

# **FORENSIC SCIENCES NEWS**

Vol. 1., Issue 2

## Computer Forensic Investigators Rely on NIST Software Library

Hundreds of millions of us, lawbreakers included, are leaving digital footprints in our wake. Computers, smart phones, GPS, gaming, and other devices record a continuous stream of our daily activities whether it's a coffee purchase, a text message, or a document download. Over the past two decades forensic

investigators have developed the expertise to use these footprints to solve crimes. Thanks to NIST, cybercrime investigators can examine hard drives much more quickly than would otherwise be possible.

In 1999, the NIST Information Technology

Laboratory began a project that has grown into the National Software Reference Library (NSRL). Computer forensic examiners use the NSRL to identify software on a seized computer, smart phone, or other digital device.

“We know that the NSRL is used daily in every computer forensic lab in the United States,” says Barbara Guttman, leader of the Software Quality Group in the NIST Information Technology Lab. “About 20,000 copies of each NSRL quarterly update release are downloaded from our website. We

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Special Agent Edward Labarge, an agent with the U.S. Army Computer Crimes Investigative Unit at Quantico, Va., conducts investigative research into a suspected network populated by computer hackers' intent on illegally accessing a restricted Army network. Credit: U.S. Army

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encourage users to redistribute it. The FBI, for example, redistributes it to every field office with digital forensics capability.”

Investigators rely on it to either exclude files from examination or to look for files of interest. In a child exploitation case, an examiner can exclude the thousands of images that come with Microsoft Office and then concentrate on unknown files that may contain illicit material. However, in a hacking case, the examiner might be interested in hacking software found on the drive. Either way, it saves investigators from having to examine every file.

The NSRL consists of a library of software, a database of information about the software, the Reference Data Set which is the output extracted from the database that law enforcement uses, and a research environment to help the community develop new and better ways of identifying software.

The NSRL currently contains more than 19,000 software packages and 100 million file fingerprints, which are based on an advanced cryptographic technique and are quite similar to real fingerprints. The fingerprints uniquely identify the file, but the file

cannot be re-created from the fingerprint.

NIST has published the NSRL Reference Data Set each quarter since the fall of 2001 as NIST Special Database 28. The Reference Data Set is available via subscription and download. It can be freely redistributed. Users can verify that their copies are correct via the NSRL website.

Although it is designed to serve primarily the computer forensics community, computer security experts and cultural heritage preservationists find it useful too.

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National Institute of  
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U.S. Department of Commerce

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**[www.nist.gov/forensics](http://www.nist.gov/forensics)**

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Computer forensics interests span from crimes committed with computers, such as child pornography and hacking, to intelligence, civil, and corporate disputes.

All of these users need the efficiency of data reduction and the ability to know what software is or has been run on a computer system. For example, in a civil case, it could be important to know whether a disk wiper had been run on a system, possibly violating an order to preserve evidence.

The computer security community uses the NSRL to find at-risk software installed on a computer.

The computer security community also uses the NSRL to validate files that are known to be safe and for other aspects of software package management.

The third major user of the NSRL is the cultural heritage community, consisting mainly of libraries and archives. NSRL preservation strategies – originally employed to meet the need to preserve evidence – are

being adopted by the cultural heritage community to preserve software. NIST and Stanford University Library formed a [partnership](#) earlier this year to catalog the data contained in about 15,000 software releases from the early days of microcomputing, many of which are game titles. The project will help give software its place in culture and will expand the NSRL.

Visit the [NSRL website](#) to learn more. Sign up for a subscription at <http://www.nist.gov/srd/nistsd28.cfm>. §

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### Key Dates in Computer Forensics at NIST

1984 Computer Fraud and Abuse Act enacted. Addresses array of computer crimes.

1984 FBI forms Magnetic Media Program (later renamed the Computer Analysis and Response Team).

1987 Florida Computer Crimes Act, first law to address unauthorized modification/deletion of data on a computer system.

1994 Department of Justice publishes federal guidelines for search and seizure of computers.

1998 Scientific Working Group on Digital Evidence formed.

1999 NIST creates the National Software Reference Library (NSRL) and the Computer Forensic Tool Testing (CFTT) program.

2001 NIST releases the first NSRL Reference Data Set (NIST Special Database 28) version 1.0.

2001 NIST releases the first work product for the CFTT – a disk imaging specification.

2003 NIST releases first hardware-based write blocking specification and test material.

2004 NIST adds a new project to the computer forensics program – Computer Forensics Reference Data Sets or CFReDS.

2005 NIST releases first deleted file recovery tool specification and test material.

2009 NIST releases first mobile device forensics tool specification and test material.

2010 NIST publishes first paper on error rates and computer forensics.

2012 NSRL adds first set of mobile app hashes.

2013 The NSRL exceeds 100 million files in its database.

## New NIST Forensic Science Website Launched

More than 400 publicly funded crime laboratories in the United States rely on NIST science every day. To ease the way for crime lab personnel to connect to essential resources at NIST as well as other federal agencies, NIST has launched a new forensic science website: [www.nist.gov/forensics](http://www.nist.gov/forensics).

The site is intended primarily for the forensic science community – laboratory, law enforcement and criminal justice personnel; academic researchers; standards developers; and equipment manufacturers – but, students, teachers, and journalists may also find the array of features on the site of interest too.

“If you need to know about developments in forensic science, particularly what NIST is doing to strengthen forensic science, visit our new site,” says Mark D. Stolorow, director of the NIST Law Enforcement Standards Office (OLES). “We have also included links for forensic science activities beyond NIST to make the site more useful to our customers.”

The heart of the NIST forensic science website is its research section which points to descriptions of relevant research projects in the NIST labs. OLES will work with scientists across NIST to expand and continually update the research pages.

A [resources section](#) guides visitors to funding opportunities, other federal agencies with forensic science activities, training programs, and scientific literature and data resources. The site also includes sections for:

[Conferences and events](#);  
[NIST forensic publications](#);  
[Reference materials and standards](#);  
[Reference data](#); and  
[Forensic science news](#).

The site includes a listing of all the [scientific working groups](#) for forensic science specialties with links to the groups' websites. NIST is responsible for administering and coordinating support for these groups through a [new initiative](#) with the Department of Justice announced earlier this year.

