

UNITED STATES DEPARTMENT OF JUSTICE
BUREAU OF ALCOHOL, TOBACCO, FIREARMS AND EXPLOSIVES
Philadelphia Field Division

Philadelphia
Firearms Analysis System (FAS)



Prepared by:
Alison Price-McGinnis
Intelligence Research Specialist
Bureau of Alcohol, Tobacco, Firearms, & Explosives

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FIREARMS ANALYSIS SYSTEM

TABLE OF CONTENTS

OVERVIEW	2
PHASE 1	2
PHASE 2	3
NEW TECHNOLOGY ARCHITECTURE.....	3
<i>Improved User Interaction.....</i>	<i>4</i>
<i>Improved Data Quality.....</i>	<i>4</i>
<i>Decreased Training Time</i>	<i>4</i>
<i>Web Services Support</i>	<i>4</i>



FIREARMS ANALYSIS SYSTEM

Overview

The Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) is a law enforcement agency within the U.S. Department of Justice that enforces Federal laws and regulations relating to alcohol, tobacco, firearms, explosives, and arson. ATF works directly and in cooperation with other agencies to suppress and prevent crime and violence; provide fair and effective industry regulation and revenue collection; support and assist Federal, State, local, and international law enforcement; and provide innovative training programs in support of its functions.

ATF established the National Tracing Center (NTC) as the sole agency responsible for tracing firearms used in crimes and recovered at crime scenes. Firearm tracing is the systematic tracking of firearms from manufacturer to purchaser for the purpose of aiding law enforcement officials in identifying suspects involved in criminal violations, establishing stolen status, and proving ownership. NTC communicates trace requests to the gun manufacturer, which is required to provide the name of the wholesale/retail distributor and the date of transfer. The chain of wholesale/retail transactions is then followed from the point of sale to an individual citizen. Further tracing is then at the discretion of ATF and dependent on the significance of the individual investigation and the availability of special agent resources. A trace analysis can assist with linking crime gun sellers, purchasers, and possessors across jurisdictions, including identifying suspects who may be serving as "straw purchasers" for those who are linked to gun trafficking and firearm violence.

Between 1997 and 2002, a joint project between the Philadelphia Police Department, the University of Pennsylvania Center for Youth Policy, the Cartographic Modeling Laboratory, DCANet, and the Bureau of Alcohol, Tobacco, Firearms & Explosives (ATF) was created to develop a web-based Firearms Analysis System (FAS). This initiative was funded by the Pennsylvania Commission on Crime and Delinquency (PCCD) and was intended to accelerate the transmittal of trace requests to the NTC by enabling detectives and officers to document the firearm and incident when the gun was seized, thereby creating an electronic record that would be sent to the NTC, which would, in turn, send back an electronic response. The goal was to eliminate the manual hand-written and fax system that was previously in place, integrate the trace process with their records management system, provide data analysis and visualization tools via secure intranet applications. Since its use, the FAS has catalogued and transmitted 5,000 firearms per year, dramatically increasing the speed with which trace results are returned to the officers requesting them and providing an important intelligence resource for both the Philadelphia Police Department and ATF.

Phase 1

In December of 2007, a team of ATF members from the Intelligence Unit were tasked with evaluating the status of the FAS application from functionality, usability, quality of data, to protocols established between ATF and the Philadelphia Police Department. The team spent several months reviewing and testing the application, meeting with key stake holders at the Philadelphia Police Department to obtain feedback and worked with members of the NTC in order to review the Batch Download/Data Transfer Function. It was determined that the FAS application desperately needed a technology update, the coordination and communication between ATF and the Police Department personnel needed to be improved, and a plan for the future of the system needed to be established to insure continued success.



FIREARMS ANALYSIS SYSTEM

In the early part of 2008, after identifying the most critical items that required attention within the FAS application, ATF and the Philadelphia Police Department approached the US Attorney's Office with a request for funding through a Project Safe Neighborhoods grant. After being rewarded funding, ATF worked with the Philadelphia Police Department and established a Phase 1 Project Team. The Project Team determined three core areas of focus: technology update, contractor support, and training/outreach.

