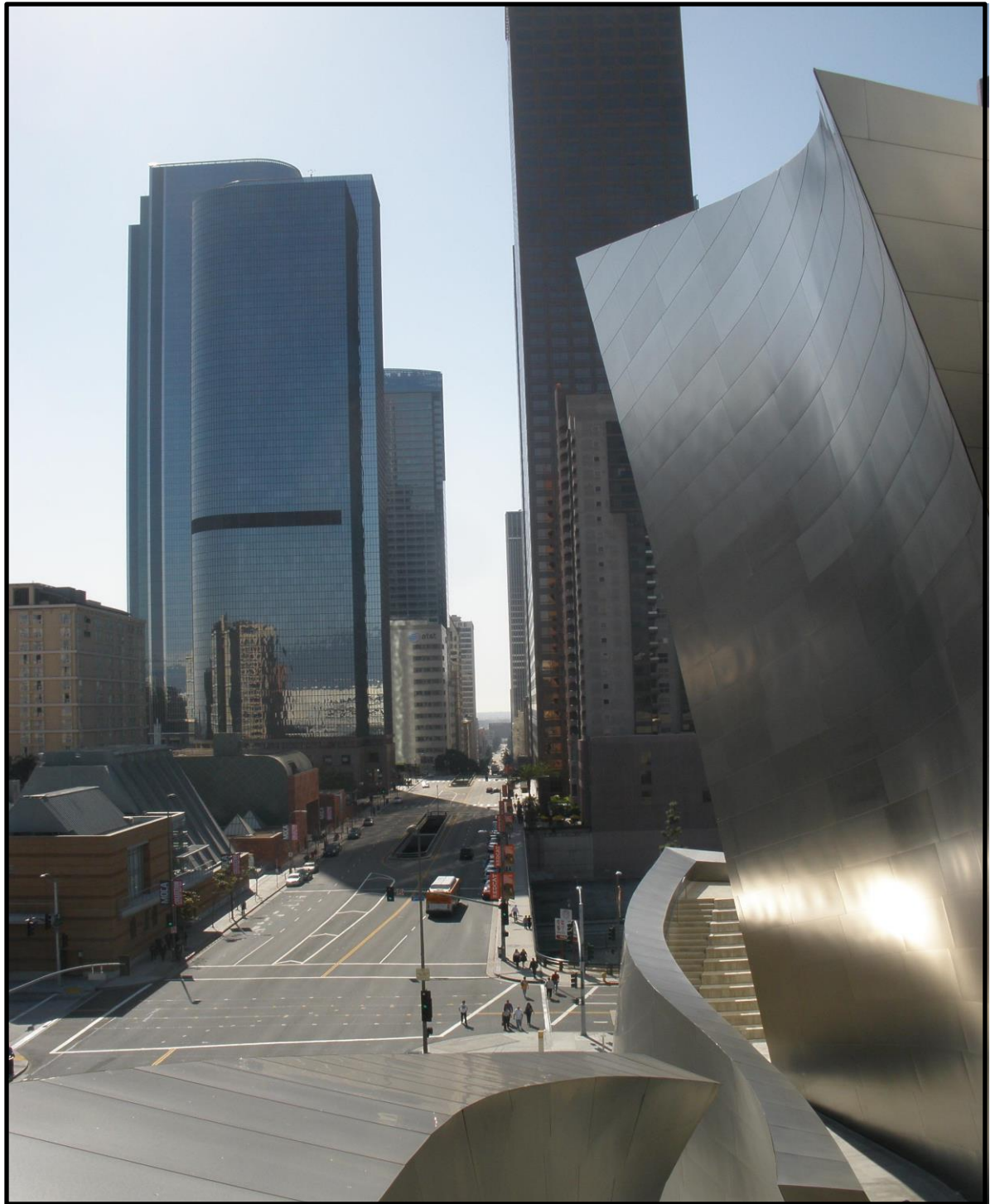


**NETWORK ANALYSIS  
FOR CRIME PREVENTION  
2013**



**5<sup>th</sup> Annual Illicit Networks Workshop**

Sept. 29, 2013 – Oct. 1, 2013

Los Angeles, CA

[www.illicitnetworks.org](http://www.illicitnetworks.org)

Co-hosts

**Aili Malm, Ph.D.**

Associate Professor, Department of Criminal Justice  
Director, ICON Lab  
California State University, Long Beach

**Gisela Bichler, Ph.D.**

Professor, Department of Criminal Justice  
Director, Center for Criminal Justice Research  
California State University, San Bernardino



## SCHEDULE AT A GLANCE

### Sunday, Sept. 29, 2013

<i>Time</i>	<i>Activity</i>	<i>Location</i>
5:00 – 7:00 pm	Registration	Foyer near Bradbury/Rose room
6:00 – 9:00 pm	Presenter's Reception & Bunker Hill Tour	Noe's outdoor patio (near the piano bar).