NIST is developing additional features for the forensic science site including an image gallery. Suggestions and feedback are welcome. Please send them to Linda Joy, OLES communications manager, [linda.joy@nist.gov](mailto:linda.joy@nist.gov). §

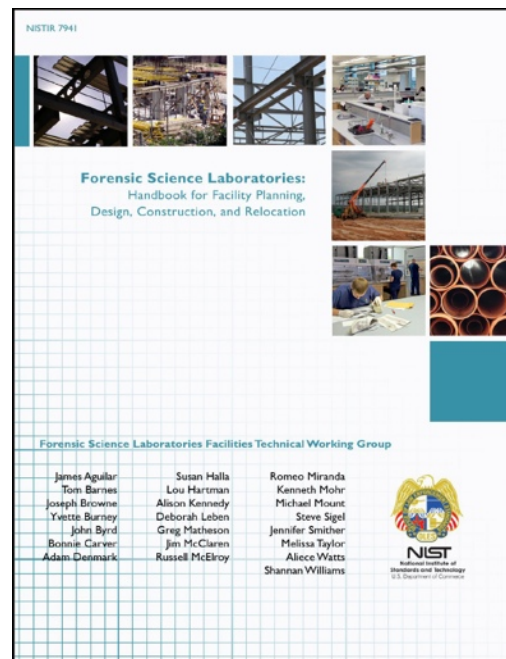
## NIST Offers Guidance on Building 21st-Century Forensic Labs

A new NIST handbook offers advice for law enforcement agencies on the planning, design, construction, and relocation of forensic science laboratories. A detailed how-to guide, the document not only outlines the process of creating a new crime lab from start to finish, it also provides guidance on integrating the latest scientific developments, efficiency improvements, and sustainability practices.

The new *Forensic Science Laboratories: Handbook for Facilities Planning, Design, Construction, and Relocation* is intended for laboratory directors, architects, designers, builders, and others who have an interest in planning and constructing the 21st-century crime lab.

The National Institute of Justice published the original handbook on planning and building forensic laboratories in April 1998. That 71-page document has been consistently popular,

receiving frequent hits on the NIST Law Enforcement Standards Office website. However, over the past 15 years developments in



forensic science as well as in sustainable building practices have outpaced the original handbook.

In addition, criminal investigators are demanding more forensic science services than ever before. The increased demand is due partly to changes in criminal activity, particularly the growth of cyber crimes and terrorist acts. Rapid advances in DNA technology and the popularity of forensic science in television crime dramas also contribute to

the demand for forensic science services. In order for laboratory directors to meet these demands, they will require specific and clear guidance on the steps involved in creating or renovating forensic science facilities.

NIST convened the Forensic Science Laboratories Facilities Technical Working Group to support the preparation of the new handbook. The group includes 16 professionals with expertise in laboratory management, planning, architecture and engineering. Members met in November 2011 to begin an update of the old

handbook. The National Institute of Justice provided funding to produce the new handbook.

The new 98-page *Forensic Science Laboratories: Handbook for Facilities Planning, Design, Construction, and Relocation* will help facility planners design efficient, flexible and functional forensic labs which can evolve with mission requirements. Visit this NIST webpage to download the [handbook](#). §

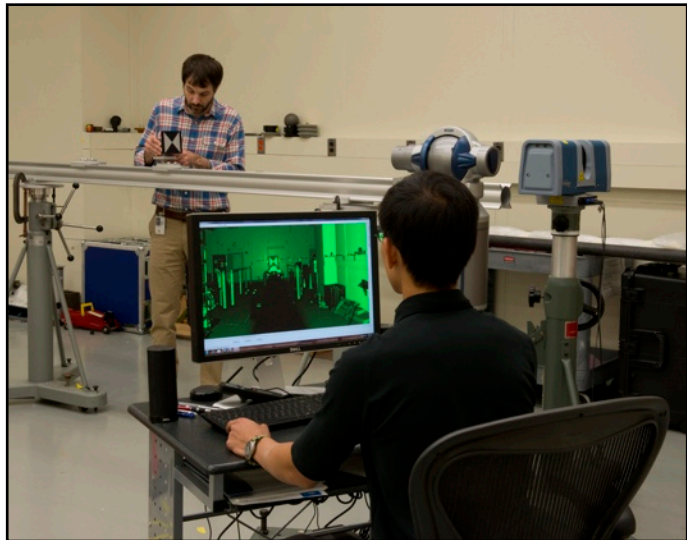
## NIST Works with Leica Geosystems to Develop Calibration for 3D Crime Scene Scanners

Three-dimensional scanners used at crime scenes are not just the stuff of prime time television. Investigators and crime laboratories are using 3D laser scanning to measure and model the critical aspects of crime scenes.

A 3D laser scanning measurement system can sweep a laser beam over an entire room or outdoor scene, capturing up to a million measurements per second. It creates a panoramic image with a 3D data visualization that reproduces the dimensions of the area. These data are then used to identify bullet trajectories, victim positions, witness viewpoints, and other points of interest with high accuracy and speed.

In the typical use of a 3D scanner, investigators will position a length artifact in the scene to be scanned along with everything else. The artifact's measured value is compared with the known value to test whether the instrument is working correctly before critical measurements are performed.

"They take a complete 3D scan so that later they can go back and query this data to see, for example, how far this wall is from where this person is standing over here," says Christopher Blackburn, a key member of the NIST Physical Measurement Lab team involved in dimensional measurements. Without established length standards to assess the scanner performance, the investigators may not be able to defend the method as having an acceptably high level of certainty and the results might not be admissible in court.



NIST Physical Measurement Lab's Christopher Blackburn (background) works with 3D laser scanning measurement system. Its output is displayed on the screen. Credit: NIST

Robert Thompson of the NIST Law Enforcement Standards Office brought this challenge to PML and put members of the Dimensional Metrology Group in touch with Leica Geosystems, a manufacturer of 3D laser scanning instruments. The PML/Leica team developed a new measurement system that calibrates the company's length artifact, a twin-target pole.

"This artifact can now be put in the crime scene so the investigators can get a length reference to test the instrument before measurements are performed," explains Blackburn. "This helps establish traceability back to the SI for the evidence they'll be presenting in court."

