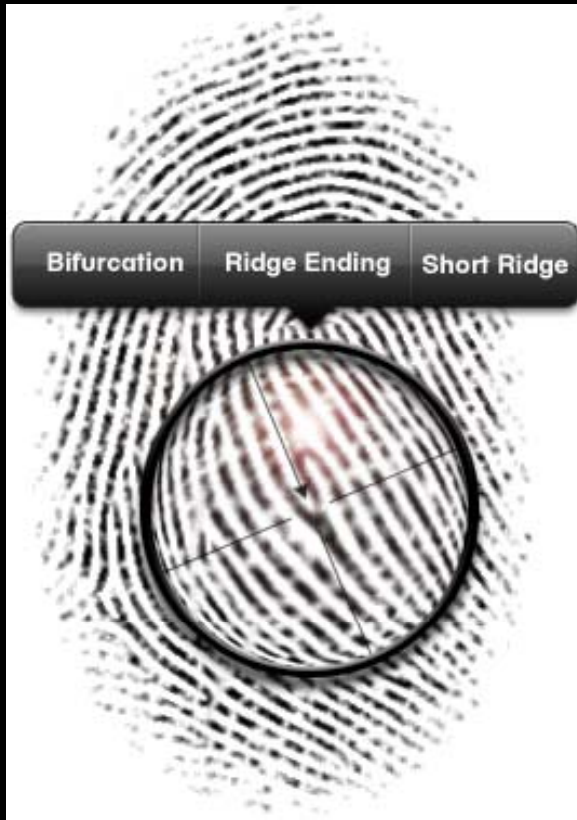
Information Technology:

**American National Standard for Information Systems—
Data Format for the Interchange of Fingerprint
Facial, & Other Biometric Information – Part 2:
XML Version**



NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

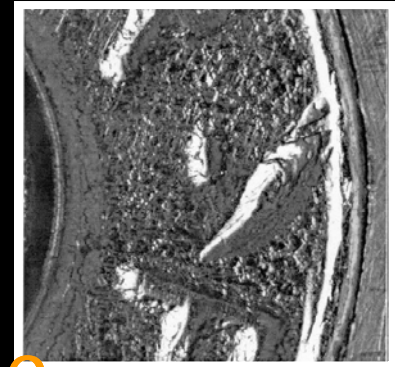
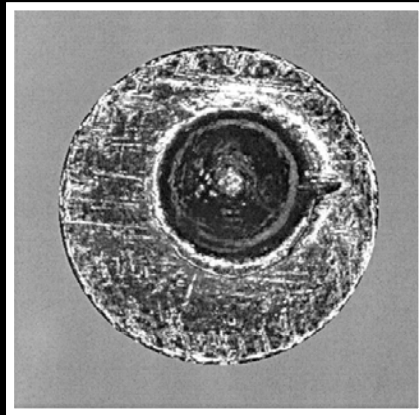
Latent Fingerprint Technologies (in IFL)



Usability

- Design tools and human-computer interfaces that are efficient, effective, and intuitive
- New interaction paradigms: moving away from mouse-and-click to touch technologies that mimic the way examiners work with photographs, loops, and pins
- Elimination of examiner bias through standardization of processes and procedures
- Promote validity, reliability, and traceability

October 2002
The Hunt for
the D.C.
Snipers



Is a
National Ballistic
Imaging Database
needed?

Is it practical?

Standards Are Missing

NIST SRM 2460/2461 Standard Bullet and Casing



Standard Reference Material for Additives in Smokeless Powder

- Samples with known proportions of:
 - propellant** (nitroglycerine)
 - stabilizers** (diphenylamine & ethyl centralite)
- Used to calibrate equipment and protocols
- Ensure accurate and reliable analyses

Magnified view of gunpowder residue





DNA

PROBLEM:

Getting analysis results quickly

SOLUTION:

- Multichannel format
- SNPs
- Microfluidic DNA Analysis System

SRM for PCR-DNA Analysis

Low-Level DNA Research

Mixture Interpretation

Variant Allele Sequencing

Expansion of U.S. Core Loci

Evaluation of New STR Kits

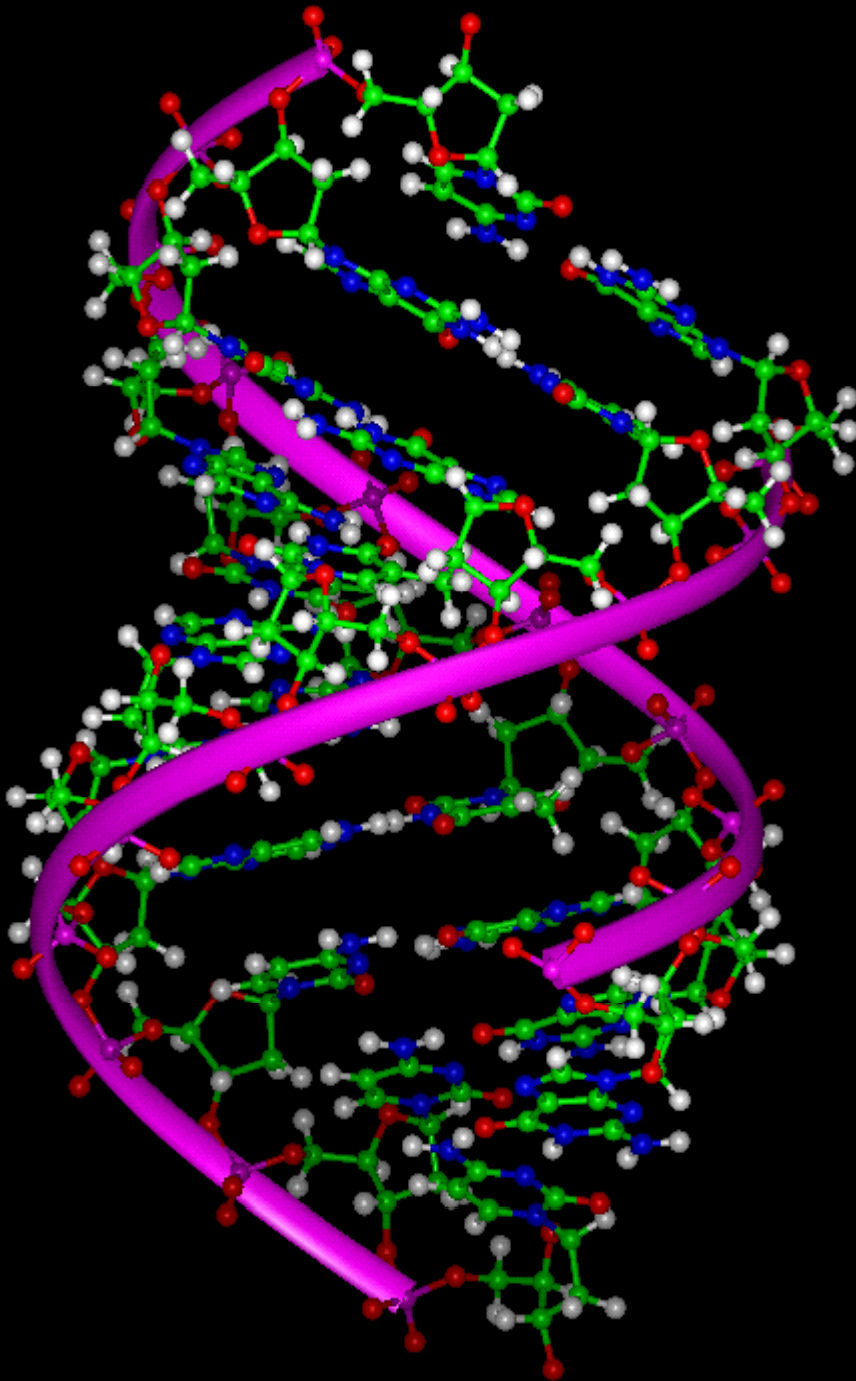
Evaluating Alternative Genetic
Markers

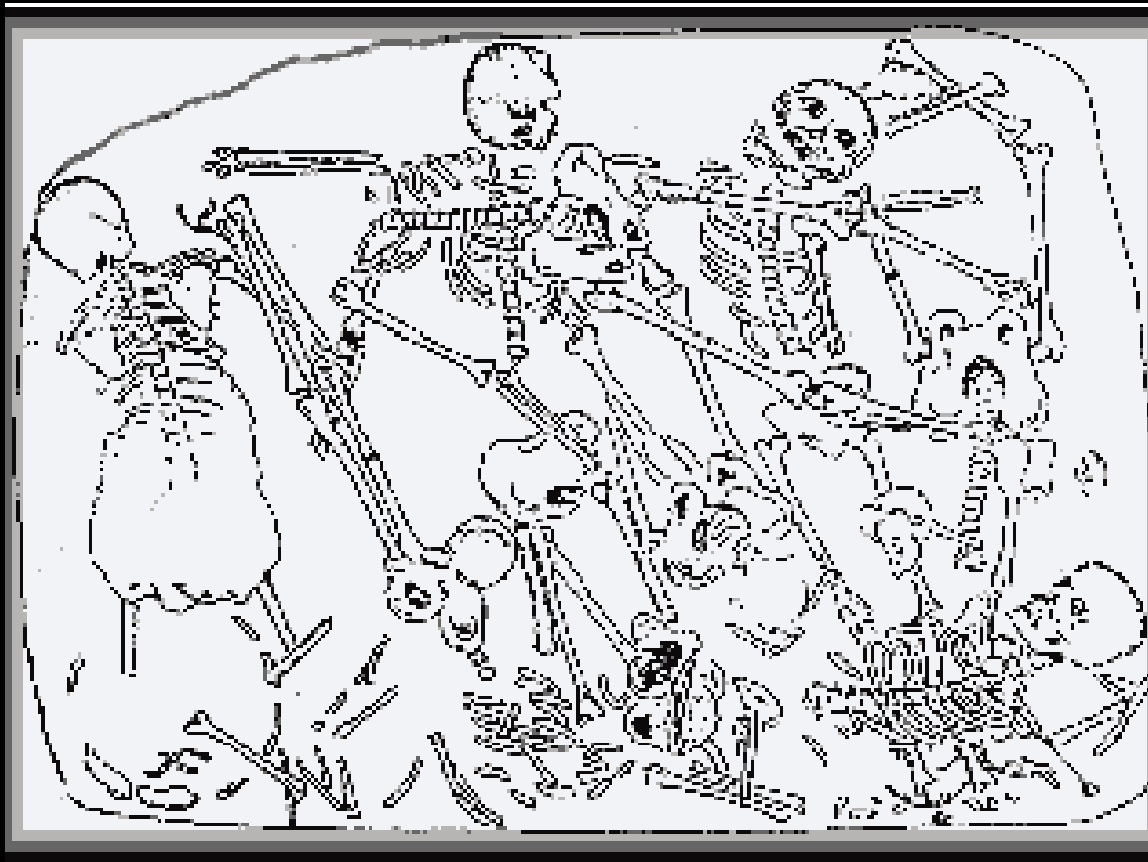
Kinship analysis

Standard Reference Material

Updates

Rapid DNA Processing for
Potential Biometrics Application





At NIST: Detecting graves by headspace collection

In the past, investigators used ground penetrating radar, a bulky instrument that slowly moves over the surface emitting radar pulses as a means to find burial locations.