### Monday, Sept. 30, 2013

<i>Time</i>	<i>Activity</i>	<i>Location</i>
Morning		
7:30 – 9:00	Registration	Foyer near meeting room
7:30 – 10:40	Coffee & Carbs	Foyer near meeting room
9:00 – 9:15	Opening Remarks	Bradbury/ Rose room
9:15 – 9:20	5 min. break	
9:20 – 10:30	<b>Panel 1</b>	Bradbury/ Rose room
10:30 – 10:40	10 min. break	
10:40 – 11:40	<b>Panel 2</b>	Bradbury/ Rose room
11:45 – 12:00	Poster Briefs	Bradbury/ Rose room
Afternoon		
12:00 – 1:20	Lunch	Crocker room
1:20 – 3:00	<b>Panel 3</b>	Bradbury/ Rose room
3:00 – 3:30	Full Coffee Break*	Foyer near meeting room
3:30 – 5:00	<b>Panel 4</b>	Bradbury/ Rose room
Evening		
5:00 – ?	Freshen-up & Dinner	See the recommendations list.

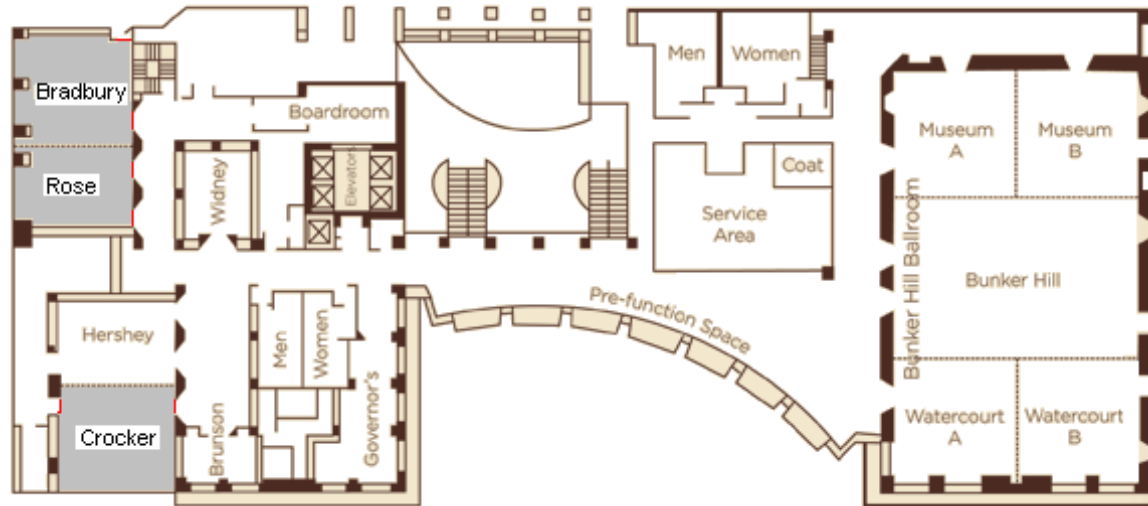
### Tuesday, Oct. 1, 2013

<i>Time</i>	<i>Activity</i>	<i>Location</i>
Morning		
8:00 – 9:00	Registration	Foyer near meeting room
8:00 – 9:30	Coffee & Carbs	Foyer near meeting room
9:00 – 10:30	<b>Panel 5</b>	Bradbury/ Rose room
10:30 – 11:30	Brunch	Noe' Restaurant
11:30 – 12:30	<b>Panel 6</b>	Bradbury/ Rose room
Afternoon		
12:30 – 12:40	10 min. break	
12:40 – 1:40	<b>Panel 7</b>	Bradbury/ Rose room
1:40 – 2:15	Full Coffee Break*	Foyer near meeting room
2:15 – 3:00	<b>Panel 8</b>	Bradbury/ Rose room
3:00 – 3:10	10 min. break	
3:10 – 4:30	Concluding Remarks & Business Meeting	Bradbury/ Rose room

\* Full coffee breaks include snacks.

## FACILITIES MAP

### Omni Hotel Second Floor Conference



The primary meeting room is the Bradbury/Rose room. **The registration table will be positioned close to the entrance to the meeting space.** On Monday, lunch will be served in the Crocker room; and, on Tuesday, brunch will be located in the Noe' restaurant. Posters and coffee breaks will be located in the hallway immediately adjacent to our designated meeting space.