These NIST-calibrated artifacts, which help provide traceability, have been a tremendous boost for Leica Geosystems, which has increased sales and their workforce.

See the [full story](#) on the NIST Physical Measurement Laboratory website. §

## Is Your Forensic Science Publication MIA in NIST Webpace?

The new [NIST Forensics Science publications page](#) encourages people to use the [NIST Publications Portal](#) to search for journal articles and other NIST publications related to forensic science. It suggests selecting “forensics” from the topic area field to produce a list of relevant publications.

So, how do you ensure that your publication will appear on the resulting list so that interested members of the forensic science community will see it? The

essential step is to enter “forensics” or “forensic science” as keywords when you submit your manuscript in NIST’s NIKE database. This screenshot shows where to find the keywords field.

More detail on the database and manuscript submission is available on the NIST Virtual Library website at <http://inet.nist.gov/nvl/services/werb.cfm> (not available outside of NIST). Please contact Sharon Hallman on ext. 3570 or Sabrina Springer on ext. 5404 with questions. §

The screenshot shows the 'MANUSCRIPT PUBLICATION REQUEST FORM' interface. At the top, there is a navigation menu with buttons for 'My Work', 'Search Publications', 'Search Authors', 'Submit Manuscript', 'Initiate ERB Form', 'Reports', 'Help', 'Administration', and 'Logout'. Below the menu, a warning message states: 'Please refrain from using your browser's BACK button while in the form submission process. Using your browser's BACK button may result in your having to re-enter the information or duplicate submission.' Below this, there are instructions for required fields: '\* - Required Fields' and '\* \* - Required Fields Except for Noting'. The form contains several input fields: 'Title of Publication \*', 'Abstract', 'Keywords (delimited by ";")', 'Internal Notes (Maximum: 10000 characters)', and 'Research Category \*'. The 'Keywords' field is highlighted with a red circle and a callout box that shows the text 'forensics; forensic science' with a cursor at the end. A 'Show Tree View' link is located at the bottom right of the form.

### Receive NIST Forensic Science News Updates by Email

Stay up to date with forensic science news from NIST by subscribing to our news alerts by email. Sign up at [www.nist.gov/forensics](http://www.nist.gov/forensics) (look for the brown box on the left side of the page).

## NIST Forensic Science News Briefs

**NIST Seeks Input on Forensic Science Guidance Groups:** NIST is seeking input on the structure of guidance groups that would promote scientific validity and reliability in forensic science. NIST is inviting comments on the structure of the groups through a Notice of Inquiry published Sept. 27, 2013, in the *Federal Register*. The groups, each focused on a specific forensic science discipline, will develop guidance for forensic science practitioners. The proposed mission of the guidance groups, defined in the notice, "is to support the development and propagation of forensic science consensus documentary standards, monitor research and measurement standards gaps in each forensic discipline, and verify that a sufficient scientific basis exists for each discipline."

NIST is responsible for administering and coordinating support for the guidance groups, as outlined in a February 2013 [memorandum of understanding](#) signed by NIST and the Department of Justice to support and strengthen forensic science in the United States. The guidance groups will replace an existing ad hoc system of [scientific working groups](#) that are funded by a variety of agencies and have different sizes, structures and outputs.

"We envision the guidance groups as being voluntary collaborative organizations of forensic science practitioners and researchers from a wide array of disciplines. Members would represent all levels of government, academia, non-profits and industry," said Susan Ballou, NIST program manager for forensic science.

Please send questions or comments by email to [susan.ballou@nist.gov](mailto:susan.ballou@nist.gov) or to the National Institute of Standards and Technology, c/o Susan Ballou, 100 Bureau Drive, Mailstop 8102, Gaithersburg, MD, 20899. Due to the federal government shutdown, the comment period has been extended to Nov. 26. §

**NIST Research Highlighted at World Forensic DNA Conference:** The 25th Congress of the International Society for Forensic Genetics (ISFG) met Sept. 2-7 in Melbourne, Australia, with 556 delegates from 49 countries. Five NIST researchers delivered 13 presentations that included three workshops. John Butler and Mike Coble were part of a six-member international team that taught two pre-conference workshops on Basic Principles

and Advanced Topics in Forensic DNA Evidence Interpretation to about 100 attendees. Workshop handouts have been made available on the NIST STRBase website: <http://www.cstl.nist.gov/strbase/training/ISFG2013workshops.htm>.

John Butler also taught a one-hour workshop on



NIST researchers meet Sir Alec Jeffreys, a pioneer of forensic DNA testing, at the 25th Congress of the International Society for Forensic Genetics in Melbourne, Australia. Left to right: Kevin Kiesler, Becky Hill, Mike Coble, Sir Alec Jeffreys, John Butler, and Peter Vallone.

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scientific writing and reviewing (see [http://www.cstl.nist.gov/strbase/pub\\_pres/Butler-ISFG2013-ScientificPublicationWorkshop.pdf](http://www.cstl.nist.gov/strbase/pub_pres/Butler-ISFG2013-ScientificPublicationWorkshop.pdf)). NIST reference materials and data were highlighted with four poster presentations. Peter Vallone, Becky Hill, and Kevin Kiesler showed their latest work on NIST SRM 2372 for DNA quantitation, SRM 2391c for DNA typing, and SRM 2392 for mitochondrial DNA with standard and next-generation DNA sequencing. Their presentations are available at <http://www.cstl.nist.gov/strbase/NISTpub.htm#Presentations>. Mike Coble gave an oral presentation on investigating software programs for analysis of complex DNA mixture interpretation. Following the conference, the NIST Applied Genetics Group members visited the local Victoria Police DNA Laboratory and gave another series of presentations to its staff in hopes of initiating some international collaboration with the largest forensic science laboratory in Australia. §

