The Forensic Technology Center of Excellence (FTCoE)

The Forensic Technology Center of Excellence (FTCoE) is a collaboration of RTI International and its Forensic Science Education Programs Accreditation Commission (FEPAC)-accredited academic partners: Duquesne University, Virginia Commonwealth University and the University of North Texas Health Science Center. In addition to supporting the National Institute of Justice’s (NIJ’s) research and development (R&D) programs, FTCoE provides testing, evaluation and technology assistance to forensic laboratories and practitioners in the criminal justice community. NIJ supports FTCoE’s efforts to transition forensic science and technology into practice (Award Number 2011-DN-BX-K564).

FTCoE is led by RTI, a global research institute dedicated to improving the human condition by turning knowledge into practice. With a staff of more than 4,700 providing research and technical services to governments and businesses in more than 58 countries, RTI brings a global perspective. FTCoE builds on RTI’s expertise in forensic science, innovation, technology application, economics, data analytics, statistics, program evaluation, public health, and information science.

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EXECUTIVE SUMMARY

RTI International (RTI) and its Forensic Science Education Programs Accreditation Commission (FEPAC)-accredited collaborators (i.e., the University of North Texas Health Science Center Department of Forensic and Investigative Genetics and Center for Human Identification, Duquesne University Center for Forensic Science and Law, Virginia Commonwealth University Department of Forensic Science, University of Central Florida, and Midwest Forensics Resource Center) have been working to meet all tasks and objectives put forward under the National Institute of Justice (NIJ) Cooperative Agreement No. 2011-DN-BX-K564. These efforts include determining technology needs; developing technology program plans to address those needs; developing solutions; demonstrating, testing, evaluating, and adopting potential solutions into practice; developing and updating technology guidelines; and building capacity and conducting outreach.

Each year, the Forensic Technology Center of Excellence (FTCoE) at RTI works with NIJ to support evidence-based best practices and move knowledge from research to impact. The FTCoE engages the community in all its activities. In 2016, the FTCoE worked with hundreds of stakeholders within government and law enforcement agencies, academia, forensic laboratories, and law and advocacy offices to help prevent crime and promote public safety.

The 2016 Annual Report for the FTCoE shares key project accomplishments in the following categories: Online Events, Onsite and Blended Events, Technology Transitions, Success Stories, Databases, Evaluation and Guidance Documents, Special Projects, Web Statistics, and Outreach. Each section begins with a brief description and overview of the activities contained in that section, followed by a summary of the specific activities. Hyperlinks are available for many of the work products and can be obtained from the FTCoE website: http://www.forensiccoe.org.

Sincerely,

Jeri D. Ropero-Miller, Ph.D., F-ABFT
Project Director
Forensic Technology Center of Excellence

Director,
Center for Forensic Sciences
RTI International
jerimiller@rti.org
1. INTRODUCTION

The National Institute of Justice’s (NIJ) Forensic Technology Center of Excellence (FTCoE) at RTI International has established itself as a leader in the advancement of forensic science within the criminal justice community by implementing new methodologies derived from the successful production of resources addressing education, practice, policy development, and technology adoption. Through its unprecedented blend of expertise, experience, and knowledge in forensic science combined with its objectivity and national reach that includes all justice program stakeholders, the FTCoE delivers practical and valuable solutions to the forensic science community and bridges the gap between the scientific and justice communities.

From October 1, 2015 to November 30, 2016, the FTCoE delivered more than 28,000 hours of content through 95 live online and on-demand events involving forensic science professionals, law enforcement, researchers, lawyers, sexual assault nurse examiners, and policy-related professionals. These events were attended by more than 9,400 attendees from the U.S. and abroad. In addition to this comprehensive online collection, assistance and knowledge sharing activities included more than 122,091 website views, 2,235 downloaded evaluation and guidance reports, five technology transition workshops, three working groups, two symposiums, 172,000 database queries, 339 research and development (R&D) projects triaged and 171 supported for technology transfer (new and ongoing), 30 publications and presentations, and 29,000 newsletter recipients, among other educational opportunities. All of these activities are summarized in this Annual Report and can be found at http://www.forensiccoe.org. A list of acronyms found in this report is located in the Appendix.

2. R&D PORTFOLIO MANAGEMENT

In collaboration with NIJ, the FTCoE established an R&D portfolio management process for NIJ-funded research. The ultimate goal of this process is to provide impactful outcomes and solutions to the forensic science community. The FTCoE works to achieve this goal by identifying grants that, with FTCoE support, may be able to better leverage the research to benefit the forensic community. Cases are captured in a database and then considered for support via a rapid screening process or “triage,” which is often followed by a more in-depth assessment of the potential types of assistance that can be provided.

2.1 FTCoE Portfolio Management Database

Annually, the FTCoE sends a data collection request to NIJ R&D awardees to collect information via a Web portal on their publications, presentations, and other technology transition elements and measures of impact. In December 2016, the FTCoE sent out its annual grant information request to all of the Fiscal Year (FY)2009–FY2015 NIJ R&D grantees in its database asking them to provide or update information on their transition activities and dissemination products. The FY2009-FY2014 grantees were asked to update their information, and the FY2015 grantees were asked to enter their information for the first time. This request was sent to a total of 326 grantees through an automated e-mail. In 2016, updates to this process included the ability for grantees to denote whether work on their grant had ceased and, thereby, indicate that the grantee had reviewed the request but had nothing to report. The FTCoE also broadened the type of dissemination products that a grantee could report (e.g., Web-based reports and techniques) to align with the uniform format for reporting performance progress on federally funded research projects, as detailed in the Research Performance Progress Report. Finally, a question was added to determine whether the grantee wanted to request FTCoE assistance for transition activities.

By implementing this NIJ R&D Portfolio Database, the FTCoE has collected full citations of grantee work products resulting from supported research. For example, the most current information from more than
420 grantees who reported publications and presentations dated 2009–2016, regardless of the year the grant was funded, included 589 publications and 1,327 presentations that resulted from NIJ-supported research. It should be noted, however, that these numbers do not represent the true values for all NIJ-supported research because the response rate in the last data collection was 62 percent.

In addition to the collection of data about grantee products and full citations, the FTCoE R&D Portfolio Database is also a repository for information collected through the R&D portfolio management process for NIJ-funded research. This year was the first year that triage managers were able to enter information directly into the online Web portal.

The FTCoE continued making revisions to the internal online grantee database during 2016. The focus of these revisions was to add functionality to achieve two major tasks:

1. Enable internal staff and experts in the field to input triage data, including scoring matrices that enable the center to rank projects in terms of their potential for dissemination and transition efforts; and

2. Allow for the online documentation of technology assessments and transition support activities related to NIJ grants. Once the cases are in the database, the FTCoE can use the system to track all interactions with the principal investigator (PI), experts, and potential partners for technology dissemination and transition. The FTCoE has also incorporated the ability to run reports on the transition activities that it can provide to NIJ program managers upon request.

### 2.2 2016 R&D Portfolio Triage

For 2016, the FTCoE prepared a third batch of cases to be considered for transition support, beginning with all cases that had not yet undergone triage (339 cases) and any cases that had been triaged previously and placed into the uncertain/hold and revisit category (74 “revisit” cases). These cases were cross-correlated with input provided by PIs via the FTCoE annual data collection from NIJ R&D grantees (298 cases; See Section 2.1) to build on the PI’s commentary. From among these cases, 265 new cases were selected for triage, broken down as follows: Anthropology (17), Controlled Substances (13), Crime Scene (11), Digital Evidence (3), DNA (79), Entomology (3), Fire and Arson (10), Friction Ridge (24), General (7), Impression (32), Pathology (10), Pattern (1), Questioned Documents (7), Toxicology (15), and Trace (33).

The triage process leveraged the FTCoE website, which allowed RTI staff and external experts to input triage information for the cases they reviewed via the website. This process included a quick review by individuals (each assigned to a particular discipline) and a meeting of an expert panel to collectively consider and agree on final recommendations. The 265 cases were triaged by 12 individuals and finalized during four group meetings. Each case was considered for future support as follows:

- **Knowledge Transfer/Training**: Presentations, webinars, seminars, guidance documents, blogs and other social media outlets to disseminate information related to new technologies or laboratory and/or field techniques from research and training for the forensic community to incorporate into their procedures.

- **Validation**: Work with an outside/commercial partner to assess the feasibility of the funded research.

- **Technology Transfer**: Identify and attract potential partner(s) for licensing/commercialization.

In some cases, the triage could not determine the outcome, and thus, some cases are slated for further assessment, including contacting the PI and, in some cases, the forensic community. For other cases that
are likely to provide a valuable benefit, the next step is to begin the transition plans. Exhibit 1 highlights the distribution of recommendations by discipline.

