Social Network Analysis (SNA)
Using SNA to Enhance Policing Strategies
Speakers

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What Is Social Network Analysis (SNA)?

- Analysis of social relationships
  - Beyond individual attributes
  - Maps relationships between individuals

- Information and goods flow between people, so the structure of relations matters

- Through SNA, we can identify important individuals based on their social position
Social network analysis is not social networking

It is not Twitter or Facebook
Why SNA?

- Crime concentration
- Overlap between offenders and victims
  - Risk factors
  - Role of retaliation
  - Influencers
- Good starting point for understanding dynamics within deviant social groups
- Starting point for actionable intelligence
Delinquent peers - one of the strongest predictors of crime (Warr)

Violence is concentrated among networks of people (Papachristos)

The closer you are socially to violence, the more likely you are to become a victim (Papachristos)

Position is important within the network (Morselli, McGloin)
SNA Terminology

TIE

NODE
SNA Sociogram
Types of Network Data

▪ Converting data into intelligence
Data (Input)

- Information that connects or informs the relationship between two or more people
  - “Street intel”
  - Field interview forms (FIFs)
  - Arrest reports
  - Car/traffic stops
  - Gang intelligence reports
  - National Integrated Ballistic Information Network (NIBIN)
Data - Caution!

- Intelligence will only be as good as the data used
- Flawed, incomplete, stale, cursory data yield similar output
## Visualizing a Network

<table>
<thead>
<tr>
<th>Field Interview</th>
<th>Edge</th>
<th>Network Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIF1 100 Andrew</td>
<td>100 200</td>
<td><img src="image" alt="Network Representation for FIF1 &amp; 2 Combined" /></td>
</tr>
<tr>
<td>FIF1 200 Ken</td>
<td>200 350</td>
<td></td>
</tr>
<tr>
<td>FIF2 200 Ken</td>
<td>200 400</td>
<td></td>
</tr>
<tr>
<td>FIF2 350 Joe</td>
<td>350 400</td>
<td></td>
</tr>
<tr>
<td>FIF2 400 Tiffany</td>
<td>400 400</td>
<td></td>
</tr>
</tbody>
</table>

FIF1 & 2 Combined

100 200 350
200 350 400
350 400 400
Visualizing a Network

Network of Gang Members and Associates (n=288)

Layout optimization
- No lines overlap
- Social distance on the page
Who is the most central in the network?

1. Degree Centrality
2. Betweenness Centrality
Types of Centrality

Degree centrality: Person with direct connections
(knows a lot of people)

Person A

Betweenness centrality: Person in the best path
(connects a lot of people)

Person B
Key Players

Degree Centrality

Betweenness Centrality
SNA in Practice

Arrest networks

High betweenness centrality 3.2xs more likely to be victim of violence

(Fox et al. 2020)
SNA in Practice

- Identifying gang structures/focused deterrence
- Hot spot enforcement and engagement
- ATF/NIBIN utilization
- Smaller jurisdictions
- Challenges
Implementing Focused Deterrence Utilizing SNA

Intelligence Models
Build intelligence models and relationships to direct the finite resources of the police department to the core group of individuals involved in, or likely to become involved in, violent crime

Community Relationships
Build relationships in the community to establish a moral voice that impacts violence

Establish Structure
Establish a structure of outreach to those who want to change and need the help to make change
SNA Case Study in First Application for FD

▪ Dime Block gang network
▪ Developed by UMKC and KCPD Detective
▪ Process took two months
▪ Silos of intelligence
▪ Information technology barriers/crystal reports
Single Gang Set Sociogram
SNA Single Gang Set Breakdown

- 360 members in group
- 202 in largest connected group
- 60 currently were on probation/parole
- 32 pending cases were in Jackson County processes
- 126 members had active warrants
- 22 warrants were felony
Betweenness Centrality (Warrant)
Betweenness Centrality (Probation & Parole)
The Social Structure of Violence in a Major U.S. City