### **NIST Scientists Present Research to European Network of Forensic Science Institutes:**

On Sept. 12, Jun-Feng (John) Song of the Semiconductor and Dimensional Metrology Division and Robert M. Thompson of the Law Enforcement Standards Office presented research reports to the European Network of Forensic Science Institutes, Firearm and Gunshot Residue Working Group in Riga, Latvia. The research reports were titled “Validation Tests for the CMC Method using Cartridge Cases Fired with Consecutively Manufactured Pistol Slides” and “Initial Tests using CMC Method for Optical Image Correlations of Cartridge Cases Fired from Consecutively Manufactured Pistol Slides.” The reports detailed work by the NIST ballistic surface metrology team on successful development of the objective measurement of similarity of firearm evidence comparisons and on a statistical model to estimate confidence and error rate of conclusions. Many members of the audience mentioned that the work that NIST is doing is extremely valuable and timely for forensic practitioners, especially when such research can hardly be accomplished in burdened crime laboratories worldwide. §

### **NIST Forensic DNA Research Presented to Chinese Forensic Laboratories:**

John Butler was an invited keynote speaker at the Chinese National Forensic DNA Database conference held in Kunming, China, on Sept. 24. He spoke to more than 200 Chinese scientists who attended the conference. In addition, he visited four forensic laboratories – Yunnan Province Laboratory, Guangzhou Police Laboratory, Guangzhou’s Southern Medical University Centre of Forensic Science, and the Beijing Institute of Forensic Science – and gave two talks in Guangzhou and Beijing. Two

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NIST’s John Butler with Marie Samples (left) of the New York City Office of Chief Medical Examiner and Susanne Brenneke of the Missouri State Highway Patrol Laboratory visiting Chinese forensic laboratories.

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other U.S. forensic DNA scientists (Marie Samples from New York City and Susanne Brenneke from the Missouri State Highway Patrol Laboratory) also traveled with Butler to visit the forensic labs and to speak to the Chinese scientists. They found a great deal of interest in NIST DNA reference materials and how they are produced and used by U.S. forensic laboratories. China, which began its rapid growth in this field in 2009, now has 417 forensic DNA labs, over 2200 DNA analysts, and almost 20 million DNA profiles in its national database. Two of Butler's forensic DNA typing textbooks have been translated into Chinese and are widely used to train Chinese scientists. §

**New Federal Agency Forensic Science Coordination:** Tania Simoncelli, Assistant Director for Forensic Science at the White House's Office of Science and Technology Policy (OSTP), has organized a small working group to discuss forensic science research and development needs with the goal to identify potential high visibility

steps that can be taken to advance work in this field. The group consists of



two people from OSTP, three people from NIST, three from the National Science Foundation (NSF), and three from the Department of Justice (DOJ). This working group has met three times so far: Sept. 17 at NIST, Sept. 30 at NSF, and Oct. 29 at DOJ. Presentations have been shared regarding what each agency is doing in the area of forensic science research. John Butler, Special Assistant to the Director for Forensic Science, gave the NIST presentation on Sept. 17 regarding efforts in forensic science based on input from researchers across the NIST campus. §

**NSF Invites Forensic Science and Education Proposals:** The increasing interest in improving forensic science research led to the release of a National Science Foundation (NSF) "Dear Colleague" letter on Aug. 12. This letter encourages the submission of proposals for research and education in forensic sciences.

Supplemental requests to existing NSF awards can also be submitted to any NSF directorate. NSF includes seven directorates covering (1) biological sciences, (2) computer and information science and engineering, (3) engineering, (4) geosciences, (5) mathematical and physical sciences, (6) social, behavioral, and economic sciences, and (7) education and human resources. While there is not a special competition or new program being announced at this time, this letter shows NSF's desire to have greater engagement with research that may benefit the forensic science community. To view the NSF Dear Colleague Letter, go to <http://www.nsf.gov/pubs/2013/nsf13120/nsf13120.jsp>. §

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**NIST Corner in Evidence Technology Magazine:** The editor of *Evidence Technology Magazine* would like to feature a regular “NIST Corner” to update readers on research, standards development, and other activities of interest to the forensic science community. Melissa Taylor of the NIST Office of Special Programs/Law Enforcement Standards Office brought this opportunity to NIST through a recent interview with editor Kristi Mayo. The NIST Corner would appear in every other issue of the bimonthly magazine. Therefore, NIST can have a presence in the January/February, May/June, and September/October issues in 2014. *Evidence Technology Magazine* has been published for the past decade and focuses on forensic evidence collection, processing, and preservation.

Paid for by advertisements, its six issues per year are freely distributed to forensic professionals in the United States. NIST Corner articles can be authored by a NIST researcher or the editor is willing to interview someone with an interesting project and write it up. For more information on the magazine, see <http://www.evidencemagazine.com>. Articles should be approximately 800-1000 words and include a short biography of the author. High resolution photos should accompany the article, and the editors are interested in video, if available. Editorial deadlines are approximately six weeks prior to publication. Please let Linda Joy, Communications Manager for the Law Enforcement Standards Office, ([linda.joy@nist.gov](mailto:linda.joy@nist.gov)) know if you would like to propose an article. §

#### **Drug Chemists Discuss Challenges during NIST Visits:**

Drug Enforcement Administration Special Testing and Research Laboratory staff discussed challenges they are facing with measurement uncertainty issues during a visit to NIST on Aug. 20. Seven members of the lab heard presentations from Bill MacCrehan, Katrice Lipka, and Karl Irikura from the NIST Chemical Sciences Division and Steve Stein from the Biomolecular Measurement Division. Topics covered included measurement uncertainty, efforts to predict structure of new synthetic drugs from IR spectra, and mass spectral libraries being developed at NIST and with collaborators.

Developing meaningful uncertainty measurement procedures and finding appropriate quantitative proficiency tests are some of the challenges that forensic labs are increasingly facing in drug analysis. David Northrup of the Washington State Patrol Crime Laboratory gave a Chemical Sciences Division seminar at NIST on Aug. 21 to describe challenges facing his laboratory following passage of a new law legalizing recreational use of marijuana. He discussed how the new law changed the definition of marijuana to require quantitative analysis of any plant material to determine whether it contained greater than 0.3% THC by dry weight. §

## NIST-wide Forensic Science Efforts for June-September 2013

Based on reports from NIST forensic science champions, the following interactions between NIST scientists and the forensic science community took place during June, July, August, and September. We plan to continue compiling these outputs and interactions throughout the year for an eventual annual report of forensic science program activities.