Exhibit 1. Summary of the 2016 NIJ R&D Portfolio Management Progress

<table>
<thead>
<tr>
<th>DISCIPLINE</th>
<th>Triage #3</th>
<th>Assessments</th>
<th>Transition Planning</th>
<th>Webinars</th>
<th>Podcasts</th>
<th>Virtual Roundtables</th>
<th>Active Support</th>
<th>Success Stories</th>
<th>New Support Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthropology</td>
<td>17</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
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<tr>
<td>Controlled Substances</td>
<td>13</td>
<td>2</td>
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<td>1</td>
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<td>Crime Scene</td>
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<td>2</td>
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<td>9</td>
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<tr>
<td>Digital Forensics</td>
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<td>DNA</td>
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<td>Fire and Anon</td>
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<td>1</td>
<td>1</td>
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<tr>
<td>Friction Ridge</td>
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<tr>
<td>Impression</td>
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<td>3</td>
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<tr>
<td>Multidisciplinary Source Development</td>
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<tr>
<td>Pathology</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td></td>
<td>2</td>
<td>1</td>
<td></td>
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<tr>
<td>Pattern Evidence</td>
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<tr>
<td>Questioned Documents</td>
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<tr>
<td>Toxicology</td>
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<td>1</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>265</strong></td>
<td><strong>39</strong></td>
<td><strong>16</strong></td>
<td><strong>13</strong></td>
<td><strong>13</strong></td>
<td><strong>4</strong></td>
<td><strong>8</strong></td>
<td><strong>26</strong></td>
<td><strong>129</strong></td>
</tr>
</tbody>
</table>

2.3 2016 Active Transition Support

Previous triages resulted in cases that continue to be actively managed by the FTCoE. For many such grants, our assistance has enabled wider dissemination and increased technology transition progress and has opened opportunities for the FTCoE to provide additional support to ensure continued progress toward either adoption or commercialization within the forensic community. Cases receiving active transition report are documented below.


The FROG-kb database, which is housed at Yale University (PI: Kenneth Kidd), is a continually updated database of allele frequency data on single nucleotide polymorphisms (SNPs) and other genetic polymorphisms. Current SNP panels on FROG-kb include individual identification SNPs (IISNPs), ancestry inference SNPs, and phenotype interference SNPs (PISNPs). The underlying data in FROG-kb are housed in the Allele FREquency Database. FROG-kb provides tools for comparing user-provided data with underlying allele frequencies in populations and serves as a teaching and research Web interface to facilitate the use of these data in the forensic field. To increase the usability of the database, the FTCoE assisted with the development and implementation of an HTML-5 conversion of the FROG website and generated a user’s manual. These tasks were completed in December 2015 and were fully tested and integrated into the
website by January 2016. An updated version of FROG-kb was built and tested on a test server within Yale. The FTCoE delivered two pipeline illustrations for ISINP and PISNP data entry and the resulting data for inclusion on the website. The FTCoE also delivered the final user’s manual. Based on this research, a NIJ/National Science Foundation grant application was submitted in time for the Feb. 1, 2016, deadline with acknowledgement of the FTCoE’s assistance in updating the website and creating the user’s manual. The HTML-5 transition of the website is complete and publicly available at the new FROG-kb. The updated website includes Frequently Asked Questions (FAQ), Pipelines, the user’s manual, and suggested website updates from FTCoE staff. As further FTCoE transition support, a submission for the 68th Annual Scientific Meeting of the American Academy of Forensic Sciences (AAFS) resulted in a poster presentation entitled, “Updates to the Forensic Research/Reference on Genetics Knowledge Base (FROG-kb) Database” in February 2016.


The FTCoE provided support to this NIJ awardee (PI: Randall Clark) to assist with a half-day workshop held by the Southern Association of Forensic Scientists (SAFS) on Sept. 26, 2016. This Gas Chromatography (GC)-Infrared Spectroscopy (IR) Technology Transition Workshop was accepted as a peer-reviewed workshop of the SAFS annual meeting. In June 2016, FTCoE staff worked with Dr. Clark and Lewis Smith to compose a title and abstract for the workshop, and FTCoE submitted the information on behalf of the investigators.

**2008-DN-BX-K069-Application of Chemometrics for the Identification of Ignitable Liquids in Fire Debris Samples**

Based on the original triage of this case, the FTCoE saw a potential opportunity to provide support to the Ignitable Liquids Database housed at University of Central Florida’s National Center for Forensic Science (PI: Michael Sigman). After discussions with the PI it was determined that the FTCoE would compose a Success Story on this research effort. A final draft of this story has been completed and will be posted on the FTCoE website by the end of this year.

**2011-DN-BX-K558-Low-template DNA Mixture Interpretation: Determining the Number of Contributors**

Boston University [BU; PI: Catherine Grgicak] and Rutgers University are continuing to develop the NoCIT and MatchIT software applications. They will attempt to merge these two software packages into one. This work is being funded by a Department of Defense (DoD) grant through the Defense Forensic Science Center (DFSC). Currently, DoD is using the minimum number of contributors (NoC) method to determine the NoC in a sample. However, the NoCIT method is much more effective, and MatchIT circumvents the conventional technique of allele counting to match contributors to individuals. A significant amount of testing will need to be performed prior to releasing a version of this combined tool on the Web. The PI estimates that testing at three sites (Rutgers, BU, and DFSC), composing the manual, and performing other activities associated with completing a version ready for external validations will require the remaining time and resources of the grant, which has been extended to February 2017.

The FTCoE will host a webinar in early 2017 to detail the development of a model able to synthesize allele, stutter and noise signal generated from stochastic variation induced by the forensic DNA laboratory process in silico.
2010-DN-BX-K141-Resolution of DNA Mixtures and Analysis of Degraded DNA using the 454 DNA Sequencing Technology

The FTCoE continues with work Children's Hospital Oakland Research Institute (CHORI, PI: Cassandra Calloway) to explore commercialization options for the whole-genome mitochondrial assay.

The FTCoE met with PI and Illumina to discuss additional data generated in the Calloway lab. Probe-to-probe lot variability is not an issue, and additional success was shown by applying the method to generate sequence data for degraded samples, an area in which other methods have failed. Illumina is interested in this assay serve as the foundation of its work on mitochondrial DNA analysis. An agreement was signed with Illumina in August 2016 to test the feasibility of commercializing the mtDNA probe capture assay.

Two more invention disclosures for the probe capture technology have been submitted, both of which extend the field of use of this technology. CHORI is working with outside counsel to develop a patent strategy that may result in one or two patent applications. The FTCoE also created a Success Story for this project in 2016 (see the section on Success Stories below).

2.4 Success Stories

Annually, the NIJ facilitates R&D to improve how the criminal justice system gathers and uses evidence. From research on DNA identification and biomarkers, to fire and arson and controlled substances, to anthropology and toxicology, the agency supports the enhancement and creation of innovative tools and techniques to identify, collect, analyze, interpret, and preserve evidence. The main goal is to deliver these innovations into the hands of practitioners. However, taking such innovations from their earliest concept stages to actual use can be complex. The stories here feature grant awardees’ successful results obtained via their NIJ-funded research projects. The FTCoE captured these Success Stories to help highlight the benefits of the NIJ research program and drive greater awareness and adoption of the specific grants.

In 2016, the FTCoE produced five Success Stories, which are detailed below.

1. “NIJ and CHORI—Collaboration with SoftGenetics® and California Department of Justice: Customizing NextGENe Software for Forensic Applications”

"Mitochondrial analysis holds significant potential for the forensic community and represents a great market opportunity for SoftGenetics®. As part of Dr. Calloway’s NIJ funding, we were able to initiate a collaboration to customize the NextGENe® software for forensic use." — John Fosnacht, Co-Founder/VP Sales & Marketing SoftGenetics®

2. “NIJ and DNA—Polymerase Technologies: Addressing a Key Challenge for PCR-based Forensic Tests”

“DNA Polymerase Technologies has done impressive work engineering Taq mutants and in determining the proper combination of PCR enhancer cocktails to assess STR profiles in challenging samples." — Robert Bever, Ph.D., Laboratory Director Mitotyping Technologies, A Division of American International Biotechnology


“This technology provides the ability to detect blood in all sorts of circumstances, even in some cases where traditional techniques can’t.” — Stephen L. Morgan, University of South Carolina
4. “NIJ and University of South Florida—Creating an International Databank of Skeletal Biomarkers for Human Identification (DHI)”

“Forensic anthropology today is largely about applying methods and theory from studies in human variation to aid in the identification of human remains. The key is to find an approach which takes into account biological, cultural, and legal diversity so that families of the missing and the broader community find resolution and peace.” — Erin Kimmerle, Ph.D., Director, Florida Institute of Forensic Anthropology and Applied Sciences, University of South Florida

5. NIJ and University of Central Florida (UCF)—Identifying Ignitable Liquids in Fire Debris and Providing Error Rates for Purposes of Testifying

“This technique provides an alternative objective method for classifying ignitable liquid residues, which is one of the only viable options for helping to progress fire debris analysis beyond a subjective comparison technique.” — Glen P. Jackson, Ph.D., Forensic and Investigative Science & C. Eugene Bennett Department of Chemistry, West Virginia University (WVU).

3. DATABASES

The FTCoE recognizes the need for forensic databases to be sustainable and, hence, supports the widely utilized forensic databases listed below. Forensic databases have become a key component in the analysis of forensic data. It is imperative that these databases be designed and supported for longevity. In 2016, the FTCoE supports the Y-STR and ForensicDB databases in addition to the Frog-DB discussed above.

3.1 Y-Chromosome Short Tandem Repeats (Y-STR) Database

The U.S. Y-STR Database, which is housed at UCF (PI: Dr. Jack Ballantyne), is a comprehensive online Y-STR reference database that provides tools for laboratories to obtain the Y-STR haplotype frequencies needed to calculate matching probabilities with confidence intervals based on five forensically relevant ancestries: African American, Asian, Caucasian, Hispanic, and Native American. The statistical calculations generated comply with the 2014 Scientific Working Group on DNA Analysis Methods Interpretation Guidelines for Y-Chromosome STR Typing. The database is accessed by DNA practitioners for criminal casework. To date, nearly 165,000 queries have been performed, corresponding to an average of approximately 1,500 searches each month.

