The Criminal Justice Coordinating Council Network Mini-Guide Series:

20 QUESTIONS WITH MULTNOMAH COUNTY ON GIS MAPPING

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20 Questions with Multnomah County's Matt O'Keefe on GIS Mapping

By: Aimee Wickman

It is common knowledge that crime does not exist in a vacuum but is intricately entwined with a host of other socio-economic problems such as poverty, education, and employment. Yet, frequently, criminal justice planners are hard-pressed to gain a full understanding of the interrelationship in their local jurisdictions based simply on available criminal justice data. By combining criminal justice data with geographic data, a larger and more detailed picture can be painted than by relying on numbers alone. Mapping can provide

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> Spatial data analysis can drill down into issues by relying on statistical methods to help us see how physical location pertains to public safety concerns.

a valuable method to evaluate how and why crime is occurring and factors that may influence criminal justice policy. There are various applications that allow you to display spatial information. This is most frequently referred to as Geographic Information Systems (GIS).[1] Analysts can use a GIS to provide a visual display and analysis of events and geographic characteristics to help educate and inform policy.

Mapping can be another useful tool in a criminal justice coordinator's toolbox. The problem is that learning how to use mapping and GIS can be cumbersome. I sat down with Matt O'Keefe, Analyst for Multnomah County's Local Public Safety Coordinating Council, to ask him how they use mapping, what it has done for them, and how to get started.

How did you get started with GIS Mapping?

Multnomah's CJCC[2] invests in a criminal justice data warehouse and it is our mission to add value to that data through research and analysis. Part of our goal is to increase our ability to describe data using maps in our Public Safety Trends Report. Our CJCC started using ArcGIS about 18 months ago. I am still learning how to use it and all that we can do with it.

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[1] The National Institute of Justice provides information on mapping and GIS here:
http://www.nij.gov/topics/technology/maps/welcome.htm
The National Archive of Criminal Justice Data also has a tutorial on how to use data and GIS software:
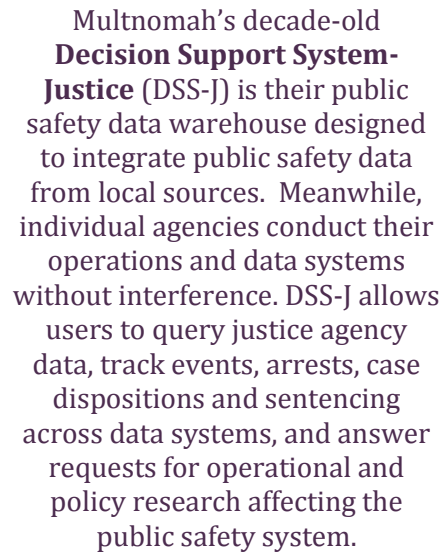http://www.icpsr.umich.edu/icpsrweb/NACJD/gis/nacjd-to-gis.jsp
[2] "Criminal justice coordinating council," or CJCC, is the term used in this paper to refer the full array of informal and formal committees known by a variety of names across the United States that provide a forum for key justice system agency officials and other general government officials to address criminal justice system issues.

Why do you use mapping?

In order to be thorough in effective planning and policy development efforts, you really need to consider geographic and environmental factors of population impacted by public policy. This means having the ability to connect the 'what' to the 'where.' Plus, including environmental factors through performance monitoring and program evaluation will better inform decisions. GIS gives us tools to better understand the many factors that impact the population requiring public safety, health, and social services.

Mapping also can allow you to be very specific. Listing data by zip codes can be useful, but mapping can allow for an increased level of detail.

Most importantly, people understand maps. I am always a little unsure when I present numbers and graphs. However, the use of maps, and GIS in particular, is a great way to tell a story with a picture. Providing stakeholders with geographically-based information allows policy makers an opportunity to improve decision-making.

Multnomah's decade-old **Decision Support System-Justice** (DSS-J) is their public safety data warehouse designed to integrate public safety data from local sources. Meanwhile, individual agencies conduct their operations and data systems without interference. DSS-J allows users to query justice agency data, track events, arrests, case dispositions and sentencing across data systems, and answer requests for operational and policy research affecting the public safety system.

What is the mapping software you use?

Multnomah uses ArcGIS 10.1. ArcGIS is the leader in the market for spatial analyses through maps. They serve a wide variety of fields including public safety and emergency response.[3] It is similar to SPSS or STATA in that you can perform statistical analyses within the program to create maps and layers within maps.

Are you familiar with any alternatives? If so, why did you choose ArcGIS?

