

# It's in the Data: University-Police Collaborative Research

Gary Bass: Moderator

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# The ICURS-Policing Big Data Research Experience

- Joint Research using big police data sets
- Collaborative, Multi-Disciplinary
- Linked international labs
- Secure High Performance Computing Lab (CFI)

# Today: Selected ICURS Themes

- Mental Health and Policing
- Complexity of policing
- Economics of policing
- Rural and Remote Policing
- Big Data
  - Crime Analysis
  - Criminal Analysis
  - Perception and Fear Analysis

# Mental Health and Policing

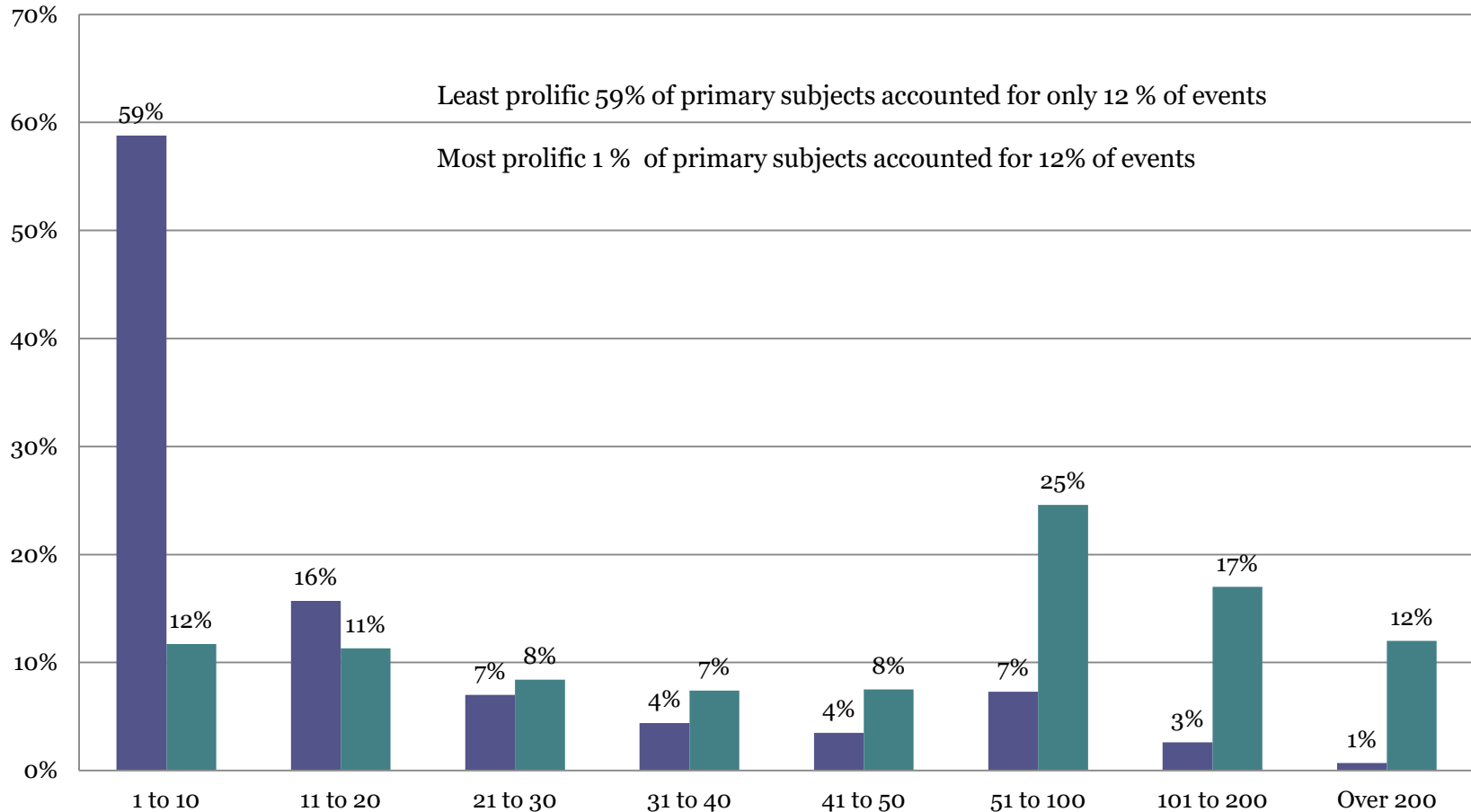
- **Emergency rooms**
  - Collaborative: ICURS/police/health authority
  - Fraser Valley Health Authority
  - E Division and independent departments
  - Interviews, Big Data analysis
  - Policy Alternatives
- **Forensic Hospital**
  - 100 most violent forensic patients
  - Policing and health trajectory

# Preliminary Findings

- A disproportionate amount of police time required to deal with SAMI population
- This group also consumes a lot of health and social service resources and policing resources and has specific needs
- ER focal point
- Compounded by recurring contacts with police and Emergency Rooms
- **“Not just a policing issue”**

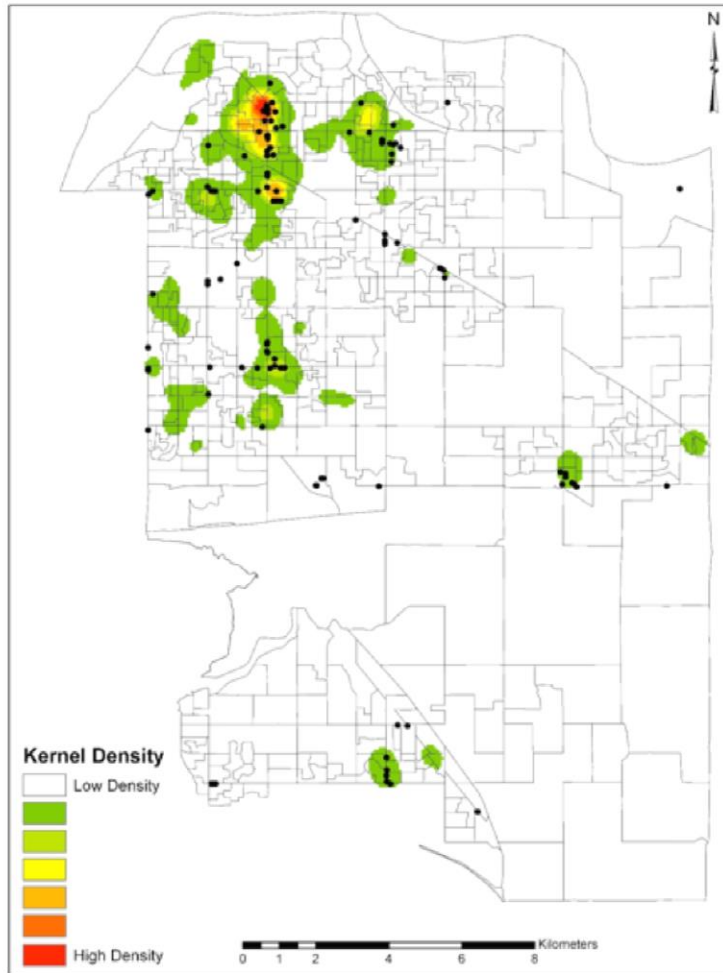
# Analysis of 44,500 EDP Events E-Division PIRS Data Set 2000-2006

■ Percentage of Subjects   ■ Percentage of Events



## Spatial Distribution of EDP Calls for Service: Descending Order

- Alcohol-Points-of-Sale
- City Hall
- Criminal Justice Services
- Hospital
- Pharmacies
- Public Health Offices
- Mental Health, Substance Use, and/or Addiction Services (Private & Public)
- Walk-in Clinics