Standard Reference Materials (SRMs)

Arson: 2285

Blood Alcohol: 1821, 1828b

Drugs of Abuse: 1508a, 2381

DNA: 2390, 2391b, 2392, 2392-1

Explosive Stimulants: 2905

Glass: 610-17,

SEM: 1690, 1691, 1961, 1963a, 1965

GC/MS: 1543

UV: 935a

IR: 1921b

Standard Reference Databases

Biotechnology

Short Tandem Repeat DNA Internet Database

Human Mitochondrial Protein Database

Chemistry

Hydrocarbon Spectral Database

NIST/EPA/NIH Mass Spectral Library

Biometrics

Mated Fingerprint Card Pairs

Fingerprint Minutiae from Latent Matching Tenprint Images

Plain and rolled Images from Paired Fingerprint Cards

Fire Investigation

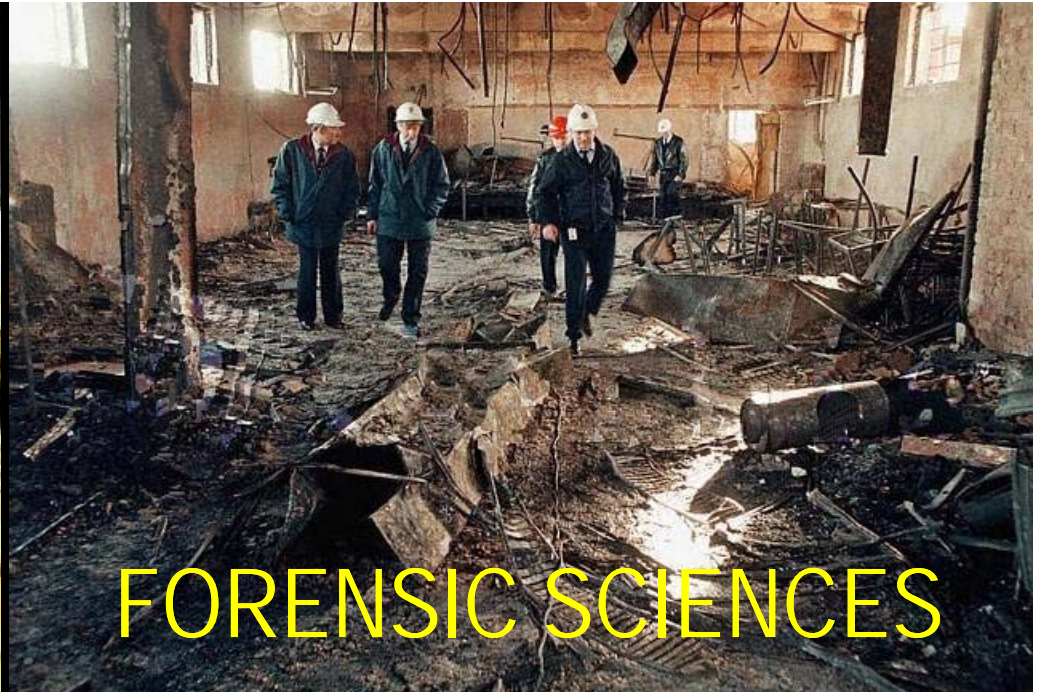
Fire Modeling Programs

NIST FASTData Fire Test Database

Expert Working Groups

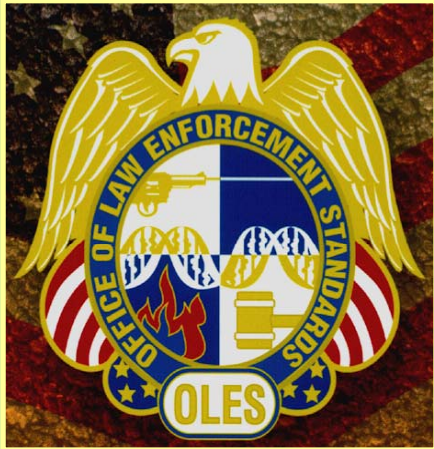
- Biological Evidence Preservation
- AFIS Interoperability
- Human Factors on Latent Print Analysis

After reading the
the sentence, you are
now aware that the
the human brain
often does not
inform you that the
the word 'the' has
been repeated twice
every time.



FORENSIC SCIENCES





Thank You
~
Questions?

National Institute of Standards and Technology

(301) 975-2757