Inter-jurisdictional Law Enforcement Data-sharing With GIS.

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Abstract:

Examples of use of GIS to create and disseminate geospatial data among multiple law enforcement agencies is the same metropolitan area, county, region, state and between national police agencies will be presented. Cases illustrating application of GIS and related technologies to the analysis of crime patterns, to specific series of homicides, to deploy resources and to inform the public will be highlighted. The benefits derived from using a common set of geospatial data and common database schema and the centralization of activities such as geo-coding will be emphasized. Issues impeding intra-jurisdictional use of GIS such as confidentiality concerns, cost-sharing problems and lack of common approaches to data management will be discussed. Selected material from the presenter's new book published in December 2002 by Taylor and Francis of London will be supplemented with additional examples from the United States, Canada and Europe.

Body of Paper

Introduction.

Geographic information systems and other related geospatial technologies, in particular digital aerial photography and global positioning systems, are fining ever more frequent applications in various aspects of law enforcement. By-in-large most users of GIS in law enforcement are municipal police departments in relatively compact urban areas. In that situation, the need to share data with other law enforcement jurisdictions or cooperate closely with other governmental agencies has generally been rather limited. However, there are a growing number of situations where it is beneficial or even essential for law enforcement agencies to share data, including data with a significant spatial component, either across jurisdictional boundaries or with other branches and elements of government. Broadly speaking, the situations where inter-jurisdictional data sharing related to law enforcement is desirable are where their are crimes that span jurisdictional boundaries, where there are multiple cities in close proximity within a metropolitan area, where a regional law enforcement entity such as a regional metropolitan police department or county sheriffs department wishes to use GIS, and where a state or national law enforcement agency wishes to use GIS. Examples where intergovernmental sharing of GIS data is desirable also frequently exist. These situations include where a police department lacks the internal expertise to develop and maintain a GIS, but another component of local or regional government has that expertise, where some aspect of law enforcement application of GIS impinges on the bailiwick of another agency of government or where another agency of government can benefit from geospatial data collected and managed by a law enforcement agency and that agency is willing to release that information for the benefit of the community. In this paper examples of each of these situations will be provided. Most cases specifically involve utilization of GIS software from ESRI, but examples of use of GIS software provided by other vendors will also be cited. After citing examples of successful cooperation in sharing of GIS data between jurisdictions and components of government, examples of the continuing barriers that exist to furthering this type of generally mutually beneficial cooperation will be provided.

Crimes Spanning Jurisdictional Boundaries.

It has been observed that just as criminals are frequently oblivious of legal restrictions they are likely to be equally contemptuous of jurisdictional boundaries and niceties. This is a valid contention with respect to casual or drug-crazed criminals of the lowest order, it is not however valid in many instances. For example, organized gangs of criminals engaged in robbery or confidence schemes frequently make a point of moving from one jurisdiction to another. The same can be said of the well organized rings of prostitutes that circulate call girls around the nation or groups like the "Irish Travelers" or "Gypsies" that are highly mobile. International money launderers, drug traffickers and terrorists also take advantage of jurisdictional impediments in many cases, particularly

weak national and regional governments and porous borders in places like Latin America, Eastern Europe Pakistan and southern Italy.

Specific examples of this type of behavior include organized serial killer Kenneth McDuff who moved carefully from county to county in Texas and the shotgun wielding gang of jewelry store robbers that specialized in robbing suburban areas of Maryland and northern Virginia in the 1990's. In this latter case GIS was used to see the overall pattern of related robberies despite their being located in multiple Counties. Another similar example is presented by the organized group of home burglars operating in the small independent enclaves of Memorial Park Village, Hunter Creek Village, Bunker Hill Village and Piney Point Village in the Houston, Texas area in recent past. GIS has been used by the author to map burglaries in these four enclaves and identify proximity of target homes to the boundaries of the areas under the jurisdiction of the small contract police force that patrols this region.

