

# 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




# What SNA Is NOT!

- 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
- 

# Research on SNA

- 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



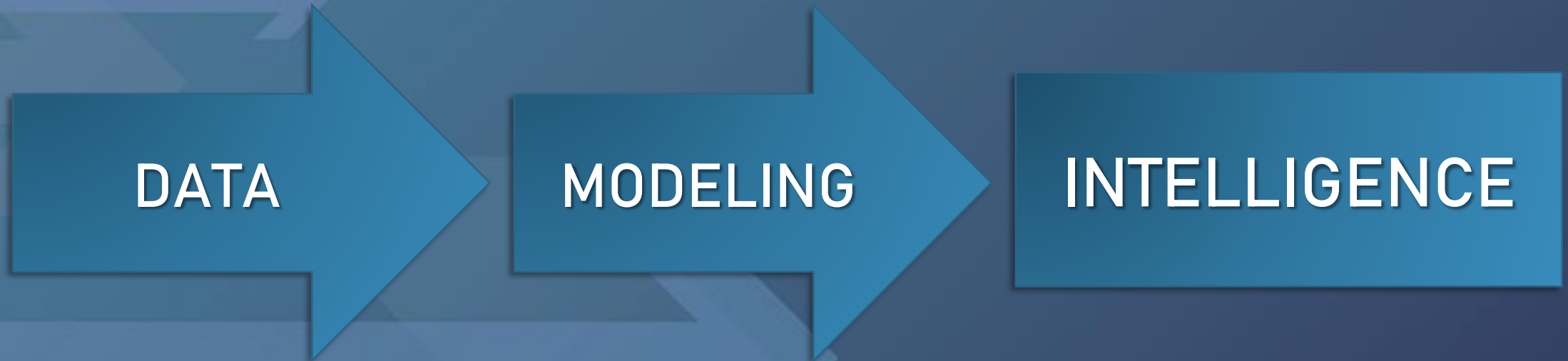
# SNA Sociogram





# 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

## Field Interview

FIF1

100 Andrew

200 Ken

FIF2

200 Ken

350 Joe

400 Tiffany

FIF1 & 2 Combined

## Edge

100      200

200      350

200      400

350      400

100      200

200      350

200      400

350      400

## Network Representation

100

200

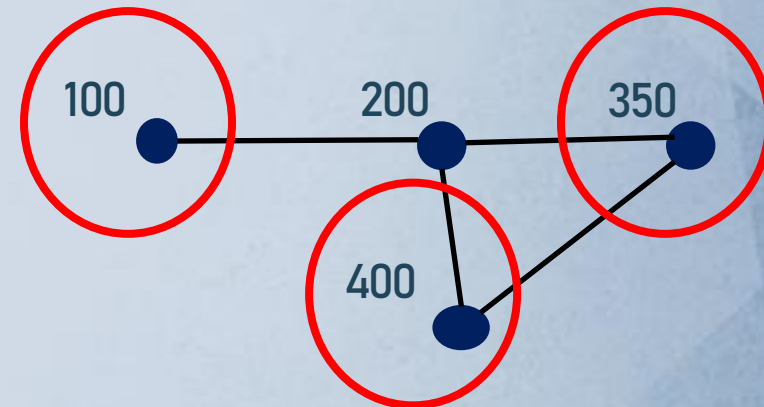
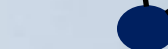


200

350

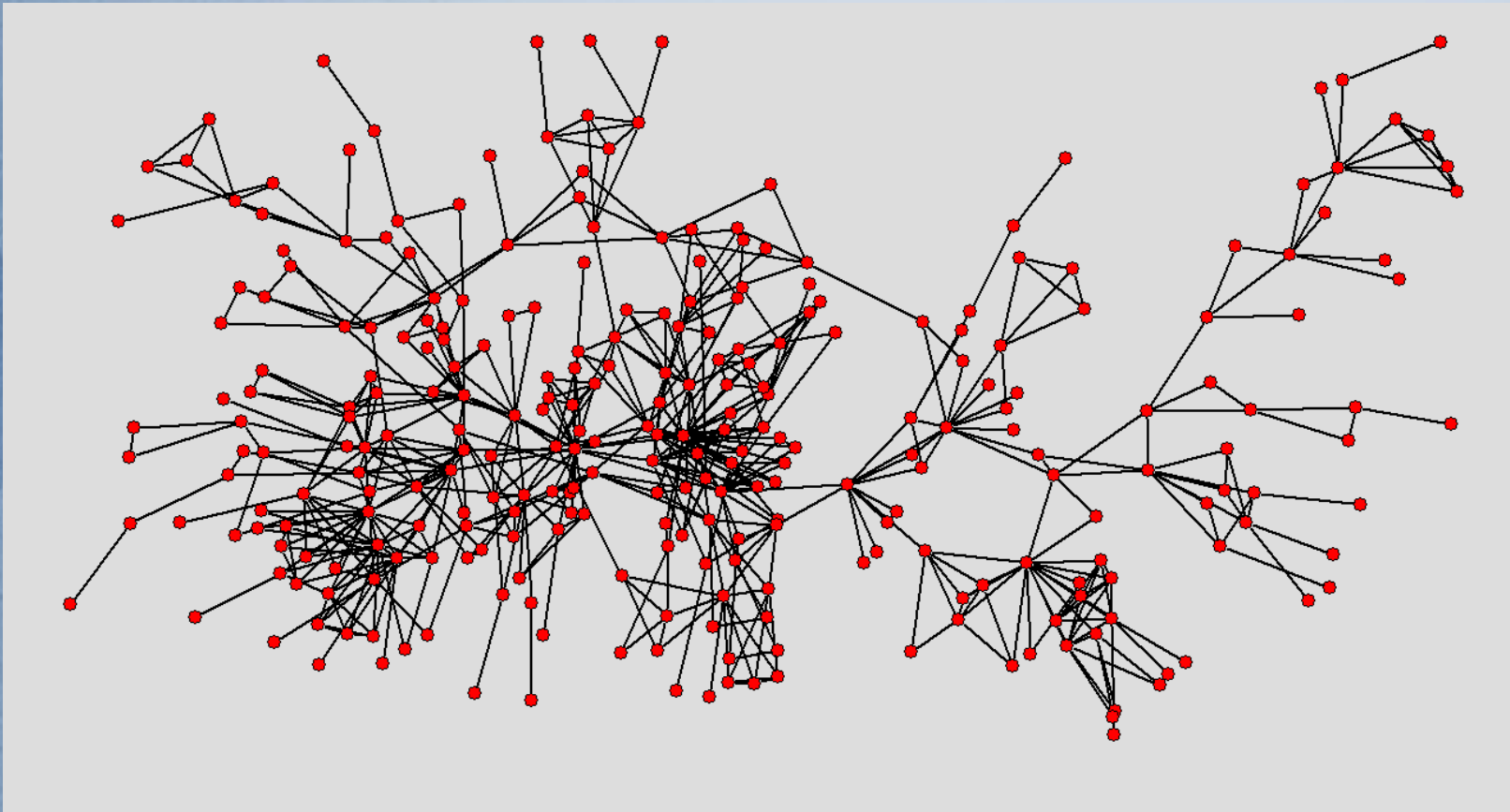


400



# Visualizing a Network

Network of Gang Members and Associates (n=288)



## Layout optimization

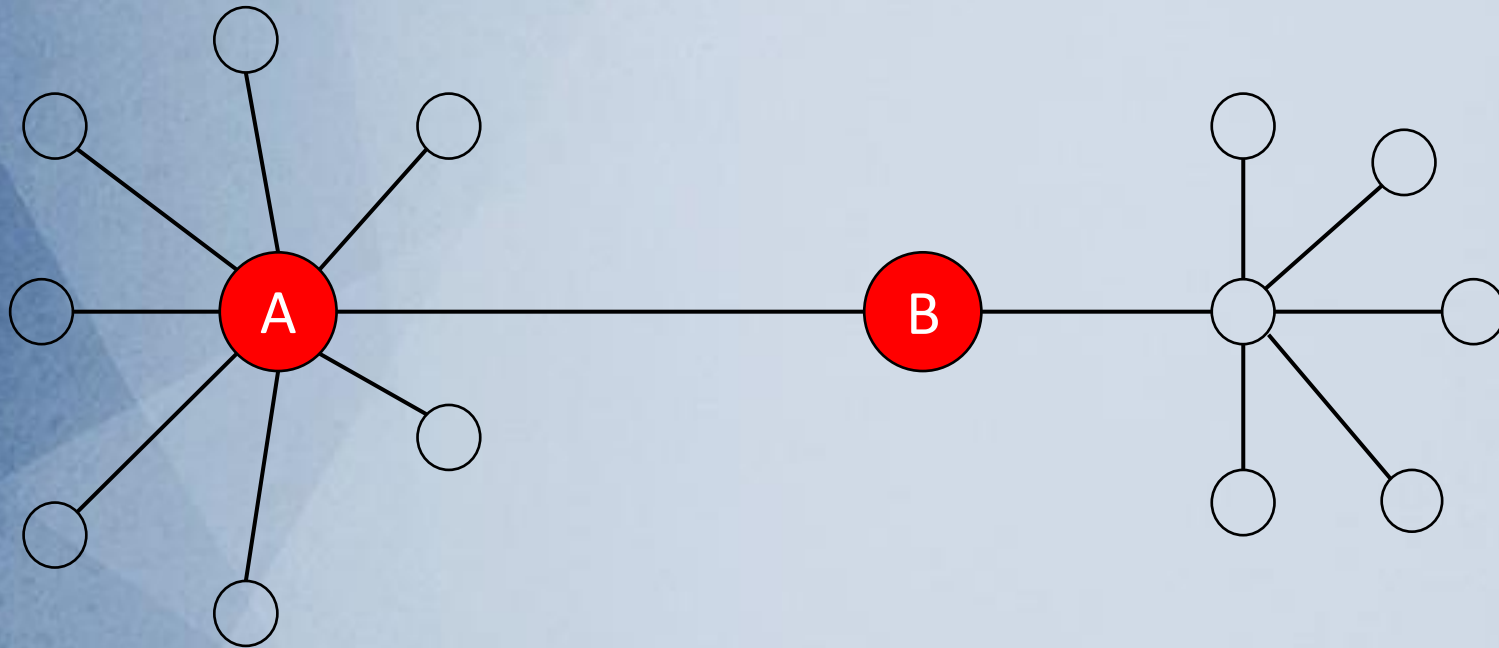
- No lines overlap
- Social distance on the page

