Data-Driven Approaches to Crime *and* Traffic Safety (DDACTS) Data Suggestions for Implementation

EXECUTIVE SUMMARY

Analysis driven operations have been proven to be effective and efficient while also achieving reductions in crime and crashes. Data-Driven Approaches to Crime *and* Traffic Safety (DDACTS) provides a model and a structure to implement such operations, analyze the impact and measure for improved outcomes in crime and crash reductions. DDACTS is specifically designed to simultaneously combat crashes and crimes that have concentrated at specific locations within jurisdictions. The DDACTS model uses data-driven, place-based analysis for allocating police department resources in high visibility enforcement campaigns.

Data is the heart of Data-Driven Approaches to Crime *and* Traffic Safety. Quality data leads to quality analysis which leads to effective operations and ultimately supports the goal of reductions in crime and crashes.

It is recognized that each agency uses different data automation and analysis methods, has varying access to data, and a wide range of analytical capabilities and tools. Agencies with the most primitive capabilities can utilize this model and continue to refine data methods as the model evolves.

Outlined in the report are the basic data suggestions desirable to effectively implement DDACTS to achieve reductions in crime and crashes. Within these guidelines are a wide range of options that allows each agency to implement DDACTS with the methods and techniques that it chooses.

Crimes, crashes and violations should have at a minimum the date, time, location and type attributes for Standard Analysis. They will be essential for the most basic of analysis to identify where high visibility enforcement should be implemented.

- Crashes and crimes need to have specific type codes so that at the very least they can be analyzed and separated into severity of injury.
- Perhaps the best documented enforcement is arrests, which are routinely accompanied by a detailed arrest report.
- Citation data can be extremely valuable in determining if traffic enforcement is having an impact on crash and crime reduction and can further assist in evaluating the impact of changes in enforcement efforts.

The implementation of DDACTS and expected results are based on quality data and the proper analysis of the data. “Quality” data is defined by its accessibility, accuracy, completeness, timeliness and cleanliness. Prior to launching DDACTS activities, a chief must first ask; what data is needed, what data do we have access to and what is the quality of that data? Law enforcement agencies of all sizes have access to a variety of data sources and tools to assist them in using the DDACTS concept. This document will outline usable data types, and provide guidance and suggestions to help an agency develop its DDACTS model.

Data Suggestions for Implementation

Analysis driven operations have been proven to be effective and efficient while also achieving reductions in crime and crashes. Data-Driven Approaches to Crime *and* Traffic Safety (DDACTS) provides a model and a structure to implement such operations, analyze the impact and measure for improved outcomes in crime and crash reductions. DDACTS is specifically designed to simultaneously combat crashes and crimes that have concentrated at specific locations within jurisdictions. This model uses data-driven, place-based analysis for allocating police department resources in high visibility enforcement campaigns.

Data is the essential ingredient for implementing the DDACTS model. Without data, the model can be of no use. Data is essential not only to identify sites for high visibility enforcement but also to evaluate success of the enforcement and adjust as necessary for greater impact. Based upon surveys of Law Enforcement Agencies on their use of data and analysis, there are three general types of readiness with regard to an agency's analytical capabilities. These levels of automation, data collection/production capabilities, and analysis activities allow for starting points on what an agency might do to implement the DDACTS model.

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Agency Data and Analytical Tiers:

As stated earlier, law enforcement agencies generally fall into three categories of analytical capabilities. These categories will guide an agency to identify where it is with regard to implementing DDACTS. By acknowledging where an agency is at the start of the process, it can then be determined what is needed to move toward more advanced analysis.

Analytical capabilities:

1. **None: No automation, data, or analysis capabilities:**
   There may be a significant number of agencies in this tier, but that will most likely be because lack of access to data makes it appear that there is no data and therefore no data to analyze. If a department has a CAD (computer aided dispatch) system, it has data and needs only to build access to that data and an efficient way to add critical data details. If there is no CAD system and then, likely, no automation, then the data will have to be entered from hard copy reports. The data can be managed and analyzed through the use common software applications such as Microsoft Access and Excel.

