Project Update to the National Institute of Justice:

NIJ R&D Portfolio Management and Technology Transition Support

Report Summary

BACKGROUND

NIJ Forensics R&D

The National Institute of Justice (NIJ) is the research, development, and evaluation agency for the U.S. Department of Justice (DOJ). As part of its mission, NIJ funds research and development (R&D) grants across all forensic disciplines, with a particular focus on improving capabilities to expand the information that can be extracted from traditional types of forensic evidence and to quantify its evidentiary value. The NIJ's investment in R&D is also aimed at developing reliable and widely applicable tools and technologies that allow faster, cheaper, and less labor-intensive identification, collection, preservation, and analysis of forensic evidence of all kinds, as well as the reduction of existing case backlogs.[1] NIJ's Forensic Science R&D Program prioritizes research that has a direct impact on forensic science policy and practice. R&D investment ultimately matures forensic science related to useful materials, devices, systems, or methods that have the potential for forensic application (www.nij.gov).

From 2003 to 2012, the NIJ funded approximately 355 R&D grants in the forensic sciences (henceforth referred to as the R&D portfolio).[2,3] Two-thirds of these grants were for Applied[4] Research, while the remainder were for Basic[5] Research. Among these projects, Forensic DNA projects represented roughly 50% of NIJ's R&D award budget. The other discipline categories funded were Anthropology; Controlled Substances; Crime Scene Investigation; Digital Forensics; Entomology; Fire and Arson; Friction

This report was developed by the Forensic Technology Center of Excellence (FTCoE) to document the purpose of, and processes related to, the management of NIJ's R&D portfolio to increase impact for forensic applications. The ultimate goal of the portfolio management process is to enable the use of the NIJ-funded solutions by various parts of the forensic community. The successful outcome may take the form of commercialization (e.g., new products), technology implementation (e.g., new processes), or knowledge transfer (e.g., new understanding). The process seeks to find R&D that, with additional support, can have a greater impact. This effort does not evaluate the R&D projects themselves, nor does it seek to identify the best technology for a given application; rather, it focuses on the technology adoption efforts needed to successfully move the technology from the R&D laboratory to the forensic practitioner laboratory or field application. The process is a rapid way to bring forward opportunities for the FTCoE to augment the investment made by NIJ to push the R&D to greater adoption.

Ridge; General Forensics (e.g., statistics); Impression Evidence (e.g., bloodstain pattern analysis, firearm and toolmark examinations); Pathology; Questioned Documents; Toxicology; and Trace Evidence.

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[1] http://www.nij.gov/topics/forensics/pages/priorities.aspx

[2] Does not include funding for Paul Coverdell Forensic Science Improvement Grants Program, DNA Backlog Reduction Program to States, Research Fellowships, or Research and Evaluation in Social Sciences.

[3] While data going back to fiscal year 2003 are included, prior to fiscal year 2007, the lists may not be complete.

[4] An Applied Research award is a systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.

[5] A Basic Research award is a systematic study directed toward a greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward any processes or products in mind.

Forensic Science Technology Center of Excellence (FTCoE)

Since 2011, RTI International (RTI)[6] and its partner universities[7] have operated the FTCoE for the NIJ. The FTCoE is tasked by the NIJ to be a bridging organization within the forensic community to enable adoption of technology solutions. The FTCoE helps the NIJ consider how well a solution addresses the intended functional requirement. This determination can range from market analysis (for early-stage solutions) to real testing (for mature solutions).

Ultimately, the FTCoE works with the NIJ to facilitate the introduction of the solution into practice. After adoption, the solution's impact on practice is evaluated.[8] Thus, the R&D solution plays a critical role by identifying promising R&D solutions that may have a substantial impact on practice and be worthy of further NIJ investment.

NIJ R&D Portfolio Management Process

To assist in bringing impactful solutions to the forensic community, the FTCoE has worked to develop an R&D portfolio management process for NIJ.

This effort includes the following actions:

- Creation, population, and maintenance of an R&D Portfolio Database containing NIJ R&D research grants

- Analysis of the R&D grants to identify

  - R&D outcomes with demonstrated value in the form of practical use, publications, and presentations

  - R&D with the potential for broader impact through additional FTCoE and stakeholder support

- Plan for and provide technology transition support for selected R&D

- Communicate successful transition and adoption

- Execute a steady-state process for managing NIJ's R&D portfolio of grants for technology transition support.

The ultimate goal of the portfolio management process is to enable the use of the NIJ-funded solutions by the forensic community. The successful outcome may take the form of commercialization, technology implementation, or knowledge transfer. It is also important to communicate NIJ R&D transition successes to further encourage adoption and to motivate participants, including the following:

- **Science** – Researchers working specifically in forensic disciplines, as well as researchers working in non-forensic applications but who enable technology areas (e.g., DNA); NIJ grantees; and state and local laboratories.

- **Justice** – Individuals working for the systemic collection and flow of evidence from crime scenes to courtrooms, including law enforcement, lawyers, judges, and other forensic practitioners in the criminal justice system, such as those working at U.S. federal agencies (e.g., the National Institute for Standards and Technology, the Federal

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[6] RTI International is a trade name of Research Triangle Institute.

[7] Duquesne University; Virginia Commonwealth University; University of North Texas; West Virginia University; University of Central Florida; Midwest Forensics Resource Center

[8] http://www.nij.gov/topics/technology/pages/research-development-process.aspx,

Bureau of Investigations, the U.S. Department of Homeland Security, the Secret Service, the NIJ, the Drug Enforcement Administration, and the U.S. Department of Defense).

■ **Society** – The public.

Benefits of FTCoE's process to support management of NIJ's R&D portfolio include the following:

1. Connecting to NIJ's funded principal investigators (PIs) to understand the status, impact, and needs related to transition of their research into useful application.

2. Encouraging a culture of innovation through the adoption of research product in value-added applications.

3. Collecting, analyzing, maintaining, and disseminating performance metrics on NIJ forensic R&D awards.

4. Identifying R&D that can benefit from FTCoE transition support to gain broader impact.

The following report summarizes the process, results to date, and continued planning related to the FTCoE's management of technology transition support for NIJ's R&D portfolio. As illustrated in **Figure 1**, the goal of these efforts is to drive research funding into impact through the use of new products, information being available to the community, and continuous support and improvement for NIJ research.

Enable Products

Provide support to enable products to reach the forensics community. This can include validation, in-field evaluation, licensing, or other commercialization support.

Inform the Field

Communicate about available products and techniques that are ready for adoption. In some cases, this is about enabling access to and generating use of information resources, as well as determining other ways to transfer knowledge.