In the past year, U.S. Y-STR Database usage has increased from approximately 1,300 to more than 1,800 search queries performed each month, corresponding to an increase of nearly 40 percent. The FTCoE supports Y-STR growth and maintenance efforts to solicit data and/or samples from accredited forensic laboratories and institutions, continuously expand the number of individuals (N) for each ancestral group and geographical location, and incorporate additional Y-STR markers as they become available in newly developed commercial kits. The continuous incorporation of practitioner suggestions and recommendations to improve the design and functionality of the database is implemented when feasible.

3.2 Cheminformatic Database-ForensicDB

ForensicDB, which launched in December 2010, was a Web-based cheminformatic database containing a collection of spectral data pertaining to toxins, drugs, and other compounds of interest to the forensic community. Currently, other databases and resources for spectral data exist for use by the forensic community at no cost. As a result, the FTCoE has shifted its efforts away from curating its own cheminformatics database to working to disseminate the spectral data within ForensicDB to these available resources. Below is a list of resources of available spectral data:
• Forendex;
• Cayman Spectral Library;
• SWGDRUG: Drug Monographs, Searchable Mass Spectral Library, and Searchable Infrared Library;
• Designer Drugs Online Mass Spectra Database; and
• National Institute of Standards and Technology (NIST) Direct Analysis in Real Time (DART) Forensics Library.

4. ONLINE EVENTS

The FTCoE offers onsite and virtual educational opportunities that provide hands-on instruction delivered by forensic science experts to the forensic science community. Our onsite opportunities provide a setting in which practitioners, stakeholders, and policymakers can engage in discussion and cultivate ideas. Our virtual educational opportunities are relevant, engaging, and created with full collaboration from forensic experts. Designed for forensic practitioners, our events are often presented live and subsequently archived. These educational activities cover the full range of forensic disciplines and are presented via easy-to-use platforms.

4.1 American Society of Crime Laboratory Directors (ASCLD) Webinar Series

The ASCLD webinar series began as a live series offered in January and February of 2016. In total, more than 1000 users attended these live events and all continue to be available on the FTCOE website as archived offerings.

On Jan. 14, 2016, the FTCoE hosted “ASCLD Webinar Series: Firearms”. This course served as an overview of the field of firearms examination in terms of crime laboratory administration and provided non-firearms examiners who supervise members within this field a basic overview of the analyses performed, discipline-specific administrative challenges, and limitations of report writing and testimony. In total, 526 users registered for this event, and 310 attended. The archived version of the event can be found here.

On Jan. 21, 2016, the FTCoE hosted “ASCLD Webinar Series: Toxicology Discipline”. This course served as an overview of the field of forensic toxicology in terms of crime laboratory administration and provided non-toxicologists who manage this discipline as part of a forensic laboratory or who supervise members within this field a basic overview of the analyses performed. This webinar also addressed discipline-specific administrative challenges and current issues and/or challenges facing the forensic science community. In total, 271 users registered for this event, and 142 attended. The archived version of the event can be found here.

On Jan. 28, 2016, the FTCoE hosted “ASCLD Webinar Series: Controlled Substances”. This course served as an overview of the controlled substances discipline in terms of crime laboratory administration and provided non-controlled substance analysts who manage this discipline as part of a forensic laboratory or who supervise members within this field a basic overview of the analyses performed. This webinar also addressed discipline-specific administrative challenges and current issues and/or challenges facing the forensic science community. In total, 360 users registered for this event, and 184 attended. The archived version of the event can be found here.

On Feb. 4, 2016, the FTCoE hosted “ASCLD Webinar Series: Digital Multimedia Evidence”. This course served as an overview of the digital multimedia evidence (DME) discipline in terms of crime laboratory administration and provided non-DME analysts who manage this discipline as part of a forensic laboratory
or who supervise members within this field a basic overview of the analyses performed. This webinar also addressed discipline-specific administrative challenges and current issues and/or challenges facing the forensic science community. In total, 261 users registered for this event, and 145 attended. The archived version of the event can be found [here](#).

**On Feb. 11, 2016**, the FTCoE hosted “ASCLD Webinar Series: Latent Prints”. This course served as an overview of the latent prints (LP) discipline in terms of crime laboratory administration and provided non-LP analysts who manage this discipline as part of a forensic laboratory or who supervise members within this field a basic overview of the analyses performed. This webinar also addressed discipline-specific administrative challenges and current issues and/or challenges facing the forensic science community. In total, 402 users registered for this event, and 239 attended. The archived version of the event can be found [here](#).

**On Feb. 18, 2016**, the FTCoE hosted “ASCLD Webinar Series: DNA Discipline”. This course served as an overview of the DNA discipline in terms of crime laboratory administration and provided non-DNA analysts who manage this discipline as part of a forensic laboratory or who supervise members within this field a basic overview of the analyses performed. This webinar also addressed discipline-specific administrative challenges and current issues and/or challenges facing the forensic science community. In total, 209 users registered for this event, and 127 attended. The archived version of the event can be found [here](#).

### 4.2 Organization of Scientific Area Committees (OSAC) for Forensic Science Webinar Series

**On Feb. 22-23, 2016**, the FTCoE hosted the OSAC Public Status Reports & Open Discussions at the AAFS Conference in Las Vegas, Nevada. Attendees of the OSAC for Forensic Science sessions at the AAFS meeting were the first to hear about the OSAC’s recent activities and updated priorities. All 29 presentations and questions from the audience were webcast live and archived for future on-demand viewing. The OSAC invited all to attend and participate. NIST OSAC Affairs partnered with NIJ’s FTCoE operated by RTI to manage the registration process and broadcast the webcast to all interested stakeholders. In total, 752 in-person and 747 online users registered for this event, and 402 in-person and 392 online users attended. The archived version of the event can be found [here](#).

### 4.3 NIJ 2016 Forensic Science R&D Symposium

**On Feb. 23, 2016**, the FTCoE hosted the NIJ 2016 Forensic Science R&D Symposium at the AAFS Conference in Las Vegas, Nevada. The NIJ Forensic Science R&D Symposium was a free, all-day, open meeting held in conjunction with the 68th Annual AAFS Scientific Meeting at the Rio All-Suite Hotel. Topics included Impression, Pattern, and Trace Evidence; Forensic Biology and DNA; Controlled Substances and Toxicology; and Anthropology and Microbial Forensics. In total, 101 in-person and 131 online users registered for this event, and 222 in-person and 51 online users attended. The archived version of the event can be found [here](#).

### 4.4 Virtual Webinars

**On Feb. 24, 2016**, the FTCoE hosted a webinar—“Proteomics: Multiplex Assay to Identify Biological Stains”—in which Dr. Christian Westring discussed the development and validation of a rapid multiplex assay for the identification of biological stains using comparative proteomics. Despite being historically utilized and heavily relied upon in crime laboratories, current serological techniques have limitations, including the non-specificity of tests and a lack of commercially available tests for vaginal fluid, menstrual blood, and anal secretions. Comparative proteomics can identify key forensic biological marker proteins in
three steps using technology that is currently available in most crime laboratories. This presentation described the strategy, chemistry, and validation of a proteomic biomarker multiplex assay that overcomes the limitations of current serological techniques. In total, 65 users registered for this event, and 53 attended. The archived version of the event can be found here.

On March 2, 2016, the FTCoE hosted a webinar—“Challenges to Implementation of New Technologies NCSCL”—which was originally presented at the 2014 Genome ID Forum. This presentation by John Byrd, the director of the North Carolina State Crime Laboratory, discussed the challenges and changes experienced by this crime laboratory since 2009. Various factors, such as the caseload volume, salary rate with respect to turnover and vacant positions, and trials proceeding through legal reviews of protocols but resulting in no technological advancements, laid the groundwork for exceptionally trying times for this crime laboratory. Mr. Byrd discussed how new approaches, new management, and the utilization of external resources, including relationships with private industry and universities, provided an opportunity and support for this crime laboratory to stabilize, advance, and expand. This presentation proffered a new path forward through which other crime laboratories can achieve similar successful outcomes. In total, 34 users registered for this event, and 25 attended. The archived version of the event can be found here.

On March 2, 2016, the FTCoE hosted a webinar—“Utilization of Organic Constituents into GSR Analysis”—in which Suzanne Bell of the Departments of Chemistry and Forensic Science, WVU, presented on the utilization of organic constituents in gunshot residue (GSR) analysis. This innovative technology utilizes experimental and modeling studies to elucidate the skin permeation characteristics of five compounds present in organic GSR (OGSR). The results showed that OGSR should be detectable on skin for many hours after a firing event involving as few as one or two shots and that the detection capability is a function of the efficacy of sampling and sample preparation and the instrumental method employed. The permeation rates of the OGSR compounds were sufficiently different to suggest the potential to develop methods to approximate the time since deposition. In total, 56 users registered for this event, and 47 attended. The archived version of the event can be found here.

On March 2, 2016, the FTCoE hosted a webinar: “Legal Perspective on the Adoption of Advanced Technologies.” Ted Hunt is the chief trial attorney in the prosecuting attorney’s office in Kansas City, Mo. Mr. Hunt brings a fresh, legal perspective to the adoption of advanced DNA analysis technologies for forensic crime laboratories. In this presentation, he discussed the potential admissibility challenges faced by next-generation technologies and why an interdisciplinary approach and preparation are necessary when implementing next-generation sequencing technologies. By providing an overview of the existing laws and their relationships with emerging technologies and addressing the current issues faced by prosecutors when presenting forensics evidence in court, Mr. Hunt brought to light the imminent legal challenges that must be considered for the law and DNA forensic science to be in accord. In total, 162 users registered for this event, and 114 attended. The archived version of the event can be found here.