2. **Standard: Some automation, limited data access, and ready for basic analysis:** Most agencies will fall into this category. These agencies will have a CAD and a records management system (RMS), and they may or may not have existing data access. Even without automated access to the data, these agencies may already have in place a database of crime, crash and enforcement data and may already have personnel committed to the task.

3. **Advanced: Full automation, full data access, with ongoing advanced analysis:** There will be many DDACTS departments that fall into this category. These agencies will have all of the structural components in place and may well have been doing some level analysis-driven operations in response to both crimes and crashes. Within this tier however, there may be agencies that are only analyzing crime and perhaps not crashes and/or enforcement. There may also be some state or county agencies that are analyzing only crashes and not crime or enforcement. For these agencies, DDACTS will provide a new structure and strategy for achieving greater impact and efficiency.

It is recognized that each agency uses different data automation and analysis methods, has varying access to data, and a wide range of analytical capabilities and tools. Outlined below are the basic data requirements desirable to effectively implement DDACTS and achieve the goal of reductions in crime and crashes. Within these guidelines are a wide range of options that allows each agency to implement DDACTS with the methods and techniques that it chooses.

Data Requirements:

Attribute Data

There are aspects about crime and crash incidents that should be recorded to appropriately identify sites for high visibility enforcement and to properly evaluate the impact. These data elements can also eventually lead to insight into the relationships between why crimes and crashes occur in the same places. At most agencies, this basic data will be available from within the CAD system for crime, crash and enforcement activity.

Crimes, crashes and violations should have at least the following attributes for Standard Analysis. These will be essential for the most basic of analysis to identify where high visibility enforcement should be implemented.

1. **Date**: Date that crime, crash and/or enforcement occurred. (CAD)
2. **Time**: Time that crime, crash and/or enforcement occurred (CAD)
3. **Location**: Address that crime, crash and/or enforcement took place (CAD)
4. **Type**: Type of crime, type of crash and/or type of enforcement (RMS)

DATE: The data needs to be the date that the incident, crash or enforcement occurred, and NOT the date when the incident, crash or enforcement was reported and NOT the date when the report was entered into the CAD, RMS and/or database. The appropriate date, entered in a date/time data

format will then be able to be converted into day of week, week of year, month, quarter and/or year without any further data entry or calculations.

TIME: The data needs to be the time that the incident, crash or enforcement occurred, and NOT the time when the incident, crash or enforcement was reported and NOT the time when the report was entered into the CAD, RMS and/or database. The appropriate time, entered in a date/time data format will then be able to be converted into hour of day, shift, period and/or other blocks of time without any other data entry or calculations.

LOCATION: Location is perhaps the most important data element in any DDACTS operation. Intuition may serve to fill in other data gaps but the locations MUST be as accurate as possible. Intersections should only be used as the location IF the crash happened in or at the intersection. A street number should be used for all urban, non-intersection locations. For outside crimes not tied to any specific residence or business, the closest street number is appropriate. For incidents related to a specific residence or commercial establishment, the street number address must be accurate. For major institutions such as schools, hospitals, government buildings, etc. one specific street number address should be used for all incidents.

Location data, generally in the form of addresses, must also be standardized in order to make analysis possible. Through a combination of proper policy and procedure for data entry and the utilization of technology, an agency can assure accuracy such as proper spelling for street names and standardization of street suffixes as well as standardized identification of intersections.

Even if the agency is not mapping data at the outset, it is important to have location data in a format that could eventually be geocoded and mapped.

TYPE: Crime incidents need to have the appropriate, accurate code. There are often many codes for crimes that represent the laws and philosophies of the jurisdiction. The agency must select the most appropriate code that represents what the incident was. This will be necessary because it will be important to identify which crime types correlate with which crash types so that the most appropriate high visibility enforcement approach can be crafted. It will also, as stated above, allow for specific evaluation of the impact on crime in the target neighborhood and the adjacent neighborhoods.

