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OPENING THE BLACK BOX OF NIBIN: A DESCRIPTIVE PROCESS AND OUTCOME
EVALUATION OF THE USE OF NIBIN AND ITS EFFECTS ON CRIMINAL
INVESTIGATIONS
Executive Summary

Overview of NIBIN

The National Integrated Ballistic Information Network (NIBIN) is a national database of linked ballistics imaging terminals. The database is populated by images of tool marks from fired bullets and spent cartridge cases. Images of ballistics evidence in NIBIN can be compared and possible matches identified as probable hits. Probable hits are then visually examined by firearms examiners to verify a hit or match. A NIBIN hit links two crimes or events that were not previously known to be related.

The NIBIN program is managed and overseen by the federal Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), but local police agencies and crime labs, called NIBIN sites, operate the NIBIN equipment, process firearms evidence, populate the NIBIN database, and search for matches or hits. As of September, 2013 there were 150 NIBIN sites and the program had produced more than 50,000 hits.

Key Study Findings

Variations in the local implementation of NIBIN. As of 2012, the implementation of NIBIN by crime laboratories varied greatly on a host of metrics such as staffing, procedures, and policies. Sites also differed greatly in the quantity and types of inputs into NIBIN and the number of hits. For example, sites acquired a median of 4,719 brass inputs and 463 bullet inputs, and identified a median of 76 brass hits and 0 bullet hits but sites varied considerably in terms of inputs and hits. Some NIBIN sites were relatively unproductive and others highly productive. For instance, 29 sites produced no brass hits but eleven sites (4.5% of NIBIN sites) produced

more than 1,000 brass hits each. The productivity (in terms of inputs and hits) at NIBIN sites located in municipal areas was partially explained by the extent and nature of gun crime in each site's jurisdiction. NIBIN sites located in geographic areas with gun crime problems input a greater amount of evidence and produced more hits.

Delays in identifying hits. NIBIN sites differed greatly in the timeliness with which they processed evidence and identified hits. Some sites were faster than others and identified hits within a few days of a crime. Other sites produced hit reports so slowly that reports were not useful to criminal investigators. Among the 19 study sites, the median elapsed time between a crime and identification of a NIBIN hit was 101 days (mean = 337 days). Across these sites there was considerable variation in elapsed times. Some sites identified hits soon after the commission of a crime but other sites were beset by considerable delays in identifying hits. Some processing delays were imposed on labs by outside agencies or occurred as a result of cumbersome lab procedures. Within crime labs, for example, procedures for routing guns and evidence to the firearms section within crime labs created processing delays that most firearms sections cannot control.

NIBIN and criminal investigations. Criminal investigators rarely used NIBIN hit reports to identify unknown suspects in violent criminal cases and hits seldom assisted in the arrest of suspects. In 50% of the 65 cases sampled, the suspect was identified by investigators before the hit was produced. In 34.5% of cases the suspect had already been arrested by the time the hit was identified. Investigators credited a NIBIN hit with helping to identify the suspect in 9.7% of cases, and assisted with an arrest in 1.6% of cases. Investigators still found hit reports useful as background or to confirm (or disconfirm) other sources of information. NIBIN's utility in

assisting criminal investigators in suspect identification and arrest, however, is likely impeded by the considerable delays in identifying hits.

Strategic uses of NIBIN. NIBIN data were rarely used strategically to assist in the identification, investigation, and prosecution of criminal groups. When NIBIN was used strategically the results were impressive. One agency mapped NIBIN hits, which assisted greatly in investigations. Another agency used NIBIN hits through social network analysis. A third agency used NIBIN hits for RICO prosecutions of criminal gangs. Overall, however, these examples were the exceptions rather than the rule with NIBIN.

NIBIN's potential. NIBIN holds great promise as a tactical and strategic tool for law enforcement agencies. As a tactical tool NIBIN has potential to link crimes involving the same firearm, and help investigators identify suspects. As a source of strategic intelligence NIBIN has the potential to help law enforcement officers understand larger patterns of gun crime within and across communities. Despite its great potential, at present NIBIN is severely under-resourced at the federal and local levels. Additionally, its current configuration and data systems make it difficult for ATF to monitor the program's performance and make it difficult for local agencies to access NIBIN data, which could be used for strategic analysis. Little technical support is provided to localities and there is not an ongoing process of continuous system improvement allowing for the NIBIN program to remain innovative. In short, it is a tool with massive untapped potential due in part to chronic underfunding and due to a limited vision of its capacity.