# Key Players

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

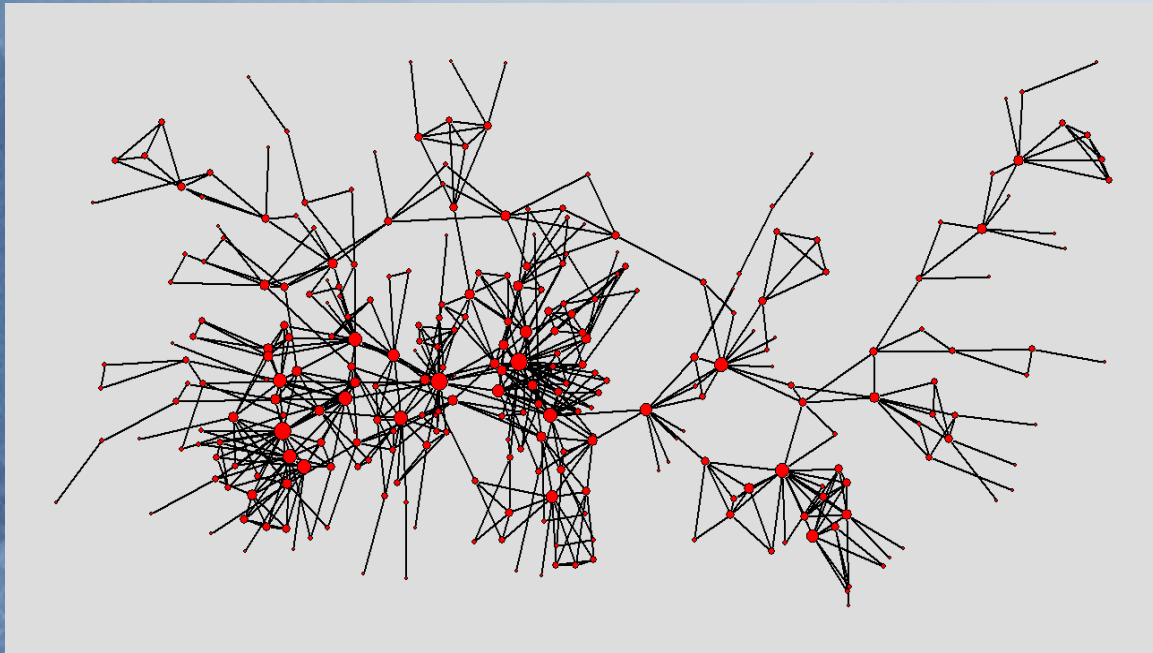
Betweenness centrality: Person in the best path

(connects a lot of people)

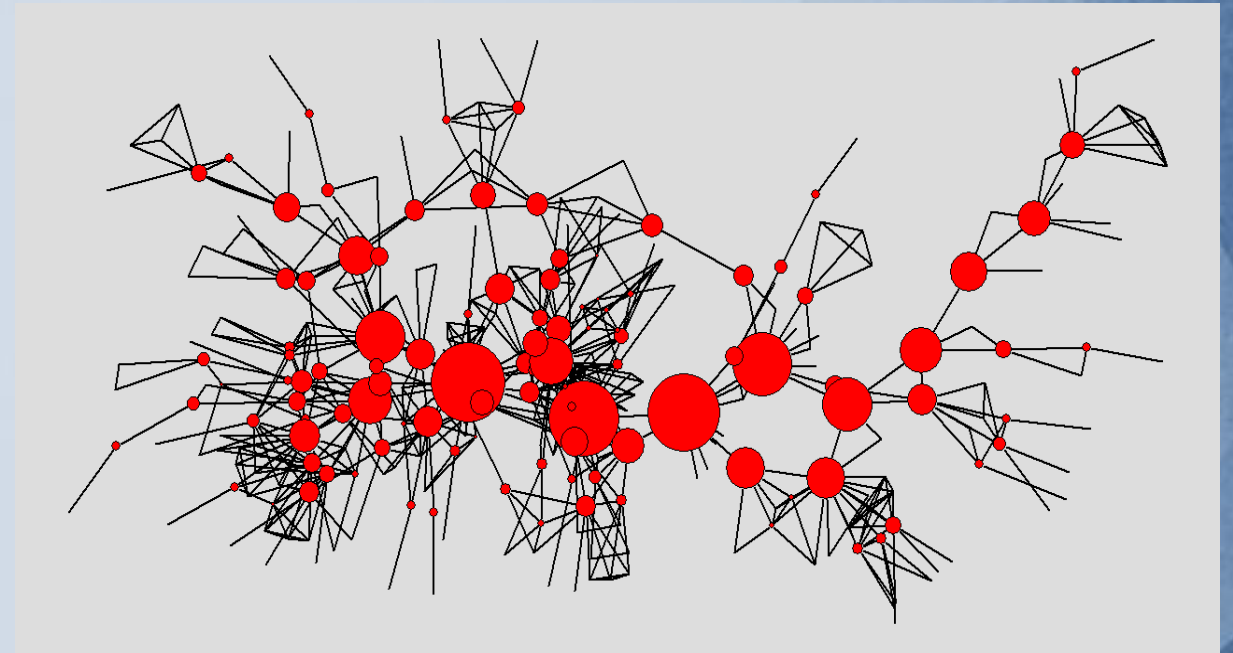
Person B

# Key Players

## Degree Centrality



## Betweenness Centrality





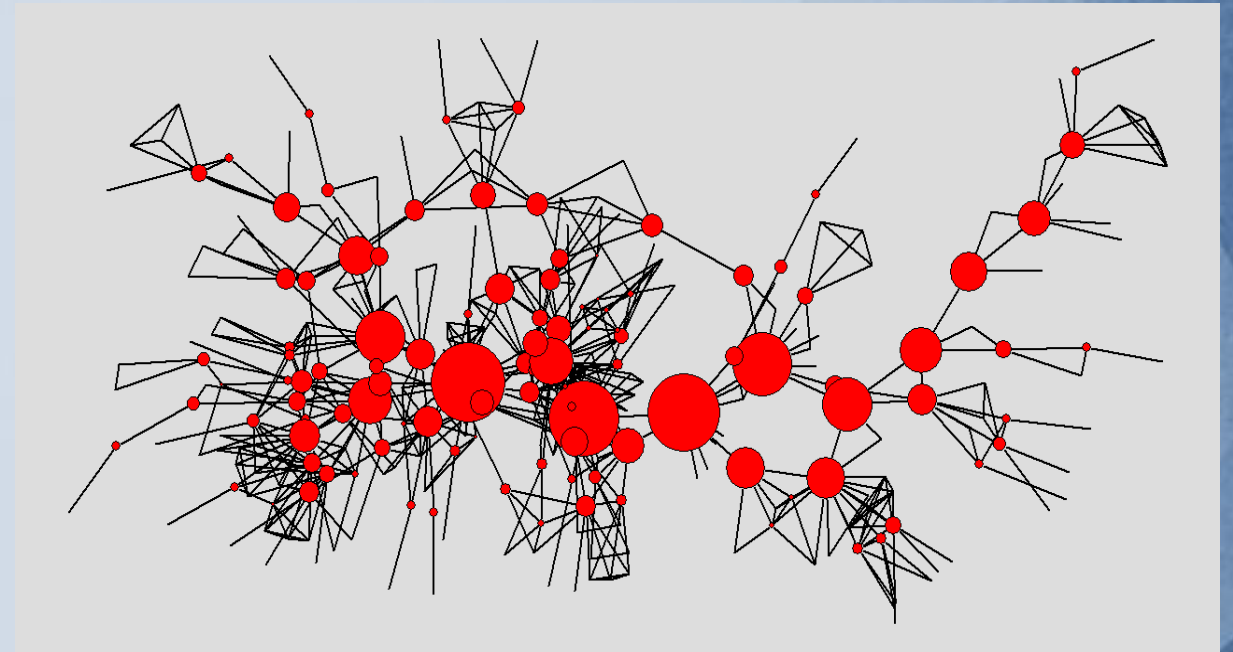
# SNA in Practice

## Arrest networks

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

(Fox et al. 2020)