Document Success

Capture metrics related to use and impact from NIJ-funded R&D to highlight the application. This can broaden community awareness.
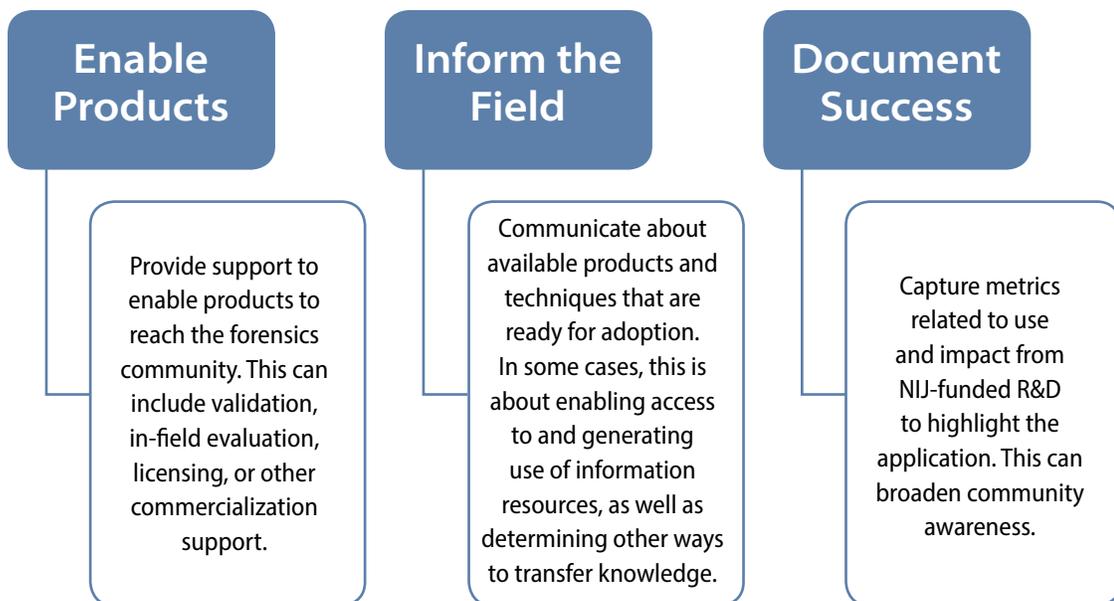
Figure 1. Impact of FTCoE's transition support of NIJ's R&D portfolio.

PROCESS

The FTCoE understands the breadth and value of the NIJ's investment in R&D in areas of significant interest to the criminal justice and forensic science communities. As a result, the FTCoE created a portfolio management process to capture and recognize R&D that has, or can, positively impact these communities.

Figure 2 illustrates the overall portfolio management process and presents the timeline (by year) and process steps. The figure also shows the flow of the first set of cases (NIJ R&D awards from FY2009–FY2011) to go through the process. The values in each funnel section (e.g., Forensic Database Capture, 320+; Triage, 132) represent the number of NIJ R&D grants in the set at each stage of the process. The reduction in numbers shows the winnowing that occurs as the grants move through the triage and assessment stages.
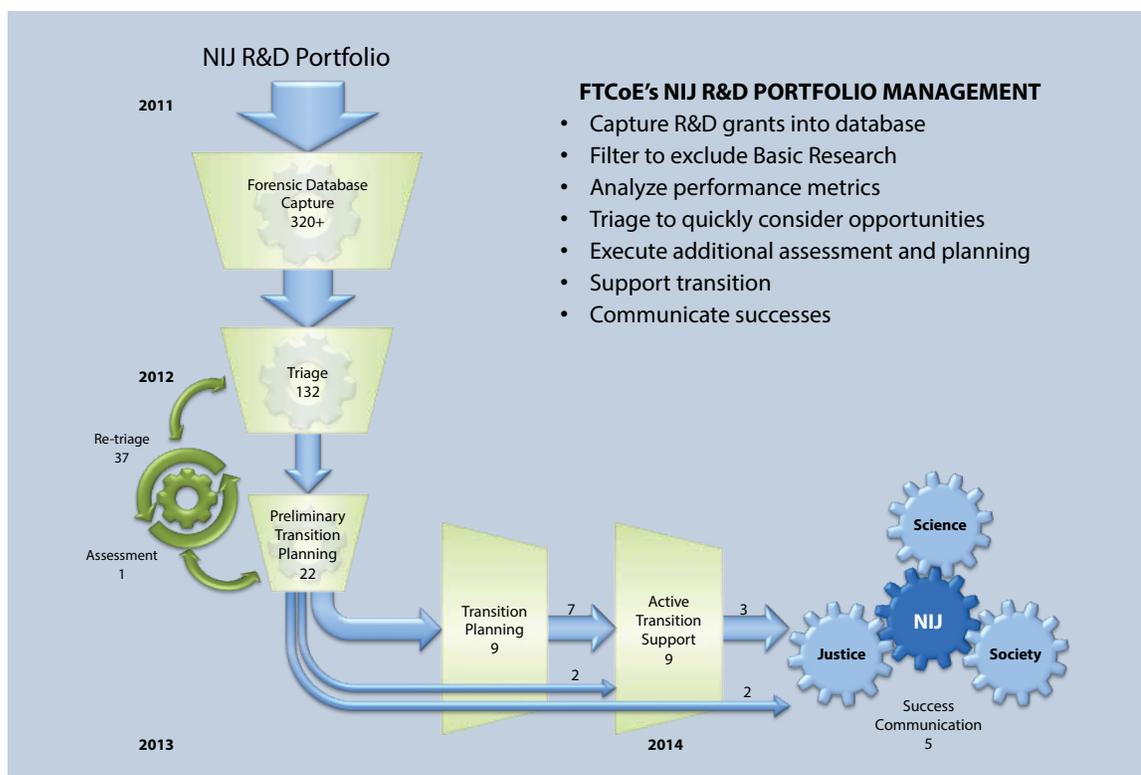
Figure 2. FTCoE's portfolio management process. Preliminary portfolio management captured and considered cases from FY2009–FY2011.

The numbers in the figure represent the first batch of grants to go through the process, with over 320 starting the process, and very few remaining by the active support stage. After triage, 22 cases received additional assessment, with 9 needing more tactical planning; 2 having obvious paths and moving straight to active support; and 2 moving straight to communication of their success. Of the 9 that had additional planning, 2 did not continue, and 3 went straight to communication their success. This figure is illustrative of how cases flow through the process.

ACTIONS & RESULTS

Database Development, Maintenance, and Use

In 2012, at the request of NIJ, the FTCoE established a Microsoft Access (MS)–based R&D Portfolio Database for collecting, analyzing, and maintaining performance metrics on NIJ forensic R&D projects and for assessing opportunities to effectively transition forensic technologies to forensic and criminal justice practitioners. This database was developed to store information needed to describe and monitor R&D awards more efficiently, provide performance metrics, and evaluate NIJ-funded R&D projects over time. Data collected in this database include information on dissemination activities, technology transition activities to date, and future technology transition plans.