### Publications

#### NIST Special Reports

Taylor, M.K., *et al.* *Forensic Science Laboratories: Handbook for Facility Planning, Design, Construction, and Relocation*, NIST Interagency Report 7941, published June 25, 2013. Online at [http://www.nist.gov/manuscript-publication-search.cfm?pub\\_id=913987](http://www.nist.gov/manuscript-publication-search.cfm?pub_id=913987).

#### Ballistics

Chu, W., Thompson, R.M., Song, J., Vorburger, T.V. (2013) Automatic identification of bullet signatures based on consecutive matching striae (CMS) criteria. *Forensic Science International*, 231, 137–141.

Song, J. (2013) “Proposed NIST Ballistics Identification System (NBIS) based on 3D Topography Measurements on Correlation Cells”, *AFTE Journal*, 45(2), 184-194.

Chu, W., Tong, M., Song, J. (2013) Validation tests for the congruent matching cells (CMC) method using cartridge cases fired with consecutively manufactured pistol slides. *AFTE Journal*, 45(4), 361-366.

Song, J., Renegar, T.B., Soons, J., Muralikrishnan, B., Villarrubia, J., Zheng, A., Vorburger, T.V. (2014) The effect of tip size on the measured Ra of surface roughness specimens with rectangular profiles. *Precision Engineering*, 38(1), 217-220.

#### Computer Forensics

NIST Special Database #28, National Software Reference Library (NSRL) Reference Data Set (RDS) 2.42. September 2013.

*Fast Disk Acquisition System: Test Results for Digital Data Acquisition Tool: Fast Disk Acquisition System*. Prepared for the Department of Homeland Security Science and Technology Directorate Cyber Security Division by the NIST Office of Law Enforcement Standards, July 2013. ([.pdf](#))

#### DNA

Oostdik, K., French, J., Yet, D., Smalling, B., Nolde, C., Vallone, P.M., Butts, E.L.R., Hill, C.R., Kline, M.C., Rinta, T., Gerow, A.M., Allen, S.R., Huber, C.K., Teske, J., Krenke, B., Ensenberger, M., Fulmer, P., Sprecher, C. (2013) Developmental validation of the PowerPlex® 18D System, a rapid STR multiplex for analysis of reference samples. *Forensic Science International Genetics*. 7: 129-135.

Lee, S.B., Crouse, C.A. and Kline, M.C., (2013) Optimizing Storage and Handling of DNA Extracts; Chapter 2 in Shewale, J. (ed.), *Forensic DNA analysis: Current Practices and Emerging Technologies*. Taylor & Francis/CRC Press: Boca Raton. pp.19-37.

Butler, J.M. and Hill, C.R. (2013) Biology and genetics of new autosomal STR loci useful for forensic DNA analysis. Chapter 9 in Shewale, J. (ed.), *Forensic DNA Analysis: Current Practices and Emerging Technologies*. Taylor & Francis/CRC Press: Boca Raton. pp. 181-198.

Kiesler, K.M. and Vallone, P.M. (2013) Allele frequencies for 40 autosomal SNP loci typed for US population samples using electrospray ionization mass spectrometry. [Croatian Medical Journal 54: 225-231](#).

Strychalski, E.A., Konek, C., Butts, E.L., Vallone, P.M., Henry, A.C., Ross, D. (2013) DNA purification from crude samples for human identification using gradient elution isotachopheresis. *Electrophoresis* 34(17): 2522-2530.

### **Fingerprint Analysis**

Sisco E., Demoranville L., Gillen G. (2013) Evaluation of C<sub>60</sub> secondary ion mass spectrometry for the chemical analysis and imaging of fingerprints. *Forensic Science International*, 231, 263-269.

### **Trace Analysis of Drugs and Explosives**

Clemons K., Dake J., Sisco E., Verbeck G. (2013) Trace analysis of energetic materials via direct analyte-probed Nanoextraction coupled to Direct Analysis in Real Time Mass Spectrometry. *Forensic Science International*, 231, 98-101.

Demoranville, L.T., & Brewer, T.M. (2013) Ambient pressure thermal desorption ionization mass spectrometry for the analysis of substances of forensic interest. *Analyst*, 138, 5332-5337.

Forbes, T.P., Brewer, T.M., Gillen, G. (2013) Desorption electro-flow focusing ionization of explosives and narcotics for ambient pressure mass spectrometry. *Analyst* 138: 5665-5673.

Sisco E., Dake J., Bridge C. (2013) Screening for trace explosives by AccuTOF™-DART®: an in-depth validation study. *Forensic Science International*, 232,160-168.

Forbes, T.P., Brewer, T.M., Gillen, G. (2013) Primary and secondary droplet and charge transmission characteristics of desorption electro-flow focusing ionization. *Applied Physics Letters*, 102, 214102.

### **Other**

Ballou, S. (2013) The NIST Forensic Measurement Challenge – Part II. *IAI IDentification News*, 43(4), August/September.

### **Presentations**

1. **John Paul Jones** gave opening remarks as part of the Measurement Science and Standards in Forensic Handwriting Analysis Conference & Webcast (Gaithersburg, MD), June 4-5, 2013 – video available at: <http://www.nist.gov/oles/handwriting.cfm>

