INNOCENCE PROJECT

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INNOCENCE PROJECT PUBLIC COMMENT ON
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
REQUEST FOR INFORMATION REGARDING
FEDERAL TECHNOLOGY TRANSFER AUTHORITIES AND PROCESSES
[Docket Number:180220199-819-01]
July 30, 2018

The Innocence Project submits this statement in response to the *Request for Information Regarding Federal Technology Transfer Authorities and Processes* [Docket Number:180220199-819-01] issued by the National Institute of Standards and Technology (NIST) in the May 1, 2018 issue of the Federal Register. This comment focuses on (1) the current state of federal technology transfer in the forensic science sector, and (2) the need for the Department of Commerce to work through NIST to improve forensic science and increase public safety.

Founded in 1992, the Innocence Project harnesses the power of DNA technology to free innocent people wrongfully convicted of crimes. The misapplication of forensic science is the second most common contributing factor to wrongful convictions, found in nearly half (45%) of the 358 DNA exoneration cases documented to date. In order to address and prevent the misapplication of forensic science, the Innocence Project's forensic science priorities focus on improving the empirical basis of and supporting initiatives that enhance the scientific foundations of forensic methods used in criminal proceedings. The Innocence Project is deeply committed to the transfer of scientific knowledge to and technological innovations for the forensic science sector to improve the accuracy, reliability and accountability of science used by the justice system. Additionally, high quality and accurate forensic science will help to identify, remediate, and prevent wrongful convictions, as well as help identify the true perpetrators of crime, thus providing true justice to both victims of crime and the wrongfully convicted.

Current state of Federal Technology Transfer in the Forensic Science System

While there is currently no formal system to transfer scientific advancements to forensic science providers, scientific knowledge and technological innovation are critical to improving criminal investigations. The challenges to bringing developments from the federal government's research investments to the criminal justice system are significant. In 2009, the National Academy of Sciences published a report, *Strengthening Forensic Science in the United States: The Path Forward*, which raised concerns about the fragmented state of the forensic science system. "The forensic science enterprise also is hindered by its extreme disaggregation" and "the fragmented

nature of the enterprise raises the worrisome prospect that the quality of evidence presented in court, and its interpretation, can vary unpredictably according to jurisdiction."[1]

The establishment of an effective transfer system requires an understanding of the number, size, scope, and diversity of providers within the forensic science system. The forensic science system consists of providers that are varied in size, type of service(s) provided, and operational structure. This diversity can present considerable challenges to effective and efficient implementation of innovations. Forensic analyses are conducted in publicly funded laboratories, forensic science units operating outside the traditional forensic science service provider framework, and privately-funded laboratories. Based on the most recent BJS *Census of Publicly Funded Forensic Crime Laboratories, in 2014*, 26% operate with less than 10 and 6% operate with more than 100 full-time employees, and the proportion of labs conducting different types of trace evidence analyses range from 32% (explosives analysis) to 70% (fire debris analysis).[2] In August 2014, the National Commission on Forensic Science approved a directive advising the Attorney General to have the Bureau of Justice Statistics develop a survey to capture the scope of law enforcement forensic units operating outside the traditional forensic science service provider framework.[3] The Bureau of Justice Statistics (BJS) initiated this project, but has not yet released a report. Consequently, information on the number, type, and scope of forensic science units operating outside the traditional publicly-funded forensic science service provider setting is unknown. The missing data and the diversity of the known forensic science service providers provide challenges to delivering innovations to the right entities.

A transfer system in the forensic science space must not only deliver innovations in a timely manner, but must also ensure they have been evaluated for valid and reliable forensic applications. The evolution of forensic DNA technology is an example. Although DNA sequencing was widely used in clinical and scientific research in the 1980s, its early application to the criminal justice system was neither uniform nor reliable.[4] The National Academy of Sciences convened two panels of scientists and experts to ensure that the method and the interpretation of results were scientifically sound for forensic application.[5] Even after forensic DNA became a cornerstone of the criminal justice system, implementation of innovations in this sector has lagged. For example, the deconvolution of complex DNA mixtures has presented criminal cases with a number of

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[1] National Research Council. 2009. *Strengthening Forensic Science in the United States: A Path Forward*. Washington, DC: The National Academies Press, p. 16. https://doi.org/10.17226/12589. (Hereafter, "NAS report").
[2] Durose, M. R., Burch, A. M., Walsh, K., & Tiry, E. (2016). Publicly Funded Forensic Crime Laboratories: Resources and Services, 2014 (No. NCJ 250151). U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics. Retrieved from https://anab.qualtraxcloud.com/ShowDocument.aspx?ID=12371
[3] Butler, J. M. (2014). *The National Commission on Forensic Science and the Organization of Scientific Area Committees*. Retrieved from https://www.nist.gov/sites/default/files/documents/forensics/Butler-ISHI-Proceedings2014.pdf
[4] *People v. Castro*, 143 Misc.2d 276 (1989).
[5] National Research Council. 1992. *DNA Technology in Forensic Science*. Washington, DC: The National Academies Press. https://doi.org/10.17226/1866; National Research Council. 1996. *The Evaluation of Forensic DNA Evidence.* Washington, DC: The National Academies Press. https://doi.org/10.17226/5141.