Even if the intention of the criminal is not to avoid retribution from law enforcement by crossing jurisdictional boundaries, such may result during the attempt to elude capture. The annals of criminal justice are replete with examples of criminals that have fled across a jurisdictional boundary to avoid capture or prosecution. The recent case of Mr. Luster heir to the Max Factor cosmetic fortune fleeing Ventura County, California to Puerto Vallarta, Mexico (where he was apprehended by a bounty hunter) is a case in point. An example where GIS came into play in such a situation was one where a *car-jacker* fleeing from the Post Oak Mall in College Station, Texas with police in hot pursuit crossed into the jurisdiction of the Brazos County Sheriff then along a highway where Texas State Troopers were involved and the chase terminated in the adjacent community of Bryan, Texas. Since an officer involved shooting and a collision between a police vehicle and the automobile of another motorist occurred it was felt necessary to create a map showing the route of the car chase. Unfortunately, the College Station Police Department lacked geospatial data for areas outside their jurisdiction; they therefore choose to use the GIS capabilities of the Brazos County Appraisal District to generate a map covering these multiple jurisdictions. This is an excellent example where not only were multiple police jurisdictions involved, but also another component of government specifically a countywide appraisal district whose cadastral data also included the street centerline data that was essential to mapping the events surrounding the car-jacking and subsequent pursuit.

Complex Metropolitan Areas

Where a single autonomous city exists with a suburban fringe and a surrounding rural area with the urban area under the jurisdiction of a municipal police department and some portion of the suburban area and all of the rural area being administered by a County Sheriff, inter-jurisdictional issues related to law enforcement are minimal. However, many urban regions in the United Stated do not fit this neat pattern. Three cases in point are the Washington, D.C., Los Angeles and Houston, Texas metropolitan areas.

In Washington, D.C. there is a tremendously complex situation with a Federal District, Two States (Maryland and Virginia) and multiple counties and cities in the regions (with Baltimore being the largest). The problems of sharing data among these numerous federal, state, county and municipal law enforcement agencies has led to the adoption of GIS as a tool to analyze and coordinate law enforcement activities. In particular, drug trafficking in the region has been actively mapped on a cooperative basis. GIS also played a role in mapping the activities of the Washington, D.C. area sniper; another example incidentally of a series of crimes occurring in multiple jurisdictions.

Law enforcement data analysis in Los Angeles, California has only one state involved and no federal district, but it has perhaps even more cities, many of these cities have their own GIS capabilities within the Police Department, as does the Los Angeles County Sheriff's Department. Where the need for GIS cooperation became most evident in Southern California was with respect to coordinating drug interdiction. In this case the solution was a GIS equipped "war room" strategy. The State Attorney General's Office along with Federal counter-drug support played a role in its creation. The sprawling character of this area, along with the large size and population of the Counties present in southern California which include the highest population (Los Angeles with approximately 8 million residents) and largest area (San Bernardino with an area of 19,600 square miles) in the U.S. This fact has led many of the county sheriffs in the region to adopt and use GIS and this has in turn facilitated sharing of GIS data across jurisdictional boundaries, particularly between the counties and the regional drug task forces and between countries and cities located within those counties.

Houston Texas is an example of another sprawling metropolitan area with significant issues related to sharing geospatial data. Houston is a city that has outgrown its surrounding county, the incorporated area of Houston covers portions of three counties Harris, Fort Bend and Montgomery Counties, Houston is adjacent to 28 cities with their own Police forces, and no fewer than seven cities are entirely surrounded by miles of incorporated city of Houston jurisdiction. Several of these cities have reputations as "speed traps". But this is a minor issue, sharing data, cooperation and even knowing where the boundaries actually are present is a bigger problem. Unfortunately there is no regional crime mapping solution at work in Houston and only two of 110 law enforcement jurisdictions in the region are using GIS. The need to better coordinate numerous agencies to respond to homeland security threats is empowering a regional solution being developed by the regional council of Governments, resistance particularly divvying up the costs involved is impeding development of an integrated approach however.

Regional Crime Mapping by Sheriff's and Metropolitan Police Agencies.

Counties that have a significant degree of urbanization or a large spatial extent have found that using GIS in a sheriff's office has many benefits. Sometimes that GIS

development effort sweeps up incorporated municipalities that are located in the County, and a truly County-wide crime mapping program is initiated. Examples of County Sheriff's Departments using GIS in the U.S. include the San Diego, Los Angeles, Riverside, San Bernardino, and Ventura County Sheriffs in California, the Harris and Nueces County Sheriff's in Texas, the Bernadillo County Sheriff in New Mexico, and the Ada County Sheriff in Idaho and the Pinellas County Sheriff in Florida. These last two counties are making an effort to develop county-wide GIS-based crime mapping.