On March 2, 2016, the FTCoE hosted a webinar: “HD SNP Array for forensic Casework.” In this presentation, Dr. Sandra Close presented her latest research on the application of high-density SNP array technology to forensic casework. Dr. Close presented an overview of the platform, including the chemistry, the assay, and its interpretation, and expanded the application of the technology to evaluate its capability for typical forensics samples, particularly for mixture interpretation. Detailed validation studies were discussed, followed by data interpretation and mock case examples, including mixtures of four individuals. Dr. Close presented the application of this technology to utilize SNPs for the resolution of mixed DNA profiles and presented data to support her conclusions. In total, 50 users registered for this event, and 36 attended. The archived version of the event can be found here.
On May 4, 2016, the FTCoE hosted a webinar—“Microbial Forensics: Learning about Microbial Forensics”—in which Dr. Bruce Budowle presented a history and overview of microbial forensics, including epidemiology, the current state of microbial forensics, and the impact of this field on bioterrorism investigations. This webinar provided participants with a better understanding of the history of microbial forensics and the role it plays in combating bioterrorism. In total, 256 users registered for this event, and 144 attended. The archived version of the event can be found here.

On May 18, 2016, the FTCoE hosted a webinar—“Microbial Forensics: Basics of Microbiology as Applied to Microbial Forensics”—in which Dr. Bruce Budowle and Dr. Dana Kadavy presented on microbiology, pathogens, the human microbiome, and genetic engineering/synthetic biology as applied to microbial forensics. The final product of this webinar series will be a guidance document that can be used to inform forensic scientists and other stakeholders about the basics of microbial forensics to drive considerations and discussions pertaining to policy development addressing microbial forensic applications. In total, 173 users registered for this event, and 71 attended. The archived version of the event can be found here.

On June 15, 2016, the FTCoE hosted a webinar—“Expansion of Microbial Forensics”—in which Dr. Bruce Budowle and Dr. Heather Jordan presented on biocrime, the post-mortem interval (PMI), agroterrorism, and the role of the forensic scientist in microbial forensics. In total, 144 users registered for this event, and 46 attended. The archived version of the event can be found here.

On July 14, 2016, the FTCoE hosted a webinar—“New Paradigm for Fingerprint Reporting without Individualization”—presented by Henry Swofford. In November 2015, the DFSC issued an Information Paper announcing the decision to cease the use of the terms “individualization” and “identification” in LP technical reports and expert witness testimony. This webinar provided an opportunity for audience members to learn more about the reasoning behind the change and to participate in a question-and-answer session regarding the new reporting language of the DFSC. In total, 924 users registered for the first live presentation, and 573 attended. The archived version of the event can be found here.

On Sept. 15, 2016, the FTCoE delivered the encore presentation of “New Paradigm for Fingerprint Reporting without Individualization”. In total, 487 users registered for this event, and 260 attended. The archived version of this topic can be found here.

On Aug. 18, 2016, the FTCoE hosted a webinar—“Removing PCR Artifacts in Forensic DNA Analysis”—presented by Dr. Scott Kennedy. This webinar reviewed the basics of massively parallel sequencing (MPS) technologies and described duplex sequencing, its current uses, and applications for highly accurate forensic genotyping. This webinar presented a new method that removes confounding polymerase chain reaction (PCR) artifacts in forensic DNA analysis using high-accuracy MPS. In total, 232 users registered for this event, and 127 attended. The archived version of this event can be found here.

On Aug. 18, 2016, the FTCoE hosted a webinar—“The Abuse of E-Cigarettes, Their Impact On Criminal Justice”—presented by Dr. Michelle Peace. E-cigarettes are used as alternatives to traditional cigarettes, for recreational activity, and as a delivery device for other licit or illicit drugs. This forum discussed the problem posed by e-cigarettes to public health/criminal justice, how e-cigs work, and other relevant research. In total, 307 users registered for this event, and 196 attended. The archived version of this event can be found here.

On November 16th the FTCoE hosted an event – Development of a Dynamic Model of DNA presented by Dr. Catherine Grnicak. This webinar detailed the development of a model that synthesizes, in silico, allele, stutter and noise signal generated from stochastic variation induced by the forensic DNA laboratory process. The model described herein allows rapid in silico simulation of electropherograms from multi-contributor samples which enables detailed investigations of involved scenarios. An implementation of the
model in the StellaTM environment that is parameterized by extensive laboratory data is freely and publically available. To illustrate its utility, we presented data demonstrating the effects of sample dilutions, of injection time and cycle number on peak height, and the nature of stutter ratios at low template. We verified the model’s findings by comparison with experimentally generated data, illustrating its utility. 182 users registered for this event and 81 attended. The archived version of this event can be found here.

On November 29 the FTCoE hosted an event – Using Forensics and Biometrics to Combat Human Trafficking presented by Professor Timothy Palmbach. Global realities are that millions of people are immigrants, refugees, human trafficking victims, or may be susceptible to acts of terror. Biometric methods are tools that assist in the overall protection of victims, and identification of offenders. In total, 162 users registered for this event, and 89 attended. The archived version of this event can be found here.

On December 6th the FTCoE hosted an event – DNA RADAR: Innovations in Human Identification using NGS presented by Brian Pollock. DNA RADAR™ is an innovative and proprietary NGS platform that provides a complete human identification solution including CODIS and ENFSI markers; phenotype markers for blood type, hair and eye color, ancestry; and prediction of SURNAME. In total, 199 users registered for this event, and 137 attended. The archived version of this event will be added to the FTCoE website, check back soon.

On December 7th the FTCoE hosted an event - μ-XRF of glass: A practical explanation of ASTM E2926 presented by Troy Ernst and Ted Manasian. This webinar will focus on the practical application of E2926-13 to the forensic analysis of glass, with additional discussion regarding validation of XRF instrumentation for use in forensic casework. In total, 163 users registered for this event, and 85 attended. The archived version of this event will be added to the FTCoE website, check back soon.

5. ONSITE AND BLENDED EVENTS

5.1 Workshops

Drug-facilitated Sexual Assault (DFSA) Workshop

On March 1, 2016, the FTCoE hosted a two-day workshop on DFSA in conjunction with the Society of Forensic Toxicologists Continuing Education and Drug-facilitated Crimes Committees with the DC Office of the Chief Medical Examiner. This workshop included lectures on the investigation and prosecution of DFSA cases, alcohol and memory, and the various drugs used to facilitate sexual assault. In total, 21 users registered for this event, and 10 attended. The archived version can be found here.
Technology Transition Workshop: Discovery and Recovery: Death Investigation in Natural Environments

**On Aug. 2-4, 2016,** at the College of Science, Department of Biological Science, North Carolina State University, the NIJ and FTCoE’s “Technology Transition Workshop: Discovery and Recovery: Death Investigation in Natural Environments” was held, focusing on disseminating practical knowledge of how to discover and recover clandestine burials, including the documentation and collection of anthropological and entomological evidence. The target attendees for this event were law enforcement officials, crime scene investigators, and forensic scientists.

Attendees gained a fundamental understanding of how to search for and flag evidence using triangulation, mapping, and compass work. Additionally, participants were instructed on how to apply the scientific method for human vs. non-human identification, insect identification, and the estimation of the PMI using entomological evidence.

Technology Transition Workshop: Courtroom Knowledge of Forensic Technology and the Impact on Frye and Daubert Standards

**On Aug. 9-10, 2016,** at Duquesne University and the Allegheny County Medical Examiner’s Office in Pittsburgh, Pa., NIJ and the FTCoE held their “Technology Transition Workshop: Courtroom Knowledge of Forensic Technology and the Impact on Frye and Daubert Standards”. The target attendees for the event were legal professionals, including criminal court judges, prosecuting and defense attorneys, and legal academicians. This workshop focused on introducing and enhancing the knowledge of innovative forensic technologies to legal professionals, such as how newer technologies need to be supported to pass a Frye or Daubert test. Background information about technology and scientific methodologies included presentations and panel discussions by discipline-specific experts. Case examples and vignettes were used to illustrate and define questions about technology and admissibility. Additionally, participants toured the Allegheny County Medical Examiner’s Office Laboratory Division to gain insight regarding the processing of forensic evidence. This workshop helped legal professionals use their knowledge of forensic technology advancements to better inform and facilitate their legal decision-making processes and, potentially, improve policy and practice.
Statistics and Applied Mathematics in Forensic Science Decision-making and Reporting Workshop

In collaboration with Dr. Cedric Neumann (2NForensics), the FTCoE hosted an encore “Statistics and Applied Mathematics in Forensic Science Decision Making and Reporting” workshop Oct. 31-Nov. 2, 2016, in Washington, DC. The purpose of this three-day workshop was to refresh, review, and complete basic notions of statistics and probability theory that apply to a wide range of forensic disciplines and evidence types. Fundamental statistical concepts, such as confidence intervals, hypothesis testing, sampling theory, logical inference, and their applications to forensic problems, such as the sampling of large drug seizures, calculating confidence intervals for forensic chemistry and toxicology analyses, and interpreting the probative value of pattern evidence, were presented, discussed, and practiced in class. Examples and data sets were provided for the practical exercises. These examples focused on trace and pattern evidence and forensic drug analysis and toxicology. Additionally, the audience was encouraged to email the instructor ahead of time with their own data and statistical questions, which were incorporated into the class. The encore workshop was able to accommodate an additional 42 attendees.