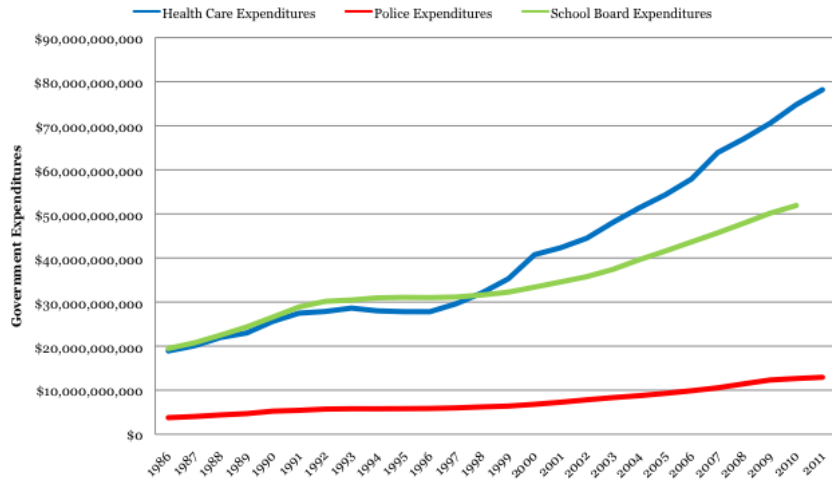


# Economics of Policing Studies

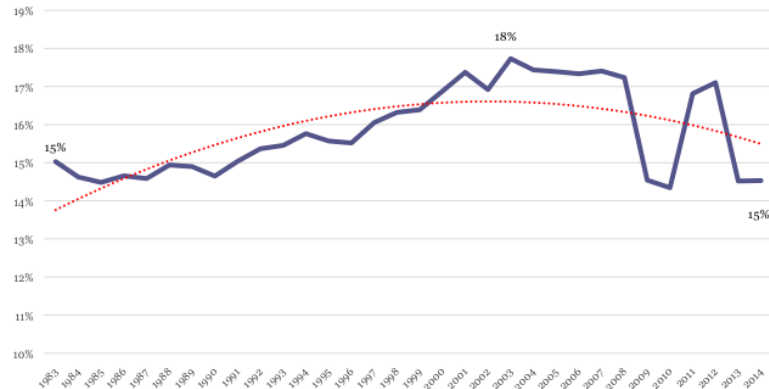
- Government expenditures for policing service have increased but at the same pace as expenditures for other government services including health care, education and recreation
- While the standard crime rate has declined, the volume of calls for police services has not
- Police work has become far more complicated over time



### Expenditures on Health, Local School Boards and Police Canada 1986-2011

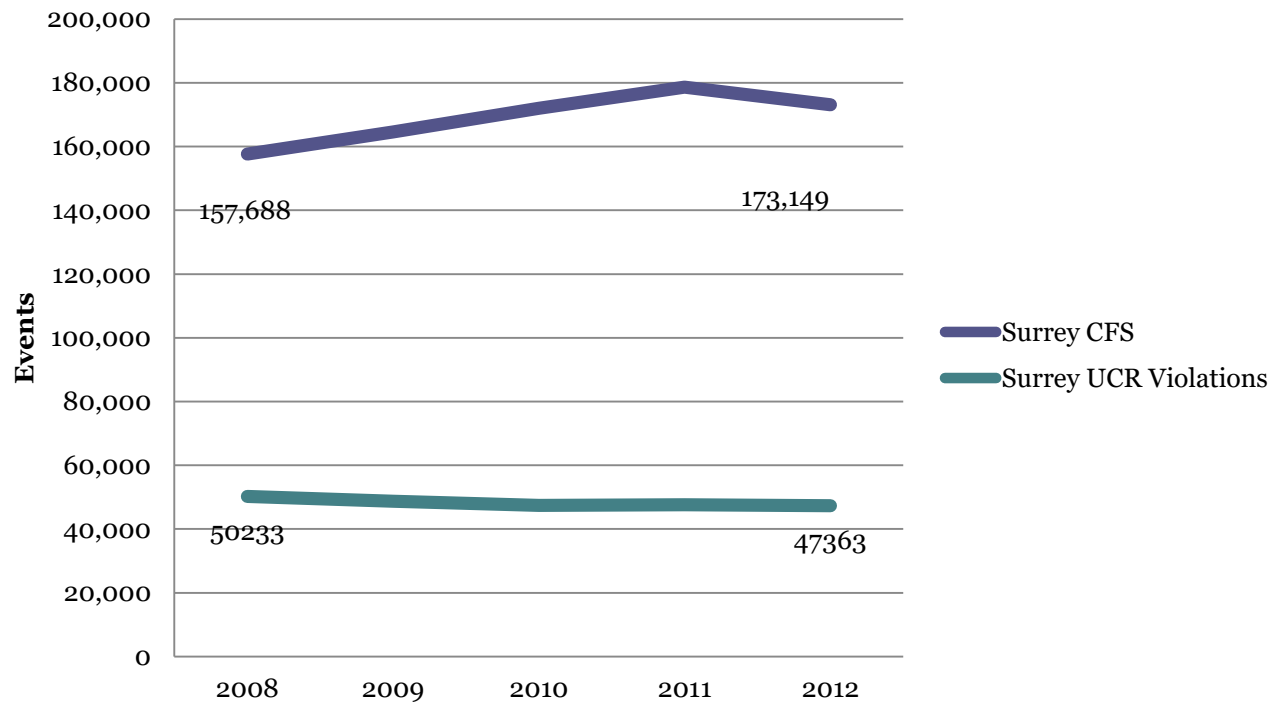


### Policing Share of Municipal Operating Expenditures British Columbia 1983-2014



# CFS and CRIME Calls- RCMP E-Division

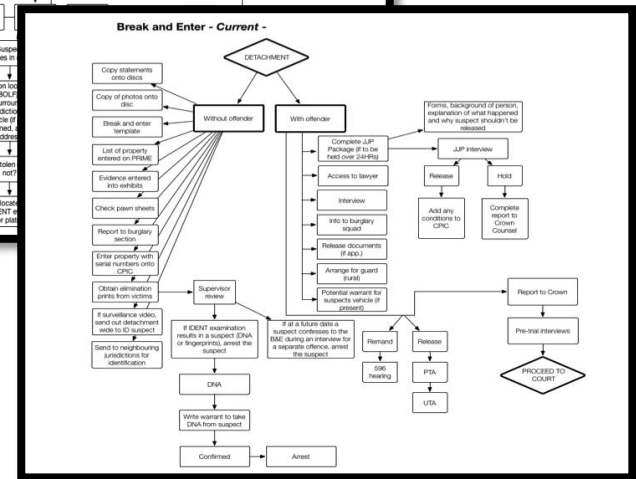
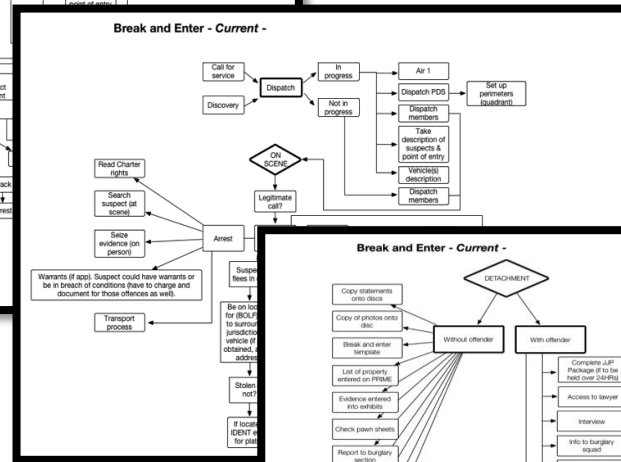
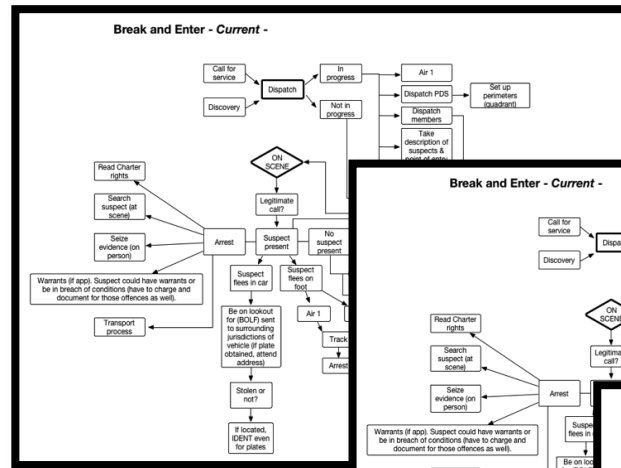
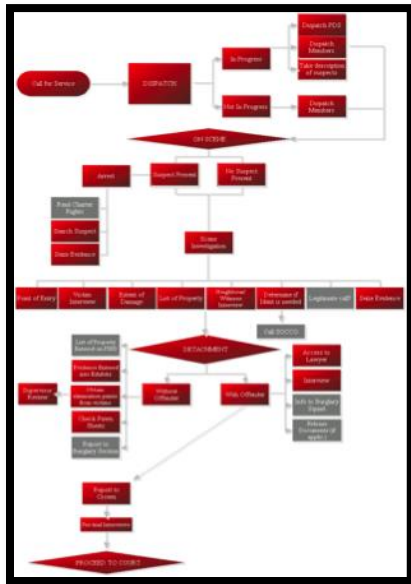
## Surrey Detachment 2008-2012