In the case of Pinellas County, Florida, the GIS mapping solution from AutoDesk is being employed, while in Ada County, Idaho the Sheriffs Department is using ESRI software to map crime in the unincorporated area as well as support crime mapping in Boise and two other incorporated cities. County-wide crime mapping makes a lot of sense in counties that are urbanized such as Harris County, Texas or Los Angeles County or are large such as San Bernardino County, California. This is especially true if there are many small law enforcement jurisdictions with overlapping boundaries. In this situation, the County Sheriff can serve as a logical central repository and geo-coding center for crime mapping, with the municipal law enforcement agencies accessing the county-wide crime map and submitting incident reports over a web-based application.

A related form of regional crime mapping exists in areas where there is a municipal police department that has taken on the responsibilities of becoming a metropolitan police agency. Thus a whole metropolitan area may served by a single joint city-county entity. In this situation, a logical outgrowth of that arrangement is to do crime mapping for an entire metropolitan region. Several of the most sophisticated users of GIS in the law enforcement community fit this pattern. These include the Las Vegas, Nevada Metropolitan Police Department and the Charolotte-Meklingberg North Carolina Metropolitan Police Department. The situation in Las Vegas is a little complicated, since independent police departments exist inside Clarke County, these include North Las Vegas, Henderson and Boulder City. However, the Las Vegas Metropolitan Police Department does provide policing and map and use GIS to spatially analyze crime patterns outside the city limits of Las Vegas itself. This is fortunate since the famous "Las Vegas strip" is in an unincorporated portion of Clark County, but it is in an area of continuous urbanization that is contiguous with the City of Las Vegas itself.

Regional crime mapping is common in Great Britain where entities such as the West Midlands and South Yorkshire and Thames Valley Constabularies are mapping crime incidents throughout their regional jurisdictions. There regional policing has been found to be a solution to a host of jurisdictional problems and this more centralized approach to law enforcement has in turn facilitated regional crime mapping and analysis. The existence of the Ordnance Survey digital base-map with building footprints in addition to streets defined by curbs (not centerlines) and attribute data that identifies over 400 million features including over 30 million Royal Mail postal addresses, greatly facilitates geocoding incidents compared to the interpolation methods needed in the U.S. or most other areas.

Use of GIS by State Government Law Enforcement Agencies.

Just as county governments have lagged municipal governments in use of geospatial technologies in law enforcement, State Governments have proven even less likely to use GIS than county government entities in the context of statewide crime mapping or other law enforcement related purposes. Exceptions include Delaware (an Intergraph software user) and to a lesser extent Illinois (an ESRI software user).

Illinois should be a candidate for widespread use of GIS since use of GIS is deeply rooted in its largest city; Chicago and since the Illinois Criminal Justice Information Authority has been in the forefront of computerizing crime records and has developed tools for spatial analysis of crime patterns. Nevertheless, the early start taken by the Illinois State Police in crime mapping and analysis (which included installation of GPS –based automatic vehicle locator systems in patrol cars and using GPS technology to locate accident locations, and arrests) has subsided due largely to recent budget cuts. Examples of inter-jurisdictional sharing of data between the Illinois State Police and other agencies include support for tracing guns involved in drug and gang related shootings and support for the City of Springfield in crime mapping and analysis. Delaware is the best example of state wide crime mapping.

Delaware uses web-based application developed using Intergraph software to provide for real-time crime reporting and context sensitive mapping of crime. The reasons this has happened involve Delaware's small size (second smallest state in area) and the fact that except for one county, all law enforcement outside the thirty nine incorporate cities is provided by the State Police. Since the mission of the State Police extends beyond traditional duties, such as law enforcement on state highways and interstate highways, to include local law enforcement; mapping crime incidents on a statewide basis seemed a logical extension of the State Police's activities. Since the system is centralized and web-based it is a relatively easy matter for the municipalities and the single county sheriff to submit incident reports in a common format and then be able to view context sensitive maps of their boundaries, street centerlines, and selected crime incidents by type and by temporal criteria.

Since most State Police Departments do not have local law enforcement responsibilities, they have generally not adopted the added responsibility of mapping crimes that are beyond their jurisdiction. However, there are some types of incidents that may occur within local or county jurisdiction that nevertheless are mapped by state entities. These include automobile accidents and or automobile fatalities as well as drunk driving related accidents. Since these types of accidents are typically reported to state agencies, there are several states that are mapping them on a state- wide basis. This data that is them available to local or county jurisdictions, if these choose to avail themselves of it. Unfortunately, the data is frequently reported by highway mile, so the spatial accuracy is questionable. Examples of statewide automobile accident mapping being performed by State Police agencies include the efforts of the New Mexico State Police. The State of Iowa is doing similar work, although there it is performed by the Iowa Department of Transportation. State governments in Australia are also active in state-wide crime mapping, at least in New South Wales, and Victoria.