Advanced Radiologic Imaging in Medicolegal Death Investigation Workshop

In conjunction with the University of New Mexico, the FTCoE hosted a technology transition workshop focusing on advanced radiologic imaging for medicolegal death investigation. This workshop was held at the New Mexico Office of the Medical Investigator/Radiology-Pathology Center for Forensic Imaging and a computer laboratory at the University of New Mexico Health Science Center, School of Medicine. The goal of the workshop was to enable and enhance the effective transfer of advanced imaging technology into forensic practice in the U.S. This goal was accomplished by introducing attendees to the history and current status of radiology and advanced imaging in forensics, basic concepts in the production of computed tomography (CT) and magnetic resonance (MR) images, CT and MR protocols, image viewing software, three-dimensional (3D) rendering, and the interpretation/reporting of advanced imaging results. Major imaging findings in common types of death were introduced, and salient imaging case examples of each were provided in the relevant section of the course. The targeted audience included forensic pathology decision-makers, Chief and Assistant Chief Medical Examiners/Coroners, leaders of the National Association of Medical Examiners, and members of the College of American Pathologists-Technology Assessment Committee. The workshop was submitted for conference reporting approval and was held Nov. 11-13, 2016.

Sexual Assault on Campus and Forensic Nursing Symposium

On March 2, 2016, the FTCoE hosted the “Sexual Assault on Campus and Forensic Nursing” symposium. According to a recent study, as many as one in five female college students will be sexually assaulted during
her undergraduate career. According to another statistic, for every 1,000 women attending a university, 35 incidents of rape occur each academic year. Perhaps even more troublingly, less than 5 percent of completed or attempted rapes against college women are reported to law enforcement, and reported assailants receive little or no punishment from their schools’ judicial systems. Nearly one year after the White House issued “Not Alone,” a report on steps colleges should take to address sexual assaults, and after the Department of Education’s Office of Civil Rights unveiled a list of 55 schools it is investigating for possible Title IX violations, Duquesne University’s Cyril H. Wecht Institute of Forensic Science and Law in collaboration with the university’s School of Nursing, Department of Public Safety and Title IX coordinator, local sexual assault nurse examiners, and a leading sex crimes prosecutor to offer this timely seminar. In total, 159 users registered for this event, and 88 attended. The archived version can be found here.

### Statistical and Applied Mathematical Sciences Institute: Stats & Applied Mathematics in Forensics

On Feb. 1, 2016, the FTCOE hosted the “Stats & Applied Mathematics in Forensics” workshop. This three-day workshop provided an overview of the core topics relevant to the forensics program, which is devoted to the development of methodological, theoretical, and computational treatment of statistical and applied mathematical analysis. In total, 113 users registered for this event, and 46 attended. The archived version of this event can be found here.

5.2 Symposia and Meetings

### Science, Law, and Politics of Cold Case Investigations Symposium

On March 2, 2016, the FTCoE hosted the “Finding Closure: Science, Law and Politics of Cold Case Investigations” symposium. This workshop covered the following topics: What do the JonBenet Ramsey murder, the BTK killings, and the Centennial Olympic Park bombing have in common? When does a criminal case go “cold,” and what does it take to “thaw it out” again? At a time of laboratory backlogs and funding cuts, what warrants the re-opening of a cold case? How much physical evidence is enough, and what sort of witness is sufficiently compelling? What are the political hurdles involved, and how can they be overcome? How have DNA analysis and other scientific advances made it possible to re-investigate and successfully prosecute cold cases? What makes some cases ultimately unsolvable? In total, 52 users registered for this event, and 47 attended.

### Impression Pattern Trace Evidence Symposium

NIJ—the research, development, and evaluation arm of the U.S. Department of Justice (DoJ)—and its FTCoE sponsored the “Impression, Pattern and Trace Evidence Symposium (IPTES)” held on Aug. 25-27, 2015, in San Antonio, Texas. This symposium was specifically designed to bring together practitioners and researchers to enhance information sharing and promote collaboration among the impression, pattern, and trace evidence law enforcement and legal communities. It also provided unique opportunities for forensic examiners in the disciplines of impression, pattern, and evidence. In total, 393 users registered for this event, and 184 attended.

Portions of the symposium (i.e., the keynote, plenary, and oral presentations) were recorded to capture the interactions between the presenters and attendees during the live event. These archived recordings were made available online to the public in 2016:

**Agenda:**

- [2015 IPTES: Full Agenda](#)
Archived Events:
- 2015 IPTES: Opening Remarks;
- 2015 IPTES: NIST Forensic Science Community Updates;
- 2015 IPTES: NIJ Forensic Science Community Updates;
- 2015 IPTES: Future of Forensics Plenary Session;
- 2015 IPTES: The Basics of Error Rates in Pattern Evidence;
- 2015 IPTES: What Could Happen When Prosecutors Don’t Follow the Rules;
- 2015 IPTES: The Conviction of Family Annihilator Christopher Vaughn;
- 2015 IPTES: Use of Likelihood Ratios for Evidence Quantification in Forensics; and
- 2015 IPTES: Examination of Fibers, Hair and Personal Lubricants.

NIJ R&D Symposium
The NIJ Forensic Science R&D Symposium was a free, all-day, open meeting where attendees can learn about NIJ-funded research across a variety of forensic science areas. Guests were invited to stop by and listen to specific presentations or stay all day and learn about NIJ-funded forensic research in depth.

This symposium was held in conjunction with the 68th Annual AAFS Scientific Meeting on Feb. 23, 2016, at the Rio All-Suite Hotel Pavilion 11, Las Vegas, Nev.

On Feb. 23, 2016, 719 users registered live, online, and On Demand for this event, and in total, 560 users attended it.

Agenda:

- 2016 NIJ R&D Symposium Agenda

Archived Events:
- 2016 NIJ R&D Series: Impression, Pattern & Trace Evidence;
- 2016 NIJ R&D Series: Forensic Biology & DNA;
- 2016 NIJ R&D Series: Anthropology & Microbial Forensics; and
- 2016 NIJ R&D Series: Controlled Substances & Toxicology.

International Forensic Radiology Research Summit
On May 10–11, 2016, the U.S. NIJ, Netherlands Forensic Institute (Dutch Ministry of Security and Justice of the Netherlands), and NIJ’s FTCoE at RTI convened the “International Forensic Radiology Research Summit” at the Academic Medical Center in Amsterdam. The summit assembled 40 international researchers, practitioners, government employees, and professional staff from 14 countries. The goal of this two-day summit was to identify gaps, challenges, and research needs to produce a road map to success regarding the state of forensic radiology, including formulating a plan to address challenges facing the implementation of these advanced imaging technologies in medicolegal investigations. These proceedings

NIJ FTCoE (2011-DN-BX-KS64)
summarized the important exchange of technical and operational information among attendees and other stakeholders of forensic radiology.

**National Sexual Assault Policy Symposium**

The FTCoE hosted the “Looking Ahead: The National Sexual Assault Policy Symposium (NSAPS)” on Sept. 8-9, 2016, in Washington, DC. This symposium focused on how the nation is moving forward and finding solutions to the complex issues that arise in sexual assault cases and in testing sexual assault evidence. This unprecedented event, which featured an array of stakeholders, including medical staff, law enforcement, crime laboratories, victims’ advocates, and prosecution, highlighted current accomplishments and shared valuable experiences from jurisdictions throughout the country. The goal of the event was to support our nation’s policymakers and practitioners as they drive future efforts to solve sexual assault cases, provide justice to victims, and ultimately, improve public health and safety.

All of the panel presentations have been archived and can be found on the [FTCoE website](https://www.fedtech.gov/). In addition, a video highlighting the NSAPS was prepared onsite with participation from NIJ, speakers, and attendees. The NIJ and FTCOE websites will showcase this video in the coming months. In total, 196 users registered for this event, and 168 attended.

**Archived Events:**

- 2016 NSAPS: Day 1: Opening Remarks;
- 2016 NSAPS: Panel 1: Immediate Aftermath of Sexual Assault;
- 2016 NSAPS: Video: Nevada SA Kit Backlog Working Group;
- 2016 NSAPS: Panel 2: Victim-Centered Approaches;
- 2016 NSAPS: Panel 3: Investigating Sexual Assault;
- 2016 NSAPS: Panel 4: Legislative Reform on Sexual Assault;
- 2016 NSAPS: Panel 5: The Role of Evidence in SA Cases;
- 2016 NSAPS: Day 1: Closing Remarks;
- 2016 NSAPS: Day 2: Opening Remarks;
- 2016 NSAPS: Panel 6: An Unbelievable Story of Rape;
- 2016 NSAPS: Panel 7: Testing Sexual Assault Evidence;
- 2016 NSAPS: Panel 8: Building an Efficient Laboratory;
- 2016 NSAPS: Day 2: Guest Speaker with Alicia D. O’Neill;
- 2016 NSAPS: Panel 9: Funding & Resources to Solve SA Cases;
- 2016 NSAPS: Panel 10: Collaboration to Improve SA Response; and
- 2016 NSAPS: Day 2: Closing Remarks.