2. **Qijun Zhao**, Anil Jain, Nicholas Paulter, Melissa Taylor and Yi Zhang presented “A Generative Model for Fingerprint Minutiae” at the 6th International Conference on Biometrics, June 4-7, Madrid, Spain.
3. **John Butler** presentation at the American Bar Association's Fourth Annual Prescription for Criminal Justice Forensics (New York City, NY), June 7, 2013, "DNA Mixture Interpretation: History, Background, Thresholds, Statistical Methods, and SWGDAM" [[.pdf](#)]
4. **Mark Stolorow** presentation at the Visiting Committee on Advanced Technology (VCAT) Meeting at NIST (Gaithersburg, MD), June 11, 2013, "Memorandum of Understanding (MOU) on Forensic Science between NIST and US Department of Justice"
5. **Tom Bruno** was the plenary speaker at the Metropolitan State University of Denver, Annual Criminalistics Advisory Breakfast on June 14, 2013. This breakfast brings together the Forensics Science program at Metro State with advisers from law enforcement and the scientific committee. Bruno is among the advisers to the program.
6. **Mark Stolorow** gave opening remarks at the NIST sponsored Scientific Working Group (SWG) Chairs Meeting (Gaithersburg, MD), June 18, 2013
7. **Sue Ballou** presented during the NIST sponsored Scientific Working Group (SWG) Chairs Meeting (Gaithersburg, MD), June 18, 2013, on proposed structure for the management of Scientific Working Groups
8. **John Paul Jones** presentation during the NIST sponsored Scientific Working Group (SWG) Chairs Meeting (Gaithersburg, MD), June 18, 2013, “Forensic Science Frameworks for Consideration”
9. **Xiaoyu Alan Zheng**, Johannes Soons, Ted Vorburger, John Song, Thomas Renegar, and Robert Thompson presented “Applications of Surface Metrology in Toolmark Identification,” presented at the 14th International Conference on Metrology and Properties of Engineering Surfaces, June 20, Taipei, Taiwan.
10. **John Butler** presentation to the Seventh Judicial Circuit of Maryland Conference (Chesapeake Beach, MD), June 21, 2013, "Everything a Trial Judge Needs to Know about DNA (in a nutshell)" [[.pdf](#)]
11. **John Song** presented “Initial tests and analysis for ballistics identifications and evidence searches using correlation cells and Congruent Matching Cells (CMC) method,” at the 44th AFTE Annual Training Seminar entitled June 27, Albuquerque, N.M.
12. **Xiaoyu Alan Zheng**, Johannes Soons, and Robert Thompson spoke on “2D and 3D Topography Comparisons of Toolmarks Generated by Consecutively Manufactured Chisels and Punches,” at the 44th AFTE Annual Training Seminar, June 27, Albuquerque, NM.
13. **John Song** gave an invited talk on “NIST’s Forensic Topography and Surface Metrology Project,” at PTB, Germany on July 8.
14. **Erica Butts** and **Becky Hill** gave an invited presentation to the NIST Middle School Teachers Program (Gaithersburg, MD), July 10. “An Introduction to Forensic DNA” and a gel electrophoresis demonstration.
15. **Michael Coble** gave an invited presentation to the NIST Middle School Teachers Program (Gaithersburg, MD), July 19, “How to Calculate Forensic DNA Statistics.”
16. **John Butler** presentation at SWGDAM (Dumfries, VA), July 18, 2013, "Recent NIST Forensic Science Efforts" [[.pdf](#)]
17. **Peter M. Vallone** presentation at SWGDAM (Dumfries, VA), July 18, 2013, "NIST Update" [[.pdf](#)]
18. **Mark Stolorow**, **Susan Ballou**, and **Rich Cavanagh** made a joint NIST presentation at the American Academy of Forensic Science Executive Board Meeting (Seattle, WA), July 26, 2013, "Administration of Forensic Science Discipline-Specific Guidance Groups"
19. **Mark Stolorow** presentation at the Green Mountain DNA Conference (Burlington, VT), July 29, 2013, "Forensic Science Activities at the National Institute of Standards and Technology (NIST)"

20. **Robert M. Thompson** spoke on “Initial Tests using CMC Method for Optical Image Correlations of Cartridge Cases with Consecutively Manufactured Pistol Slides” at the International Association of Identification Conference in Providence, R.I. held from Aug 4-10.
21. **Melissa Taylor** gave a presentation on a specification for open standards for searching fingerprint databases across federal, state and local jurisdictions at the International Association for Identification annual meeting in Providence, RI, on Aug. 6.
22. **Sue Ballou** gave a presentation at the 98<sup>th</sup> International Association of Identification Educational Conference (Providence, Rhode Island) during the Executive Leadership Seminar for Managers in the Forensic Science Community, August 6, 2013, on the topic of “The Creation of a National Commission on Forensic Science”
23. **Sue Ballou** gave a presentation at the 98<sup>th</sup> International Association of Identification Educational Conference (Providence, Rhode Island), August 7, 2013, “Consider Research Results Before Analyzing That Case”
24. **Melissa Taylor** gave a presentation on the need for recommended best practices in searching AFIS (Automated Fingerprint Identification System) as new functions are introduced by the FBI’s Next Generation Identification program and as new interoperable systems come online on Aug. 8 at the International Association for Identification annual meeting in Providence, RI.
25. **Melissa Taylor** conducted a training session on Aug. 8 for fingerprint examiners on a new training tool for the extended feature set markup guidelines, a new quantifiable standard method of characterizing the information content of a fingerprint at the International Association for Identification annual meeting in Providence, RI.
26. **William MacCrehan, Katrice Lippa, and Karl Irikura** presented “Collaborative Efforts of the CSD/NIST and DEA to Support Drug Measurements” at the NIST/DEA Collaboration Meeting, Gaithersburg, MD, on Aug. 20.
27. **Stephen Stein** presented “MS Libraries for Forensics: DART-MS and GC-MS” at the NIST/DEA Collaboration Meeting, Gaithersburg, MD, on Aug. 20.
28. **Sue Ballou** presented “Forensic Science Discipline Specific Guidance Groups” at the Technical Working Group for Fire and Explosions, Aug. 21, Phoenix, Ariz.
29. **Ted Vorburger** presented a summary of the NBIC projects at the NBIC-2 Workshop, Aug. 27, Phoenix, Ariz.
30. **Ted Vorburger** presented “Certification of SRM 2461” at the NBIC-2 Workshop, Aug. 27, Phoenix, Ariz.
31. **John Song** presented “NIST’s Ballistics Topography and Surface Metrology – Related Projects,” at the NIST NBIC-2 workshop on Aug. 28, Phoenix, Ariz.
32. **Xiaoyu Alan Zheng** presented “SRM 2461 Standard Cartridge Case Control Chart” at the NIST NBIC-2 workshop on Aug. 28, Phoenix, Ariz.
33. **John Paul Jones** presentation during the 71<sup>st</sup> Annual Meeting of the American Society of Questioned Document Examiners (ASQDE), (Indianapolis, IN), August 29, 2013, “NIST Measurement Science and Standards in Forensic Handwriting Analysis Conference Report Out”
34. **Becky Hill** invited presentation at the 25th Congress of the International Society of Forensic Genetics Promega Lunch Symposium (Melbourne, Australia), Sept. 4. “Assessing STR Kit Performance with PowerPlex® ESX 17 and ESI 17 Fast Systems.”
35. **John Butler** presentation at the 25th Congress of the International Society of Forensic Genetics (Melbourne, Australia), Sept. 4, "*FSI Genetics: Journal Status Report to the ISFG General Assembly*" [[.pdf](#)]
36. **Michael Coble** presentation at the 25th Congress of the ISFG (Melbourne, Australia) Sept. 6. “An Exploration of Probabilistic Software using semi-continuous and continuous approaches.”