How do you engage this network? Who does it?
Hot Spot Networks
Major Urban City Patrol Division

- Area of 45.4 square miles
- Population: 82,585
- 172 sworn law enforcement officers
- 44 homicides in 2015
- 70,000 calls for service
- Dozens of community groups
- Melting pot, industry, tourism
Intelligence-Led SNA Hot Spots

- Central players (betweenness)
  - Wanted
  - Messaging

- Probation parolees (central players first)
  - Home visits to verify plan
  - Arrest absconders

- Community interaction
  - Identify key players to drive preventive conversation with faith-based and service-oriented groups
Intelligence-Led SNA Hot Spots
Impacting Gun Crime Through SNA and NIBIN
Agencies can integrate all ballistic matches that link gun crime, connecting the cases, then identify the networks of people involved in those crimes, victims, witnesses, and suspects to overlay that intelligence in the SNA networks.

This information allows us to place a higher degree of "risk" for violence based on the prior history of individuals.
ATF/NIBIN Intelligence

- These dots indicate linked gun crimes – yellow dots indicate cases involving homicides
ATF/NIBIN Intelligence

Yellow Dot = Indictment
ATF/NIBIN Intelligence

Probation & Parole

Green Dot = Probation/Parole
ATF/NIBIN Intelligence

Betweenness
ATF/NIBIN Intelligence

Sex

Pink Dot – Female
Blue Dot – Male
Smaller Jurisdiction Model
Applicability to Smaller Jurisdiction

- Cluster of three agencies’ data in Eastern Iowa
- Three jurisdictional data sets: two police departments and one sheriff’s office
- Population of metropolitan area: about 257,000
- Very safe: three to five homicides per year
- Violence very concentrated
Network Method

- May 1, 2015, through April 30, 2017
- All incidents and field interviews
- Two-mode network connecting people through incidents
Extreme Concentration
Implementation Challenges
- Procedures to draw out human intelligence must be in place
- Commanders must direct staff to document relationships and share information to produce robust SNA
- Patrol elements are one of the absolute best sources of relational data - “the book”
- FIFs must be completed
Barriers to Advancing SNA

- Data not structured correctly for analysis
  - What is an edge list?

- Multiple names and monikers for same person
  - Jonathon, Jon, Johnny, Jay Jay, Skinny Boy...

- Paper files contain large amounts of relational and node data
  - Gang files, detective interview reports (DIRs)

- Human knowledge of relationships not documented
  - Patrol elements fail to complete FIFs
Barriers to Advancing SNA

- Investigative elements unwilling to talk or grant access to files
  - Our case will be compromised (case unsolvable, crime continues)

- Physical separation of investigative elements
  - Covert locations tend to be huge silos

- No central database for storing group and individual-level intelligence
  - Intel system that no one had access to or training on (big secrets!)

- SNA dismissed by “tech-challenged” personnel
  - First SNA models may hit the trash if training not conducted
Officer Safety Issues

- SNA has outlined undercover and long-term federal investigations
- Units were not adhering to “deconfliction” practices dictated by policy
- SNA charts with names need to be kept out of public view and in secure environments
Command and Line Element Misconceptions

- SNA is mistaken for Social Media Analysis
  - You are doing a great job with that “Facebook stuff”

- SNA will contain all walks of life, not just criminal elements
  - “Their data is horrible; they have a security guard mapped out”

- The “let’s go arrest everyone” mentality
  - SNA must be a tool to drive smart and impactful crime reduction operations
The U.S. Constitution is “still in effect” when using SNA
Being identified in a social structure does not transition to “probable cause or reasonable suspicion”
▪ SNA should be considered “raw intelligence”

▪ SNA should never be referred to in investigative or public access documents

▪ The process of preparing networks should always be accomplished with information that we legally have access to in the course of our duties

▪ SNA in the law enforcement realm should never be utilized for personal or political gain
Questions?
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Thank You!