The Role of Social Network Analysis in Intelligence-Led Policing

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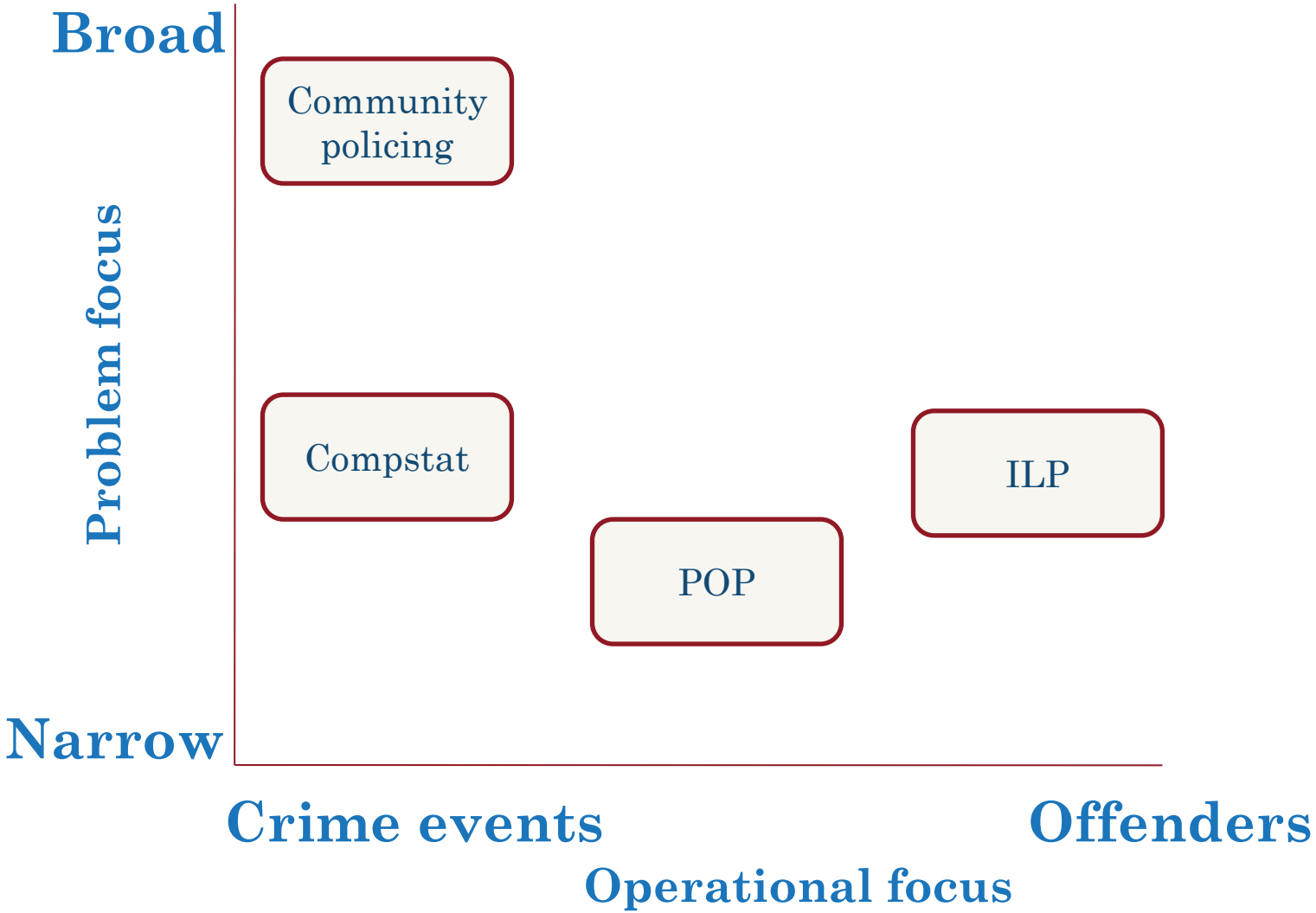
Definition: Intelligence-led policing

"A managerial philosophy where data analysis and crime intelligence are pivotal to an objective, decision-making framework that facilitates crime and problem reduction, disruption and prevention through both strategic management and effective enforcement strategies that target prolific and serious offenders."

Source: Ratcliffe, J. (2008). Intelligence-Led Policing, Willan Publishing: p. 89.

- Strategic decisions
- Intelligence/data driven
- Focus on problem reduction
- Target prolific offenders

Policing paradigms



The Utility of SNA in ILP

ILP

- Using intelligence to address criminal groups and prolific offenders.
- It often focuses on social relationships