We chose ArcGIS because it is one of the most powerful and popular GIS applications currently being used in the market. There is an array of open source and free options online. A list of geographic information systems software is available on Wikipedia. Finally, many universities have programs dedicated to display and analyze spatial data. A Google search on 'GIS tutorial' returns about 1 million results.

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[3] As an example, follow this link for a guide on GIS for law enforcement and public safety personnel: http://www.Esri.com/library/brochures/pdfs/criminal-intelligence.pdf

GoogleMaps is a great place to start. For example, with GoogleMaps you could look at where treatment providers are in your community. You would begin by creating a spreadsheet and add the addresses of treatment providers. Google also offers a way to create fusion tables, which is what they call their data visualization web application. With fusion tables you can create maps from large data tables and then share and edit the maps online. Google provides tutorials for creating maps and fusion tables.

Bing also offers a heat map creator. This is another free program. With this service, you input your own data to create either a density map (if your data are location-only) or a heat map (if your data also includes values). This is another useful resource for when you do not have funding for something like ArcGIS and you want to try out and play around with the various options out there for mapping tools.

Another good resource is Social Explorer. I've found this site to be a great resource for Census and ACS data. This site allows you to create time series maps using census data. With Social Explorer you can show, for example, population growth and changes in where people are residing and which census tracks have the highest percentage of high school dropouts. One drawback is that Social Explorer only allows you to map the data that they provide. This means you cannot add your data to create your own maps. However, there is a lot you can do by creating county-level graphics from their census data. This program is relatively inexpensive. They offer a free thirty day trial. After that you can request a quote for the cost for your office.

Crime Stat is another spatial statistics program designed by Ned Levine & Associates for the National Institute of Justice. However, it requires GIS software of some kind to use. This is helpful for agencies that may have a basic GIS application without the analysis expansion packs that can increase GIS license costs.

Crime Mapper was created by the Portland Police Bureau. They built the program in-house with the city's GIS services. It is basic, but does require some existing capacity in GIS mapping. I would think that there are cities with GIS capacity within their planning and zoning departments. Reaching out to your city, county, and even state planning agencies might be a great first step if you are interested in accessing ArcGIS software and maybe even GIS analysts. The Portland Police Bureau also makes their data available online for application developers.

The Justice Mapping Center is great resource for examples of how mapping can inform criminal justice policy. The Justice Atlas of Sentencing and Corrections is a tool that allows mapping of populations returning from prison and under community supervision. This tool was inspired by the mapping analysis used in a 2004 Village Voice article 'Million-dollar blocks'. This analysis helped illustrate the concentration and magnitude of corrections spending at the block level in Brooklyn, NY. For me, this type of analysis really demonstrates the power mapping can bring to a policy discussion.

How much does it cost to use mapping software?

It depends on what you would like to do with it. I can only speak from experience with ArcGIS, but there are many other options out there. As for ArcGIS, just like with many other applications, there are several types of mapping and analysis products that vary in price depending on the scale of the project.

Also, adding analysis expansions can increase the cost of the system. (ArcGIS cost information for government organizations can be found [here](#).)

Are there any Open Source, or lower cost, options for GIS?

[Open source](#) GIS software includes [QuantumGIS](#), Arizona State University's [GeoDA](#) and the [Geographic Resources Analysis Support System](#) (GRASS). These packages are fully functional GIS systems that are widely used in government, commercial, scientific and academic professions. Typically these packages will require intermediate to advanced familiarity with GIS software. The OSGeo Foundation has a number of guides available for using Open Source GIS toolkits.

Do you need to be or have an IT person in your office to use GIS?

You need to have experience with statistical analysis software and databases. ArcGIS software is not plug-and-play and requires some time to learn menu navigation. We have a number of dedicated GIS analysts within the county. If you do not have a lot of experience or training on GIS, it's good to know an experienced analyst who can provide assistance. There are lots of tutorials online that cover the basic and intermediate functions of ArcGIS.

Do you need training to use GIS? If so, how much training and how costly is it?

It is good to be familiar with statistical analysis software and database tools. There are various course options through [Esri](#), a company that provides geographic technology and other professional software and services. Enrolling in a training course can also be an easy and more cost-effective way to try out ArcGIS. For example, [Joel Caplan and Leslie Kennedy at Rutgers University](#) conduct a training course on [risk terrain modeling](#). It is an online course and also is a useful site for guides to public safety. The online course includes a student addition of ArcGIS. This might be a good way to test out the software and how it might be useful for you without a huge monetary commitment. However, this is an advanced course for people who are used to working with complex data.