## Betweenness Centrality



# 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

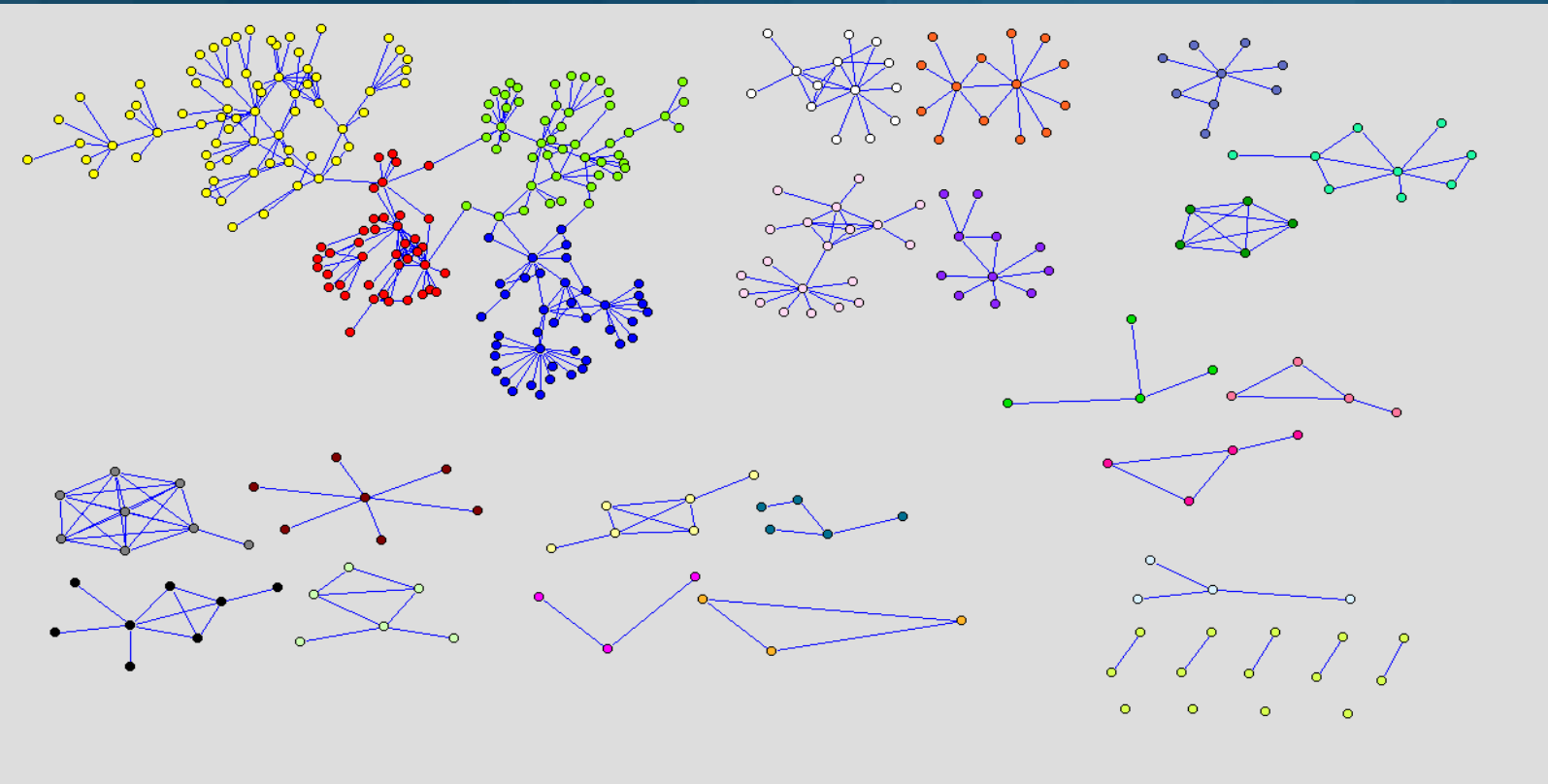
Build relationships in the community to establish a moral voice that impacts violence

## Establish Structure

Establish a structure of outreach to those who want to change and need the help to make change

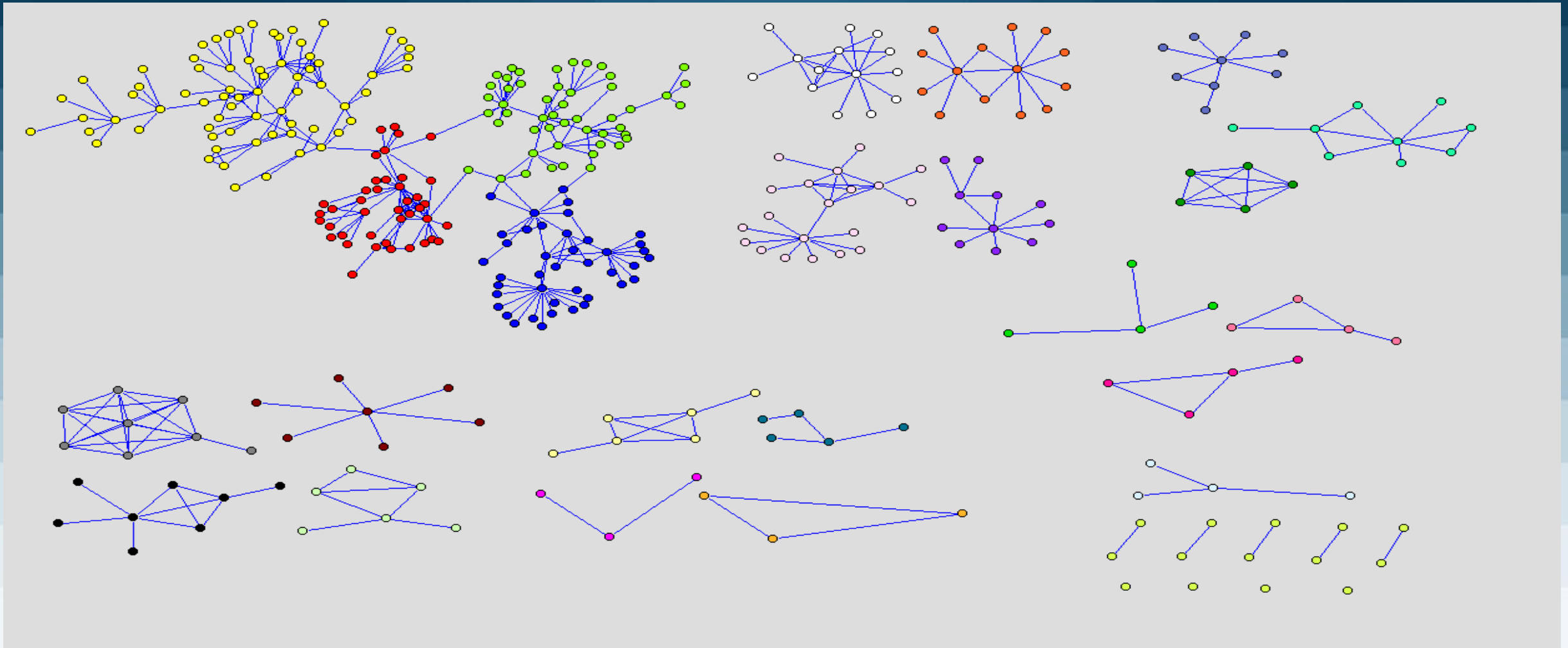


# SNA Case Study in First Application for FD



- Dime Block gang network
- Developed by UMKC and KCPD Detective
- Process took two months
- Silos of intelligence
- Information technology barriers/crystal reports