# Example of complexity

- A working generation ago policing tasks were dramatically less complex than they are at present
- Handling a break and enter case then compared to now involved
  - Fewer steps
  - Fewer requirements
  - Significantly less time to “process”

# B&E Former and Current Process



# Northern, Rural and Remote

- Adds to complexity in police, wider CJS and governmental services
- Further study needed for pros/cons of policing outside of major population centres
- Limited (or no) availability of services
- Life-work balance, stress, always 'on the job'
- Community expectations

# Challenges

- While there are benefits to policing in smaller, rural/remote communities
  - Potential for cohesive and self-sustaining ethos
  - Look out for your community
- There are concerns
  - Substance misuse, under employment, poverty and suicide, among others
  - Standard Crime Rates suggest northern areas have more violent offense rates per capita than rest of Canada

# Logistic / Economic Challenges

- Northern, Rural and Remote tend to have different:
  - Response times
  - Shift/scheduling
  - Leaves, training (HR available strength)
  - Travel costs (fuel, alternative methods)
  - Geography
  - Climate

# Research Agenda

## ‘non-urban policing’

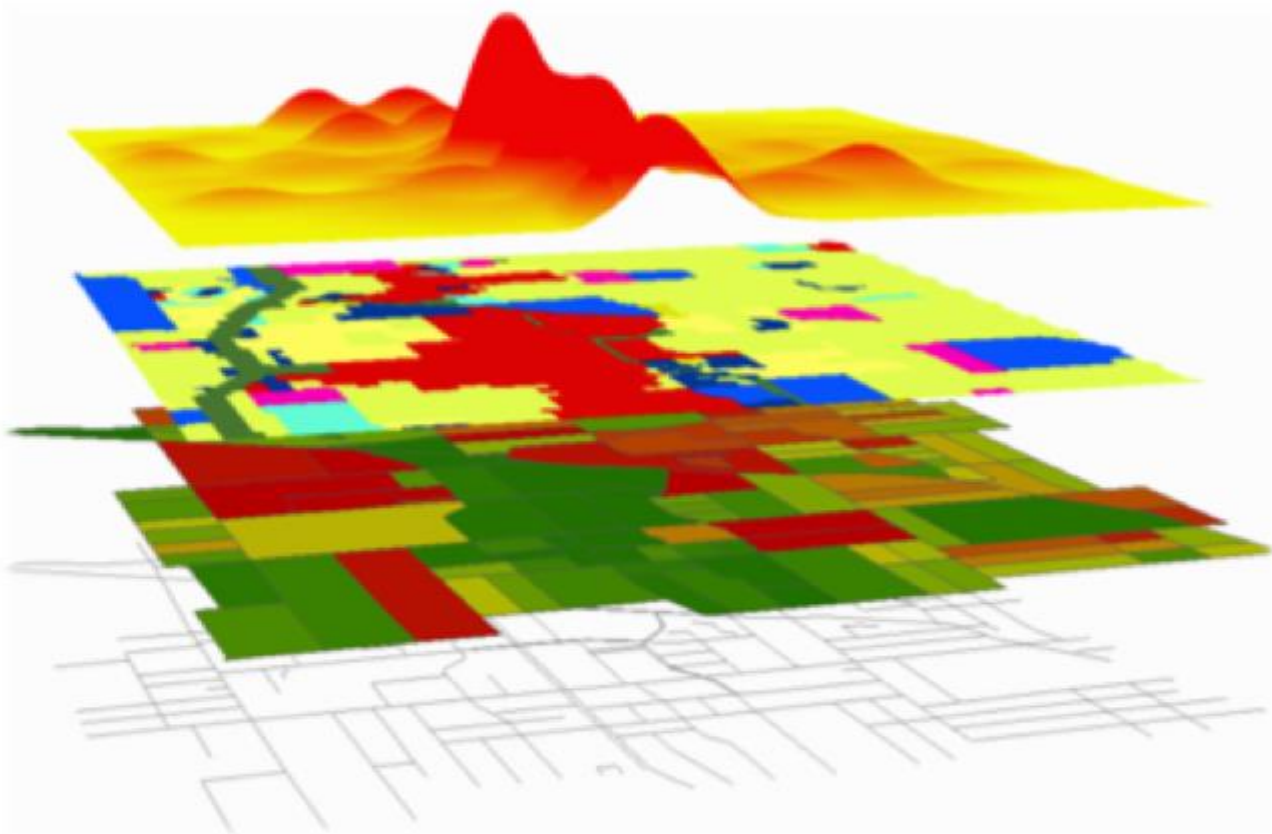
- Examine non-urban policing contexts for:
  - Advantages
  - Disadvantages
- Methods for capturing police work, value, performance, etc., for detachments/units with less urban populations
  - Classifications of “northern”, “rural” and “remote” by population, population density, proximity to emergency care, etc.



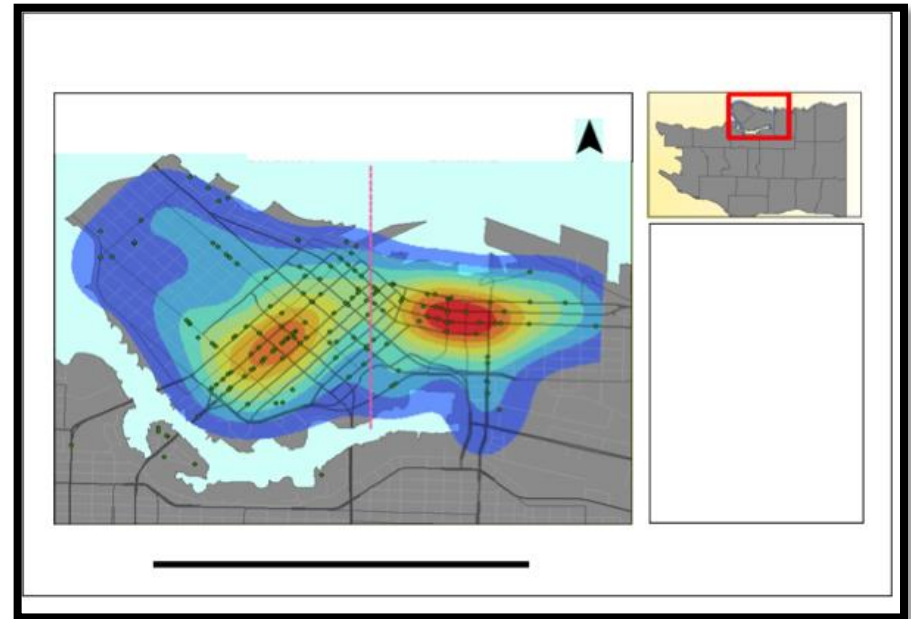
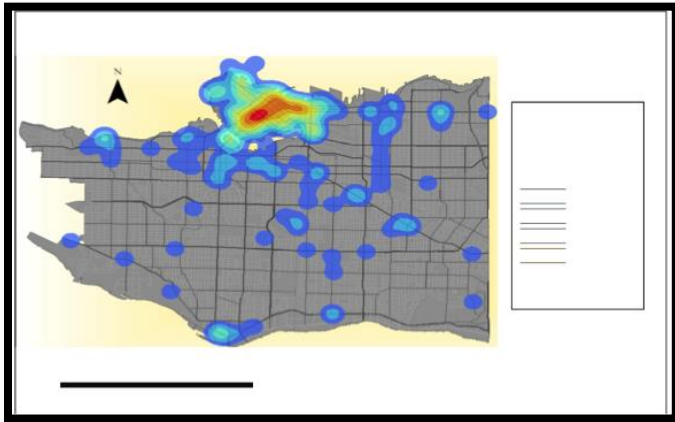
# Policing research and Big Data