What are the things you need in place before you can begin using this mapping software?

The most important thing is to have data that includes precise location information. Another piece is to define the geographic features, attributes, and areas to be used the GIS. For example, we have created boundary files for drug enforcement areas, neighborhood associations and school districts.

How much time do you spend on average creating new maps and updating old maps?

It all depends on the question and the complexity of the data. Our GIS analyst can spend approximately five hours on the map below. Once you have created a map, you can automate workflow and build a stored procedure to create the same maps with updated data. This decreases the amount of time significantly.

You can get a lot out of using a traditional or static map. However, a GIS map is dynamic and has different layers of information that you can turn on and off. The data are refreshed based on the most

current information. Right now, the analyst has to create a refreshed map each time, but for projects like the one being created for parole and probation, maps will not have to be developed by the analyst each time. They can have the map whenever they want, have the conversation, and plan.

**What kinds of projects or policy areas do you use mapping for?**

We see that violent crime is declining but it is not realized equally over the County. There are some areas where crime is decreasing and other areas where crime is emerging. You cannot see this in an Excel spreadsheet. It is important to recognize the role of place in policy development and implementation. Crime is tied to a number of other factors, whether through research or urban legend, but there is typically a clustering of social problems in areas impacted by crime.

Another area where we are hoping to use mapping is victimization rates. It is a relative rate index that is useful for understanding disproportionate minority contact (DMC). A weakness in our ability to measure DMC is that the rate is based on an overall percentage. Portland is predominantly white and therefore looking at the relative rate is a useful tool. Minorities have a higher rate of being arrested, but also of being victimized. Mapping helps us look at what is driving DMC. Is it enforcement in high minority areas? Is enforcement being informed by victimization?

Mapping can be useful is to inform prevention efforts. Multnomah was recently awarded a STRYVE Grant from the Center for Disease Control to minimize youth violence. We are beginning to understand the factors that can aid in planning and developing policies to reduce violent crime among juveniles. For example, we are looking at where individuals under the age of 24 are being arrested and where they live. These two are not always the same.

We are also working on a project with the district Attorney's office to map residence information for known gang members and including nearby schools. By mapping where gang members live (Map 1) relative to schools we can target schools for prevention efforts and anti-gang messaging.

Map 1: Gang Member Address Map
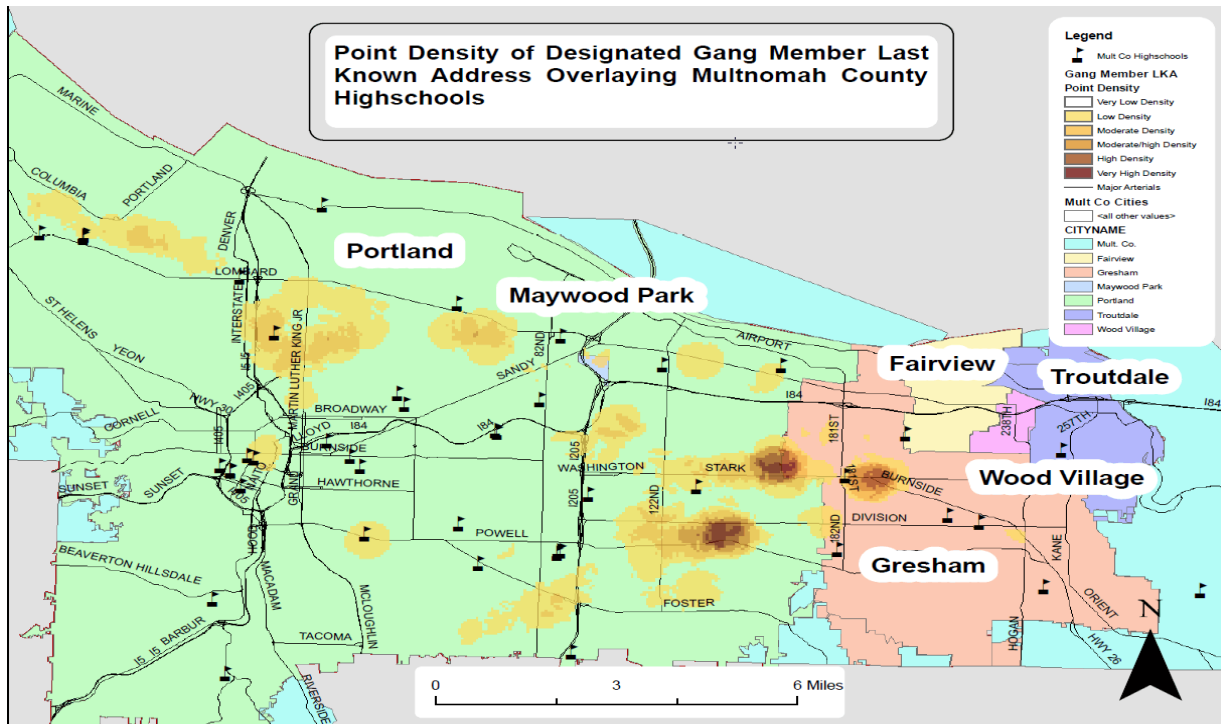
The Offender Release map (Map 2) that our CJCC created to inform the work of our Re-Entry Council is very valuable. Our database maintains addresses and we use those in combination with an individual's release date. This can show us where they will most likely be going as they return to the community. We are looking to use this information in a number of ways. It may be used as a predictor of social problems and can also be used to connect with an individual's needs for other services. We are still researching this area; however, this variable appears to be highly correlated with other areas of interest for Multnomah County.