Capture R&D Grants into Database

The FTCoE's initial step in the portfolio management effort involved the creation and maintenance of the R&D Portfolio Database.

As part of database development, original information obtained from NIJ indicated that the NIJ R&D portfolio is categorized by type of research (e.g., Applied, Basic); forensic discipline (e.g., Anthropology, Controlled Substances, Crime Scene, Digital, DNA, Fire and Arson, Entomology, Friction, Impression, Pathology, Toxicology, Trace, Question Documents, General); and grantee type (i.e., state/local, academic, non-profit, and federal).

Figure 3 summarizes the distribution of the first set of awards considered by the FTCoE by forensic discipline, with the top three represented by DNA, Friction, and Impression Evidence.

Filter to Exclude Basic Research

The FTCoE used the R&D Portfolio Database to consider projects by research type (Applied vs. Basic/Fundamental), age, and technology area. The focus of the first portfolio management effort was the Applied Research assets. **Figure 4** indicates that two-thirds of NIJ's R&D assets from 2009 to 2011 were Applied topics.
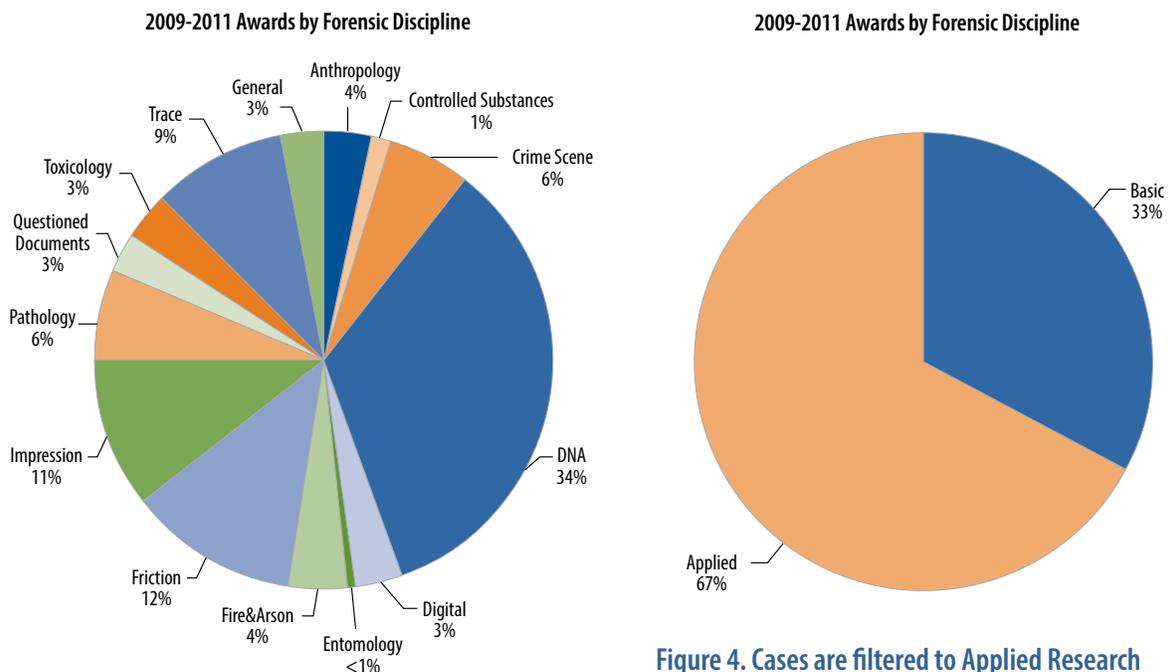
2009-2011 Awards by Forensic Discipline

Figure 3. Captured case distribution by topic

2009-2011 Awards by Forensic Discipline

Figure 4. Cases are filtered to Applied Research

In 2013, the FTCoE completed a second round of data collection with PIs from R&D 2006–2012 grants using this modified data collection approach. The second round of data collection also included about 20 additional grantees for which the FTCOE did not have contact information for the first round of data collection.[9]

The total number of NIJ Grantees in the database is now approximately 330.

Results from all metrics contained in this database are as follows:

- **Publications documented** – A total of 411 publications were reported by 125 responding grantees for an average of 3.2 publications per responding grantee. Responding grants had a median of 2 publications, with publications increasing over time, as shown in **Table 1**.

Table 1. Publications reported by responding grantees by calendar year.[a]

Calendar Year	Number of Publications	Mean Number of Publications by Awardee
2006	3	1
2007	25	2.8
2008	33	2.2
2009	34	1.9
2010	59	1.7
2011	61	1.6
2012	83	1.6
2013[b]	65	1.5
TOTAL	364	–

[a] Publications where the year of publication could not be determined were excluded.

[b] Fewer publications are shown for 2013 due to data being collected prior to the end of the calendar year.

- **Presentations documented** – A total of 1,004 total presentations were given by 169 responding grantees, for an average of 6 presentations per responding grantee. Responding grants had a median of 4 presentations. Thus, for the set of PIs that responded, which are a self-selecting set, some transition via knowledge transfer had already occurred. Presentations by responding grantees have also increased over time, as shown in **Table 2**.

Table 2. Presentations given by responding grantees by calendar year.[a]

Year	Number of Presentations	Mean Number of Presentations by Awardee by Year
2006	21	3.5
2007	60	3.5
2008	83	3.1
2009	91	2.6
2010	134	2.4
2011	233	3.1
2012	247	2.3
2013[b]	110	2.7
Total	**979**	–

[a] Presentations where year presented could not be determined were excluded.

[b] Fewer presentations are shown for 2013 due to data being collected prior to the end of the calendar year.

- **Transitions Documented** – Of the 91 PIs who responded, 25% (23 awardees) indicated that they had some type of successful technology transitioning of their project results (e.g., database developed and used by practitioners, implementation by one or more forensic laboratories, knowledge transfer).

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[9] The same collection period and collection reminder protocol was in place for both data collections (i.e., 3 months and several email reminders for follow-up). A possible contributing factor to a lower response rate in the second round of data collection was that the PI who answered the first-year effort did not respond to the second-year effort because he/she had nothing to add. In the future, we will add a means that the PI may indicate "No updates" in response to the data collection effort, and the PI will be dropped from the data collection to next year.

Assessment

The assessment phase of the portfolio management process uses a traditional innovation funnel as a portfolio management framework. The assessment process adds in additional expert review and opinion to continue to focus technology transfer resources on R&D that will benefit from transition support. This phase includes triage, additional assessment, and transition planning.

