



**United States Attorney's Office
Eastern District of Pennsylvania**



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PSN MAPPING & ANALYSIS PROGRAM (PSN MAP)

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Introduction

Criminal activity does not recognize jurisdictional boundaries. A significant problem within criminal justice agencies around the country is their lack of systemized cross-jurisdictional information sharing technologies and protocols. Each agency has their own “data island” with few links to other sources of information. The different agencies use different police record management software that code data in different ways and run on different operating systems.

In Eastern Pennsylvania there is a serious gun, drug, and violent crime problem. An extensive network of major roadways that connect the counties to New York City and Philadelphia facilitates the problem. Since the implementation of Project Safe Neighborhoods (PSN), a federally funded initiative, a substantial effort has been employed to create PSN Task Forces. This mechanism for federal, state, and local law enforcement to work in partnership to enhance the sharing of intelligence has had a great impact on the problem. However, the verbal exchange of crime information is limited in its long-term effect.

For several years, the United States Attorney’s Office, Eastern District of Pennsylvania (USAO) has utilized a Geographic Information System (GIS) to spatially track, display, and analyze homicides, firearms and drug crimes in the city of Philadelphia. This system relies upon coordination with the Philadelphia Police Department to provide the incident data used in the GIS system and it allows the USAO to analyze patterns of crime citywide. The USAO is able to determine if there are connections between investigations being conducted by local and federal agencies. In addition, it allows the USAO to ask intelligence-driven questions regarding criminal activity to defendants who are cooperating. The successful coordination in Philadelphia County needed to be replicated in the other eight counties to maximize data sharing among PSN partners.

The USAO created a district-wide, electronic system to collect and share Project Safe Neighborhoods data for the nine county task forces that were established in the Eastern District of Pennsylvania. The system provides the district attorney’s offices and local, state, and federal law enforcement agencies with an easy-to-use Web-deployed mapping tool that enables the users to gain a geographical perspective on firearm and homicide incidents within their own jurisdiction, bordering jurisdictions, and the entire Eastern District of Pennsylvania.

The USAO consulted with GeoDecisions, Environmental Systems Research Institute, Inc., and the Middle Atlantic-Great Lakes Organized Crime Law Enforcement Network (MAGLOCLN) in an effort to develop a strong team to assist with the development, implementation, and deployment of this system. In addition to the above partners, members of the PSN initiative have played a vital role in assisting with the development of the project.

In order to understand the development of this project, the reader must be familiar with the composition of the Eastern District of Pennsylvania, the Project Safe Neighborhoods Initiative, and the Regional Information Sharing System.

Eastern District of Pennsylvania

The United States Attorney’s Office (USAO) for the Eastern District of Pennsylvania is responsible for one of the nation’s largest districts covering 5,475 square miles with over 5 million people residing within its nine counties. The district is unique in its diversity, evident not only in its environment but also in its population. From a large metropolitan city to country farm to mountain town, the Eastern District of Pennsylvania represents a microcosm of the nation. Philadelphia, both a city and county, is the country’s fifth largest metropolis, housing over 1.4 million people, and the birthplace of our nation. The city is rich in historical significance including Independence National Historic Park, the home and resting place of Benjamin Franklin, and many other sites. Situated along the Delaware and Schuylkill Rivers, Philadelphia is a thriving seaport that is also noted for its world-renowned educational system of colleges and

universities, including four medical schools. Business is also well established in the fields of health care, government, insurance, and international travel and trade. Additionally, the city's economy is enhanced by its strategic location along the Northeast Corridor between New York and Washington and is serviced by multiple interstate highways, rail and ever-expanding international airport.

In contrast to the urban character of its largest city, the district's eight other counties, Berks, Bucks, Chester, Delaware, Lancaster, Lehigh, Montgomery and Northampton, reflect a mixture of settings and cultures. With the completion of a new interstate highway and the redevelopment of its regional airport, the Lehigh Valley cities of Allentown, Bethlehem and Easton are now in a position to reap the benefits of the suburban expansion that has been occurring across the country. Chester, Montgomery and Bucks counties have recognized significant growth in both residential and business development based in large part to the success of the technology and retail industries. Lancaster county, with its farms and rolling hills, remains home to the Pennsylvania Dutch, farmers, tradesmen and other artisans who supply all of the district's communities with fresh produce, new home construction, crafts and many other products. With this increase in highways and population, an increase in crime as occurred.