Map 2: Felony Offender Release Map
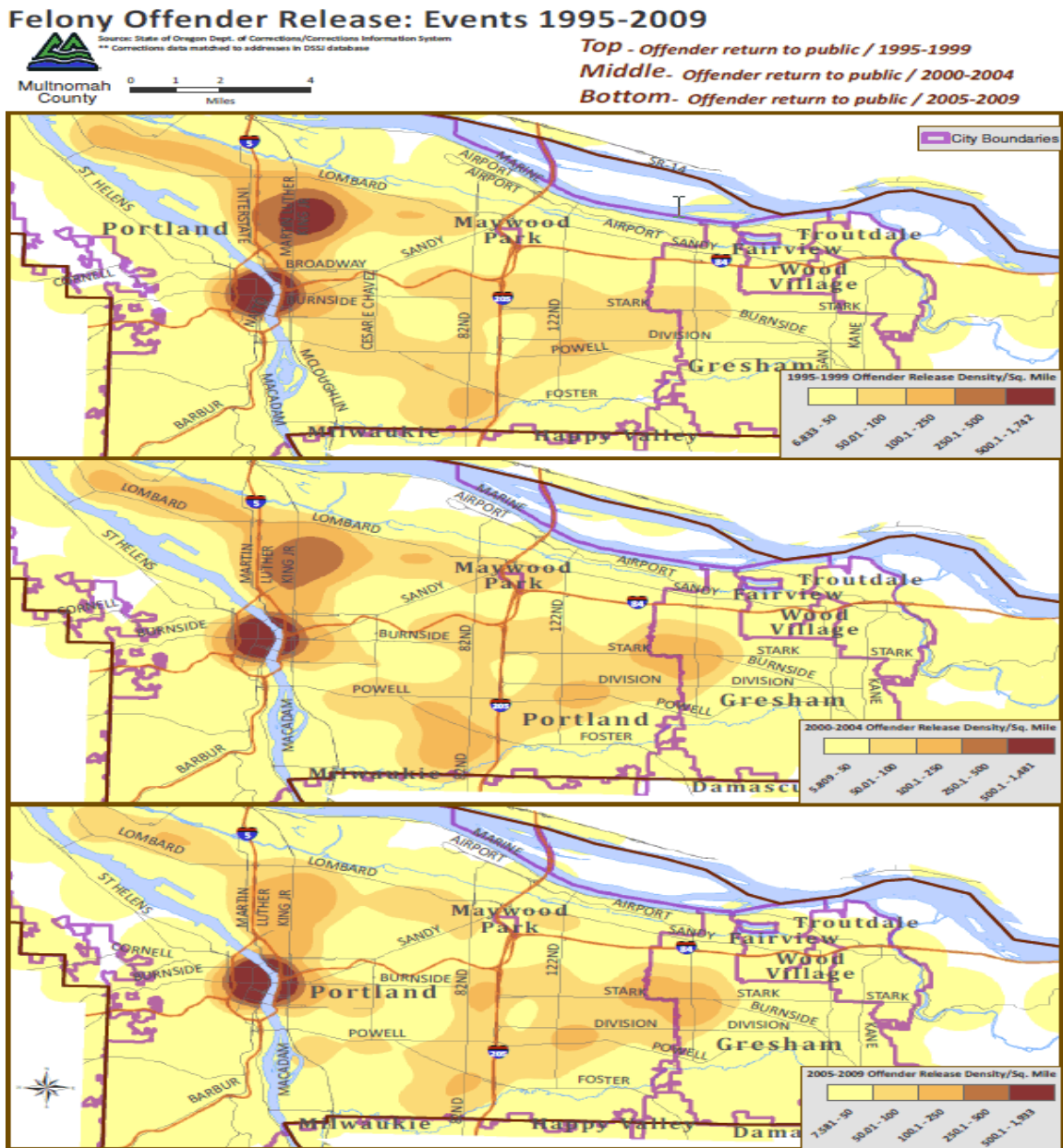
Mapping can also be very useful for individual agencies. Multnomah is currently working on something that allows parole and probation officers to enter information into the system and the information automatically goes into a map (Map 3). This allows parole and probation officers to look at their caseload on a map and plan home visits and case work. Management also uses this tool to determine staffing and resource allocation based on how many offenders are supervised from a specific office.