37. **Becky Hill** poster at the 25th Congress of the International Society of Forensic Genetics (Melbourne, Australia), September 3-6, "The Impact and Advantage of Expanding the U.S. Core Autosomal STR Markers" [[.pdf](#)]
38. **Peter M. Vallone** poster at the 25th Congress of the International Society of Forensic Genetics (Melbourne, Australia), Sept. 3-6, "Recertification of the NIST Standard Reference Material 2372: Human Quantitation Standard" [[.pdf](#)]
39. **Becky Hill** poster at the 25th Congress of the International Society of Forensic Genetics (Melbourne, Australia), Sept. 3-6, "Additional Sequence Characterization of NIST SRM 2391c: PCR-Based DNA Profiling Standard" [[.pdf](#)]
40. **Kevin Kiesler** poster at the 25th Congress of the International Society of Forensic Genetics (Melbourne, Australia), Sept. 3-6, "Characterization of NIST Standard Reference Materials by Next Generation Sequencing" [[.pdf](#)]
41. **Peter M. Vallone** presentation at the Victoria Police Forensic Services Department (Macleod, Victoria, Australia), September, 9 2013 "Ongoing Projects in the Applied Genetics Group at NIST" [[.pdf](#)]
42. **Becky Hill** presentation at the Victoria Police Forensic Services Department (Macleod, Victoria, Australia), Sept. 9. "Variability of Y-STR Marker Sets in the NIST 1036 U.S. Population Samples."
43. **Kevin Kiesler** presented at the Victoria Police Forensic Services Department (Macleod, Victoria, Australia), Sept. 9, "Use of NGS for forensic applications."
44. **Mark Stolorow** presentation at the First Annual SNP Forum (Greenville, NC), September 10, 2013, "Update on NIST's Role on the National Commission for Forensic Science and the Framework for Forensic Science Discipline-Specific Guidance Groups"
45. **John Song** and **Robert Thompson** presented research reports for the European Network of Forensic Science Institutes Firearm and Gunshot Residue Working Group (ENFSI-FA&GSR) in Riga, Latvia, on Sept. 12. The research reports were entitled "Validation Tests for the CMC Method using Cartridge Cases Fired with Consecutively Manufactured Pistol Slides" and "Initial Tests using CMC Method for Optical Image Correlations of Cartridge Cases Fired from Consecutively Manufactured Pistol Slides."
46. **John Butler** presentation to the Forensic Science Research Strategy Group (Gaithersburg, MD), Sept. 17. "Forensic Science Research at NIST"
47. **Peter M. Vallone** presentation at the Biometrics Consortium Conference (Tampa, FL), September 18, 2013 "NIST Rapid-DNA Interlaboratory Study" [[.pdf](#)]
48. **John Paul Jones** presentation during the Northwest Association of Forensic Scientists (NWAFS) 41<sup>st</sup> Annual Training Conference, (Vancouver, WA), September 19, 2013, "NIST Research, Guidelines and Tools that Support Forensic Scientists: The Latest News"
49. **John Butler** presentation at the 3rd National Congress of Forensic DNA Database (Kunming, China), Sept. 24, "The Future of Forensic DNA" [[.pdf](#)]
50. **Mark Stolorow** presentation at the Bode Mid-Atlantic Second Annual Advanced DNA Technical Workshop (Charlottesville, VA), September 24, 2013, "Update on NIST's Role on the National Commission for Forensic Science and the Framework for Forensic Science Discipline-Specific Guidance Groups"
51. **John Butler** presentation at Southern Medical University of China (Guangzhou, China), Sept. 26, "The Future of Forensic DNA" [[.pdf](#)]
52. **John Butler** presentation at Institute of Forensic Science (Beijing, China), Sept. 27. "The Future of Forensic DNA" [[.pdf](#)]
53. **Alex Nelson** presentation at the Digital Forensics Research Workshop (Monterrey, CA), Aug 7. "windows Registry Analysis"



## Conferences/Workshops/Sessions Organized

**John Paul Jones** organized a webcast and conference on Measurement Science and Standards in Forensic Handwriting Analysis Conference & Webcast conducted in collaboration the American Academy of Forensic Sciences -Questioned Document Section, American Board of Forensic Document Examiners (ABFDE), American Society of Questioned Document Examiners (ASQDE), Federal Bureau of Investigation (FBI) Laboratory, National Institute of Justice (NIJ) and the Scientific Working Group for Forensic Document Examination (SWGDOC) that was held at NIST on June 4-5. See <http://www.nist.gov/oles/handwriting.cfm>.

**John Paul Jones** organized a brainstorming meeting at NIST with Drug Enforcement Administration Special Testing Laboratory Scientists to discuss current collaborations and future directions on Aug. 20.

NIST staff from the **EL Fire Research Division** assisted with the development and first presentation of "Practical Applications of Fire Dynamics and Fire Modeling." This class is offered by the National Fire Academy (NFA) as a six-day on-campus course. This class utilizes NIST research results in the form of data and videos from fire experiments as well as NIST computer-based fire models including CFAST and FDS. The class is part of the six-course NFA Fire/Arson and Explosion Investigation Curriculum. The class was held Aug. 25 - 30. This effort was supported by funding from the Law Enforcement Standards Office.

**Michael Coble** and **John Butler** helped organized two concurrent workshops at the [ISFG 2013 Workshops on Forensic DNA Evidence Interpretation](#) at the 25th Congress of the International Society of Forensic Genetics (Melbourne, Australia), Sept. 2-3. Presentations included Basic Principles in Forensic DNA Evidence Interpretation: "Data interpretation: stutter, PHR, number of contributors", "Validation and thresholds", "Introduction to Mixture Statistics", "Mixture Examples: review Clayton et al 1998 rules." Advanced Principles in Forensic DNA Evidence Interpretation: "Probabilistic Genotyping" and "Putting it all together."