National Level Crime Mapping.

Examples of nation-wide crime mapping are limited because of the shear size of most nations. Examples of nation-wide crime mapping include mapping of calls for service and crime incidents by the National Police of Iceland. In Iceland the capital city holds the majority of the population for this sparsely populated country so extending crime mapping beyond the capital involves a relatively minor increase in effort. To find other examples of nation-wide crime mapping one must look to selected areas of law enforcement responsibility. So for example, in Taiwan, the National Police Agency in conjunction with the National Fire Prevention Bureau is mapping all structure fires to attempt to detect and prevent arson. Arson is a major problem in this densely populated country. Digital aerial photography is a major component of this effort which also includes a spatial decision support system with an expert system designed to identify factors related to arson. In the United States, most of the national level crime mapping activities are related to counter-drug efforts. GIS supports state and local drug enforcement in every state, a project largely coordinate through the National Guard Bureau and the Office of National Drug Control Policy. In particular, in High Intensity Drug Trafficking Areas and along the U.S. Mexican Border, a range of geospatial technologies are in use. GIS is a key component of these efforts along with remote sensing and forward looking infrared sensors mounted in aircraft. The U.S. Border Patrol is another active user of GIS both to interdict the migration of illegal immigrants as well as interfere with drug smuggling efforts. ESRI products along with ERDAS are the predominant GIS tools used by Federal agencies in these counter drug support efforts.

One of the very few examples of an international application of GIS in law enforcement is the use of ESRI software by the BKA (the German federal police agency). They have used GIS to develop flow maps for the movement of heroin and cocaine into Germany from other countries as well as between major German cities. This technique could well be used by other national law enforcement agencies to grapple with international crimes including drug smuggling, cargo theft, gun running, terrorism and the money laundering that supports these and other nefarious activities.

Data Sharing Between Components of Government.

Law enforcement jurisdictional boundaries are one barrier that can be crossed with a GIS data set that spans a county, region state or nation, another common barrier that can be bridged lies between law enforcement agencies and other components of government. Cooperation can be between a city government and the police agency covering that city. Thus a city public works or comprehensive planning department or GIS department might cooperate with a police department. This cooperation might take the form of the other component of government mapping some or all crime incidents for the city police department and providing periodic maps to support the Police. This for

example is the case in Ontario, California where the city GIS department performs that function of behalf of the Police. In Huntsville, Texas, the City Public Works Department along with the nearby State University supports crime and auto accident mapping for the police department.

County entities can support city, metropolitan and county law enforcement agencies. Thus in Spokane, Washington, mapping of locations where victims of a serial killer (Robert Yates) were discovered was supported by the County GIS Office on behalf of a joint City-County Homicide Task Force. In another project in Spokane, Washington the GIS office in Spokane prepared a map of the GPS-based surreptitious tracking of a murder suspect's (Brad Jackson) movements for the County Sheriff's Office. The resulting map involved cooperation with State and Federal agencies in mapping the movement of a suspect across state boundaries and along isolated logging roads to the location where he reburied his slain daughter.

Appraisal district and county 911 GIS data has been provided to support crime mapping on a case by case basis in several Texas counties. In fact, a county 911 agency could be a good central entity to perform crime mapping, although "calls for service" for police do not capture all crime incidents. Therefore a feedback mechanism where sheriffs and municipal police file incident reports with the county 911 agency for mapping, that can then be accessed over the internet would seem to be a logical approach. Few cities are mapping "calls for service" for police at present, but Redlands, California is an exception. The case of the State of Iowa Department of Transportation creating automobile accident maps used by law enforcement agencies including local ones is a good example of a state agency supporting local efforts at law enforcement.