Map 3: Active Offender Viewer
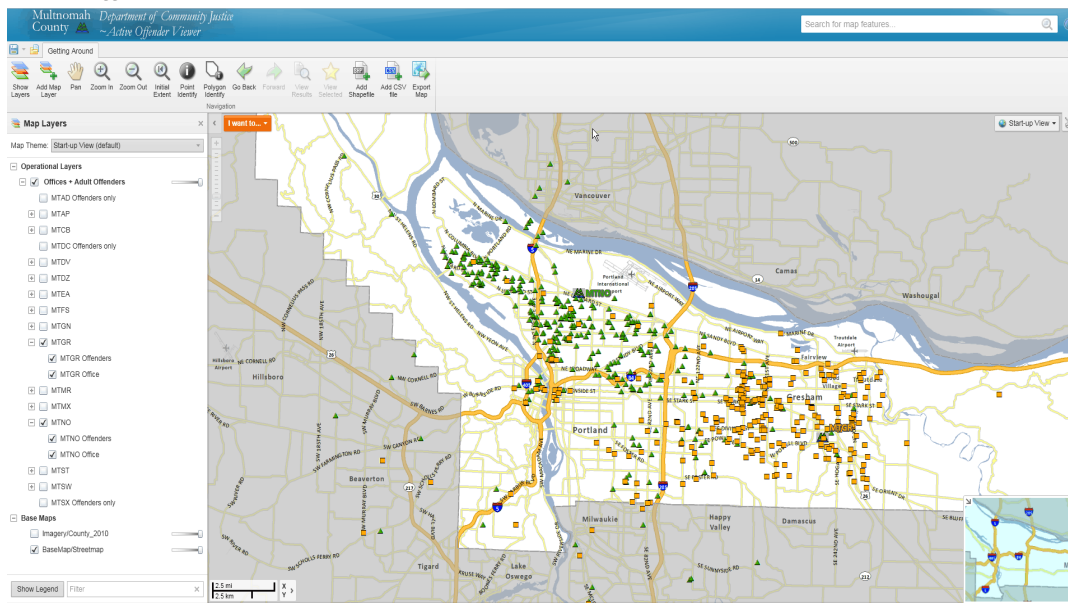
With maps you can help describe what the issues are. For example, where property and where violent crime occurs are often different. Public safety is not a common part of the discussion when new, large retail stores are being built. By mapping crime data, we see that some of the most significant property crime is occurring at or near 'big box' retailers (Map 4). Through this analysis, we were able to describe the workload to our local law enforcement agencies, look at the security in place at theses retailers, and have a discussion about how 'undercover' security in stores is impacts the local justice system. We found that retailers that had uniformed security guards generated fewer arrests for property crimes like shoplifting.