For early-stage R&D that is not yet mature, or that is not yet proven in forensic applications, the objective of the assessment process is to identify grants that could have a significant impact if allocated additional resources. For this early-stage R&D, the resource allocation required may be significant, but the potential impact warrants the investment of time and money for planning and support. The assessment process also reviews later-stage R&D that could have impact, such as for a niche audience or application. Typically, these efforts need a smaller amount of additional resources to complete validation or improve awareness.

Triage to Quickly Consider Opportunities

The R&D triage process gets its name from the medical industry, where triage is used to determine the priority of patients' treatments based on the severity of their conditions. The impact of triage—and why it is commonly used by technology transfer professionals— is its ability to focus resources where they will have the most positive effect. For NIJ, the FTCoE uses triage to quickly evaluate each R&D grant for anticipated impact, transition barriers, and potential results from transition support.

To ensure efficiency, the FTCoE's triage process manages sets of awards by time period (e.g., 3 to 4 years) and disciplines. The use of triage on large R&D sets helps to quickly focus resources on those assets with the greatest potential impact. The FTCoE staff use a defined process to filter grants by the parameters outlined previously (i.e., research type, age, and technology area). Case managers are assigned cases based on appropriate technical expertise for disposition, which enables relative comparison of a topic area by one person.

Each grant is given one of the three recommendations, as follows:

- **"GO"** – These are the best candidates for support. Key characteristics include an enthusiastic PI; proof of user interest and the potential to meet an articulated need; the identification of logical next steps that will increase transition success; and a large potential impact in terms of the impact's significance and the number of possible adopters.

- **"UNCERTAIN"** – Uncertain cases are grants where the research has not yet matured and, thus, the grants should be put back into the triage process (**HOLD**), or grants that require further assessment because more analysis is needed to make a decision (**ASSESS**). In 2013, grants for FY2009–FY2011 were re-triaged to determine if they could be moved into another category.

- **"LIMITED PURSUIT"** – These grants do not rise to the level of GO for various reasons, including that they do not focus on a forensic technology (e.g., method of development, refinement, or validation) and, thus, do not likely warrant active transition support.

The FTCoE team grouped the grants by technology area to assign to case managers. In most cases, a group of technology areas was assigned to one case manager, except for the dominant technology area, DNA, which was assigned to three case managers. **Table 3** shows how the cases were grouped for the initial triage effort.

Table 3. Case grouping for efficient triage as a front-end filter.

TECHNOLOGY AREA	NUMBER OF CASES Applied and Basic Research* (FY2009–FY2011)
Controlled Substances	9
Crime Scene	19
Entomology	1
Pathology	8
Toxicology	17
DNA	42
Digital	4
Fire & Arson	16
Trace	33
Impression	24
Question Documents	7
Anthropology	29
Friction	30
Trace	4

* Basic Research and Interagency Agreement Awards were removed from the FY2009–FY2011 triage process. The number of cases assigned to case managers is slightly higher than the total indicated (143 versus 132 awards) because 11 Basic Research awards were randomly assigned to the triage process to determine how the transition readiness of these awards compared to Applied Research awards. In all but one case, Basic awards were reviewed and recommended as having lower potential for transitioning. Often, this was due to the maturity of research (i.e., critical research questions still required before ready for adoption).

Execute Additional Assessment and Planning

As shown in the totals of the GO columns in **Table 4** (green columns), at the conclusion of the triage process, 22 cases were selected for continued analysis and support. Specifically, each case is given a case manager that then continues the additional assessment, which in effect also starts the preliminary transition planning:

1. Review documentation (e.g., the Triage Report and other materials).

2. Contact the PI. Consider the PI's thoughts on transition success to date, barriers, and if support could move the R&D toward impact for the forensic community.

3. Conduct primary[10] and secondary research[11] to recommend a transition strategy that might include one of the following (note that reviewers are familiar with these recommendation options):

   • Knowledge Transfer – Conducted via roundtable, training event, publications

   • Commercialization – Conducted via licensing, joint-venture, supply chain partnership, etc.

   • Strategic Alliance – Used for development or other transition benefit

   • Documentation of Transitioning Success – Used to show where PI can demonstrate use in community, track details

   • No Further Action – Indicates that PI is not interested, or that other insurmountable barriers exist

   • Other – Indicates inadequate information; outlines other recommendations.

4. Document findings and recommendations.

[10] Primary research includes discussions with thought leaders, market players, and Technology Working Group and Scientific Working Group representatives to gain input on the benefits, challenges, and ultimate opinion on the potential for the R&D asset. Primary research is typically in the form of scheduled phone interviews, but may also include face-to-face meetings.

[11] Secondary research includes review of sources such as academic literature, trade publications, presentations, and web-based sources.

Table 4. Summary of the results of the initial triage assessment, categorized by forensic discipline.

Topic	Total	Go	Uncertain	Limited Pursuit
Anthropology	7	1	2	4
Controlled Substances	3		2	1
Crime Scene	10	2	4	4
DNA	42	9	11	22
Entomology	1			1
Fire and Arson	2	2	2	3
Friction Ridge	13	4	3	6
General Forensics	2		1	1
Impression	12		7	5
Pathology	4	1		3
Questioned Documents	4		2	2
Toxicology	2	1		1
Trace	21	2	3	16
TOTALS	**132**	**22**	**37**	**73**

During every part of the assessment phase, the filtering process continues as finite resources are considered across cases. For each of the 22 cases, the FTCoE completed a Preliminary Transition Case Report to document the effort.

Support Transition

At this point in the portfolio management process, the focus shifts to active support, which includes

- Working to make a commercial entity aware of NIJ-funded R&D and the associated market need to enable a market supplier

- Connecting researchers to testing and validation partners

- Communicating about available "do-it-yourself" solutions.

All support efforts consider the following variables:

- **Transition Readiness Level (TRL)** – The FTCoE has revised the much-used TRL scale to reflect the realities of technology development for the forensics community. TRL is used to rank level of maturity and is one variable in considering the challenges associated with transition. The FTCoE TRL scale adapts these metrics to forensic applications to assist researchers, practitioners, and other stakeholders in the assessment of new technologies within this unique sector.

- **Transition approach** – As shown in **Figure 5** on page 11, a transition approach is built from various transition support options. Cases can have more than one transition approach that is appropriate and/or recommended. For example, a combination of an active transition effort and Success Story documentation (see below) may be necessary to drive knowledge transfer of the applicability and details on use of a technology. Information on commercial products that are available via successful marketing may also help drive adoption.

- **Estimated time to implement the Transition Plan** – This information captures the anticipated duration of an effort based on the amount of transition support, additional research and testing, and other factors (e.g., PI availability, FTCoE transition, funding).