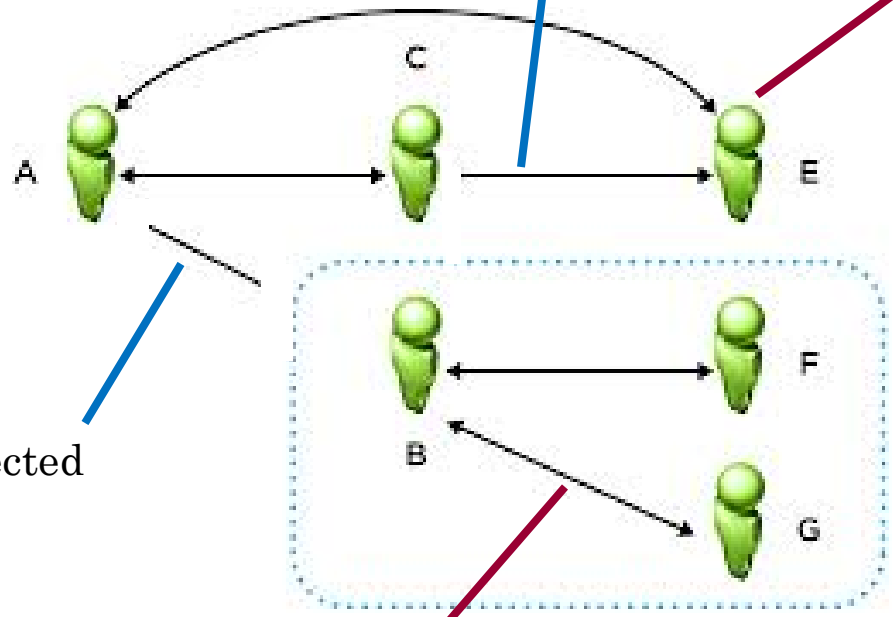
SNA

- Maps social relationships
- Identifies group/organizational structures
- Identifies those at the center of criminal groups

Sociogram

Node: individuals, gangs, businesses

Directed tie



Undirected tie

Edge or tie: type of relationship (associate, enemy, alliance)

This is not just link analysis!

1. Degree Centrality – Simply the number of ties a node has in the network.

2. Betweenness Centrality – Those who are the intersection on many paths between others.

3. Eigenvector Centrality – Those who are connected to many connected people

Example: The 9-11 Hijacker Network

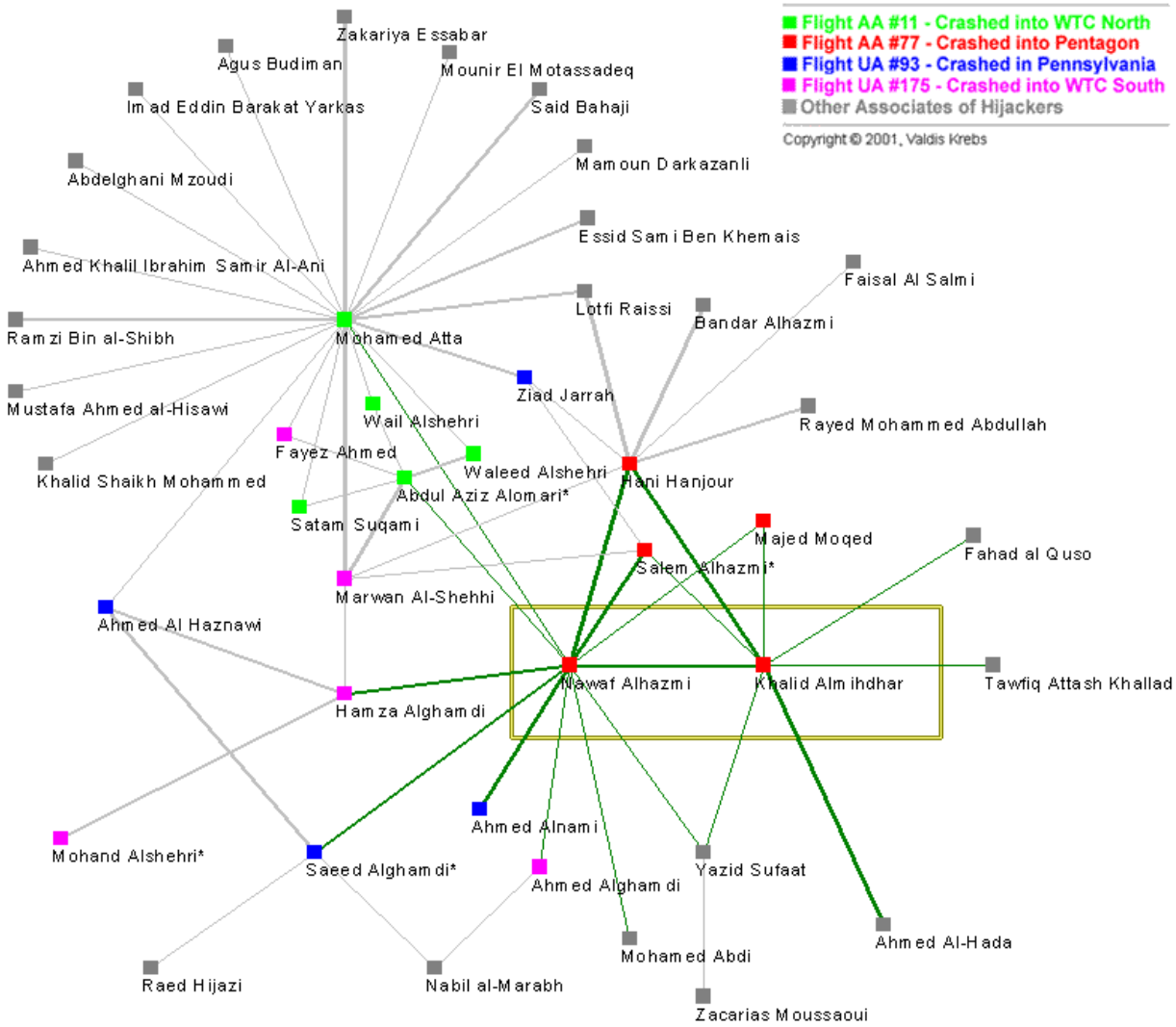


Figure 3 - All 2 step links from two known suspects

The 19 terrorists were ALL within two steps of the two original suspects identified in 2000

SOURCE: Valdis Krebs
http://www.orgnet.com/

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Is SNA possible with police data?