Not all crimes will concentrate in the same places as crashes. Therefore, it will be important to examine both violent and property crimes as well as incidents of disorder and quality of life to determine which correlates with crashes in a specific area. This will allow for specific, focused analysis on just those crimes that have some connection to the concentration of crashes and the development of focused operations in those locations.

If possible NIBRS codes can serve as crime and disorder type codes and would allow for standardization for comparison across sites. These codes should be used even if the agency is not doing NIBRS because they will serve as universal codes that will be recognized by other agencies if the data is shared.

There may need to be codes established for disorder or quality of life incidents that may have been given just general codes. Lack of a specific code makes analysis very difficult. Both CAD and RMS allow for specific codes to be given to any incident type.

CRASHES:

Most law enforcement agencies have at least a basic level of incident report automation in regard to crime and police activity reports. Even if officers are completing handwritten, hard copy reports, those are usually entered into some type of records management system as a means of documenting activity and/or producing reports to be used in court. That same level of report automation is not always applied to crash reports. In many cases, crash reports are handwritten and either filed away in traditional file cabinets or forwarded by mail to a state transportation agency. In many agencies, even if crime analysis takes place, very little analysis is done of crash incidents or traffic enforcement efforts.

Crash data should be easily integrated into the crime analysis infrastructure. In many ways crash data is similar to crime data in terms of geographic location and attribute descriptions. They are incidents with locations that have times, share descriptive characteristics, and are a product of their environment…that is they don't equally occur in every place.

Crashes also need to have specific type codes so that at the very least they can be separated into property damage crashes and personal injury crashes. From there, it is important to be able to differentiate among the severity of injuries. It is not enough to just differentiate between fatal injuries and all other. It is important to be able to know serious injuries (including fatal crashes) and all other injuries.

It is also important to be able to differentiate between crashes that occur on the roadway and "in traffic" as opposed to those that occur in parking lots or other locations that would not respond to traditional enforcement.

On and off ramps from limited access highways merit special attention and require an inspection to see if they are more related to activity in the neighborhood and not with the highway. Crashes closer to the neighborhood streets will likely be related to neighborhood issues where those closer to the highway will be related to issues on the highway. There may also be state and county law enforcement participation in DDACTS. Those agencies may focus on crashes on the highways and may also seek to impact drugs, weapons and other offenses through motor vehicle stops or other enforcement efforts.

Crash data should be located along the street segment where it occurred and not the closest intersection. Assigning the location to the closest intersection would impede accurate analysis because DDACTS is about high visibility in a neighborhood as a show of comprehensive coverage and not just at specific intersections. Assigning all crashes to intersections will inhibit statistical techniques for identifying the correct sites for analysis leading them to be limited in coverage area and not representative of where the crashes are occurring. It is recognized that many times crashes do occur at intersections and they should be geocoded as such.

There are also usually very different causal factors that contribute to crashes in intersections as opposed to crashes along the roadway. It is also very beneficial to categorize crashes by the crash factor that contributed to the crash, such as speeding, red light, stop sign, yield and other violations. These will give insights in behavioral aspects that can be examined for commonalities and will also guide enforcement.

ENFORCEMENT:

Enforcement is carried out in many different ways, with many different resulting data sets. Perhaps the best documented enforcement is arrests, which are routinely accompanied by a detailed arrest report. Traditional traffic enforcement, resulting in citations, also often produces a data trail that can be analyzed for types of violations as well as dates, times and locations of those violations and their relationships to crashes. Like crashes, however, citations are not always entered into a records management system. In many cases the citations and/or citation books may simply be forwarded to state transportation agencies.

Citation data can be extremely valuable in determining if traffic enforcement is having an impact on crash and crime reduction and can further assist in evaluating the impact of changes in enforcement efforts. The data also serves to document the time and location of enforcement efforts.

What can be more difficult to document through data analysis is enforcement efforts based upon high visibility police presence. Whether the presence is meant to impact crime or crashes or both, the activity may or may not be documented in the CAD or RMS. Especially if the goal is crime and/or crash prevention, the lack of an incident can result in no data unless there are policies and procedures in place to document officer-initiated activity.