- **Management team** – Indicates those individuals/organizations committed to driving adoption.

- **Current partners**– Documents status of partnerships.

- **Potential partners** – Documents the extent and type of appropriate partnerships.

- **Target user communities** – Considers where users might benefit from adoption and encourages complete thinking beyond the first and most obvious group.

- **Intellectual property (IP) management** – Documents any known or potential issues related to IP in terms of issued patents, pending applications, lapsed efforts, ownership, public domain, etc., that may be germane to transition efforts.

- **Manufacturing /scalability/knowledge transfer** – Considers issues related to scale up, production, and other realities of bringing a physical solution to users.

- **Funding requirements for plan execution** – Establishes level of effort and expense estimates for consideration of effort/impact for transition efforts.

- **Other requirements to stand up technology** – Reviews extra considerations that might be unique and need to be documented.
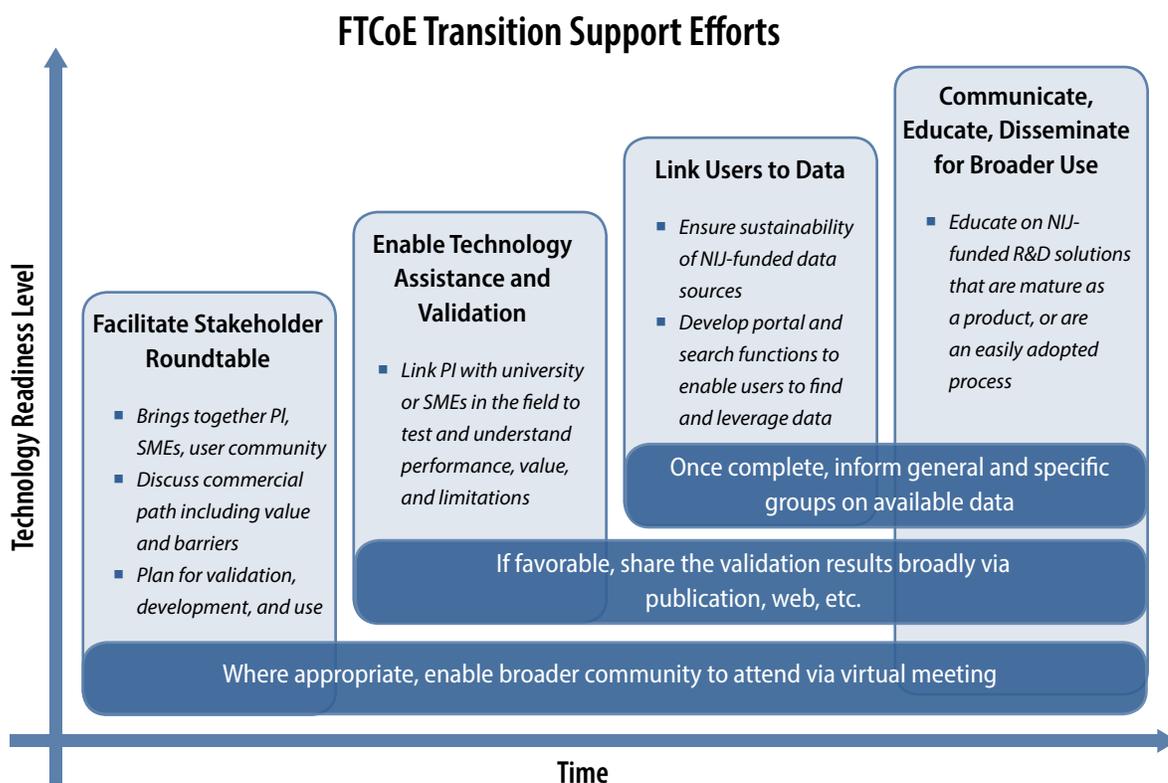
FTCoE Transition Support Efforts

Technology Readiness Level

Facilitate Stakeholder Roundtable

- *Brings together PI, SMEs, user community*
- *Discuss commercial path including value and barriers*
- *Plan for validation, development, and use*

Enable Technology Assistance and Validation

- *Link PI with university or SMEs in the field to test and understand performance, value, and limitations*

Link Users to Data

- *Ensure sustainability of NIJ-funded data sources*
- *Develop portal and search functions to enable users to find and leverage data*

Communicate, Educate, Disseminate for Broader Use

- *Educate on NIJ-funded R&D solutions that are mature as a product, or are an easily adopted process*

Once complete, inform general and specific groups on available data

If favorable, share the validation results broadly via publication, web, etc.

Where appropriate, enable broader community to attend via virtual meeting

Time

Figure 5. Technology transition support helps technologies reach broader use via commercialization and/or knowledge transfer.

Transition Support Options

Transition support is used to accelerate end-user implementation of new forensic technologies and methods. **Figure 5** presents the types of transition support efforts as discrete categories based on TRL and along a time continuum. Most efforts involve some level of communication, although communication about successful technologies is also important as knowledge transfer that drives continued adoption. Support options are chosen based on the technology readiness, and whether the end goal is to enable products, inform the field, and/or document success.

For each case, the FTCoE transition team moves forward with one or more of the following actions:

- **Facilitate Stakeholder Roundtable** – The goal of the Stakeholder Roundtable is to enable a community-type planning process for needed development and validation, as well as to define who will do what (stakeholders beyond the FTCoE) and when. The Stakeholder Roundtable allows commercial suppliers or various stakeholders to consider a grant's results or protocols, as well as the ultimate adoption of a technology. The roundtable accelerates the process by bringing together interested parties to plan for partnerships and progress. This forum is an excellent early "litmus test" of a project; for example, if a stakeholder forum is planned, and stakeholders are not interested in supporting it (e.g., investing time and travel), the potential benefits of the transition project may not warrant investment in the effort.

  A Virtual Roundtable adds the option for a broader forensics community to watch the discussion virtually via the Internet. Functionally, this format allows a larger audience to witness a discussion of selected SMEs, and enables SMEs some interface with the virtual audience in the form of questions and comments. This is a good tool for projects that need the stakeholder community (e.g., PI, market players, policy experts, users) to discuss the opportunity, but where a broader audience might benefit from watching the discussion to influence their own thinking related to adoption.

Examples of Virtual Roundtables conducted by the FTCoE in 2013 are shown in the text box to the right. Note that not all roundtables facilitated by the FTCoE to date resulted from the R&D portfolio management process. Because the R&D portfolio management process was being developed, the FTCoE was supporting efforts brought forward for transition support based on FTCoE and NIJ selection.