Strengths

- Already collected
- Easily accessible
- Structured, relational, and temporal data is plentiful

Weaknesses

- Incompleteness
- Inaccuracies
- Inconsistencies

Advantages of Using SNA

- Layout optimization
  - No lines on top of each other, clear layout
  - Space on the page to equal social distance
- Identifying key players
  - Centrality as a measure of importance
- Free software (Pajek and Excel)

Stop & Think

- What kind of intelligence is available to you?
  - Crime reports
  - Field interview cards
  - GMIC's
  - Court transcripts
  - National Integrated Ballistic Information Network (NIBIN)
  - Telephone records
  - Jail/correctional visits
  - Free talks

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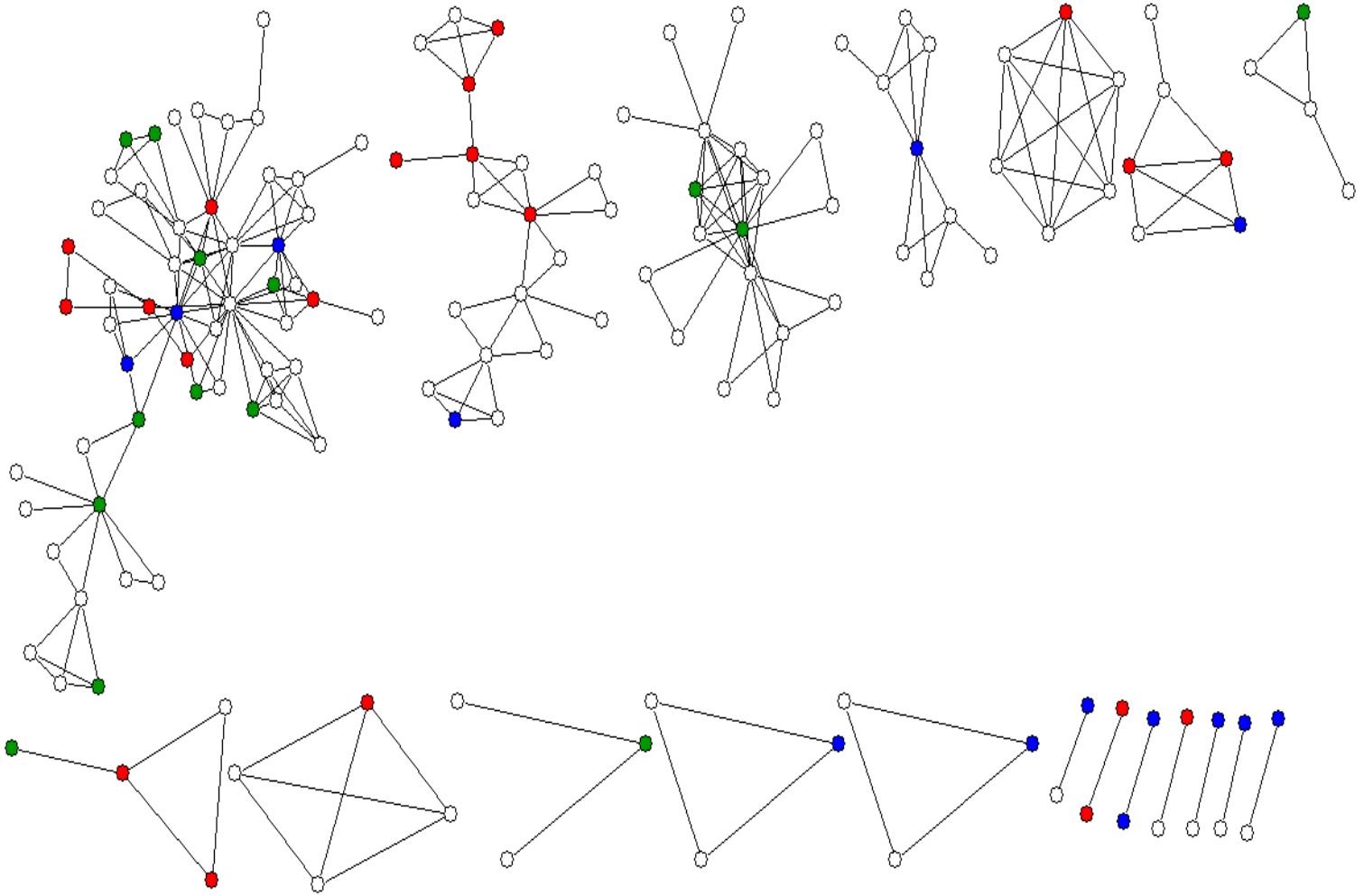
The Glendale Police Department Pilot Study

- ASU collected relational data from 2006-2010
  - GMIC
  - FI Cards
  - Merged with criminal history data
- Major findings
  - Intelligence was fairly reliable
  - Consistently collected
  - Time consuming to pull
  - Data management systems not optimally designed for SNA
  - SNA has strong utility for ILP

Major findings, cont.