- Big record counts and Big complexity of records
- Layers of data
- Types of Analysis
  - Hot Spots and Journey to Crime
  - Co-offending networks and gangs
  - Crime Corridors
  - New measures of the problem
  - Predictive Policing

# Layers of Big Data for Police Research

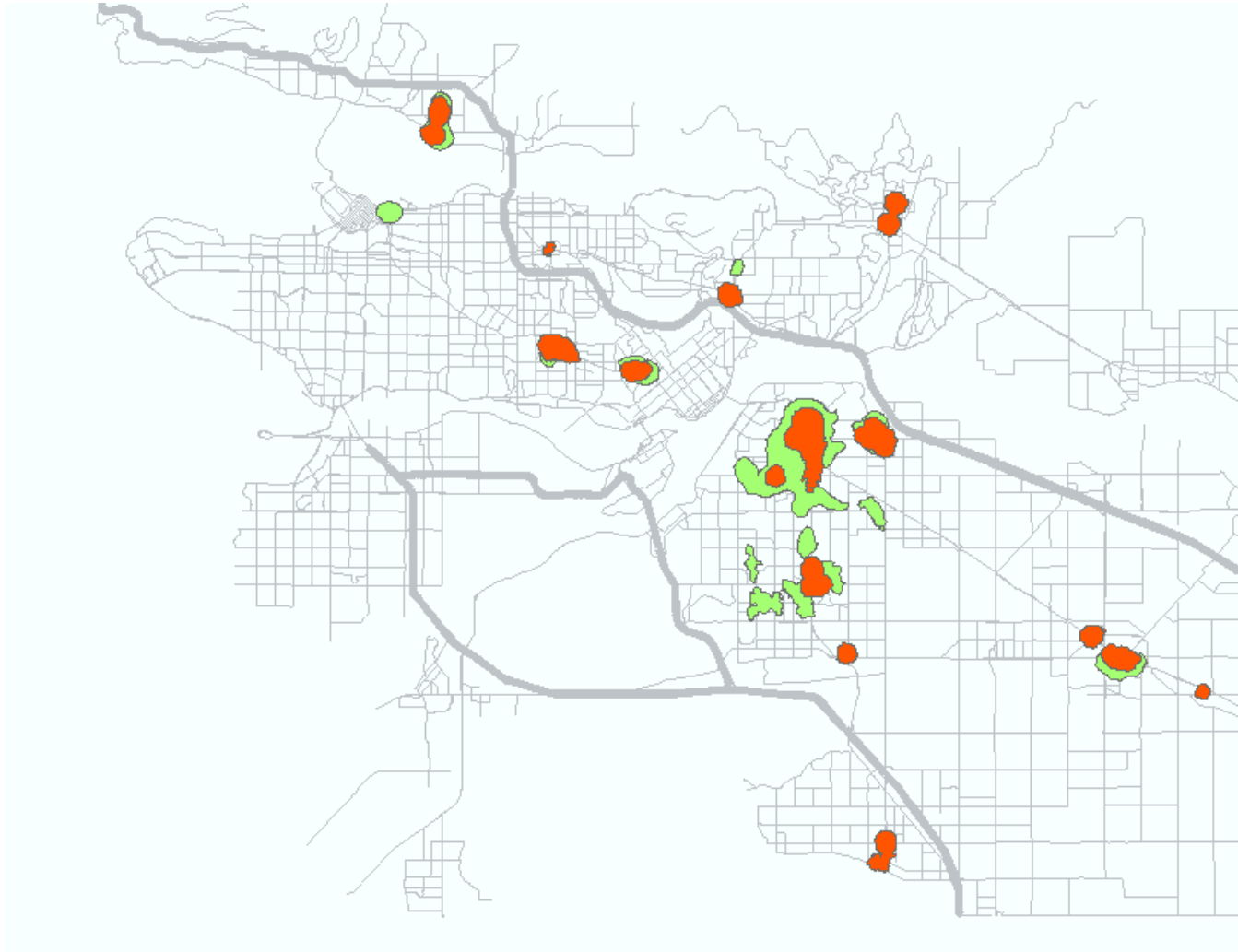


# Density of Liquor Outlets and Assaults

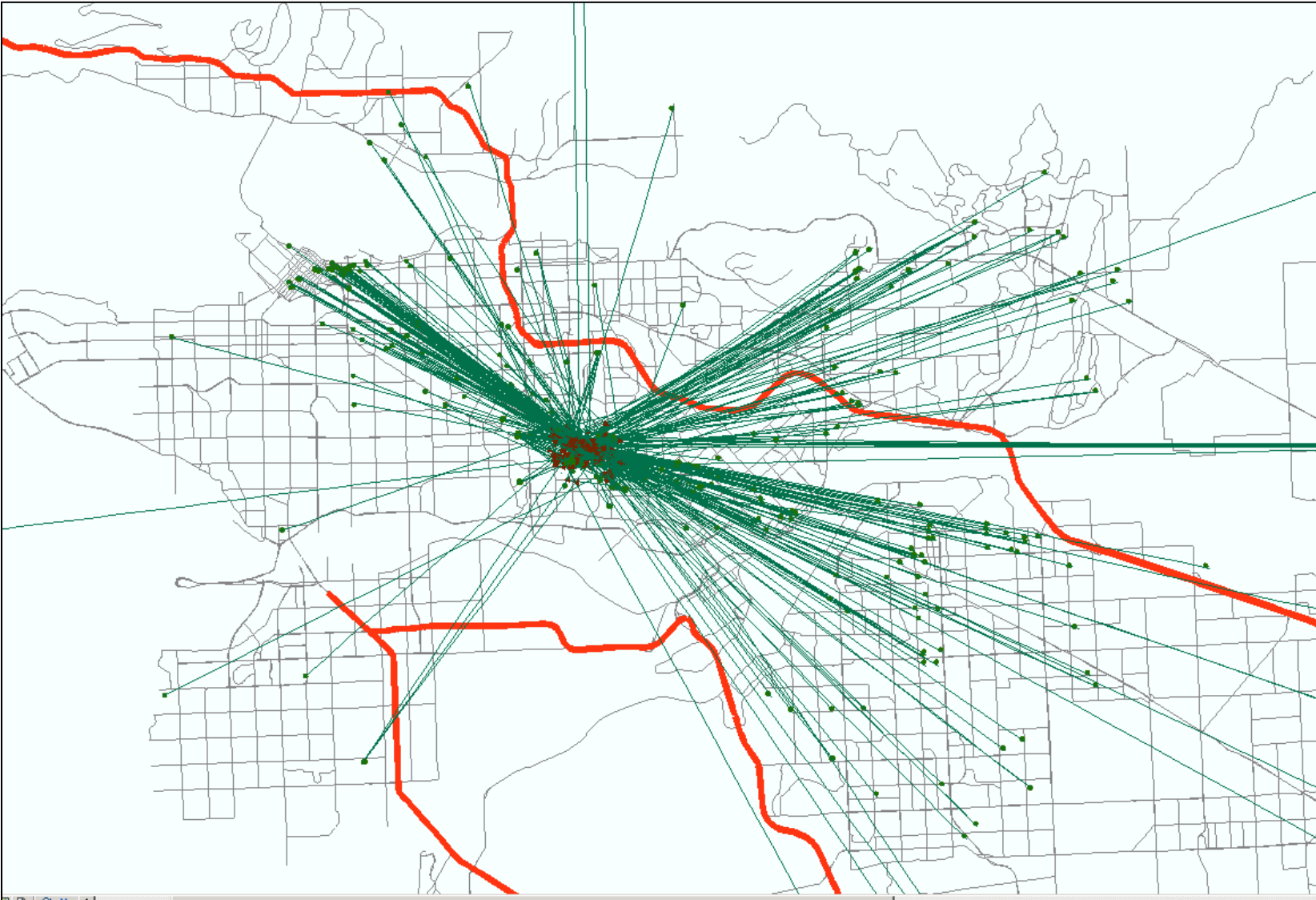


# Crime Event / Offender Home Hot Spot

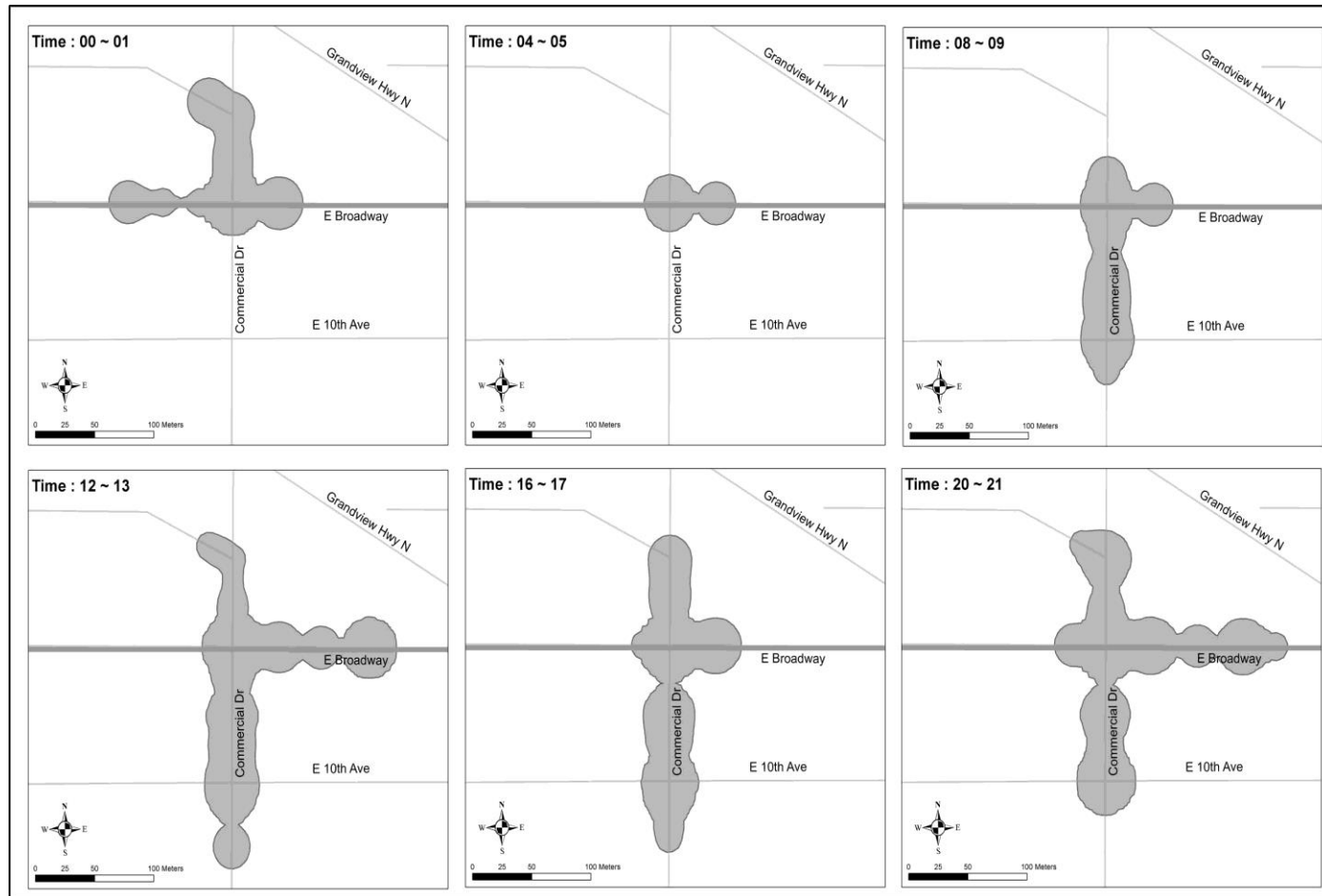
(based on 213,906 data, Point Density (100m,500m) → Contour )