**ASCLD Annual Symposium**

The FTCoE exhibited at the 43rd annual ASCLD Symposium on April 24-28, 2016, in Bellevue, Wash. This meeting involved more than 280 attendees and more than 60 exhibitors. This year’s theme was centered
on “inspiring employees for maximum performance and how to foster a culture of excellence” in a forensic organization. Throughout the week, crime laboratory leaders presented to crime laboratory leadership actionable tools and information to take back to their laboratories and continue the pursuit of excellence in all aspects of their operations. The FTCoE provided a flyer to ASCLD attendees highlighting many FTCoE activities and resources.

**LP Documentation Meeting**

The FTCoE is evaluating the role of LP image complexity in creating operationally feasible documentation policies. This project is working with practitioners in the field to (1) understand the difficulties involved in creating a one-size-fits-all policy for assigning documentation requirements to LP evidence based upon the difficulty of the image, (2) document experiential first-hand knowledge of some of the key attributes that factor into LP difficulty classifications, and (3) gain a better understanding of the arguments for enhanced documentation and some practical suggestions on how to implement such a policy and the tools needed to design a policy that conforms to each agency’s operational needs. At the end of the month, the FTCoE sent one employee to the NIST workshop on evaluating the strength of forensic evidence to gather information on current philosophies regarding the statistical representation of forensic evidence. The FTCoE also held a one-on-one meeting with a subject matter expert at NIST on related topics.

**North Carolina International Association of Identification**

The FTCoE presented at the North Carolina International Association of Identification during their annual training conference on May 11-13, 2016. The presented lecture was titled “Understanding and Calculating Error Rates in Pattern Evidence” and detailed how error rates are calculated with an emphasis on some commonly reported error rates for pattern evidence and how they should be used in the courtroom. In addition to the lecture, a half-day workshop titled “Latent Prints Testimony: How to be Transparent without Feeling Naked” was hosted that addressed how to handle challenging concepts that arise in court, taking into account error rate, discriminability, certainty, variability, bias, uniqueness, and context of the relevant population.

**Crime Laboratory Directors Working Group**

The FTCoE hosted a planning meeting with NIJ and the working group of crime laboratory directors to discuss challenges relating to the current grant programs. The goal of this working group was to discuss the challenges of the DNA Backlog Reduction and Coverdell Programs from both the federal government side and the grantees’ side and gather information on how to improve the program and tailor the solicitation to benefit all parties. This meeting achieved the missions of the Office of Justice Programs and DoJ by assessing the DNA backlog reduction and Coverdell grant programs to improve them and other federal initiatives, such as the National Commission on Forensic Sciences. This meeting was held on Aug. 29-30, 2016, in Washington, DC.

**Forensic Analysis of Human DNA Gordon Research Conference (GRC)**

The FTCoE presented a poster at the inaugural GRC on Forensic Analysis of Human DNA held June 19-24, 2016, in Waterville Valley, N.H. GRCs are a group of prestigious conferences that span all scientific disciplines in the biological, chemical, and physical sciences. Dr. James Landers of Virginia Commonwealth University and Dr. Joan Bienvenue of the Applied Research Institute at the University of Virginia were the first chairs of the conference and organized an array of cutting-edge research topics for presentation and group discussion. GRCs provide a unique venue that allows for the free exchange of ideas and unpublished research throughout morning and evening sessions. This material is meant to be “off the record” to foster open dialogue on topics and issues specific to the current state of the discipline of focus. Approximately 200 GRCs are organized each year, and each discipline can host a GRC every two years. The next GRC on the
Forensic Analysis of Human DNA is currently being planned for June 2018 by the newly elected chairs: Dr. Robin Cotton of the BU School of Medicine and Dr. Daniele Podini of George Washington University.

5.3 2016 Technical Working Group (TWG) Meeting

On Dec. 13-14, 2016, the FTCoE hosted NIJ’s Biology/DNA and General Forensics TWG meetings. Disciplines represented by the General Forensics TWGs include Trace Evidence, Controlled Substances, Toxicology, Crime Scene Examination, Pathology and Medicolegal Death Investigations, Anthropology and Odontology, and Impression/Pattern Evidence. NIJ’s TWGs are committees of 25-30 experienced practitioners from local, state, tribal, and federal agencies and laboratories associated with a particular NIJ technology investment portfolio, such as Biometrics. TWG members participate in the peer-review panels that evaluate potential solutions to address practitioner needs and are embedded in the NIJ research, development, test, and evaluation process. Each year, a list of technology needs and research requirements are developed by NIJ using the TWG process.

6. INFORM THE FIELD

The FTCoE promotes the exchange of ideas and encourages open dialogue by highlighting the most current and relevant forensic information. The Center’s comprehensive reports are designed to inform and guide the forensic community on relevant topics based on credible research and expertise. By providing these essential resources, the FTCoE promotes changes in forensic science policy and procedure, thereby improving forensic science practice at the national level. The FTCoE generates three primary types of reports: Landscape Study, Technology Evaluation, and Special Focus.

**Landscape Study** reports provide a broad view of issues and products identified as having value and usefulness in forensic applications. These reports offer laboratory managers and investigators a survey of current commercially available forensic technologies. In addition, they provide decision-makers and potential end users with issues to consider related to implementation and use examples that illustrate the successful adoption of a technology. Upon review, the reader may better understand whether a technology can benefit his or her organization and how to proceed with selecting a platform and initiating implementation.

**Technology Evaluation** reports objectively compare selected technologies to assess the capabilities, requirements, benefits, and challenges of each. These reports review the methods used for assessment, findings, technology pricing, training requirements, conclusions, and recommendations. They also outline the steps an agency may consider taking when adopting and implementing a new technology.

**Special Focus** reports shed light on certain areas within the forensic community that may require more detailed, specialized assistance when coordinating knowledge transfer, adopting new technologies, and advancing R&D into the hands of practitioners. Often, these areas face special challenges, such as multi-disciplinary national communication and coordination, before new ideas, policies, and practices can be implemented successfully.

6.1 Landscape Study

**Breath Alcohol Landscape Report**

The FTCoE developed a Landscape Study in collaboration with key stakeholders and manufacturers to document the concerns regarding the reliability or defensibility of data acquired using portable breath alcohol instruments, which have been cited as the primary barrier to their implementation. This Landscape Study will 1) compile the performance statistics of available portable instruments approved for evidential data collection; 2) summarize the variables relating to these devices, including their price, features, and
accessories; 3) identify any procedures and best practices from agencies currently using such portable instruments; 4) provide feedback regarding the ease of use in the field and overall satisfaction with the most widely used instruments; and 5) present case studies of the defensibility of evidential data from agencies currently using these portable instruments. The final report will be published on the FTCoE website by the end of the Period of Performance, check back soon.

**Landscape Report: Forensic Research across the Federal Government**

NIJ is one of the largest federal stakeholders that supports basic and applied forensic R&D. However, there are other venues that also offer support to the community whose missions align with that of NIJ, that is, pushing technology forward to increase the capabilities of state, local, and federal forensic (crime) laboratories. Currently, the FTCoE is developing a report containing a brief landscape of other agencies’ R&D funding opportunities to provide the forensic community with documented sources associated with agencies that have requirements and funding available to further the field of forensic science. In support of this effort, the FTCoE attended the Global Identity Summit in Tampa, Fla., on Sept. 19-22, 2016. At this meeting, a host of federal stakeholders discussed funded initiatives and future requirements. Stakeholders and agencies included the FBI, Department of Homeland Security, Army, and Special Operations Command. The final report will be published on the FTCoE website by the end of the Period of Performance, check back soon.

**Landscape Report: Forensic Optical Topography**

The FTCoE is currently developing a forensic optical topography landscape report that aims to review the various technologies associated with the collection of 3D data using optical means, including confocal microscopy and techniques that use interferometry, focus variation, and other approaches. This report will examine the extension of current procedures for comparisons based on 2D image data to 3D topographical images.

The final report will be published on the FTCoE website by the end of the Period of Performance, check back soon.

### 6.2 Evaluations

**Evaluation of the Effect of Sequential Fingerprint Processing Techniques on Downstream DNA analyses**

Federal and state agencies have established protocols for processing latent fingerprints on porous substrates. The effect of fingerprint processing on DNA analysis (e.g., post-Ninhydrin, 1,8-diazafluoren-9-one, or cyanoacrylate) has been examined previously, whereas the effects of applying these processes to latent fingerprints in a sequential manner have not been widely reported. However, the evaluation of samples in this manner has been stated as a requirement by the community and does not constitute a new methodology. The FTCoE, in partnership with the U.S. Secret Service laboratory will investigate the effects of sequential fingerprint processing techniques on downstream DNA analysis. The final report of this evaluation will be completed in December 2016.

**Evaluation of an Oral Fluid Device (RTI)**

The FTCoE is working to provide the community with an independent evaluation of the AquilaScan (PAS International) hand-held oral fluid drug device for the detection of drugs of abuse and a comparison of the confirmation concentrations in oral fluid and blood. Evaluations of this variety offer the community information on the relationship between the concentrations measured from each biological fluid and consist of both a laboratory evaluation and an environment evaluation. The assessments involved include
performance characteristics (accuracy and interferences), ease of use, and cost effectiveness. During September 2016, objective and subjective reads were recorded, and the test sample volume was determined.