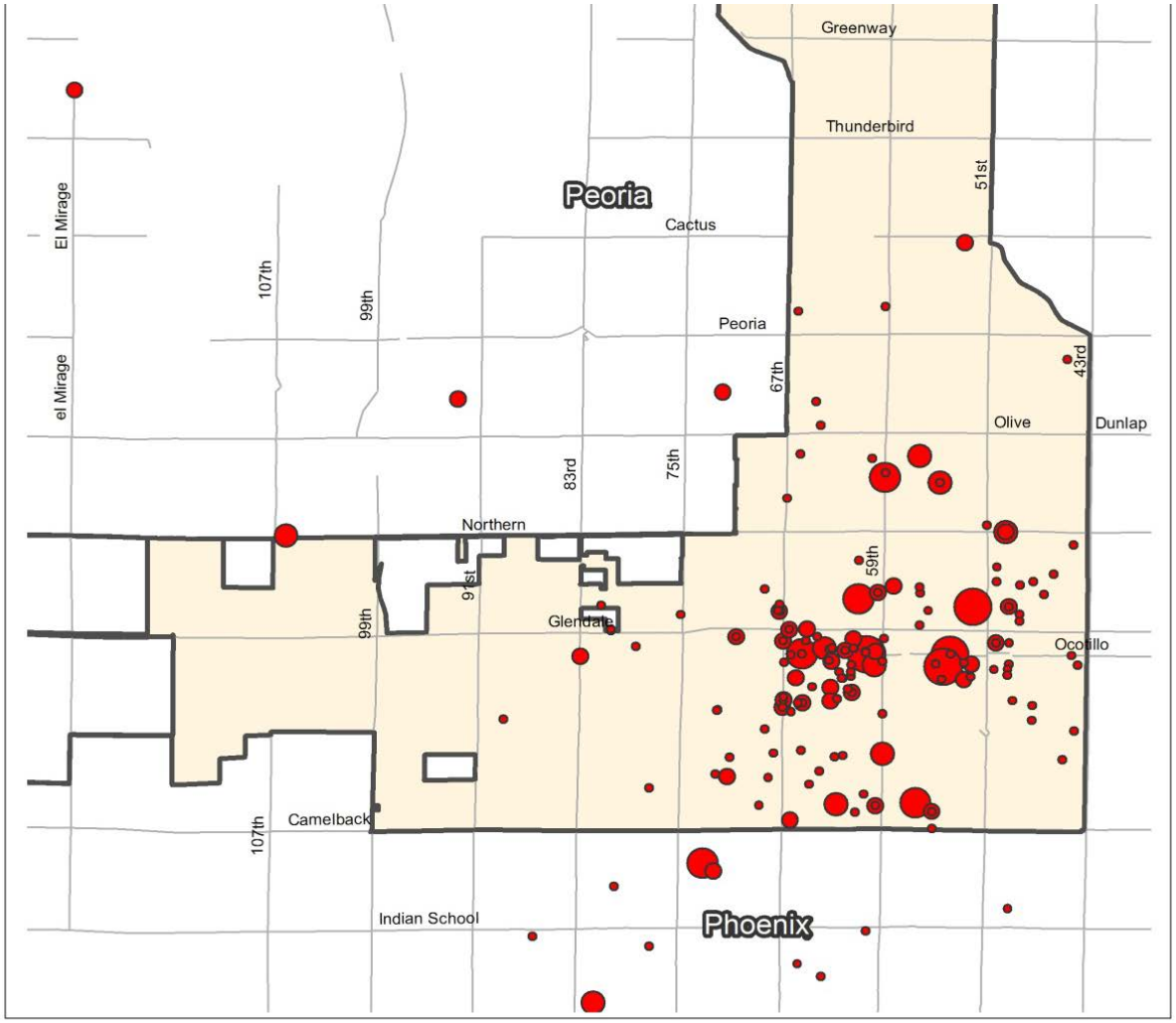
- There was not one large cohesive gang; the network consisted of many smaller connected groups.
- Gang members from different cliques were found to be in the same social network.
- Hybrid gangs were the most criminally involved.
- Betweenness centrality was more important with respect to criminal involvement.
- Gang membership * cohesion = more crime.