**John Butler** organized a writing workshop at the 25th Congress of the International Society of Forensic Genetics (Melbourne, Australia), Sept. 5. "Scientific Publication: Reading, Writing, and Reviewing" [[.pdf slides](#)] [[.pdf handouts](#)] [[reference list](#)]

**John Butler** organized a workshop for the International Symposium on Human Identification (Atlanta, GA), October 10, 2013, "New Autosomal and Y-STR Loci and Kits: Making Data Driven Decisions" (NIST slides presented by Charlotte Word due to inability of federal employees to travel during the U.S. government shutdown) [[workshop page](#)]

**Mary Laamanen** organized a new working group for digital forensics data interoperability at the Digital Forensics Research Workshop (Monterrey CA) on August 6.

## Grant Award

**Xiaoyu Alan Zheng** and **Johannes Soons** from the Semiconductor and Nanostructure Metrology Group were awarded \$256,079 by the National Institute of Justice. Robert Thompson from the Law Enforcement Standards Office is the subject matter expert of this grant award. The project aims to develop an open-access ballistics reference database — containing a wide range of two- and three-dimensional data for bullets and cartridge cases — that researchers and vendors will be able to use to improve pattern recognition, "matching,"

algorithms. This type of research database has already been created in the field of biometrics (including, for example, fingerprints), which has led to advancements in image-based matching algorithms in those fields. To stimulate similar technological advancements in pattern-matching algorithms for firearms and tool marks, the NIJ-funded ballistics database being created will include a large diversity of breech face, firing pin, and bullet land impressions of test fires, providing crucial data for testing the robustness of matching algorithms.

### Patent Filed

**T.J. Bruno**, Method and apparatus for pyrolysis PLOT-Cryoadsorption headspace sampling and analysis, filed 8/23/2013.

### Student Internship

**Valerie Jugert**, a student in the Forensic Science Program at Metropolitan State University of Denver, worked as an intern with Tom Bruno in the Experimental Properties of Fluids Group at NIST Boulder. Her work, performed over the summer and fall 2013 semesters, focused on the prediction of fire debris composition by use of the Advanced Distillation Curve method.

### Committee Assignments

**Michael Coble** participated in the North Carolina Forensic Science Advisory Board meeting in Raleigh, NC, on July 16.

**John Butler**, **Michael Coble**, and **Peter Vallone** participated in the SWGDAM meeting July 16-18 in Dumfries, VA.

**Eric Steel** attended SWGMAT meeting Sep 24-26 on glass, hair, tape, paint, and other trace forensic evidence. Eric discussed measurement and uncertainty approaches for trace evidence.

**Mark Stolorow**, **John Butler**, and **Richard Cavanagh** represent NIST on the Office of Science and Technology Policy (OSTP) Ad Hoc Forensic Science Research Strategy Interagency Committee in collaboration with NSF and DOJ, convened in September 2013 and meeting biweekly.

**Rick Ayers**, **Barbara Guttman**, and **Jim Lyle** participated in the Scientific Working Group on Digital Evidence meeting in San Antonio, Texas, Aug 9-12.

### Visitors or Tours at NIST related to Forensic Science

**Greg Gillen** and the **Surface and Trace Chemical Analysis Group** gave a forensics-related lab tour to twenty visitors from the Visiting Committee on Advanced Technology (VCAT) on June 11.

The **Surface and Trace Chemical Analysis Group** gave a forensics-related lab tour to thirty visitors from the Homeland Security Dialog Forum on June 14.

The **Surface and Trace Chemical Analysis Group** gave a forensics-related lab tour to forty visitors from the Forensic Scientific Working Group on June 18.

**The Surface and Trace Chemical Analysis Group** gave a forensics-related lab tour to Arian van Esten, Director of the Amsterdam Center for Forensic Science of Medicine, Netherlands Forensic Institute on July 1.

**The Surface and Trace Chemical Analysis Group** gave a forensics-related lab tour to three visitors from the Swedish Defense Agency on July 12.

**Erica Butts** and **Michael Coble** gave a lab tour on “rapid DNA and DNA mixture interpretation” to Tania Simoncelli, Assistant Director for Forensic Sciences, and Rick Weiss, Assistant Director for Strategic Communications of the White House Office of Science and Technology Policy on July 29. Additional tours were also given by **Greg Gillen** and **Bill MacCrehan** regarding “Measurement, Materials, and Standards for Detecting Trace Explosives and for Canine Training Aids”, **Alan Zheng** on “Standard Bullets/Casings and 3D Topography” and **Barbara Guttman** and **Rick Ayers** covering “National Software Reference Library (NSRL), Computer Forensics Tool Testing, and Forensic Analysis of Mobile Devices”.

**The Surface and Trace Chemical Analysis Group** gave a forensics-related lab tour to the Secretary of Commerce, Penny Pritzker, the NIST Director Pat Gallagher, and MML Director Laurie Locascio on August 2.

**Marty Herman** hosted and **Barbara Guttman** spoke to the Singapore Ministry of Home Affairs about the NIST digital forensics program on Aug. 2.

**Rick Ayers** hosted mobile forensics expert Samuel Brothers from DHS/Customs and Border Protection the week of August 12 to work on a revised NIST Special Publication on mobile forensics.

**Barbara Guttman** gave a lab tour on computer forensics to the Department of Commerce Office of Security on Sept. 5. §

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## The Last Word

Congratulations to NIST fire protection engineer **Daniel Madrzykowski** who was honored on [Oct. 3, with a Service to America Medal](#) for research and outreach efforts that



have “dramatically improved firefighting practices,” saving firefighters’ lives and protecting property across the nation. A 28-year NIST veteran, Madrzykowski is credited with advancing tactics for fighting fires from high-rise blazes to house fires. Much of his research is conducted through fire experiments—or controlled burns—that he carries out with local fire departments in buildings that are planned for demolition. His studies have also contributed to an improved understanding of arson. Read more in the [NIST news release](#). §