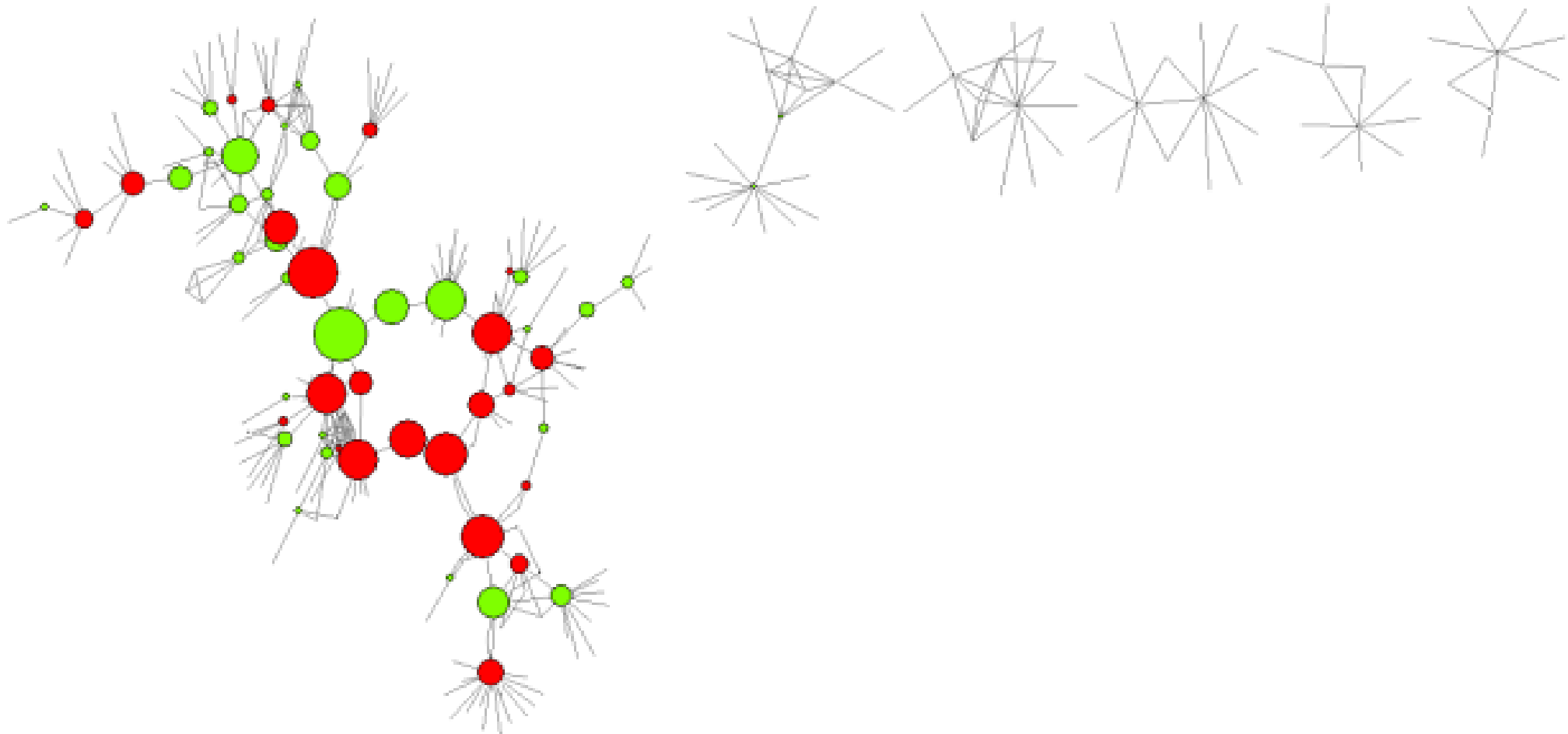
# Single Gang Set Sociogram



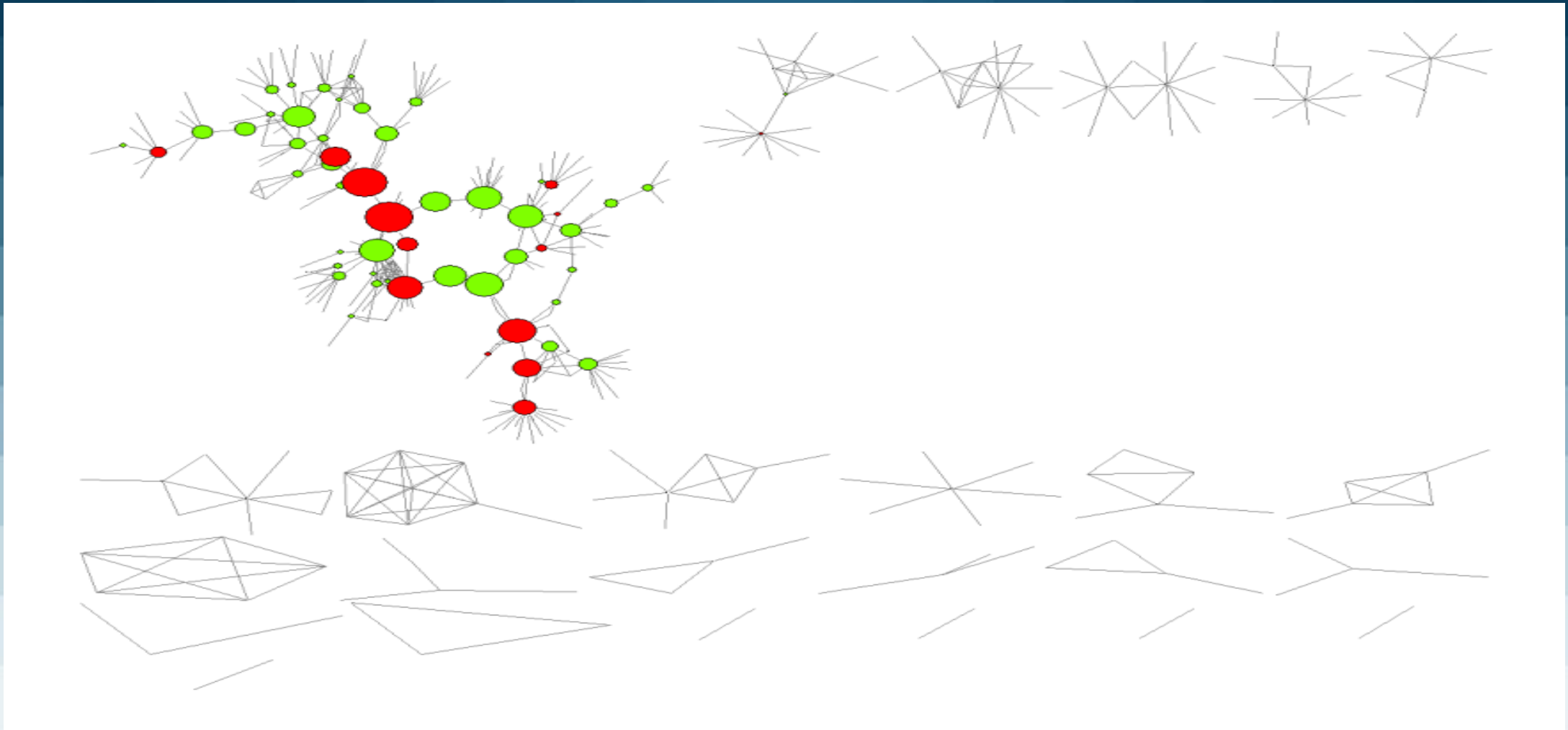
# SNA Single Gang Set Breakdown

- 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)



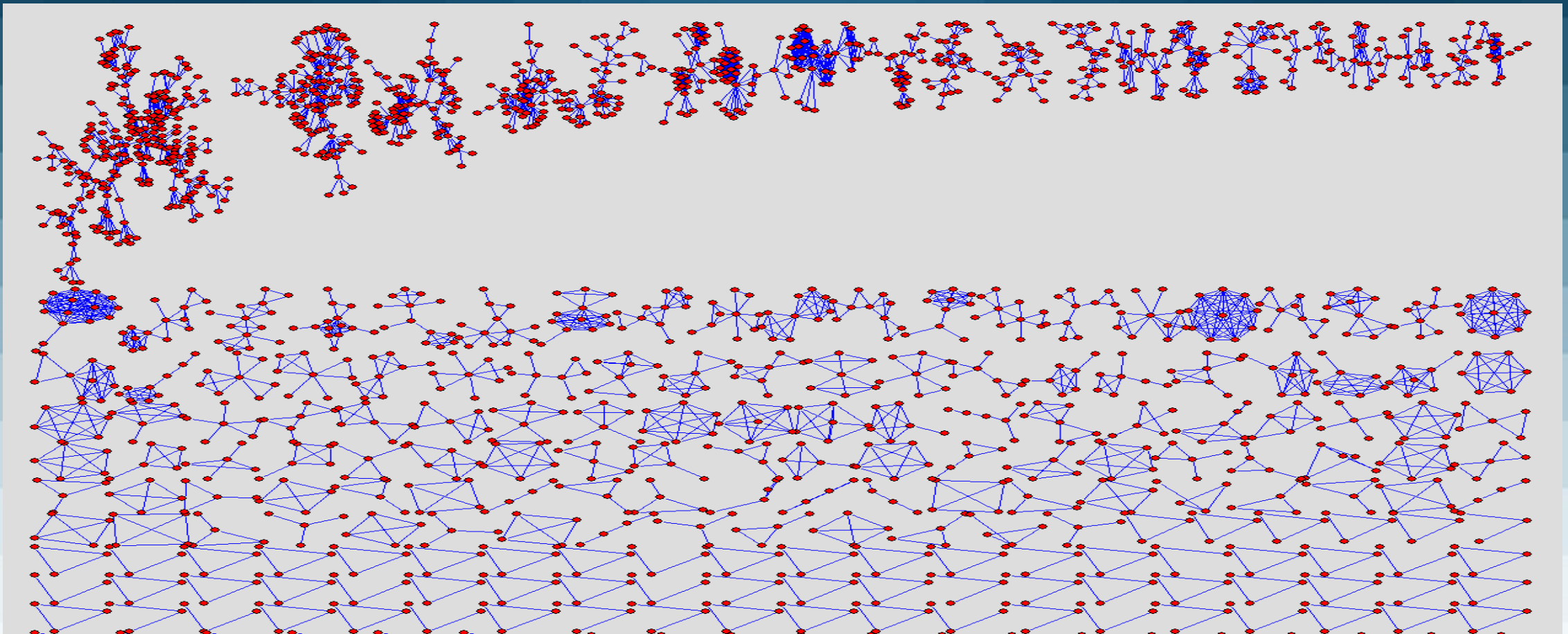
# Betweenness Centrality (Probation & Parole)