Examples of clique affiliations in 2007



Key: Varrio Sixty First = Red; West Side Grandel = Blue; Varrio Clavalito Park = Green

Betweenness Centrality



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Betweenness Centrality

	Top Betweenness		
	No		Yes
Age	22.86		21.89
Gender			
Male	82.5		95.7
Female	17.5		4.3
Race			
Asian	0.0		0.0
Indian	1.1		0.0
Hispanic	89.8		100.0
White	6.8		0.0
Black	1.7		0.0
Other	0.6		0.0
Entered network as:			
Gang member	41.2	*	83.3
Gang associate	51.3		16.7
Associate of associate	7.5		0.0
Number of Arrests			
Part 1 Violent	0.49	*	0.92
Part 1 Property	0.96		1.17
Part 2 Drug	0.93		1.33
Part 2 Sex	0.04		0.00
Part 2 Misc	3.57	*	5.33
Total number of arrests	5.29	*	7.79

Operation Jenga:
Proof of concept for the PPD

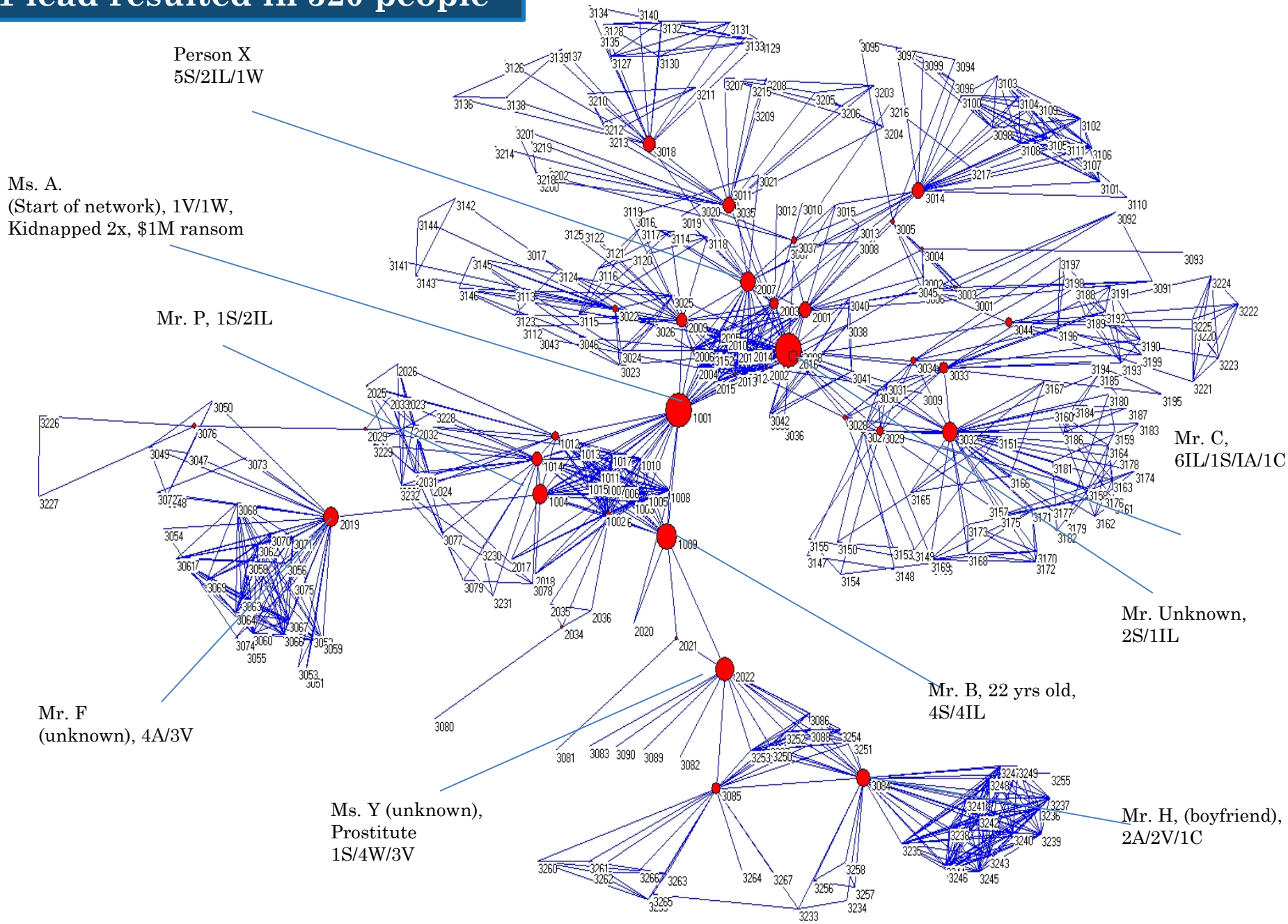
What do we need to know at this point?

- How hard is it to get to the data?
- Does it produce ties we otherwise would not know of?
- Do subgroups exist?
- What is the structure of the network?
- What roles do members in the network play?

How we started Operation Jenga

- Step 0, Anna Bella, recommended by a couple of detectives.
  - Suspect of money laundering
  - Has been kidnapped twice ($1M each)
  - Ex-husband was in a Mexican Cartel
  - She owns several check cashing businesses and a tax service, notary business.
- Data we used:
  - FI's
  - DR's
  - PPD only
- Went back 3 years
- 2 steps

1 lead resulted in 320 people



What else do we now know?

- SNA can work with PPD data
- Labor intensive data collection
- One lead resulted in 320 relationships after 2 steps
- 50% of network reachable through 2 people.
- Key players are not necessarily the most criminally involved

Challenges in using police data

- Labor-intensive
  - Manual look-up and verification of individuals
  - Manual build of edge-lists
- Quality concerns
  - CAD/RMS systems without a reliable unique identifier (with look-up capability) for every individual in the system contributes to errors in both inclusion and exclusion of individuals in the network
- Timeliness
  - Manual processes reduce tactical utility
  - CAD/RMS able to automate edge-list builds would provide near real-time analyses.