Project Safe Neighborhoods

Project Safe Neighborhoods is a nationwide commitment to reduce gun crime in America by networking existing local programs that target gun crime and providing those programs with additional tools necessary to be successful. The Bush Administration committed \$901 million to this effort over a three-year period. This funding was used to hire new federal and state prosecutors, support investigators, provide training, distribute gun lock safety kits, deter juvenile gun crime, and develop and promote community outreach efforts as well as to support other gun violence reduction strategies.

The effectiveness of Project Safe Neighborhoods is based on the ability of federal, state, and local agencies to cooperate in a unified offensive that is led by the United States Attorney in every one of the 94 federal judicial districts across America. Through unprecedented partnerships among federal, state, and local law enforcement, each United States Attorney will implement the five core elements of Project Safe Neighborhoods in a manner that is contoured to fit the specific gun crime problems in that district. The goal is to create safer neighborhoods by reducing gun violence and sustaining the reduction.

Every United States Attorney has been directed to certify to the Attorney General that a comprehensive gun violence program has been implemented in the United States Attorney's district. Each program consists five core elements:

PARTNERSHIPS
STRATEGIC PLAN
TRAINING
OUTREACH
ACCOUNTABILITY

Regional Information Sharing System

The Regional Information Sharing Systems (RISS) Program is composed of six regional centers that share intelligence and coordinate efforts against criminal networks that operate in many locations across jurisdictional lines. The Bureau of Justice Assistance (BJA) provides funding oversight and program management for the RISS Program, which is federally funded. The Middle Atlantic-Great Lakes Organized Crime Law Enforcement Network (MAGLOCLLEN) is

located in Newtown, Pennsylvania and serves Delaware, Indiana, Maryland, Michigan, New Jersey, New York, Ohio, Pennsylvania, and the District of Columbia, as well as Canada and England. The Drug Enforcement Administration; Federal Bureau of Investigation; Internal Revenue Service; Secret Service; Customs; and Bureau of Alcohol, Tobacco and Firearms are among the federal agencies participating in the RISS Program. In 2002, U.S. Attorney's Offices nationwide became members of RISS through the Executive Office of United States Attorneys. The goal of the PSN project team was not to duplicate any existing data sharing initiatives. The Executive Office of the United States Attorney encouraged the EDPA to utilize the RISS system in this mapping effort as it offers a secure network that is password and smart card protected and meets all Department of Justice security requirements.

PSN MAP

To facilitate the successful relationships established between federal, state, and local law enforcement under the PSN initiative, the project team held joint application design sessions to begin to develop the parameters of an information technology system that would later evolve into the Project Safe Neighborhoods Mapping and Analysis Program (PSN MAP). The PSNMAP is a cross-jurisdictional crime mapping and analysis system that succeeds because it leverages the existing crime reporting procedures, security trust model and data warehousing infrastructure of MAGLOCLLEN and the RISS system. This universal system allowed the development team to construct an application that uses three major components: the RISS data warehouse, ESRI's ArcWeb Services and the functionality available within the .NET framework.

The RISS data warehouse is exceedingly large and, for the purposes of crime analysis, had a greater amount of data than was required for this application. So, to narrow down the necessary data that was essential, the development team worked with the MAGLOCLLEN IT staff to define the parameters of a materialized view with RISS. A materialized view is a virtual table within a database that can be constituted on-demand when a user interacts with the database via an application. A materialized view pulls from the production database only those fields and data required to satisfy the user's needs in a pre-defined table structure. This materialized view pulled data from only two primary tables, along with various look-up tables. This view also stores the unique identification number associated with each incident, which becomes the index key field for the PSN MAP. Finally, this view is refreshed each day to take advantage of data submissions that have occurred during the previous 24 hours.

While considering a regional crime analysis application, a major hurdle was obtaining available, inexpensive regional spatial data sets that provided a street file with the inherent accuracy for geocoding and enough other context layers to provide rich base mapping. The solution to this problem became evident with the exploration of ESRI's ArcWeb Services. For an exceedingly small transaction fee, incidents that had been sent to MAGLOCLLEN could be located using the ArcWeb geocoding service. Only the spatial characteristics of the records were therefore stored on a server in Redlands, CA, along with the unique ID that served as a key to the sensitive attribute data stored behind the secure firewalls of MAGLOCLLEN. ArcWeb Services also provided a base mapping service using GDT data. This cartographically sophisticated dataset provided an excellent backdrop upon which to place the crimes that were selected by the user. Utilizing ArcWeb services eliminated the need for the USAO to purchase a multi-state dataset that could have resulted in an insurmountable roadblock to the project.