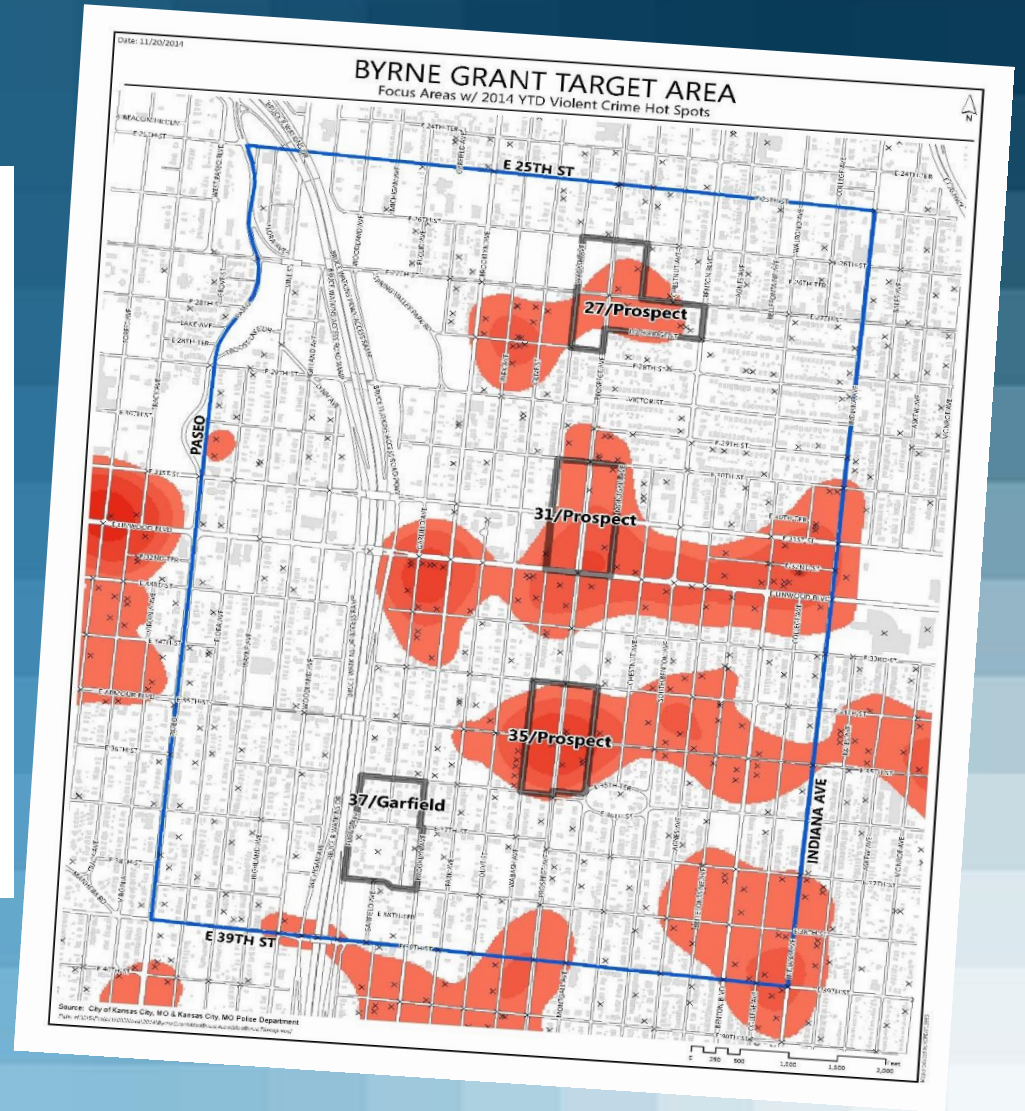
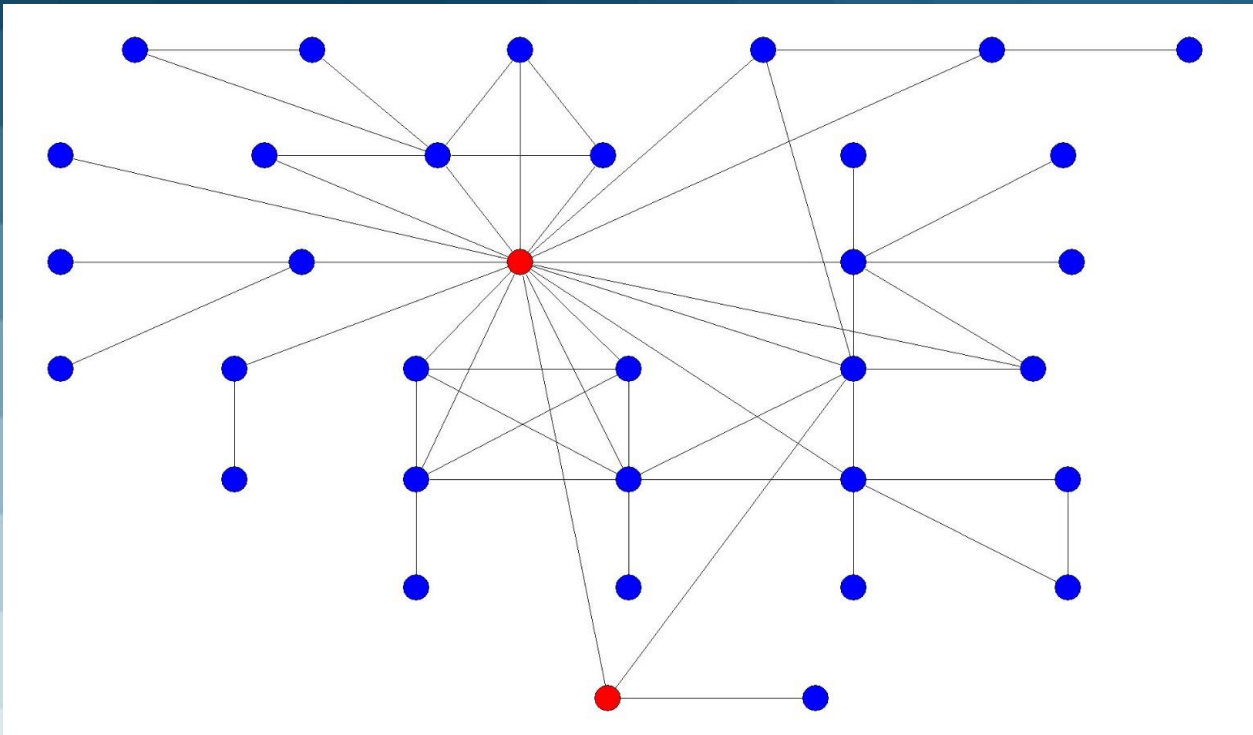


# The Social Structure of Violence in a Major U.S. City

How do you engage this network? Who does it?