Best practices in NIBIN implementation. Local sites that were successful at leveraging NIBIN for tactical and strategic purposes shared some common attributes. They all viewed NIBIN as a process involving people, inter-organizational relationships, and information sharing, and *not* merely as a piece of technology. High performing NIBIN sites strived to tightly couple

the relationships across relevant organizations. Successful sites also added information to NIBIN hits, such as geocodes and information from criminal records databases. This additional information improved the impactfulness of NIBIN hits for investigators.

Access and data quality as impediments to using NIBIN tactically and strategically. The increased use of NIBIN information by ATF and local law enforcement agencies is impeded by data access and data integrity issues. It is currently difficult for any agency to obtain NIBIN data in electronic form. There are also troubling data quality issues present in the NIBIN data. Data from some NIBIN sites list hits identified by other NIBIN sites, and there are issues with some fields in the NIBIN data. These integrity and access issues should be addressed, so that NIBIN data may assist in combating violent crime.

How the Study was Conducted.

The research team examined data from four sources. First, ATF provided usage data for all NIBIN sites on a per-month basis between June 2006 and July 2012. For each site, these files reported tallies (for both bullets and spent brass) of NIBIN inputs and confirmed hits. Second, ATF provided detailed data files on NIBIN hits produced by 19 sites. Each data file reported on hit dyads for a single NIBIN site over a five year period of time. Information included the nature of the offenses, their dates, the agencies involved, and the date when the hit was identified. After these files were cleaned they produced information on 8,004 hits. Third, every publically funded crime lab in the U.S. and every firearms section in a crime lab were surveyed by four waves of a mailed survey during 2012. The survey of lab directors produced a 33% response rate and the firearms section survey yielded a 49% response rate. Fourth, site visits to 10 NIBIN sites across the U.S occurred in 2012 and early 2013. Sites were selected to represent variation in their NIBIN performance, the type of lab (regional crime labs vs. municipal labs), and for geographic

diversity. Site visitors spent more than 167 hours on-site. Visitors toured crime labs, the firearms sections within labs, and police facilities. Interviews were conducted with crime lab directors, firearms section personnel, police commanders, and line-level workers, including analysts, investigators, and police officers whose assignments were relevant to the study. Finally, site visitors conducted interviews with detectives who had investigated 65 serious violent crimes that had been linked to a NIBIN hit report. Information from these interviews and from other sources was used to determine the impact of NIBIN hits in assisting criminal investigations.

Research Challenges.

The research team faced challenges obtaining the full NIBIN data from ATF. Due in part to budget cuts at ATF during 2011, which cut NIBIN's budget by 50%, the team only received a truncated set of data. The truncated data were adequate for examining NIBIN use and performance within 19 sites, but did not allow for a broader analysis of NIBIN hits. Analysis revealed that ATF NIBIN data require substantial screening and careful cleaning before they can be fully analyzed.

Policy Implications.

Based on the findings from this study, the research team makes the following recommendations. NIBIN is a program with great potential utility for combatting violent gun crime both tactically and strategically. The funding for NIBIN has been inconsistent due to fluctuations in federal appropriations and this variability has hindered the performance of NIBIN. It is not likely that the true potential of NIBIN as a tactical and strategic crime prevention tool can be realized without an infusion of additional resources. These resources should be directed at the strategic management and oversight of NIBIN sites by ATF, the timely production of NIBIN hits by NIBIN partners, and the tactical and strategic uses of NIBIN

intelligence by local law enforcement. ATF should consider addressing the data quality issues identified with the NIBIN data, since the dissemination and utilization of NIBIN data by local agencies is contingent on having reliable data.