- **Enable technology assistance/validation** – Some transition efforts are based on a given set of equipment or transfer that is related to hands-on activities or demonstrations. For these cases, the goal is to facilitate a meeting whereby participants can watch a demonstration or bring samples for validation. Similarly, in limited cases, the effort may support a PI going to a practitioner's laboratory to assist with technology set-up and implementation. Enabling this type of real-time, collective user-community experience can assist with transfer and provide critical feedback to PIs to influence their future research and/or refinement.

- **Link users to data** – This transition effort develops portal and search functions to enable users to find and leverage NIJ data to ensure the sustainability of NIJ-funded data sources. Where appropriate, the FTCoE is working to consider how to better collect and "amplify" use of datasets to enable long-term or sustainable access, versus research funding that creates data that cannot be accessed broadly or beyond some limited funding window.

- **Communicate, educate, disseminate, for broader use –** As illustrated previously in **Figure 5**, all of the aforementioned support efforts include elements of communication. For example, a Stakeholder Roundtable may be made available to a wide audience via Web-based streaming. This allows for the broader community to be aware of emerging research and for a facilitated discussion that may help users offer insight or start to consider future adoption. With technology assistance and validation, if the results of the testing are positive, they may be shared more broadly. Similarly, once databases are complete and enabled for increased use via a portal, their availability needs to be communicated to improve awareness and drive for user adoption. In effect, all elements of transition support should eventually touch on communication and knowledge transfer to inform the field. The ultimate goal is to share results so that others can build on the R&D investment made by NIJ.

Another method that might be selected for this type of knowledge transfer is use of a webinar. Webinars can be used to educate on the use of new technologies or the adaptation of existing technologies to enhance effectiveness, efficiency, and safety within criminal justice agencies and forensic laboratories to improve overall operations. Webinars provide a cost-effective opportunity to transfer knowledge to a large audience. The FTCoE has hosted webinars to provide technical assistance and educational instruction to state and local agencies, as highlighted in the text box to the right.

FTCoE Virtual Roundtables in 2013

Example topics supported by FTCoE technology transitioning efforts include the following four meetings, which resulted in more than 2,300 practitioners receiving valuable information by having virtual access to early adopters of a technology:

- *Advanced Medical Imaging in Medicolegal Death Investigation* (924 registrants)
- *Applications of Higher Resolution Mass Spectrometry in Drug Testing* (676 registrants)
- *Using Genetic Results to Identify Human Remains* (531 registrants)
- *Gaining Speed with "Fast GC"* (150 registrants)

Transition Support for FY2009–FY2011 NIJ R&D Awards

Of the 22 cases coming out of triage, 9 cases are still in active support. **Figure 6** shows various FTCoE support efforts based on the goals of the portfolio management process. Some cases (those noted with *) were selected by the FTCoE and NIJ outside the R&D process, but fit within the framework. The 9 cases that came through the R&D portfolio management process include the following topics: Arson (1), Crime Scene (2), Data (3), and DNA (3). Some of these cases may still fall away as transition support moves forward and as barriers are better understood. However, all of these are believed to warrant the additional support to increase the likelihood that NIJ's R&D investment can have greater impact for the forensic community.

Analysis of 22 Triage "GO" Cases through Preliminary Planning to Support

One way to better understand the R&D portfolio planning process is to consider decisions being made at different stages (i.e., triage, assessment, planning). As discussed previously, the triage process resulted in 22 "Go" cases that were then ranked as High, Medium, and Low, and each of these cases garnered additional assessment and planning. The first step in this assessment was to interview each PI to update the status of the case, as well as to consider what transition successes had already occurred and where additional support might lead to greater adoption impact.

Figure 7 presents a graphical representation of the 22 "Go" cases and their estimated placement on a "quad framework" that considers opportunity (y-axis) and maturity (x-axis). In many cases, the PI interview documented existing transition success, which is represented with a green box

FTCoE Webinars in 2013

Example topics supported by FTCoE technology transitioning efforts include the following three webinars, which resulted nearly 3,500 practitioners receiving valuable information from early adopters and researchers of a technology:

- *NIJ R&D Research Series* – 8 webinars (2312 registrants)
- *Human Identification in Mass Fatality Incidents* (676 registrants)
- *Impression and Pattern Evidence Workshop Series* (459 registrants)

around each "success" case. Successes ranged from broad public dissemination of results/methods to commercially available products.
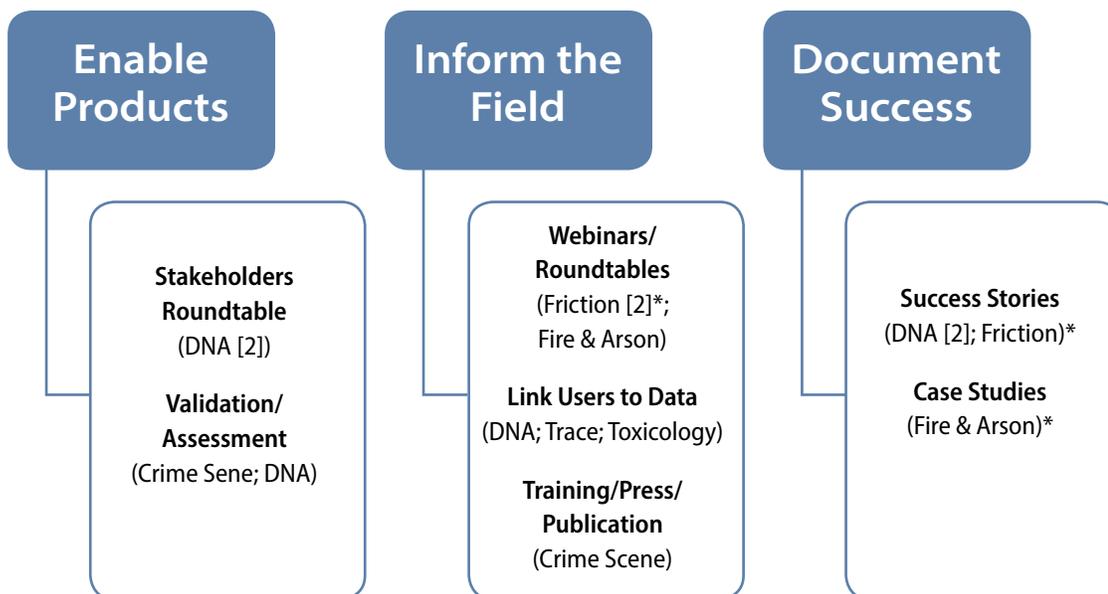

Figure 6. Existing FTCoE transition support cases.