So what? What are we going to do with this stuff?

- Degree centrality- number of ties a node has in the network
  - Not the most strategic targets
  - Could be important in collecting information on a network (e.g., informants, free talks, etc.)
- Betweenness centrality - intersection of many paths between others.
  - Strategic targets for disrupting a network
  - Ideal contagion agents for a deterrence message
  - Call-ins would be best directed at these individuals
- Eigenvector centrality - connected to many connected people
  - Collective accountability
  - Pulling levers strategy

Doe, Jane

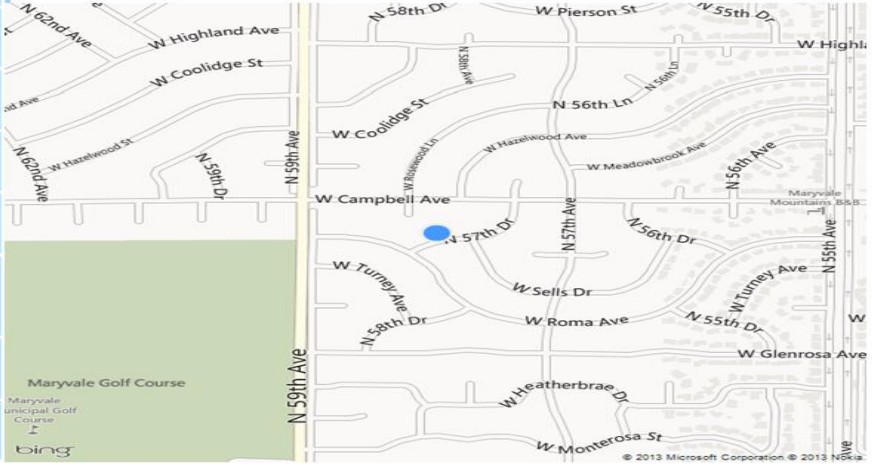
Network ID#: 2034

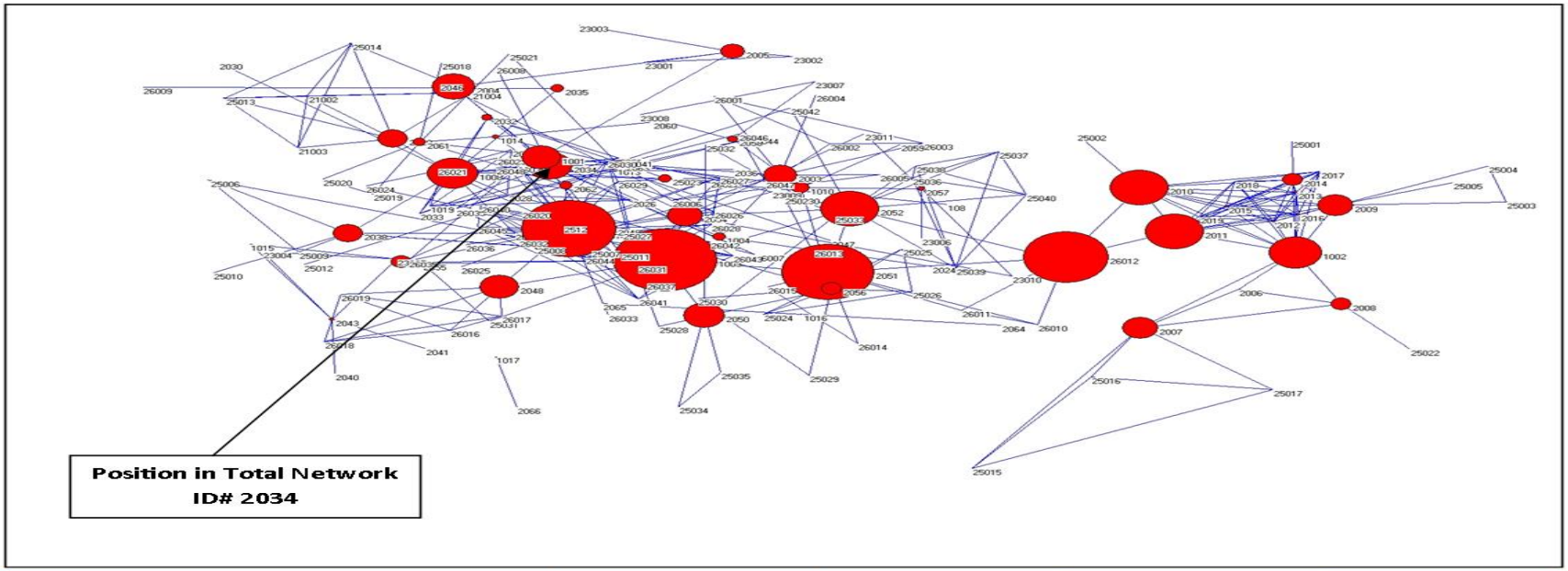
GLENDALE SPI—VIOLENT NETWORK INTEL SHEET