# Hot Spot Networks



# Major Urban City Patrol Division

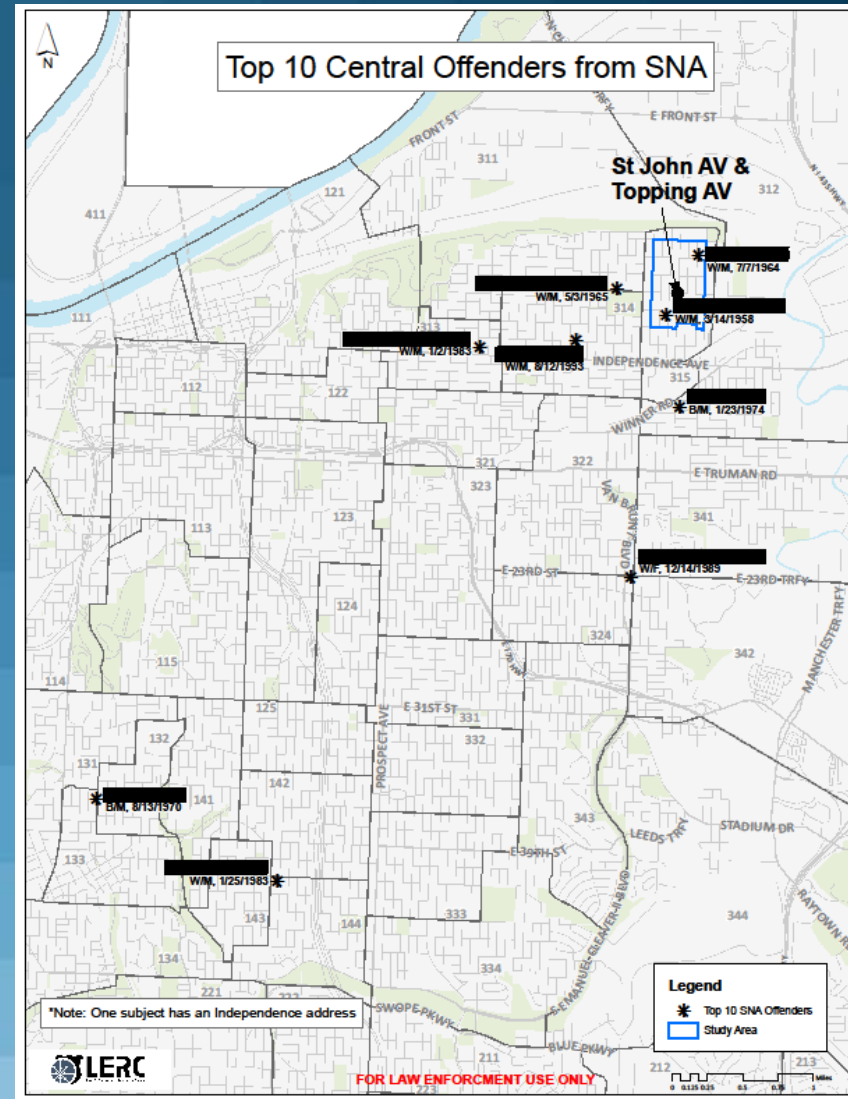
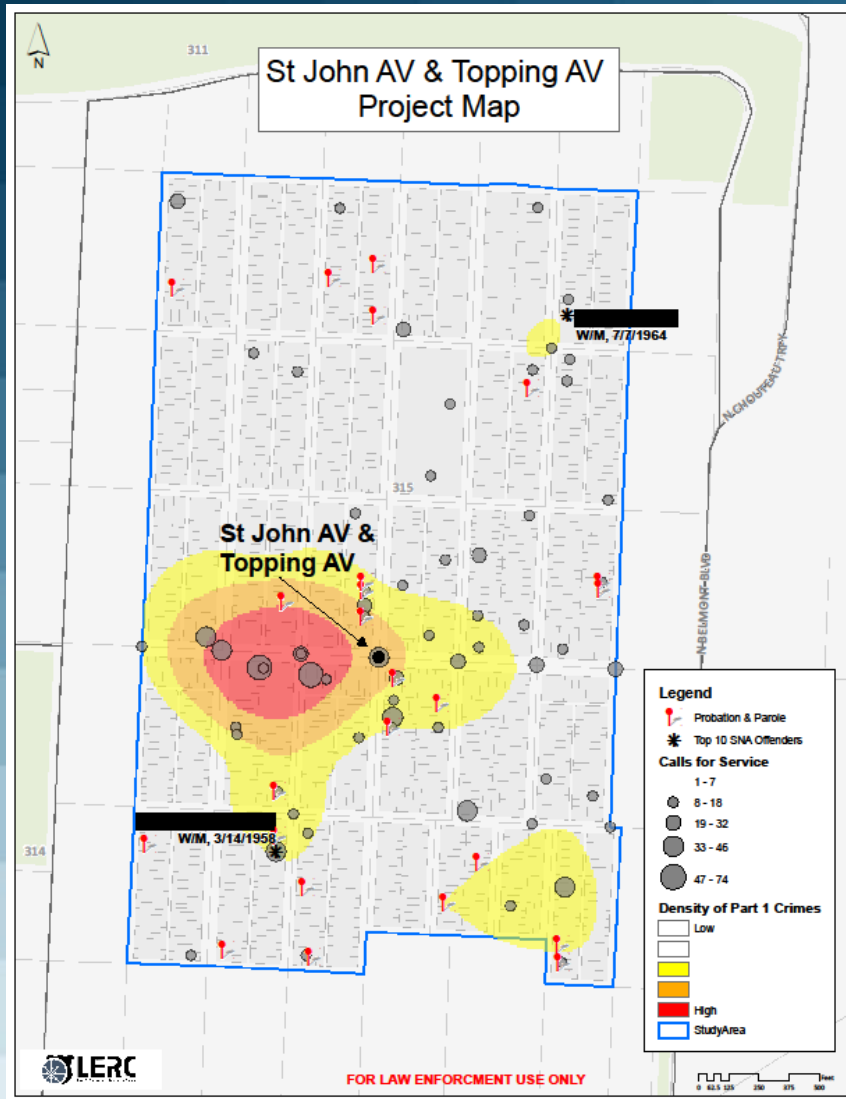


- Area of 45.4 square miles
- Population: 82,585
- 172 sworn law enforcement officers
- 44 homicides in 2015
- 70,000 calls for service
- Dozens of community groups
- Melting pot, industry, tourism

# 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



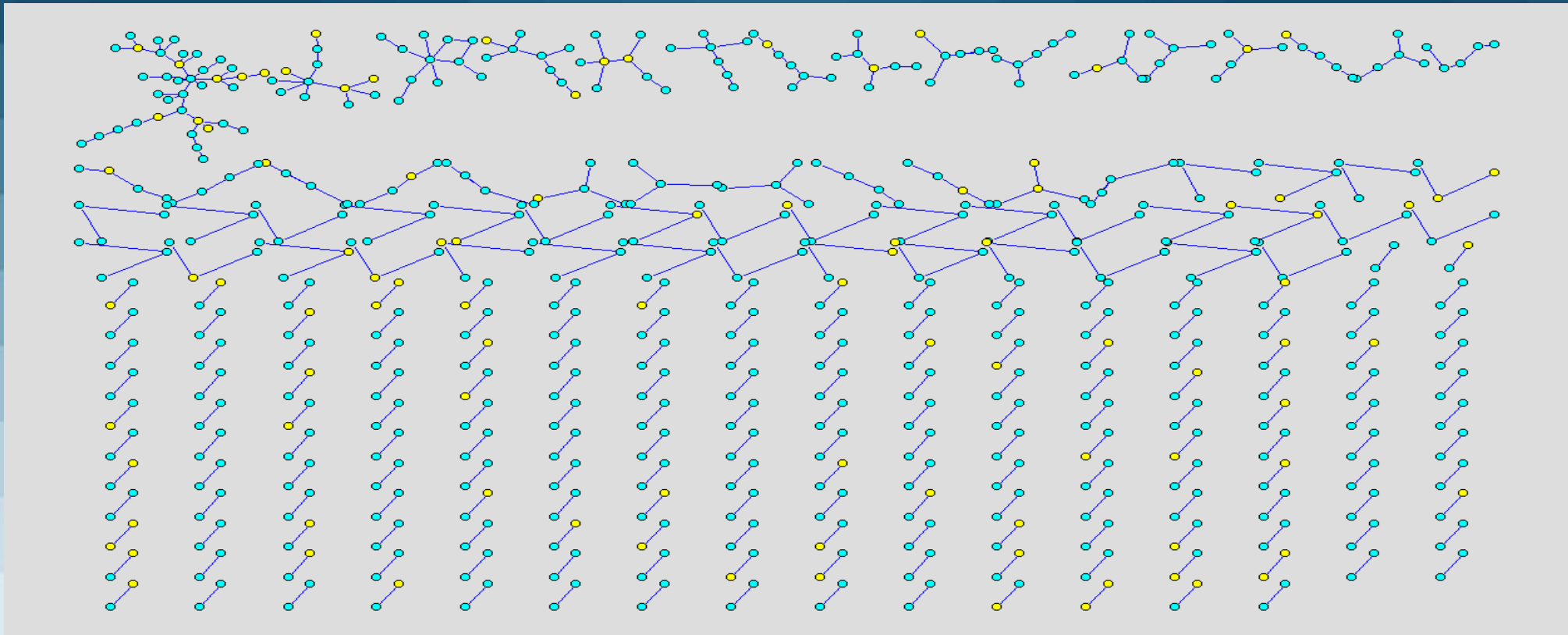
# Impacting Gun Crime Through SNA and NIBIN