Most of the success cases are located in the upper right quadrant—indicating they are more mature and offer greater potential impact to the community via adoption. It is important to note that in some cases, the documented success resulted in a decision that the case did not warrant additional technology transition support. In many of these cases, the FTCoE has started support for broader dissemination of these successes and plans to release them publicly upon approval by NIJ. One example format is a one-page flier; another is the use of webinars, such as the one completed for the ACE-V fingerprint process. In both instances, the FTCoE further highlights how these technologies were successfully transitioned from R&D efforts to implementation and use by the practitioner community.

Of the 22 cases, 9 were slated for additional planning and support. **Figure 8** plots these cases on the quad framework. As might be expected,

many of these are in the upper-left quadrant. This is logical because these cases have a high potential impact via adoption, but are less mature. Transition support may be able to help shift the cases to the right, with specific support that will increase the readiness level. In total, 15 of the 22 cases that moved from triage to planning have received, or are in process to receive, transition support that includes touting a success and/or driving to adoption.

By studying **Figures 7 and 8**, some key trends emerge:

- **Upper right quadrant** *(Mature with high potential)* **–** All cases have either a success noted or transition support planned. This illustrates the fact that mature cases with high potential adoption impact should either be touted as successes or pushed to greater impact.
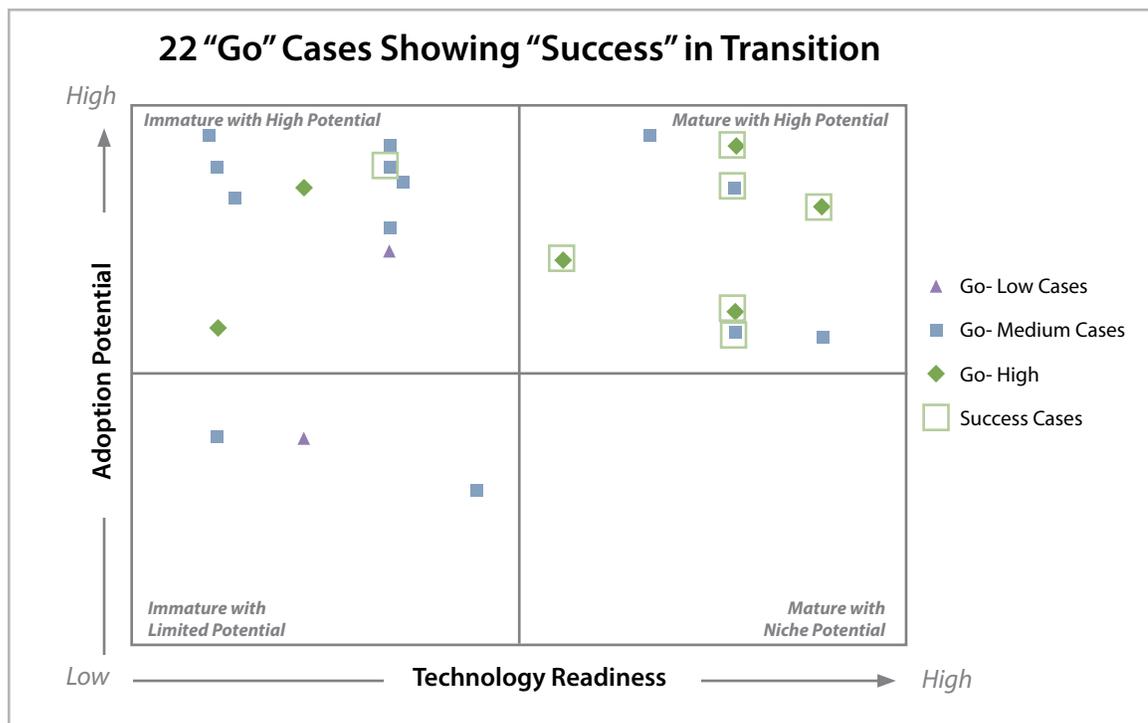

22 "Go" Cases Showing "Success" in Transition

High

Immature with High Potential

Mature with High Potential

Adoption Potential

▲ Go- Low Cases
■ Go- Medium Cases
◆ Go- High
▫ Success Cases

Immature with Limited Potential

Mature with Niche Potential

Low ——— **Technology Readiness** ——→ High

Figure 7. "Go" triage cases mapped to quad framework.

- **Upper left quadrant** *(Immature with high potential)* – Most of the cases that are more mature (farther right) have transition support being planned. This planning is to consider the best way to move the cases right, and up, and to gain the greatest impact. The one case that is between the circles was abandoned by the company developing it, thus leaving it at as an orphan technology, and in a position in which, presently, it is difficult for the FTCoE in provide assistance.

- **Lower left quadrant** *(Immature with limited potential)* – None of these cases garnered planning because, during assessment, each was found to have cost or market barriers. These may be overcome, which would likely have an associated increase in adoption impact and technology maturity.

- **Lower right quadrant** *(Mature with niche potential)* – No cases fell in this quadrant. Typically, cases in this quadrant warrant some level of support because the case has a high technology readiness and can be transitioned to a specific niche application.

Effort/Impact Considerations for Support Options

Because the FTCoE is not just executing a process, but also helping to develop and optimize it, the Center did a cursory effort/impact comparison on the FY2009–FY2011 cases based on their transition approaches (as outlined in the Preliminary Transition Plans). The cases going to complete transition support were rated on potential impact and level of difficulty (i.e., challenge ranking). The impact considered a project's ability to improve efficiency, reduce costs,
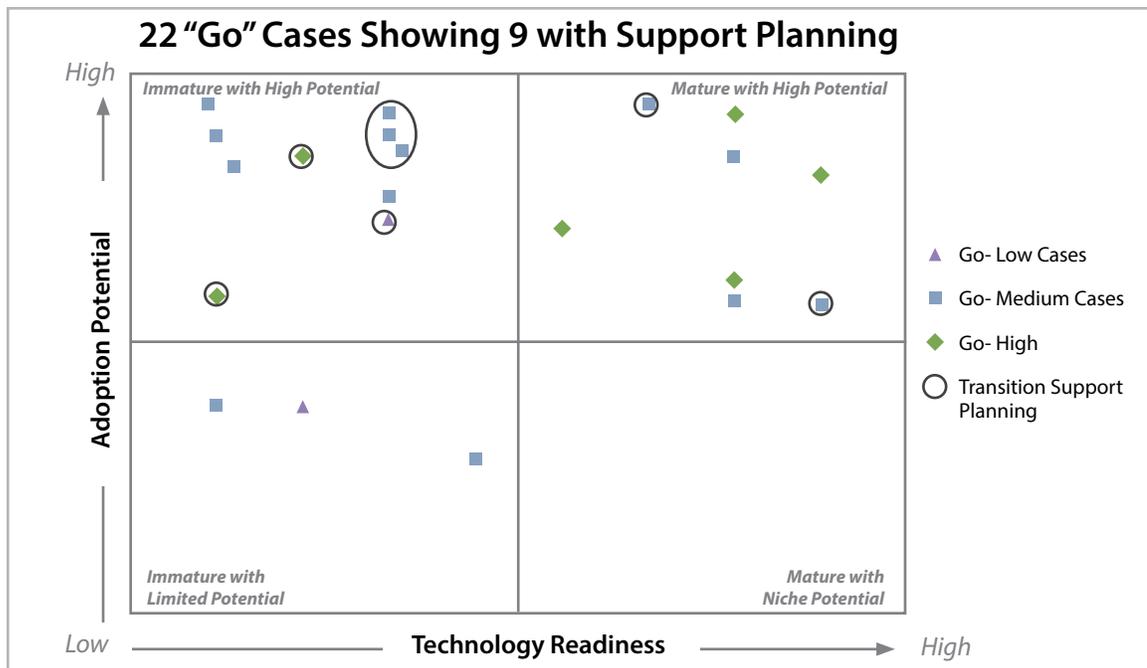