challenges. Massive parallel sequencing is a technology that would identify the number of DNA profiles represented in a crime scene sample as well as improve the certainty of the sequencing of each profile. This technology originated in the late 1990s (as early forms of forensic DNA testing were implemented widely), and became commercialized in 2005.[6] Despite its availability, this technology has not yet been implemented into the forensic science system.

Fortunately, NIST understands the need to prepare technologies for forensic use and has proactively initiated an effort to transfer massive parallel sequencing to forensic science service providers. In recently published research conducted in collaboration with the Federal Bureau of Investigation Laboratory, NIST scientists helped establish the statistical foundation needed to apply this technology to the forensic science system, thereby removing a barrier for the implementation of this powerful technology for forensic science service providers.[7] NIST's leadership role in this area should be strengthened and promoted in order to ensure effective and efficient translation and implementation of forensic science advances.

NIST has led several other cutting edge and innovative forensic science research efforts that serve criminal justice as well as national security. For example, NIST is hosting a number of challenges to spur research and development into facial recognition technology.[8] In support of facial recognition and other forensic activities, NIST develops and shares datasets for vendors and researchers to test their algorithms; establishes evaluation metrics; and encourages interlaboratory testing, software interoperability, and comparison-based studies on different technologies. NIST also has invested heavily in a globally respected and successful forensic science center of excellence, the Center for Statistics and Applications in Forensic Evidence. This multi-centered research effort based at Iowa State University is producing statistical advancements for the forensic science system at lightning speed. A delivery framework could help ensure several forensic science technology transfers, including the provision of statistically correct testimony by latent print examiners; implementation of valid 3D bullet comparison technology; and statistical analyses of user-generated event data from computers and mobile phones in law enforcement investigations.

NIST Leadership is Needed to Improve Forensic Science and Public Safety

NIST is rich in expertise and unique in its service across public and private sectors. In order to improve the effective delivery of its research resources, we urge that NIST lead the following efforts to produce the solutions the forensic science system needs, including:

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[6] Voelkerding, K. V., Dames, S. A., & Durtschi, J. D. (2009). Next-Generation Sequencing: From Basic Research to Diagnostics. *Clinical Chemistry*, 55(4), 641–658. https://doi.org/10.1373/clinchem.2008.112789

[7] Gettings, K. B., Borsuk, L. A., Steffen, C. R., Kiesler, K. M., & Vallone, P. M. (n.d.). U.S. Population Sequence Data for 27 Autosomal STR Loci. Forensic Science International: Genetics. https://doi.org/10.1016/j.fsigen.2018.07.013

[8] National Institute of Standards and Technology. (2017, December 26). Face Challenges. Retrieved July 23, 2018, from https://www.nist.gov/programs-projects/face-challenges

1. Identifying operational barriers to adopting research developments and technological innovations, examining questions such as:

- What are the organizational and cultural barriers to adopting research developments and technological innovations?
- Do these barriers differ in scope for research developments versus technological innovations?

2. Designing a delivery system that can translate research developments and technological innovations appropriately to the numerous diverse forensic science service providers across the 50 states, District of Columbia, and Puerto Rico. Not every forensic science service provider will have the resources, capacity, or quality management systems in place to adopt every research development or technological innovation. In order to scale innovations to providers, NIST should:

- Develop a database of forensic science service providers and their capacity, updating it as new scientific innovations come online
- Establish criteria to evaluate scientific innovations to ensure they meet the validity and reliability requirements for application in the forensic science setting
- Identify a set of resource and quality management requirements for implementation of new research or technological innovations develop

3. Establish an ongoing monitoring program to track the translation, implementation, and operation of research developments and technological innovations.

4. Develop a metric for determining when integration is successful.

5. Supply forensic science service providers with information on how to retire unsuccessful or outdated technologies from use.

Conclusion

NIST plays a unique and critical role in nurturing and supporting the development of scientific innovation across all domains. NIST has revolutionized the field of forensic science by leading the development of scientific innovations and initiating formal standards-setting activities. Science can be used to improve public safety and restore justice and NIST should expand its role and lead technology transfer for the forensic science system. The development of a formal delivery framework for scientific knowledge and technological innovations would ensure a return on the federal government's investment on research by both improving forensic science practice through scientific knowledge transfer and returning private sector innovations (often seeded with federal research funding) back to the public sector through public safety improvements.