# ATF/NIBIN Intelligence

- 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

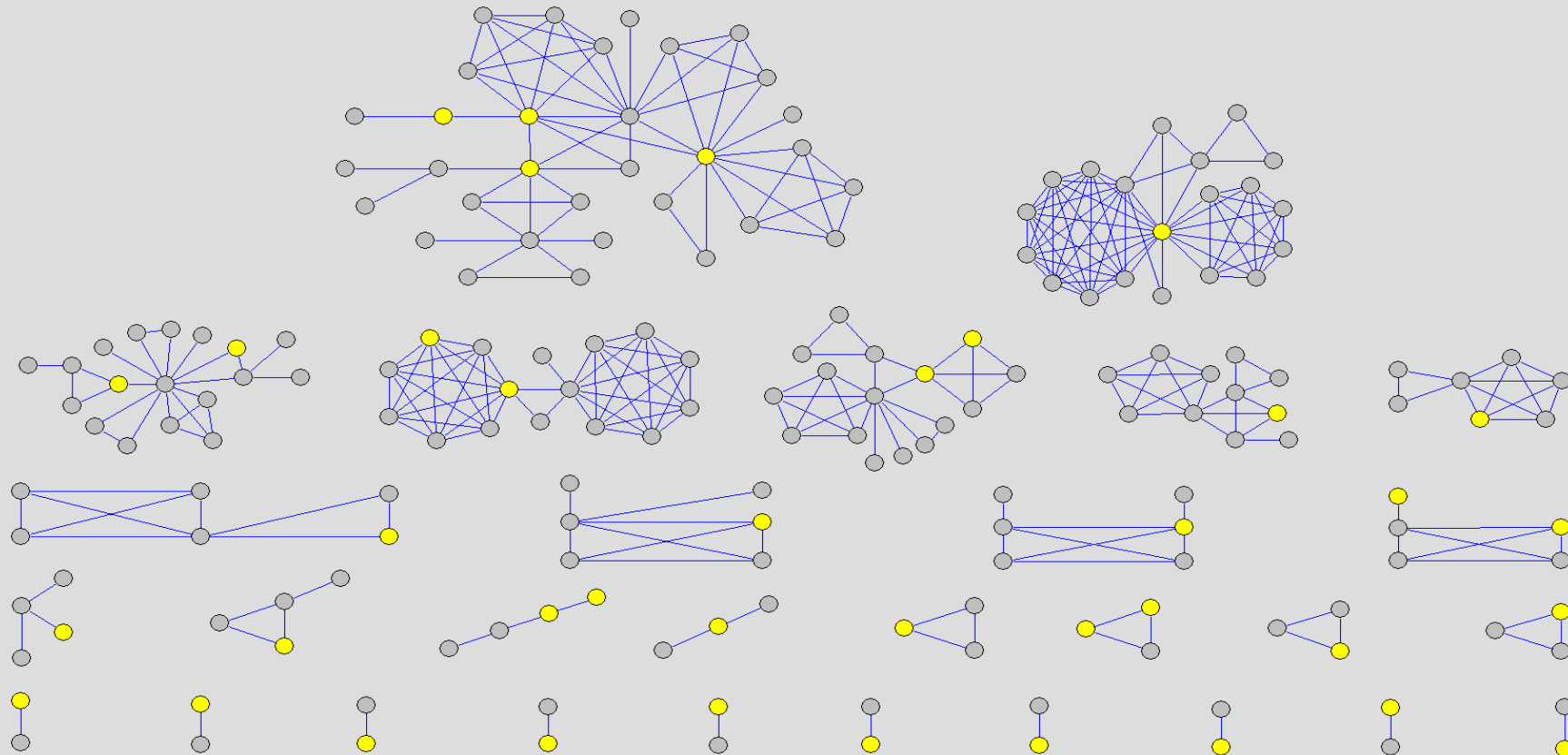




# ATF/NIBIN Intelligence

ATF

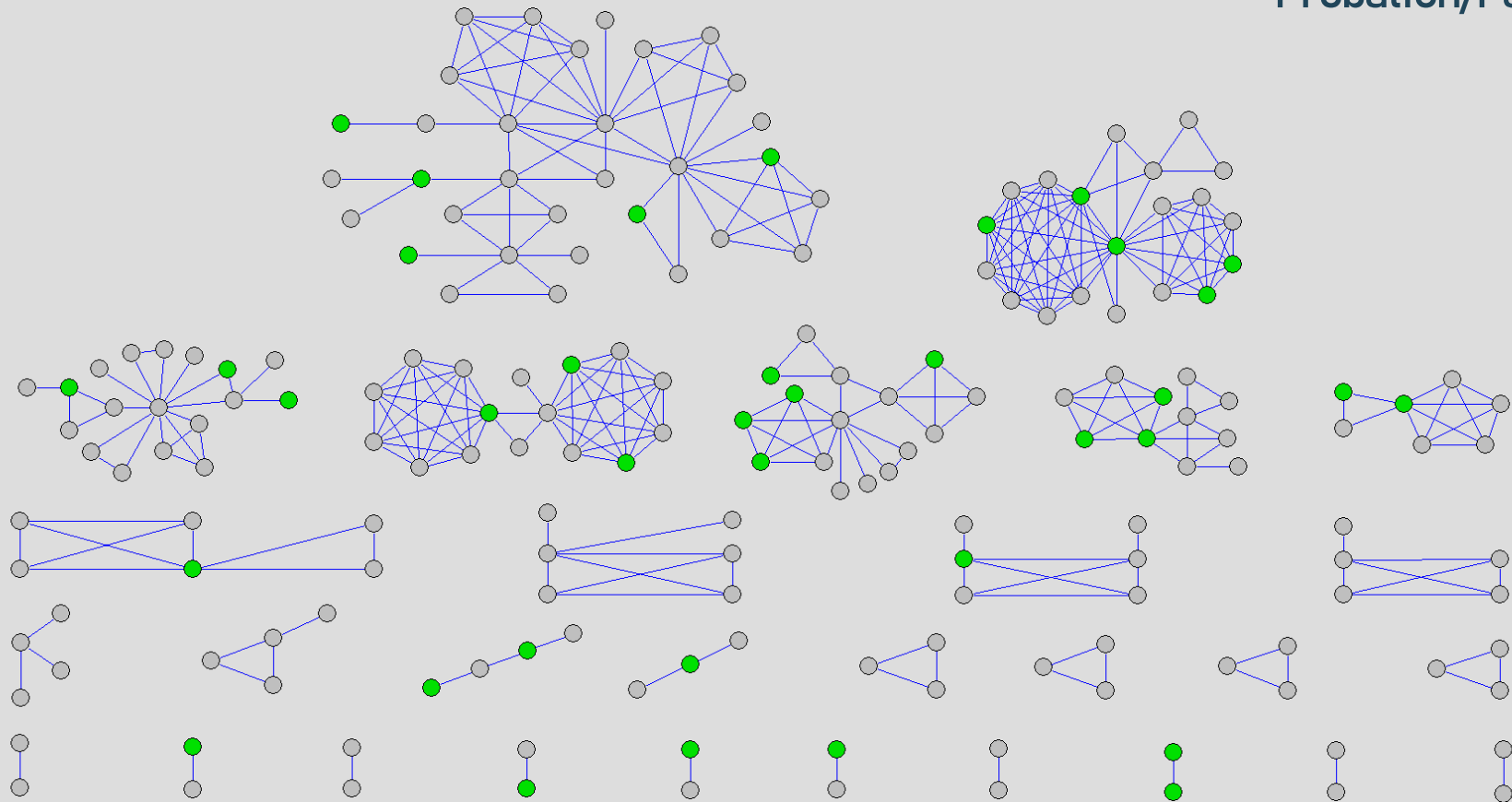
Yellow Dot = Indictment



# ATF/NIBIN Intelligence

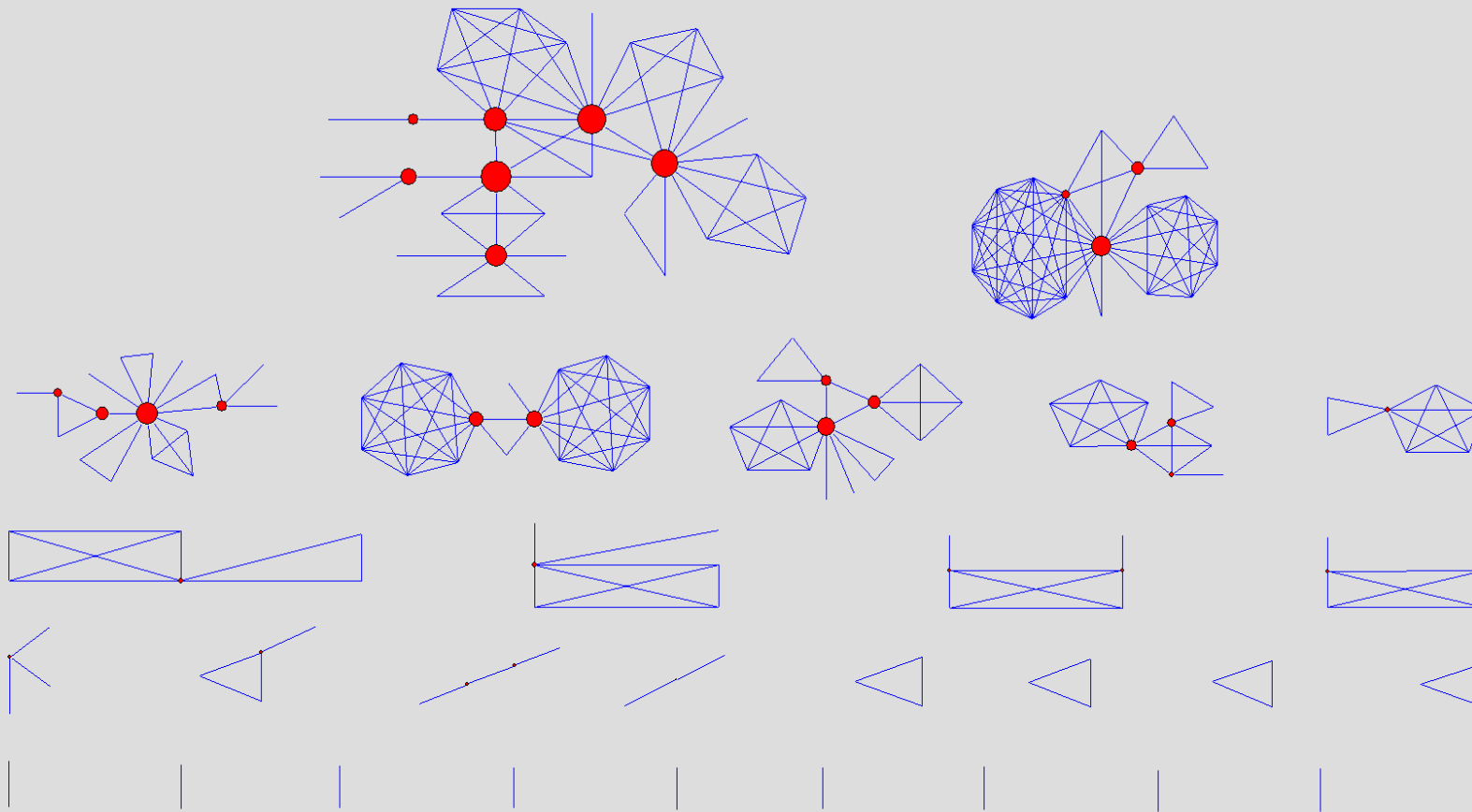
## Probation & Parole

Green Dot =  
Probation/Parole



# ATF/NIBIN Intelligence

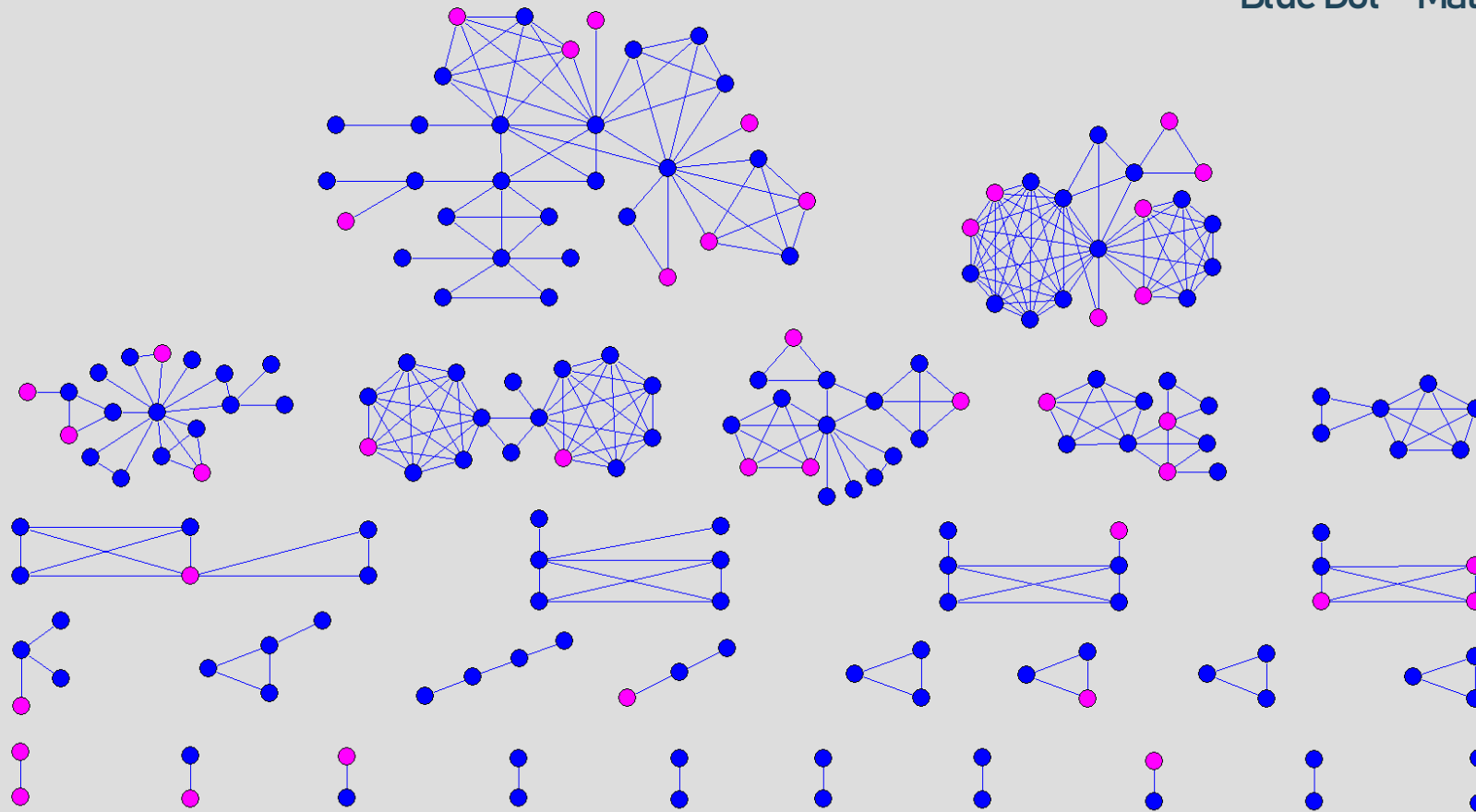
## Betweenness



# ATF/NIBIN Intelligence

Sex

Pink Dot – Female  
Blue Dot – Male



# Smaller Jurisdiction Model

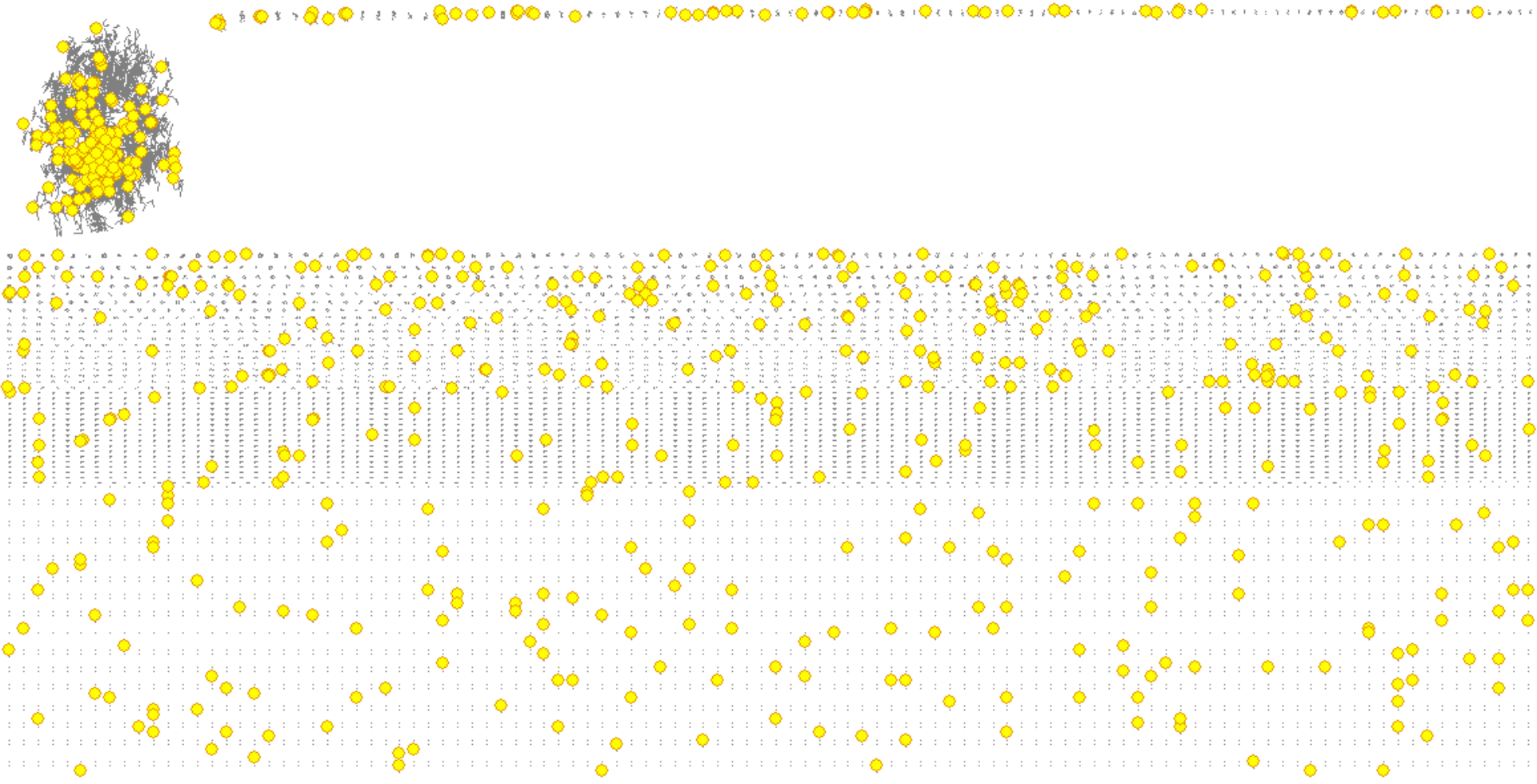
# Applicability to Smaller Jurisdiction

- 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

# Computers Cannot Replace Intuition

- 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

# Probable Cause and Reasonable Suspicion

- 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”



# Prosecutors and Discovery

- 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?**

# Contact Us



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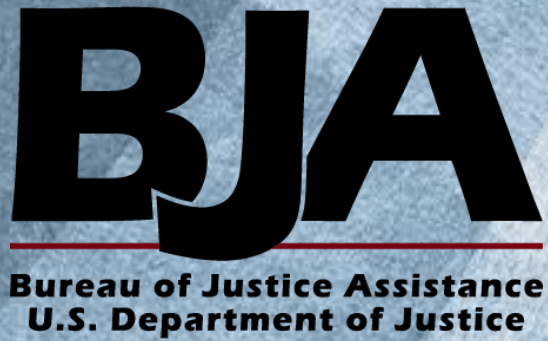
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**Thank You!**