Whether the enforcement is truly officer initiated or if it is carried out through assigned directed patrols, the enforcement can be recorded like any other call-for-service within a CAD system with date, time, location and type code. Not only will this process allow for documentation of the enforcement efforts, but analysis of the resulting data will also provide for much more specific time ranges for crime or disorder activity. If it is documented that there was a police presence at a specific location at 02:00 and it was “all clear” at that time, and criminal activity is found to have taken place at 04:00, it can be determined that the crime took place in that two hour block. If the police presence prevents crime and disorder from taking place at the known locations, and yet crime takes place at other locations, the information can be used to adjust operations and deploy resources with the goal of greater efficiency and impact.

As with crime and crashes, it is very important that the enforcement locations be real and accurate addresses and be specific to where the enforcement took place, as well as the location that the enforcement was meant to impact.

Geographic Data

At the heart of DDACTS is the recognition that within a jurisdiction, crime and crashes often occur within the specific area and could both be effectively and efficiently impacted through targeted, high visibility enforcement. Obviously, not every "high crime" location will also be plagued by "high crashes" nor will every high-crash location be a crime hotspot. For those reasons, among many others, Geographic Information Systems (GIS) are valuable tools for DDACTS related analysis and evaluation. GIS allows for visual, spatial analysis by mapping crime, crash and enforcement on a map and visually determining where the incidents overlap.

Mapping, as GIS, spatial analysis is called, requires accurate location data. Accurate street addresses, in data formats, can be "geocoded" or given latitude and longitude attributes so that they can be located on a map. Geocoding is only possible with accurate location data. The use of shortened location identifiers such as "Main & Center," misspelled street names or nearest cross roads will not respond to geocoding applications and will ultimately be left off of any map made with that data. Such data issues will ultimately compromise the effectiveness of operations. While the goal of accurate location data may seem overwhelming, there are many ways in which technology, combined with proper data entry procedures, can be utilized to ease the process.

Many law enforcement agencies utilize GIS applications such as ESRI's ArcGIS or MapInfo, or even free or low cost applications such as Google Earth, and such agencies usually recognize the necessity of accurate location data. However, even those agencies not currently utilizing any form of GIS will benefit from developing quality, location data habits.

Key Aspects to DDACTS Analysis

There are three aspects to data for implementing the DDACTS model. Without the maximization of all of three the identification of sites and the evaluation of performance will not be as effective as it can be.

Accuracy

Timeliness

Completeness

Data may not be accurate or complete straight from CAD alone. Most CAD data is based upon the knowledge and understanding of the reporting party. That may all change upon investigation by the responding officer, and may change again upon further investigation. Data resulting from incident reports, arrest reports and crash reports may also have accuracy issues if there has not been a priority placed upon accuracy. In departments that have not previously implemented analysis-driven operations, report review may have been focused only on the narrative portions

of reports and not so much on the data fields. Unfortunately, it is those individual data fields, and their accuracy and completeness, that any analysis is based upon.

The timeliness of data and subsequent analysis is critical to effective and efficient operations. Many agencies are making great investments of time, resources and personnel in support of real-time analysis. Some agencies, however, do not have policies and procedures in place to dictate the timeliness of completing reports. There are so many factors that impact crime, and specifically crashes, such as weather, major events, school vacations, construction zones and other conditions, as well as the application of enforcement. If reports, and the resulting data, are not completed and available in a timely fashion, the analysis can suffer.

Finally, the completeness of the data is critical to quality analysis. If reports do not at the very least include the key elements of date, time, location and type of incident, the resulting analysis will be significantly compromised. The end result will be applied enforcement that has little impact.

Data is the heart of Data-Driven Approaches to Crime *and* Traffic Safety. Quality data leads to quality analysis which leads to effective operations and ultimately supports the goal of reductions in crime and crashes. But quality data does not happen by itself and cannot be maintained without commitment and dedication. DDACTS has tremendous potential to help police departments to efficiently utilize limited resources and to deploy operations that will save lives but such success starts with accurate, timely and complete data.