Conversely local police departments may create crime maps or other GIS products that can be used by other components of government. For example, the Las Vegas Metropolitan Police mapped automobile accidents and street robberies, and then used data base selection and query techniques to determine which accidents and robberies occurred during the hours of darkness. Then working with the Clark County GIS Management Office and with data provided by Nevada Power on the location and illumination intensity of street lighting, they determined locations where deficient street lighting may have been a contributory factor in crime or accidents. This information fed back into the City and County Public Works Department's efforts and led to installation of additional street lights. Data on automobile accidents in Huntsville, Texas was used by the Planning Department to obtain money and expedited action from the Texas Department of Transportation on accident prone intersections. Information on liquor stores that had multiple alcohol related crimes in close proximity to them was used by the Charlotte-Mecklenburg Police to successfully convince the North Carolina State Liquor Control Board to revoke liquor licenses. In Lincoln, Nebraska and Redlands, California juvenile crime hot spots have been identified and the police have cooperated with city community development agencies and neighborhood groups like the boys and girls club to obtain funding for community youth centers and after school programs.

Barriers to Cooperation.

Several examples of barriers to cooperation have been cited in the cases discussed above. Broadly speaking, barriers to cooperation in inter-jurisdictional GIS development and data sharing among law enforcement agencies come from three main sources: lack of money, lack of trust and lack of knowledge.

Lack of Money: There are significant costs of maintaining a GIS system, creating or obtaining an accurate and up-to date base-map with key cultural features present and the on-going burden of geocoding crime incident locations and/or automobile accident locations linked to incident reports stored in a database. What agency or agencies should bear these costs if the mapping extends outside a single jurisdiction? Cost sharing agreements can be complex and often ad-hoc arrangements such as those of the Illinois State Police supporting the City of Springfield, break down when budgets get tight. No one can argue that GIS is as essential a component of law enforcement, as patrol cars or overtime pay for patrol officers or testing of DNA evidence. But many police departments are cutting these types of expenditures. How much easier to cut crime mapping work, especially if it is being done as a courtesy to another jurisdiction.

Lack of Trust: Trust among law enforcement agencies is often pretty solid, but there can also be long standing rivalries. Traditional rivalries include those between urban police departments and the more rural sheriff's jurisdiction that may surround a metropolitan area. Typically, the Sheriff's office feels short-changed of resources compared to the Police Department. In some areas there are law enforcement agencies providing security services under contract. This can cause particular bitterness, since the agency that does not receive the contract to patrol a shopping mall or a gated community may feel cheated. Some police agencies have the reputation of under reporting crime. This is particularly true of school district police and university police forces. A police force that is directed from above to minimize the apparent level of crime is unlikely to freely share data and hence is very unlikely to cooperate in inter-jurisdictional crime mapping efforts. Also when crime data is released to another party there is the fear of misuse and also litigation. This latter concern is particularly acute in litigious area such as New York and California and limits all release of data including sharing among various jurisdictions.

Lack of Knowledge: Finally there is the barrier of ignorance. Many law enforcement agencies are unaware of the potential benefits that can be derived from development of a GIS portraying crime in their community and the surrounding region. Many small law enforcement agencies feel they are fully familiar with their communities and don't need a map to help keep track of crime. How wrong that contention can be, can be illustrated by several cases brought to light by recent GIS-based mapping of jurisdictional boundaries by the Montgomery County Emergency Communications District in Texas. In the course of mapping the boundaries of incorporated communities in Montgomery County, Texas, this agency discovered one neighborhood in the town of Cut-N-Shoot (yes that is it's official name!) that was being taxed by the city government

for law enforcement services but which the police chief thought was outside the city limits. Hence calls to 911 resulted in dispatch of sheriff's deputies from father away in response to calls from this area, but the County did not receive taxes to reimburse them for the resulting expenses. In another case in the same Texas County discovered in 2003, a larger area of approximately 100 homes in Splendora, Texas was found to have been receiving municipal police and fire protection services, but the residents had never paid a cent in taxes to the City! Some residents owed property taxes going back decades and totaling into the tens of thousands of dollars. These taxes were made immediately due, but have yet to be paid while the county appraisal district and city council seek to work out a solution. No doubt more accurate mapping facilitated by GIS of many smaller towns would bring to light similar problems.

Conclusion.

GIS can play a vital role in facilitation these interactions in determining proximity and availability of resources and in helping to break down jurisdictional barriers. The precedent for cooperation among and between a wide range of entities sharing a common GIS base-map and cooperating synergistically to maximize limited resources has been set. One can only hope that the many barriers to cooperation can be lowered for to ultimate benefit of the public which law enforcement agencies and other branches of government are seeking to better serve and protect.

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