**Performance Evaluation of the Probative Value of Physical Evidence at Crime Scenes with Ambient Mass Spectrometry and Portable Instrumentation (RTI)**

RTI is evaluating the utility of a portable mass spectrometry (MS) system designed to assist the current technological needs of forensic science practitioners and laboratories. The primary goal of this evaluation is to determine the rapid screening capabilities of this portable MS instrument and elucidate its potential application to forensic science, particularly chemical testing at a crime scene. Both non-technical and technical factors are being evaluated. The efficacy of the technology for use by non-technical practitioners in different settings will also be examined. This work, which will include completion of a final report in December 2016, will continue through the end of the Period of Performance.

**Evaluation of GSR Analysis using CMV-GC-MS and LIBS for Fast Detection of the Organic and Inorganic Components in the field (Florida International University [FIU])**

Combustion products created by the discharge of a firearm are deposited around the area of discharge. GSR is the term used to describe the particles generated from combustion products. These particles are a combination of organic and inorganic components that originate from different parts of the firearm during the discharge. Currently, FIU is performing an FTCoE-supported evaluation of a previously NIJ-funded technique that allows for the fast detection of GSR and was first reported by FIU. This evaluation includes the capture of volatile organic compounds (VOCs) via the capillary microextraction of volatiles (CMV) coupled to GC-MS for the detection of organic components and laser-induced breakdown spectroscopy (LIBS) for the detection of inorganic components. This project aims to fill a gap that currently exists in GSR analysis by providing a method that is fast (1-min VOC sampling) and can eventually be used in the field. During September 2016, the following progress was made: 1) FIU continued the process of validation. 2) The first series of sampling trials of law enforcement officers shooting during training exercises was completed and the analysis of these samples began. During October 2016, a site visit FTCOE staff made to FIU to meet with the PI and observe the progress. This work, which will include completion of a final report in December 2016, will continue through the end of the Period of Performance.


The goals for Phase 3 focused on developing methods to facilitate the transition of OGSR detection from research to practice. The discharge of a firearm produces a wealth of physical and chemical evidence. Traditional forensic analysis has focused on the inorganic particulates formed from the primer, which are referred to as GSR and can consist of organic or inorganic compounds. To facilitate adoption by the forensic community, new assays utilizing instrumentation commonly found in forensic laboratories, such as GC/MS with a commercially available thermal separation probe that fits directly into the injection port, were evaluated for the determination of OGSR. The use of liquid chromatography coupled with MS was also evaluated; however, the validation of this technique with authentic samples was not completed in 2016. Work on four manuscripts funded in full or in part by this project was completed:


NIJ FTCOE (2011-DN-BX-KS64)


In addition, two webinars were presented as part of this project: one for the American Chemical Society and the other for the FTCoE.

Rapid DNA Evaluation

To address the impact of Rapid DNA technology on case resolution for law enforcement and investigative leads, the FTCoE is performing a comprehensive evaluation of Rapid DNA technology using the two major commercially available systems from IntegenX and NetBio. This evaluation is multi-faceted and includes sample analysis using the expanded Combined DNA Index System (CODIS) panel chemistries, an examination of the policies and inter-agency dynamics associated with the successful implementation of Rapid DNA by end users, and detailed use-case scenarios of early adopters who have tested Rapid DNA for investigative purposes. Currently, the FTCoE has enlisted the Miami-Dade Police Department (MDPD) to participate in this evaluation and is supporting a Rapid DNA pilot program in their district. The MDPD currently has access to an instrument manufactured by NetBio, and the FTCoE coordinated the delivery of Biochip cartridges to MDPD in September 2016. A site visit that included video recording of this project occurred in October 2016. This evaluation will continue through the end of the Period of Performance.

6.3 Special Focus

Lean Facility Design (LFD) Roadmap

In 2015, the FTCoE hosted an expert working group led by Dr. Rudi Luyendijk of the Midwest Forensics Resource Center to develop guidance documentation on incorporating ‘Lean’ concepts and principles into the construction of 21st century forensic facilities. An LFD road map was developed to serve as a blueprint for planning, designing, and constructing new or remodeled crime laboratories. By utilizing the technique of Value Stream Mapping, the future state of the new or reconstructed facility can be identified, and the allocation and utilization of space can be enhanced through improved workflow and information flow processes, resulting in improved crime laboratory performance, lower construction costs, and longer facility life. In 2016, Dr. Luyendijk has continued his work with the FTCoE and with practitioners in the forensic community who are currently planning to construct new forensic facilities and use the guidance documents to validate the road map’s utility and effectiveness and evaluate its potential for widespread implementation and use. As of September 2016, an integrated LFD needs assessment was completed for the Broward County Sheriff's Office (BSO) crime lab in Fort Lauderdale, Florida, to be used as an independent resource for supporting the decision to renovate the existing crime laboratory or to build a new one. This needs assessment includes the mapping of both the current and future work and information flow of all the BSO crime laboratory's discipline-specific processes (i.e., evidence intake, firearm/toolmark, LP, DNA, and drug analysis). The development of checklists to guide the planning, organization, and execution of LFD activities and events and a plan to integrate LFD with traditional crime laboratory design practices is included in the assessment. Finally, the development of an implementation plan for an LFD-
Integrated Facility Needs Assessment and an assessment of the readiness of the LFD roadmap for widespread use and application will be completed in the last quarter of 2016. This work will continue through the end of the Period of Performance.

Human Factors Sourcebook

Work on the Human Factors Sourcebook has been progressing. The Steering Committee has been meeting virtually and in person to discuss the goals and scope of the project. Topic areas of great importance in the forensic science community and for which relevant psychological research exists are being identified. One main goal of the sourcebook is to find areas in which human factors knowledge can be used to improve laboratory practice and bridge the gap between existing knowledge and operational implementation. The selection of members for the Working Group that will produce the sourcebook is underway and will be followed by meeting planning for a kick-off meeting of the Working Group in summer 2016 to initiate discussions and begin progress on the writing of the sourcebook.

State Forensic Commissions

The development of sound forensic science work in crime laboratories depends on validation, reliability, and quality assurance. State forensic science commissions can play a central role in efforts to implement forensic improvements. Although only 10 states (and the District of Columbia) currently have statutorily created forensic science commissions, many more states have DNA commissions or informal advisory boards or are considering forming commissions. The FTCoE developed a report that provides the first, comprehensive look at the structure of commissions and is designed to increase dialogue among current commission members and stakeholders and offer guidance to those seeking to establish new commissions. This report serve as a guidance document for states wishing to create and maintain a state forensic science commission. Recognizing the substantial differences that exist among the states regarding governance, culture, statutes, and crime laboratory systems, it is a road map that necessarily includes a variety of paths that may be considered in planning for and adopting a collaborative, supportive mechanism to provide quality forensic service. This report was published in December 2016.

7. SPECIAL PROJECTS

7.1 Strengthening Forensic Science Services Working Group Meeting

On Aug. 29-30, 2016, the NIJ convened a meeting with crime laboratory directors from various regions of the U.S. to gather information on strengthening the DNA Capacity Enhancement and Backlog Reduction (DNA), Paul Coverdell Forensic Science Improvement Grants (Coverdell), and Research and Evaluation for Publically Funded Laboratory Grant programs. The focus of this meeting was to facilitate discussions related to the DNA, Coverdell, and Research programs, two of which—DNA Capacity and Coverdell—are critical sources of funding for laboratory operations. NIJ is the federal government’s lead agency for forensic science R&D and the administration of programs that improve laboratory efficiency, reduce backlogs, and provide technical assistance. Within NIJ, the Office of Investigative and Forensic Sciences has the distinct role of leading efforts to address the needs of our nation’s forensic science community, including the need for programs with the following aims:

- To increase capacity and reduce casework backlogs;
- To strengthen the accuracy, reliability, and validity of the forensic sciences;
- To translate R&D into practice and transition newly developed technologies into the laboratory; and
To enable laboratories to hire, train, and maintain qualified forensic scientists.

The primary objectives of this meeting were to (1) gather information and feedback from forensic laboratory directors to strengthen current NIJ programs and potentially create new programs and (2) provide a forum to facilitate discussions about the needs and challenges in the forensic sciences and determine how NIJ can work closely with laboratories to respond. This open forum facilitated discussions to understand the needs and challenges related to the DNA and Coverdell programs and to promote the R&D for publically funded laboratory program.

NIJ, through the FTCoE, worked with ASCLD to select a diverse and representative group of laboratory directors consisting of 27 laboratory directors from 16 states, three counties, and eight cities. The FTCoE and NIJ are preparing a full meeting summary report and a meeting brief to release within the current Period of Performance.

7.2 Sexual Assault Response Team (SART) Medical Glossary

The FTCoE is working with the Center for Nursing Excellence International (CFNEI) to produce a Sexual Assault online glossary for medical, law enforcement, and legal professionals. CFNEI continues to import terms into the glossary and has ensured that all definitions are compliant with the FBI quality assurance standards to maintain consistency in federal documents. This glossary, which contains more than 1,000 terms, was released through the FTCoE and CFNEI websites in October 2016. The Glossary can be found [here](#).

7.3 Sexual Assault Examination Program Mobile App

The FTCoE is working in conjunction with the Sexual Assault Forensic Evidence Reporting working group to develop a mobile device application specifically for the sexual assault medical community. This app will detail the process map describing the decision-making pathway for forensic evidence in sexual assault cases and link to the FTCoE SART medical glossary. The developer created a concept brief to detail the future capabilities of the app that was presented to the NIJ in November 2016.