Enhance ATF's Capacity to Monitor the Performance of Local NIBIN Sites Using Meaningful Metrics. ATF's management and oversight of NIBIN is hampered by information bottlenecks in NIBIN databases and an insufficient number of ATF personnel to analyze and disseminate NIBIN data to local agencies. Currently, the only performance indicators for NIBIN are the number of inputs and the number of hits. The number of inputs into a system is useful for gauging workload but is incomplete as a performance measure as it is not clearly indicative of any meaningful outcome like an arrest, a clearance, or a successful prosecution. Hits are a useful output measure but even they are not clearly tied to outcomes. This study reveals that the swiftness with which hits are produced should be included in a suite of performance measures. A standardized set of performance measures that are thoughtful and well-validated should be created so that ATF can rate the performance of NIBIN sites.

Foster the Strategic and Tactical Uses of NIBIN by Local Law Enforcement Agencies by Improving NIBIN Data and Making Them Available to State and Local Agencies. ATF should consider facilitating the diffusion of NIBIN data (data on hits and data on all evidence in NIBIN) to local law enforcement agencies in order to help local agencies use it for strategic crime analysis. The availability and utility of NIBIN data could be publicized by ATF. ATF could pursue a program whereby additional criminal intelligence, such as eTrace information, is added to all NIBIN information (not just NIBIN hits). ATF could then make the data easily accessible in electronic formats to local agencies and establish demonstration projects highlighting the strategic uses of NIBIN data. At the local level, local law enforcement agencies would benefit

from adding geocodes to NIBIN entries to facilitate mapping of NIBIN data and use of NIBIN data by crime analysis units. Additionally, hit reports (for investigators) should contain relevant information about the cases involved in the hit, such as geo-locations, the names of suspects and victims, possible gang affiliations, etc.

Promote the timely identification of NIBIN hits by local sites. At present some sites identify hits quickly while other sites do not. Delays in processing ballistic evidence are the single greatest threat to the utility of NIBIN as an investigative tool. NIBIN sites should systematically address impediments to rapidly processing ballistics evidence and identifying hits. Some processing delays are imposed on labs by outside agencies or occur as a result of cumbersome lab procedures. Many of these impediments are beyond the control of firearms sections and some are beyond the control of labs. Therefore, addressing these delays will require cooperation among various entities, and not just crime labs. Fostering cooperation and problem solving by a range of criminal justice organizations is difficult, but it is a vital task for making NIBIN successful.

Establish an Ongoing Program of Research and Development Intended to Discover Effective Practices and Improve Performance at NIBIN Sites. ATF should consider establishing a research and development program to improve the performance of NIBIN sites. This program could help discover, cultivate, stimulate, and test innovative practices at local sites. One of the pressing uses this program should address is how to best remove impediments to timely identification of NIBIN hits. Establishing a robust research and development infrastructure within ATF requires additional technical personnel, additional software and hardware, effective management for this new role, and the unflinching support of the organization's leaders. This

research and development program could help produce meaningful performance metrics for NIBIN and NIBIN sites, and it should help identify excellent sites.

Provide Funds and Resources to Establish NIBIN Centers of Excellence. ATF should consider establishing regional NIBIN Centers of Excellence and work with those Centers to influence the spread of effective practice in gun crime investigation. These Centers could provide training and technical assistance, host regional conferences, establish websites and publications intended to raise the level of professional activity, and create networking opportunities for those involved in investigative gun crime, such as criminal investigators, firearms examiners, and firearms technicians. Washington may not have all the answers but through regional Centers of Excellence, it may be able to stimulate regional training, technical assistance, networking, and other professional development opportunities centered around NIBIN, eTrace, and other ATF services. The selected sites would need to be accessible to visitors from other agencies so they can learn first-hand how to establish effective structures, policies, and practices for leveraging the power of NIBIN.

Addendum.

In September 2013, we briefed senior ATF management on the findings of our project. During this briefing ATF advised us that its new management team had taken substantial steps to improve the efficiency and effectiveness of the NIBIN program. These improvements were begun in 2012 and emphasize NIBIN as both a tactical tool and a mechanism for strategic crime analysis. These steps have included: (1) transferring control of the NIBIN program to ATF's Field Operations Directorate; (2) developing a new training program emphasizing the importance of promptly inputting and analyzing evidence; (3) implementation of improved data distribution practices; and (4) implementing more robust data integrity protocols. We question the

sustainability of these changes, however, given the severe fiscal constraints facing ATF. We are impressed with the progress ATF has achieved in recent months, and believe that ATF's management has taken steps to improve the operation and enhance the value of the NIBIN program.