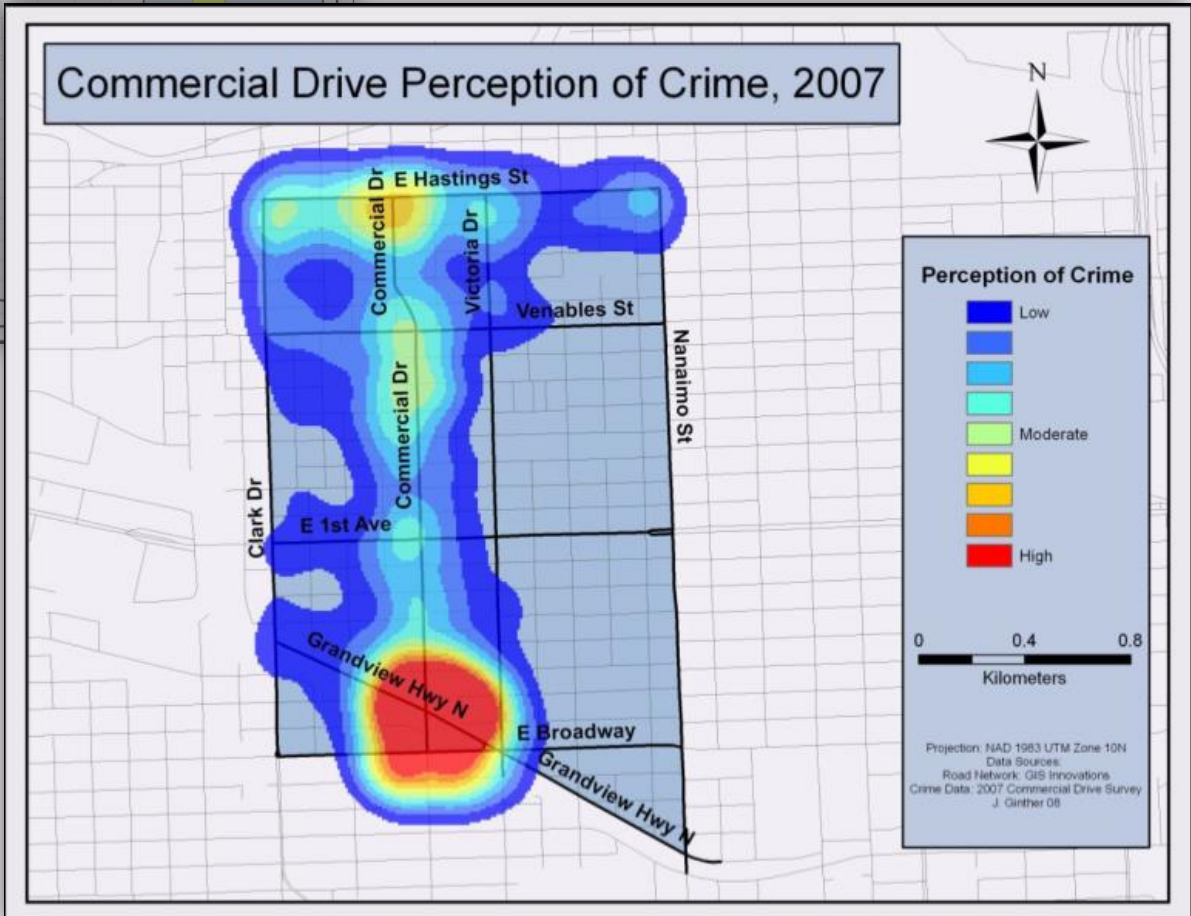
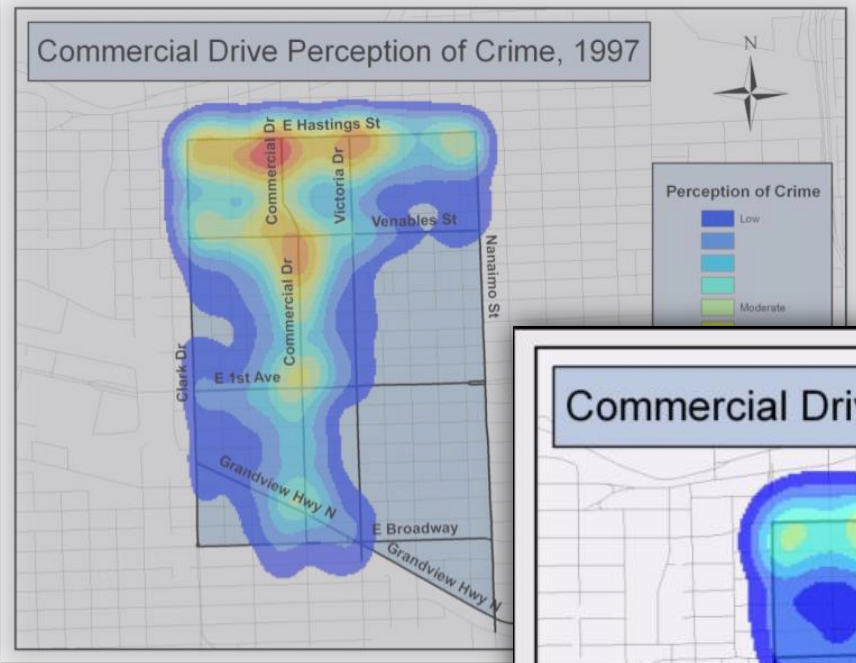
# Arrow lines showing repetitive (10+) offenders' home location to MT Mall



# Spatio-Temporal Directionality of Crime at a Transportation Hub

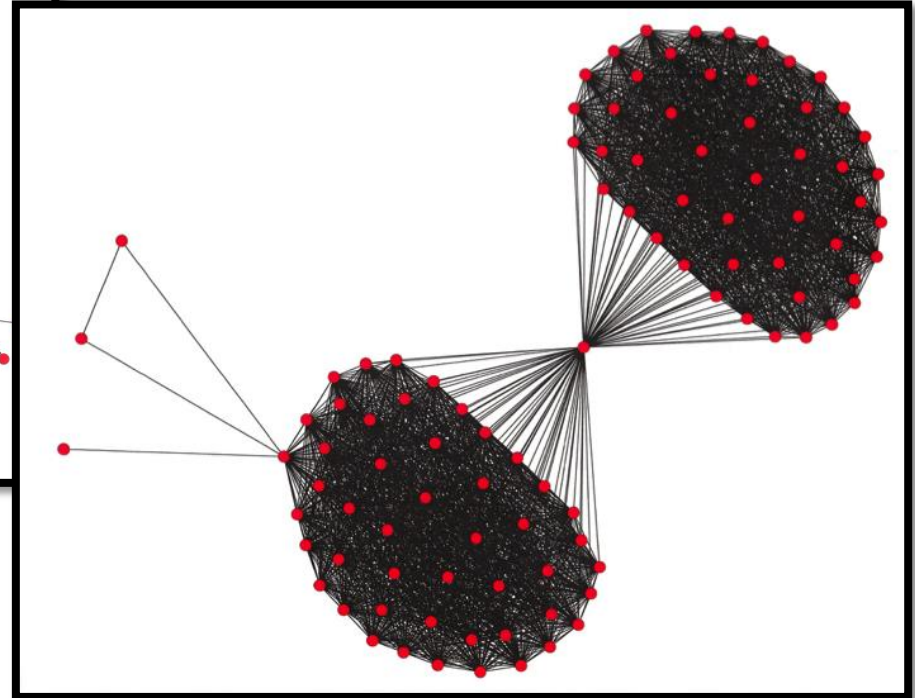
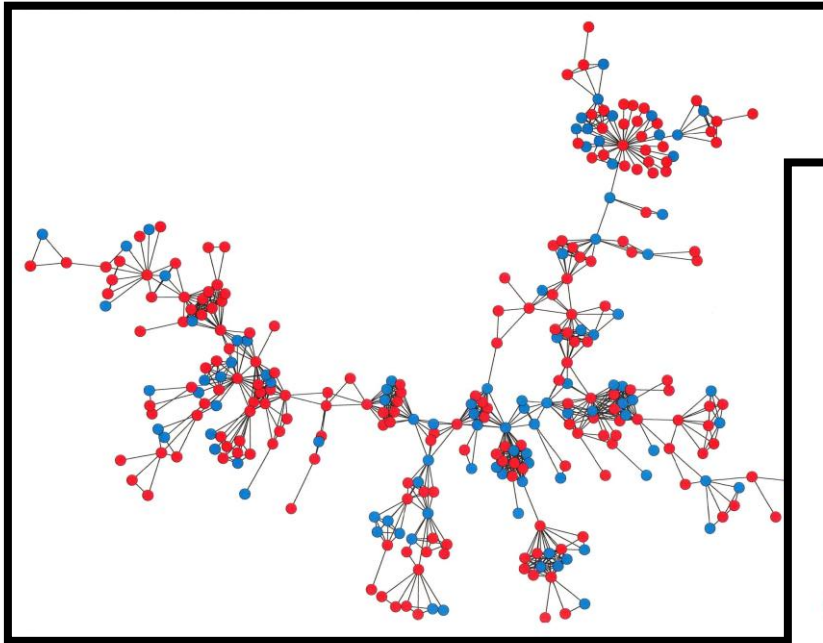