AGE:	29
DOB:	00/00/1900
SSN:	999-99-9999
SEX:	FEMALE
RACE:	Hispanic/Latina
HEIGHT:	506
WEIGHT:	120
ADDRESS:	4412 N ?? ave; Phoenix, AZ 85099 [STABLE—PARENT]
EMPLOYER:	Unemployed
EMPLOYER'S ADDRESS:	NA
GANG:	NA
CUSTODY STATUS:	NONE—Released ADC 99/99/2099
PROBATION STATUS:	NONE
PROBATION OFFICER	
PO CONTACT	
RECENT DR#s	
11-119999	INVOLVE TYPE: S (BO) DESCRIPTION: Misd Warrant
11-9999	INVOLVE TYPE: S (BO) DESCRIPTION: Misd Warrant
10-9999	INVOLVE TYPE: S (BO) DESCRIPTION: DV-Assault
10-9999	INVOLVE TYPE: S (BO) DESCRIPTION: Prohibitive Camping
10-999	INVOLVE TYPE: FI DESCRIPTION: Suspected selling of drugs
10-99999	INVOLVE TYPE: S DESCRIPTION: Poss. of Marijuana
10-9999	INVOLVE TYPE: FI DESCRIPTION: Loitering

Other information:

FBI #: 8abcsde-99999





ASSOCIATE	DR#	INVOLVEMENT TYPE	DR#	INVOLVEMENT TYPE
1008-MICHAEL	12-1	FI	12-8	FI
	12-7	FI	12-9	FI
	12-6	VICTIM	13-3	IL
	13-2	FI	12-9	SUSPECT
	12-7	VICTIM	12-1	FI
	12-7	VICTIM	12-9	SUSPECT
	13-5	FI	12-3	FI
	12-1	FI	12-4	SUSPECT
	13-2	SUSPECT	10-8	FI
	13-2	VICTIM	12-6	FI
2004-DANIEL	12-2	FI		
2031– JAMES EDWARD	NONE			
2032– NICOLE	NONE			
2033– BOB	13-4	FI		
26008– KEN	NONE			

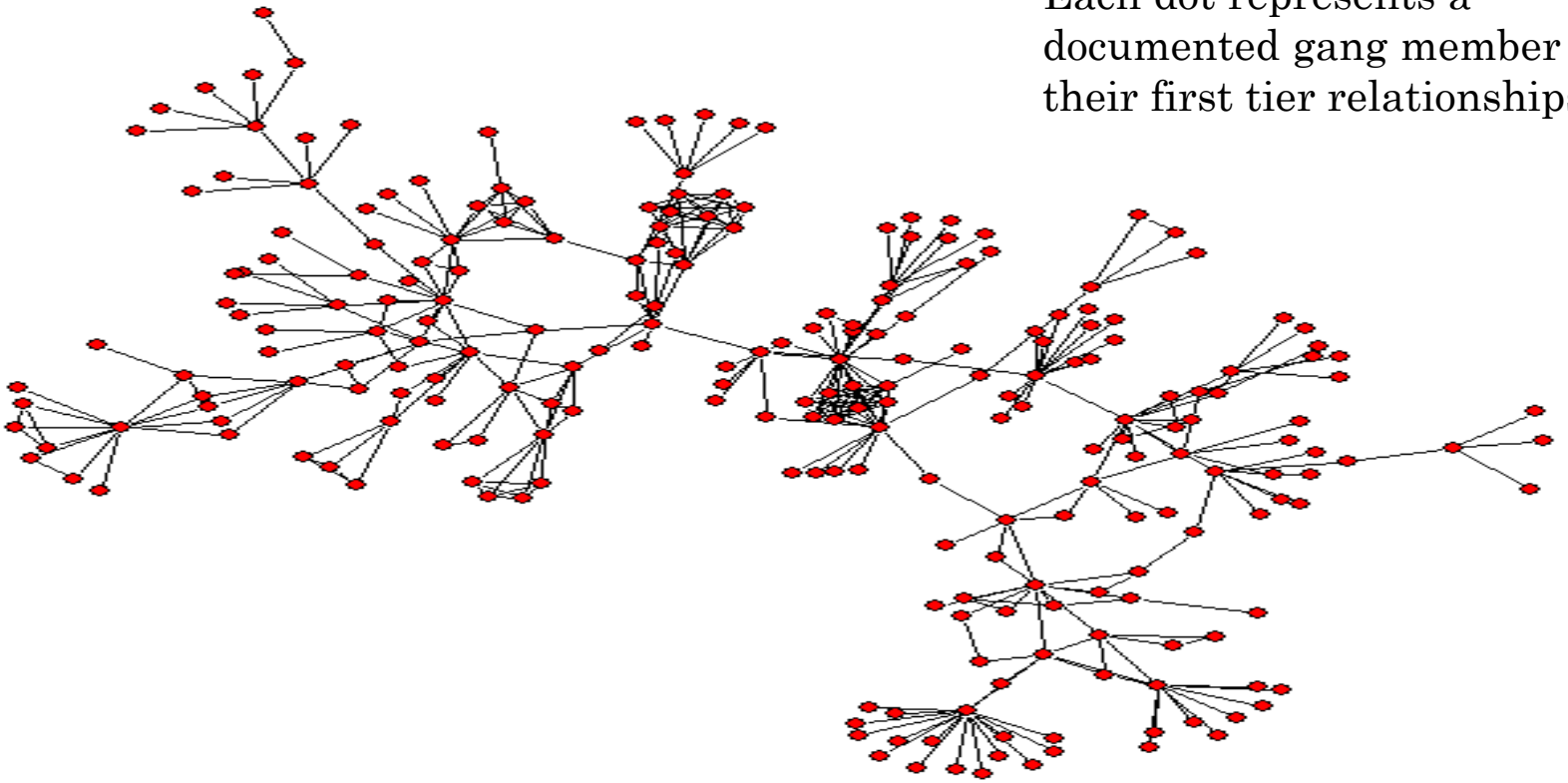
Stop & Think

- If you found these same findings in your community what would you do?