- The Project Team worked with the original vendor, Avencia Incorporated, to migrate the data input and management screens to a more contemporary software development framework that would support a richer user interaction. In addition, the application was migrated to a .NET framework, the current industry standard for applications in a Microsoft Windows Server environment and the standard implemented for new applications at the Philadelphia Police Department. This effort to date has drastically improved the quality of data.
- In September 2008, an ATF contractor was detailed to assist the Firearms Identification Unit (FIU) with verification tasks for the FAS System. After a firearm is entered into FAS by a Detective, the weapon is transported to FIU and is verified by a member of FIU to determine if the information is accurate. Due to a lack of man power, FIU did not have the manpower to verify the information prior to its submission to the National Tracing Center. The ATF contractor has worked with FIU to improve this verification process as well providing them with an onsite resource. This effort has drastically improved the quality of data.

Phase 2

After a successful Phase 1, the Project Team determined additional enhancements to the system were critical. In January 2009, ATF requested additional funding from the US Attorney's Office through a Project Safe Neighborhoods grant. Funding was secured and Phase 2 will consist of four major components: Upgrade and enhance searching functionality, upgrade and enhance reporting functionality, upgrade and enhance data visualization methods, upgrade the mapping components and spatial visualization techniques.

New Technology Architecture

Since originally being deployed in 1998, the technology for creating and deploying web applications on Windows Server has changed substantially. Active Server Pages (ASP) was one of the first technologies to successfully enable data-driven web sites. The original version of the FAS application was based on that technology. The current technology standard at the Philadelphia Police Department is the Microsoft .NET Framework. By upgrading the FAS application to the .NET framework, we have been able to improve user interaction, provide stronger application security and enhanced performance.

To enhance the look, feel and interaction of the application, the Dojo JavaScript framework was used. The JavaScript framework allowed for increased interactivity in the application. Because JavaScript runs in the browser, there is an immediate response when the user does something on the page. Dojo Dijits, which are JavaScript based page controls, have allowed us to enhance the analysis, reporting and display of



FIREARMS ANALYSIS SYSTEM

information. Graphs and charts can be refreshed without having a full page refresh, this allows the user to modify the filter on the information and get an immediate response in either a modified chart or map view. The third major upgrade was migrating from ArcIMS to ArcGIS Server. The ArcGIS Server has allowed to create map services with a much richer cartography, as well as more advanced geo-processing that could not be performed using ArcIMS and ArcXML. The increased capabilities have allowed us to re-implement pathway maps showing the life cycle of a firearm based on the information returned from the trace.

The combination of these upgrades had a number of improvements in the application. Those improvements include:

Improved User Interaction

Dojo's Wijits and AJAX allowed the application to function more like a desktop application rather than a traditional web application. In moving to the newer technology and a rich interaction, the application was now able to:

1. Allow the user will interact directly with the page elements
2. Only part of the page will be updated instead of a full page refresh
3. More detailed pages reduce the navigation confusion
4. Feedback and confirmation can be handled before moving away from the page enhancing information input

Improved Data Quality

The information that is being collected and the business process of collecting and reviewing the firearms data is not changing. What will be changed is the usability of the interfaces that the information is being collected and reviewed in. By making the forms and individual inputs easier to understand and more intuitive to work with has provided improvements in the quality of the data that is being input into the application. The increased data quality has had an effect on the quality of the downstream analysis and reporting on that data.

Decreased Training Time

In leveraging technology upgrades, it allowed us to design the application to be more usable; it is easier to train the end users in working with the application.

Web Services Support

The National Tracing Center has expressed an interest in moving toward a service-oriented architecture (SOA) for providing external services to law enforcement agencies. There is a general architectural trend in information technology toward providing software functionality as suites of services. The .Net Framework has built-in functions for both creating and consuming web services that will enable use of these services to be far more effective.



FIREARMS ANALYSIS SYSTEM

Conclusion

The upgrades to the FAS application have significantly improved the quality of firearms trace information submitted to the NTC which in turn has increased the ratio of successful firearms traces. FAS users can search by a firearm's serial number, individual name, type of crime, date of recovery, and numerous other identifiers. It provides the user with the ability to generate various statistical reports regarding the number of traces submitted over time, the top firearms traced, the average time-to-crime rates, and more. The information obtained through FAS and through the tracing process as a whole will help to reduce gun violence.