7.4 MPS Simulation Tool

At the International Symposium on Human Identification in Minneapolis, Minn., on Sept. 26, 2016, the FTCoE presented at a workshop that provided attendees with a unique opportunity to learn best practices for implementing MPS into a typical forensic laboratory workflow. Supported by the FTCoE, University of North Texas Health Science Center, and North Carolina State University, an immersive and interactive virtual simulation tool was showcased that guides DNA practitioners through three commercially available forensic laboratory processes amenable to two MPS instruments. The attendees were then given the opportunity to virtually employ laboratory protocols and analyze forensically relevant genetic loci through commercially available and third-party software applications. This simulation tool can be experienced on the FTCoE website.

7.5 Online Forensic Leadership Series

The FTCoE is currently developing an online forensic leadership series to support forensic science laboratories that will be made available free-of-charge to the public on the FTCoE website. This best practices training could be used in conjunction with the ASCLD leadership academy or the National Forensic Science Academy (NFSA) or as part of a standalone effort by individual laboratories. This series also supports laboratory accreditation and professional certification. The FTCoE’s design is intended to introduce the full range of key topics during a 10- to 12-hour period. The content will be adapted from leadership training that has been delivered to tens of thousands of law enforcement officers through the

NIJ FTCoE (2011-DN-BX-K564)
International Academy of Public Safety (IAPS). The content will be adapted for forensic professionals based on the experience of the IAPS with Jefferson Parish, Los Angeles County, and other laboratories, in addition to the input of ASCLD and other forensic organizations involved in the development of the NFSA. The content will include discussions about innovation, standards, ethics, and organizational excellence that are critical to FTCoE’s mission. Forensic professionals who implement this information in practice will continue to work with NIJ/FTCoE’s efforts in forensic improvement. During September 2016, several courses were recorded, including material relating to first-level and mid-level supervision, leadership principles, and change management.

7.6 AAFS Humanitarian and Human Rights Resource Center

The FTCoE helps to support the AAFS Humanitarian and Human Rights Resource Center, which promotes the application of contemporary forensic science and forensic medicine principles to global humanitarian and/or human rights projects requiring special forensic assistance. In June 2016, a proposal for a workshop detailing the mission of the Center was developed for submission to the AAFS annual meeting in February 2017 in New Orleans, La. Procedures and a brochure related to fundraising and center activities was developed in June 2016. The Chair of the Center, Doug Ubelaker, presented a summary of the Center’s activities at the June 2016 meeting of the International Academy of Legal Medicine in Venice, Italy.

8. OUTREACH

The FTCoE is dedicated to providing the most current news to the forensic community. These communications include new articles, podcasts, NIJ Success Stories (see above), and the FTCoE website.

8.1 “Just Science” Forensic Science Podcasts

The FTCoE developed a new online forensic education program that is formatted as podcasts. This program is entitled “Just Science” and features various interviewees in open discussions of forensically relevant topics, including MPS, DNA mixtures, the vaping of drugs, the psychology of latent fingerprint examination, and current sexual assault initiatives. These podcasts are, on average, 30 minutes in length.

8.2 News Updates

The Forensic Science Review accepts articles that bring into focus various narrowly defined topics for which the relevant literature is widely scattered. Articles are presented to stimulate further research on the one hand and worthwhile technological applications on the other. Articles also address techniques that are widely used in forensic science and innovations that hold promise for the future. In December 2016, the FTCoE contributed two professional and commentary articles titled, “Looking Ahead: The National Sexual Assault Policy Symposium (September 8–9; Washington, District of Columbia)” and “Forensic Technology Center of Excellence: Informing the Advancement of Emerging Technologies — A 2016 Update.” Both articles were authored by Jeri D. Ropero-Miller.

TechBeat, an award-winning newsmagazine of the National Law Enforcement and Corrections Technology Center (NLECTC) System, publishes on technologies currently being developed by the NLECTC System and other R&D efforts within the federal government and private industry. During 2016, the FTCoE was featured in four TechBeat articles:

1. March 2016-Phase II Report on Recovering Erased Firearms Serial Numbers Released;
2. April 2016-Report Examines DNA Mixture Interpretation Software Tools;
3. June 2016-3D Crime Scene Scanning Devices; and
4. **July/August 2016-Road Map Leads to Increased Efficient, Improved Functions in Forensic Labs.**

The *NIJ Journal*, which is published several times a year, features articles to help criminal justice policymakers and practitioners stay informed about new developments. The *NIJ Journal* presents research-based information that can help inform policy decisions and improve understanding of the criminal justice system. During 2016, the FTCoE was featured in “Recent Research Findings: Applying Lean Design to Crime Laboratories”.

The *TIAFT Bulletin* is the journal of The International Association of Forensic Toxicologists (TIAFT) and is published three times a year. It contains reports from the officers and committees of TIAFT, abstracts, articles on new technology, guidelines for laboratory practice and ethics, opinion from TIAFT members, case notes, and member news. In 2016, the FTCoE published an article titled “Forensic Technology Center of Excellence — Technology Teasers in Forensic Toxicology”.

### 8.3 Web Statistics

From Jan. 1 to Nov. 30, 2016, the FTCoE website totaled 74,555 page views from 18,090 users, with the average user remaining on the FTCoE site just over 2.5 minutes. Since Jan. 1, 2016, the FTCoE has sent out 65 issues of its newsletter, including special interest issues, to its 27,657 subscribers. The “read more” option was opened by an average of 3,354 of recipients during this period.

From January 1 to November 30, 2016, the FTCoE website hosted a total of 27,911 website sessions, 58 percent of which were new sessions. From January 1 to May 19, 2016, the average bounce rate was 52 percent (Exhibit 1). From May 19 to Nov. 30, 2016, the average bounce rate was 64 percent (Exhibit 2). From January 1 to May 19, 2016, the average number of sessions increased to 11,821. Between May and the beginning of July 2016, sessions peaked at 4,261, declined to 2,354 during August, plateaued at approximately 2,300 from August through September, spiked to more than 4,000 in October, and then declined to 332 by November. Website sessions spiked throughout May and June and peaked in July. Sessions declined and plateaued at approximately 2,300 from August through October. The number of workshops and events marketed via the newsletter during the summer months most likely contributed to the significant session incline from May to July.
Exhibit 2. FTCoE Website Audience Overview from January to May 19, 2016

**Audience Overview**

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<th>Sessions</th>
<th>Users</th>
<th>Pageviews</th>
<th>New Visitor</th>
<th>Returning Visitor</th>
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<td>56.2%</td>
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- Pages / Session: 3.03
- Avg. Session Duration: 00:02:37
- Bounce Rate: 52.39%

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</tr>
<tr>
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</tbody>
</table>
Exhibit 3. FTCoE Website Audience Overview from May 19 through Nov. 30, 2016

**Audience Overview**

**May 20, 2016 - Nov 30, 2016**

- **Sessions**: 16,090
- **Users**: 10,507
- **Pageviews**: 38,705

**Pages / Session**: 2.41
**Avg. Session Duration**: 00:02:14
**Bounce Rate**: 63.93%

**% New Sessions**: 60.45%

**Language** | **Sessions** | **% Sessions**
--- | --- | ---
1. en-us | 14,787 | 91.00%
2. (not set) | 250 | 1.55%
3. en-gb | 217 | 1.33%
4. en-ca | 121 | 0.75%
5. pt-br | 81 | 0.50%
6. es | 70 | 0.44%
7. es-es | 52 | 0.32%
8. it-it | 42 | 0.26%
9. en-au | 35 | 0.22%
10. es-419 | 35 | 0.22%
APPENDIX: LIST OF ACRONYMS

3D three dimensional
AAFS American Academy of Forensic Sciences
ASCLD American Society of Crime Laboratory Directors
BSO Broward County Sheriff’s Office
BU Boston University
CFNEI Center for Nursing Excellence International
CHORI Children’s Hospital Oakland Research Institute
CMV capillary microextraction of volatiles
CODIS Combined DNA Index System
CT computed tomography
DART direct analysis in real time
DFSA drug-facilitated sexual assault
DFSC Defense Forensic Science Center
DME digital multimedia evidence
DoD Department of Defense
DOJ Department of Justice
FIU Florida International University
FROG-kb Forensic Resource/Reference on Genetics Knowledge Base
FTCoE Forensic Technology Center of Excellence
FY fiscal year
GRC Gordon Research Conference
GSR gunshot residue
IAPS International Academy of Public Safety
IIISNP individual identification single nucleotide polymorphism
IPTES Impression, Pattern and Trace Evidence Symposium
LFD Lean Facility Design
LIBS laser-induced breakdown spectroscopy
LP latent prints
MDPD Miami-Dade Police Department
MPS massively parallel sequencing
MR magnetic resonance
MS mass spectrometry
NFSA National Forensic Science Academy
NIJ National Institute of Justice
NIST National Institute of Standards and Technology
NLECTC National Law Enforcement and Corrections Technology Center
NoC number of contributors
NSAPS National Sexual Assault Policy Symposium
OGSR organic gunshot residue
OSAC Organization of Scientific Area Committees
PCR polymerase chain reaction
PI principal investigator
PISNP phenotype interference single nucleotide polymorphism
PMI post-mortem interval
R&D research and development
SAFS Southern Association of Forensic Scientists
SART Sexual Assault Response Team
SNP single nucleotide polymorphism
TIAFT The International Association of Forensic Toxicologists
TWG Technical Working Group
VOC volatile organic compound
WVU West Virginia University
Y-STR Y-Chromosome Short Tandem Repeats

NIJ FTCOE (2011-DN-BX-K564)