The PSN MAP is based on the primary concept of crime analysis: the user desires to ask a question and obtain results that are displayed and visualized in different ways. The primary interface of the PSN MAP provides the user with a multi-tab form, built using ASP.NET. The form allows the user to complete a Quick-Picks search page or a set of more complex Who, What, Where, When and How search pages. The Quick-Picks search page is a simple form where the user determines general offense groups to search for, over a general time period,

within a jurisdiction, that may involve an individual or a weapon-type. The Advanced Who, What, Where, When and How search pages provide more query-refining controls that allow the user to narrow down the parameters of the search to a very complex, unique question. The user can then view the results of the query in a general table listing that provides six key attributes or on a map with base map context data.

The real power of the application is inherent in its multi-jurisdictional approach. Users can define a search area that crosses township, city, county or state boundaries. Patterns of crime along transportation corridors or along the interface between urban and suburban locations become much more visible as a result of this analysis. The PSN MAP provides other functionality that allows the user to view all of the attributes captured within the RISS materialized view and also provides a link back into RISS itself from within the PSN MAP, leveraging the pointer-index system paradigm of RISS. Future functionality that is being developed for PSN MAP includes temporal charting of the events, buffering analysis and more effective links from PSN MAP to RISS. A greater number of users are being introduced to PSN MAP each month with the hopes of broadening the participation and use of the program to multiple states.

Lessons Learned

Over the life of this project, several lessons have been learned. The process of extracting incident data has been problematic due to the plethora of RMS database standards. The past solution was to develop a custom database translation tool that resided within each department. This solution was determined unviable. Future enhancements include developing a prototype tool that facilitates the transfer of local police department incident data extracted from their records management system (RMS) to MAGLOCLEN for the upload of this data into RISS and, therefore, the PSN MAP database. Using the Office of Justice Planning's Global Justice eXtensible Markup Language and other secure web services protocols, the solution currently being developed exploits cutting edge Web-based development tools to create a Web-based service with which local police departments can submit their extracted incident data, automatically translate it into the RISS standard format, and then automatically uploading it into RISS.

Another lesson learned was the limitations of some of the components of the technology strategy developed at the beginning of the project. Due to the success of the project, a greater amount of incident data is being stored within the RISSNet than originally anticipated. The utilization of a materialized view as a virtual, temporal table that is created on-the-fly and then dissolved is a strategy that is proving infeasible for the future. As more data is available and a greater number of users tax the system, this technique is proving problematic, purely because of the limitations of SQL Server materialized views. A modification to this strategy is currently being explored.

In conjunction with this back-end database issue the success of the program also raised in an interesting limitation with ArcWeb Services. As more users explored the crime data stored within the database and more users from regional law enforcement began participating, the users of the system were asking general questions of a more regional nature. The resulting record sets that needed to be developed and provided to the user were becoming larger and larger. Unbeknownst to the development team ArcWeb Services places a limitation of the number of records that it can issue within a single transaction. The user requests were exceeding this threshold. After discussions with the very helpful ArcWeb Services development team, however, a looping response strategy was quickly devised and implemented to resolve this issue.

Conclusion

The Regional Crime Mapping and Analysis system will allow the USAO to collect the required PSN data in a more efficient way and allow the USAO and PSN partners to map crime problems within their areas and across jurisdictional boundaries. The system will facilitate the sharing of intelligence, interagency communication and cooperation, and lead to a reduction in redundancy across law enforcement agencies. This will enable managers to make more informed decisions to allocate resources and provide a regional and federal solution to chronic law enforcement problems. By utilizing a Web-deployed application, the user will only need Internet Explorer and access to MAGLOCLN's secured-network, which virtually all-major police departments and district attorneys offices already have.

Completing a project of this magnitude a few years ago would have cost a considerable amount of money. Due to the changes in technology, specifically ArcWeb Services, the Project Safe Neighborhoods Mapping and Analysis Project can be achieved for substantially less. The success of this project depends upon the participation of all PSN partners to provide selected crime data in a timely fashion. Those counties will be able to display this data on maps, which encompass not only their own county, but also all other counties in the district.

PSN MAP has the potential to incorporate data from police departments in adjacent areas, including New Jersey, Delaware and New York City. With newly proposed analysis tools and the continued support of MAGLOCLN, PSN MAP will have the ability to identify criminal elements and offense patterns along the major transportation routes that extend from New York City to Trenton, N.J., Camden, N.J., Philadelphia and Wilmington, Del.

PSN MAP provides innovative ways to facilitate communication and cooperation among law-enforcement agencies. It reduces data redundancy while helping to foster relationships among local, state and federal officials. As a result, law-enforcement officials are able to make more-informed decisions to allocate resources and develop, coordinate, and provide a regional and federal solution to crime and law-enforcement problems.