# Activity Nodes Fear of Crime



Jordan Ginther, ICURS

# ICURS drug network analysis



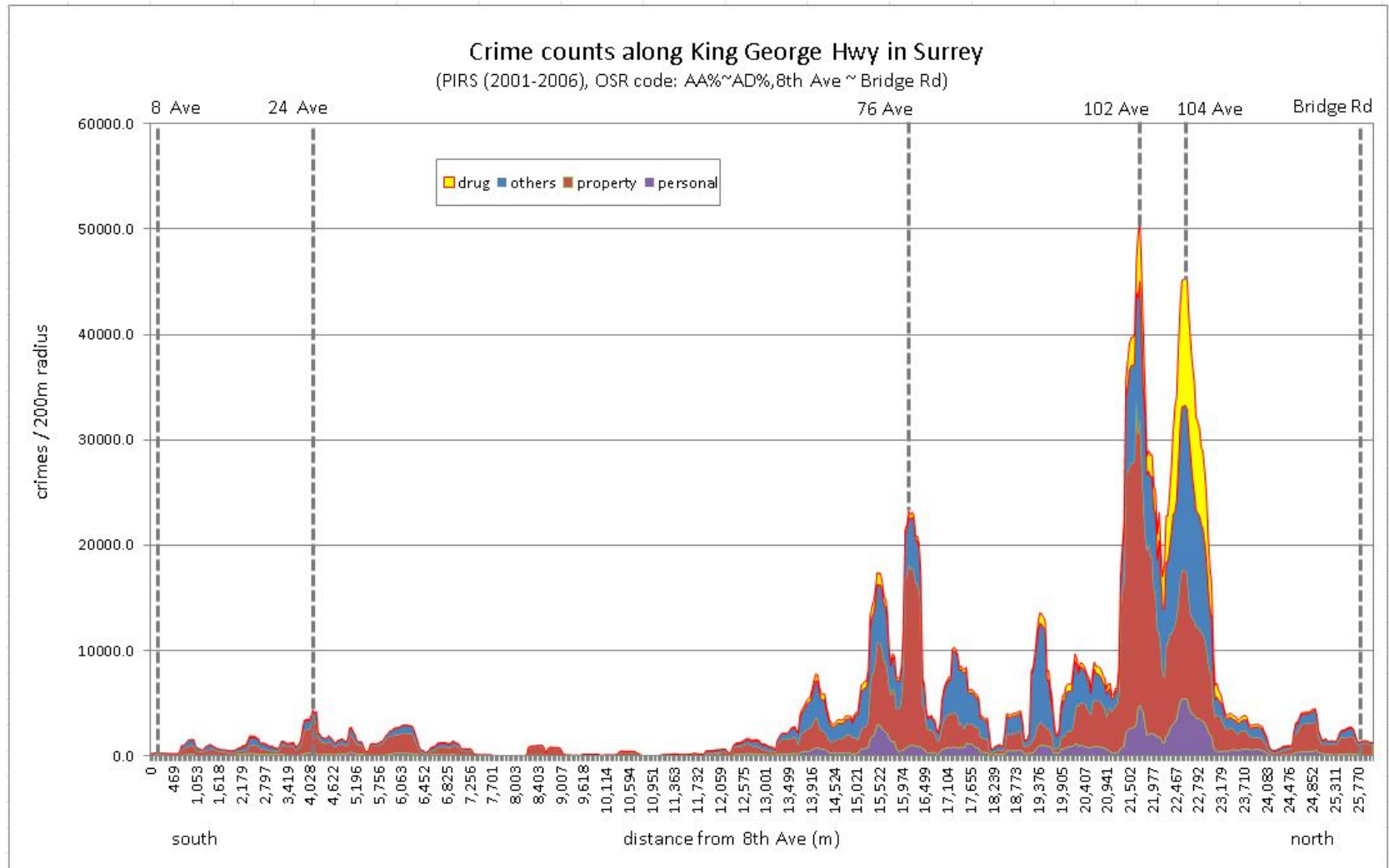
Thanks to Dr. Richard Frank,  
Dr. Uwe Glaesser



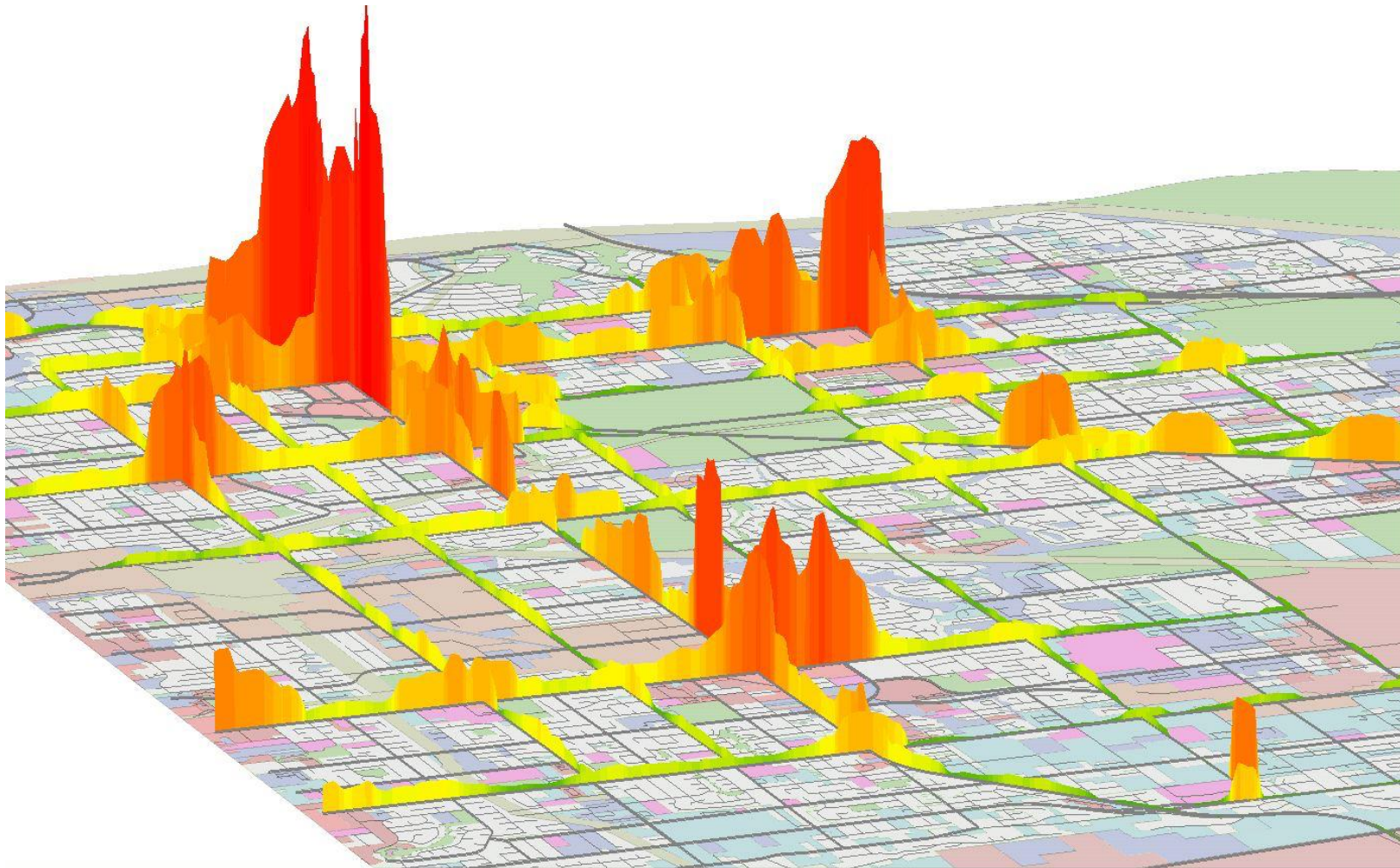
# Crime Corridors

- Police data in many cities are reported by address or intersection
  - Police are major users of crime analysis and crime analytics
  - Police usually need to know what the crime history is at a specific location.
    - You can have crime very high at one location but very little or no crime in adjacent buildings.
  - Crime can be very high in one block but low in adjacent blocks.
  - Crime corridors allow visualization of crime data that is otherwise very difficult to absorb and use.
- Thanks to Dr. Valerie Spicer and Mr. Justin Song