22 "Go" Cases Showing 9 with Support Planning

Figure 8. "Go" triage cases highlighting support selection.

and address the backlog issues that plague crime laboratories. The challenge ranking considered difficulties in persuading the forensics community to implement the technology and the challenges of working effectively with the investigator and potential partners.

The graph in **Figure 9** illustrates the transition approaches using the first group of cases as pilot data and considers the effort/impact tradeoff for various types of efforts. As would be expected, efforts related to communicating success (●) are not difficult and can have a solid impact in terms of education and communication that can lead to increased adoption. Knowledge transfer (◆) efforts that are similar to efforts related to communicating success (three blue diamonds clustered in the red squares) relate to technology demonstration, webinars, and other transfer efforts on the education end of the spectrum. Knowledge transfer efforts that are closer to tasks trying to enable use (■) relate to data-centric technologies, including databases. These latter efforts have higher impact and greater associated challenges.

This graph represents only the first wave of cases, yet the trends align with logical expectations. Also, the fact that there are no challenging but low-impact cases plotted is because of the filtering that has occurred prior to selection of the final group.
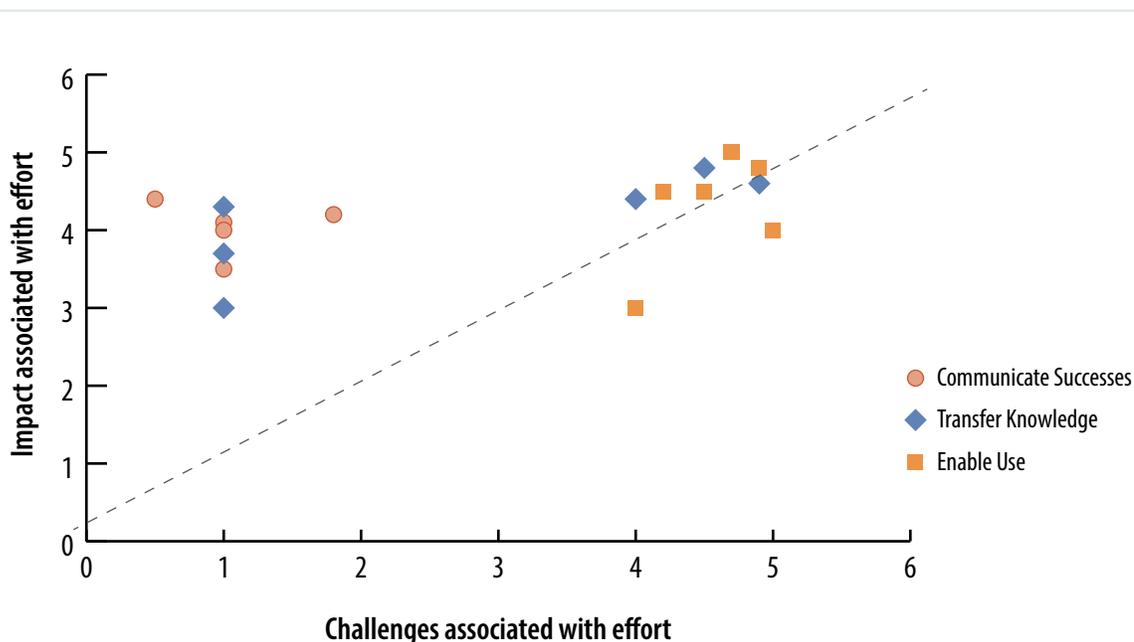

Figure 9. Effort/impact considerations for various support efforts.

BEYOND THE PROCESS

For the FY2009–FY2011 awards, the FTCoE portfolio management process can now shift to a steady-state focus of measuring and maintaining the technology transition readiness of awards. However, in addition to progress with the R&D portfolio management, it is imperative that the FTCoE continue to streamline and enhance the process, as well as seek opportunities to assist with technology evaluations and technology adoption and implementation by forensic laboratories and criminal justice agencies. In parallel to this ongoing R&D portfolio management effort, the FTCoE continues to support other technology adoption activities that go beyond this process.

Because the FTCoE's assessment and portfolio management was ongoing in 2012 and 2013, transition planning was determined largely on NIJ and community input. A report of the FTCoE executive summary of activities for the January 1, 2012, to November 13, 2013, performance period can be downloaded from the FTCoE website (https://rti.connectsolutions.com/p9mcvzui0w8/). This summary serves as a documented outline of the most significant forensic technology–focused FTCoE projects, milestones, and achievements to date.

During this period, the FTCoE has been able to disseminate funded research and deliver technology assistance and Web-based technology transfer workshops to more than 10,000 registered practitioners. In addition, the FTCoE continues to support the General Forensics and DNA Technology Working Groups, as well as various Scientific Working Groups and Forensic Science and Criminal Justice Professional organizations, by hosting onsite and online meetings. Finally, the FTCoE evaluated 8 new technologies; sponsored 6 technology transfer events, including hands-on workshops; supported outreach to 42 events; and made 19 presentations on technology to the criminal justice and forensic communities.

SUMMARY

To date, the FTCoE has collected performance metrics and developed and performed a multi-phase portfolio assessment and management process for over 400 NIJ R&D awards. The FTCOE has focused resources on 9 grants for which it is supporting a myriad of transition and adoption efforts during 2014 and beyond. These transition plans were created with input from the PIs and will include collaborative efforts with PIs and other practitioners and stakeholders.

The FTCoE will continue to work with NIJ's investment in R&D to improve a process to facilitate technology adoption and impact criminal justice operations in a positive manner. This process will continue to identify NIJ research "assets" and disseminate them to the broader forensic community. The ultimate goal is to enable products, inform the field, and communicate success to bring understanding and value to the forensics user community and more broadly, including science, justice, and society.