Map 4: Property Crime Mapping
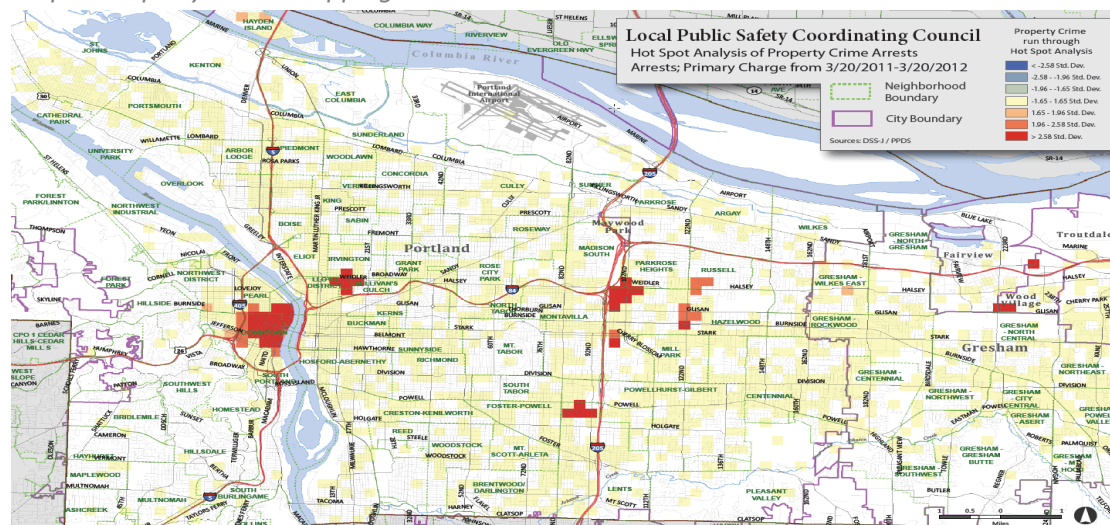
How do you present the maps you create (to whom, why, how frequently, etc.)?

I present to the Executive Committee of our Local Public Safety Coordinating Council (LPSCC). Our CJCC tries to have a data presentation every couple months. Also, I create ad-hoc maps and analysis to support the work of our CJCC's Subcommittees.

What types of questions do stakeholders most frequently ask?

When I started the question was: is crime moving east? There was no common agreement among the group. Portland is changing and along with that has come both the decline and emergence of crime. Crime has moved east and I have been working on how to show that.

You have to be ready for challenges to the data. There is so much data behind the colors on the map. It is important to let people know that. For example, on the Offender Release map (Map 2), there were somewhere around 38,000 events on that map. The map is a start; however, in combination with a descriptive chart, a map can better describe the data.

Policy makers will question the data. These questions can lead to larger and more enlightening policy discussions. For example, on a presentation on violent crime, one of the hot spots was over the juvenile detention center. When someone questioned this, it led the group to realize that the policy in the Sheriff's Office was to report fights in the detention center as a crime. This was driving the reported crime rate up in the juvenile detention center, and, in turn, creating a workload for the county that many people did not know about. By questioning the data, we initiated an important policy discussion.

What can mapping not do? What are the possible constraints or limitations?

It is only as good as the data you have. You need to have data and a link to a physical location. Having the data and location information available, I have not run up against anything that it cannot do. However, it can be difficult when, for instance, address data is not up to date, for a variety of reasons, in parole and probation. Other than for providing services, no one had recognized the value in updating that data until this point. Therefore, data has to be available as well as accurate and up to date to be most useful.

If you were hired in a brand new public safety office in an unfamiliar town with no data collection process in place and tasked with collecting data and using mapping, what are the steps you would take to get started?

In most cases, it is not about creating new data, it is about using the data you have to describe the problem. However, it is important to be mindful of the data that is not being tracked and how it could inform the policy discussion.

1. Try to gain an understanding of the high priority policy issues or questions.
2. Find out what data exists to inform these issues.
3. Where are the gaps in the data?
4. Can the data be described by location?

5. If I had few resources, I would start with 911 calls and arrest data. This data is always available. I would also look to data from the courts. Between the courts and law enforcement, you have access to great information. Where the event occurred and where the person lives should be available from these two sources.

6. Get the data from these agencies. Figure out what other elements you want to have associated with spatial info. We know where "Joe Offender" lives. Are we interested in his charge?

7. Start with the free stuff. What we want to do is build demand for information. If you begin by using free options (e.g. GoogleMaps and fusion tables) and people want more, you can always work to upgrade your software. Start with the 2010 census data in the multimedia section of the New York Times. Tie what you have found with high priority concept (e.g. for Portland, gang activity).

Not specific to mapping, what is the most influential and critical report or document your office puts out to the stakeholders? In other words, what is the most persuasive material you produce?

Right now, that would be the Offender Release map. No one has done that before in Oregon. We got that idea from Eric Cadora at the Justice Mapping Center who's mapping analysis in the article, 'Million-dollar blocks,' included maps describing prison expenditures at the city block level. The Justice Atlas of sentencing and corrections data tool is an extension of this work.

This Mini-Guide Series is being presented by The Justice Management Institute as part of the National Criminal Justice Coordinating Council Network project.

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