KC NoVA

Kansas City No Violence Alliance

Early Offender Network Model

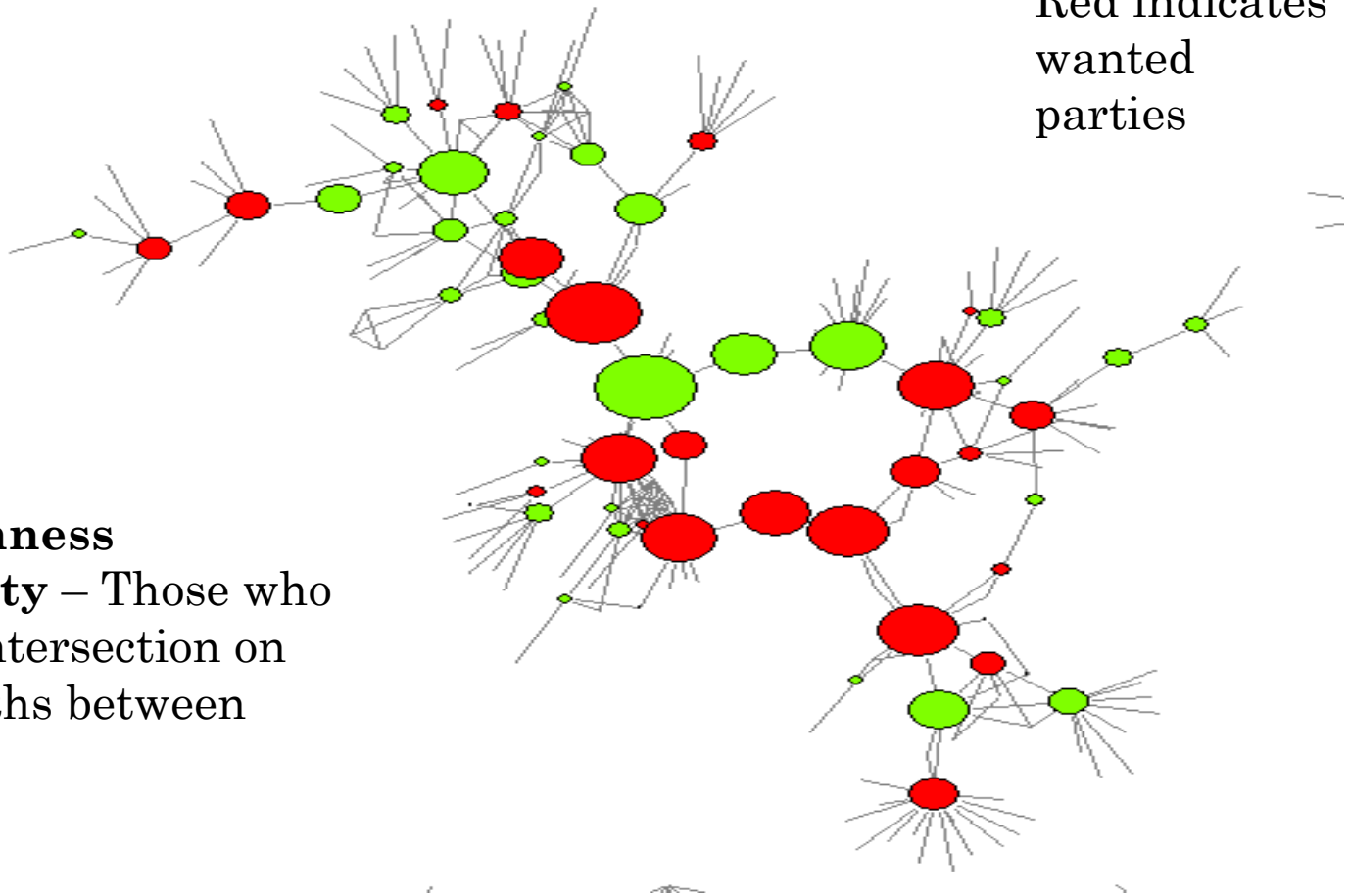


Each dot represents a documented gang member and their first tier relationships

Early offender network

- 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

Pilot Group High Betweenness and Active Warrants



Red indicates wanted parties

Betweenness Centrality – Those who are the intersection on many paths between others

Training

- Finding the right crime analysts
- Giving them time and space to learn
- Need to fully understand PD data systems and how to extract large amounts of data from those systems
- Need to understand the concepts, not just the technique

Analysis

- Software
  - Pajek: Free, Windows-based
  - UCINet: Free, Windows-based
- Resources
  - Wasserman & Faust (1994), *Social Network Analysis: Methods and Applications*
  - Training seminars
  - Local university
  - CNA

Questions, comments?

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