# Crime Corridor for One Street



# Crime corridors in a large city



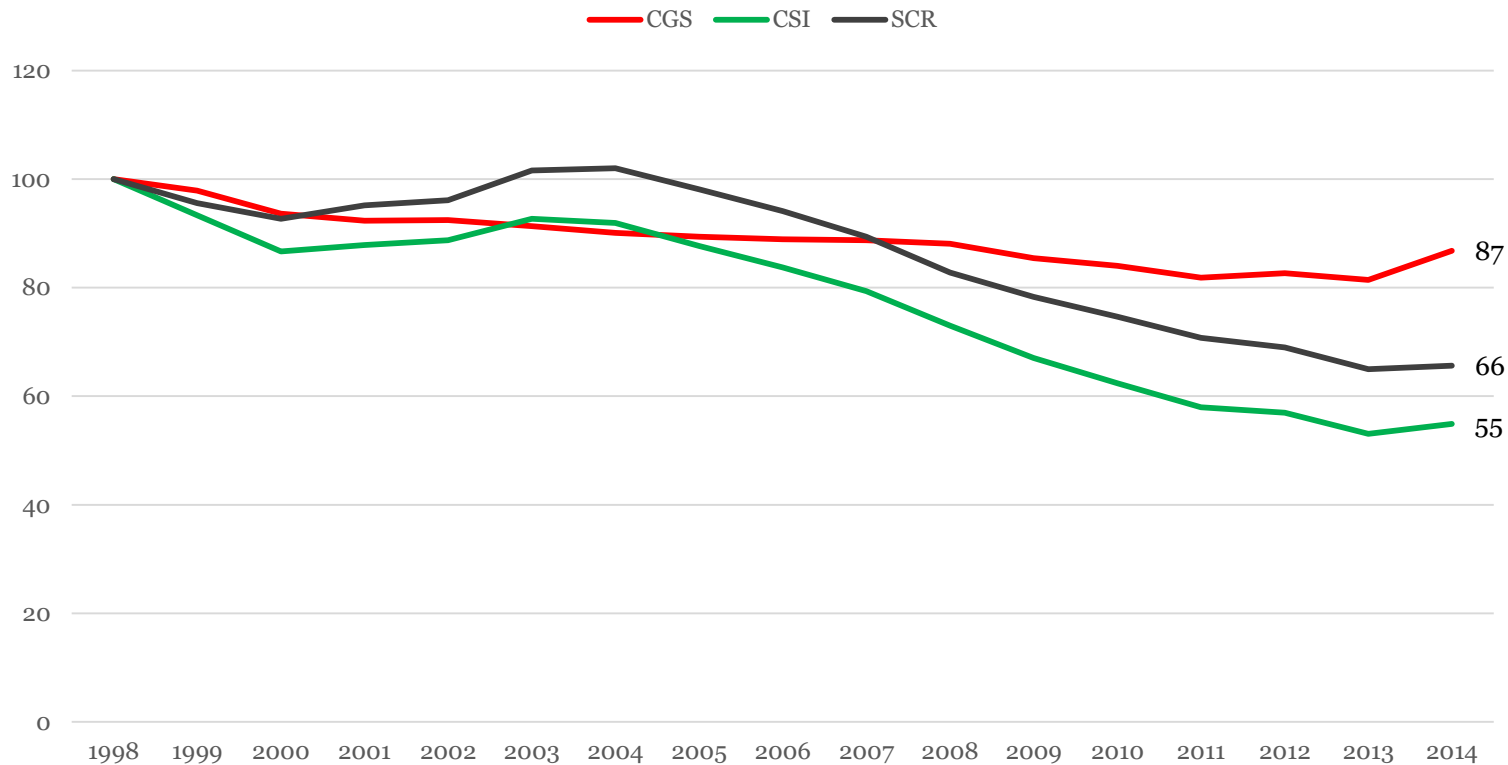
# Multiple Measures of Crime and Police Work

- Uniform Crime Reports Measures
  - The Standard Crime Rate
  - The Crime Severity Index
- New Crime Gravity Score
  - Developed at ICURS
  - Utilizes UCR data
- Location Quotients of Crime
  - Developed at ICURS
  - Identifies Local Crime Problem

$$CGS = \frac{(\sum_{i=1}^n C_i * W_i)}{\sum_{i=1}^n C_i}$$

$$LQC_{i_n} = \frac{C_{i_n}}{C_{t_n}} \bigg/ \frac{\sum_{n=1}^N C_{i_n}}{\sum_{n=1}^N C_{t_n}}$$

# Trends in Crime Gravity, Crime Severity and the Standard Crime Rate British Columbia Values Indexed to 1998 = 100



# LCQ for Violent Crime Rate and LQC in BC: Rebecca Carleton (2014)

Figure 3.4: BC Violent Crime Rate (2006) per 1,000 persons

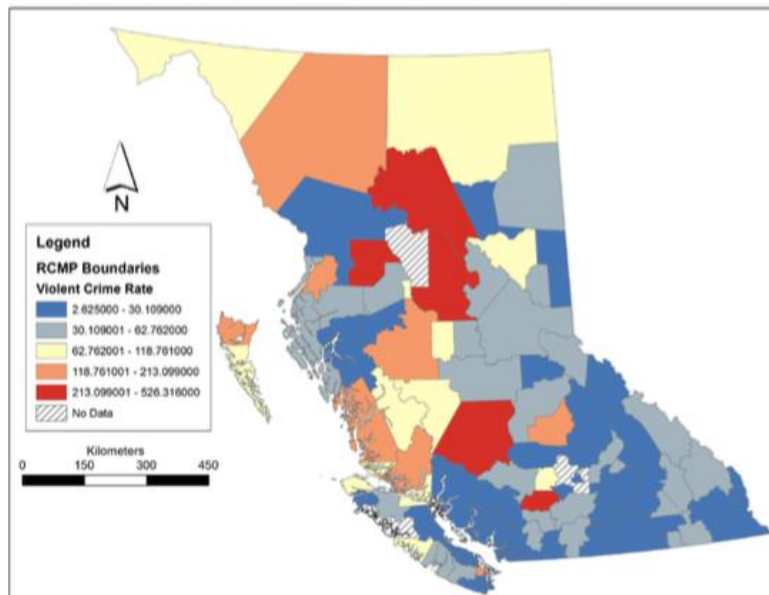
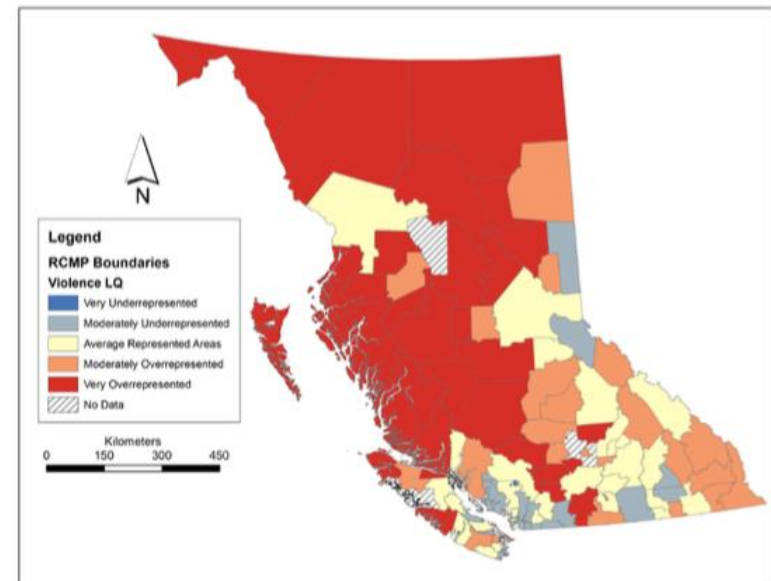


Figure 3.5: Violent Location Quotients (2006) by representation category



# Future

- More Canadian Policing Research conducted collaboratively with Universities on continuing basis
- Expansion of Secure Research Data Warehouses at universities under police and ministry sponsorship
- Increased use of PhD students and Post Docs

# Questions