Instructions about off-site dinner options will be provided during the opening remarks and directions are available at the registration desk. Attendees will be escorted to dinner locations by conference staff. Sites are located a short walk from the conference facility.

## SPONSORS AND SUPPORTERS

This meeting is made possible by generous support made by: The **California Endowment, Office of Community Oriented Policing**, the Departments of Criminal Justice at **California State University at Long Beach** and **California State University at San Bernardino, Target®**, and the **California Police Chiefs Association**. This support enabled us to assemble a stellar group of individuals dedicated to uncovering the structural characteristics of illicit networks for the purpose of supporting crime control policy and prevention.

On behalf of the organizing committee, we would like to extend our sincere gratitude to all those individuals that contributed their expertise, resources, and energy to make this meeting a success!



## PROGRAM

Sunday, Sept. 29, 2013

5:00 – 7:00 pm

**Registration**

6:00 – 9:00 pm

**Welcoming Reception for Presenters and Sponsors**

Larry Gaines, Chair, Department of Criminal Justice, CSUSB  
Aili Malm and Gisela Bichler, Co-hosts

Monday, Sept. 30, 2013

7:30 – 9:00 am

**Registration**

7:30 – 10:40 am

**Coffee & Carbs**

9:00 – 9:15 am

**Opening Remarks**

9:20 – 10:30 am

**Panel 1: Network Resilience** (20 min. per paper presentation & 10 min. discussion)

**Guns for hire: North America's intra-continental gun trafficking networks**

Christian Leuprecht, Royal Military College of Canada  
Andrew Aulthouse, Queen's University

**Dark network resilience in a hostile environment: Optimizing centralization and density**

Sean Everton and Dan Cunningham, Naval Postgraduate School

**(POSTER BRIEF) Drone effects: Structural change in Al Qa'ida communications**

Stacy Bush, CSUSB

10:30 – 10:40 am

**10 min. break**

10:40 – 11:40 am

**Panel 2: Social Relations of Crime Groups—Terrorists and Organized Crime**

**Criminal interaction orders: Towards a theory of criminal encounters**

Andrew Goldsmith and Russell Brewer, Flinders University

**Cooperation in criminal organizations: Kinship and violence as credible commitments**

Paolo Campana and Federico Varese, University of Oxford

11:40 – 11:45 am

**5 min. intermission/stretch**

11:45 – 12:00 am

**POSTER BRIEFS: CCJR Illicit Gun Trade Initiative**

**Supermarkets: Conflict cessation and weapons trade**, Juan Franquez, CSUSB

**Responding to embargoes: A pulse model of weapons flow**, Jennifer Hagala, CSUSB

**In and out of Africa: Illicit small arms trade, 1997-2010**, Mary Wood, CSUSB

12:00 – 1:20 pm

**Lunch**

Monday, Sept. 30, 2013 (cont'd)

1:20 – 3:00 pm

**Panel 3: The Business of Policing**

**Preventing crime online: A social network based analysis of a carding forum**

David Décary-Héту and Dominique Laferrière, Université de Montréal

**Framing technological innovations as legitimate: The role of networks in influencing the endorsement and use of on-officer video cameras**

Jacob T. N. Young and Justin Ready, Arizona State University

(10 minute intermission/stretch)

**Crime control networks on the Los Angeles waterfront: Overcoming structural barriers and building resilient partnerships**

Russell Brewer, Flinders University

**(POSTER BRIEF) Taming the steel horse I ride: Identifying the problematic links in commuter rail systems, Janet Enriquez, CSUSB**

3:00 – 3:30 pm

**Full Coffee Break (with snacks)**

3:30 – 5:00 pm

**Panel 4: Gaining Prominence: A Matter of Whom *and* Where**

**Overlapping crime: Stability and specialization of co-offending relationships**

Thomas U. Grund, Rémi Boivin, and Carlo Morselli, Université de Montréal

**The use of actor attributes and centrality measures to identify key actors: A case study of a drug trafficking network**

David Bright, Catherine Greenhill, and Alison Ritter, University of New South Wales  
Carlo Morselli, Université de Montréal

**A micro-level study of criminal activity space**

Mohammad A. Tayebi, Uwe Glässer, Justin Song, and Patricia L. Brantingham, Simon Fraser University

**Dinner Options**



**The Perch**; Zagat rating 18 (good to very good). <http://perchla.com/press.html>.

**This French bistro has an outdoor seating area, on a rooftop with views of the city.** Live jazz is played most evenings. The bistro is a short walk from conference. Happy hour runs from 4-6 pm with a nice range of food and beverage choices. **Staff escorts are Jennifer and Stacey G.;** meet outside **conference meeting room at 6:00 pm.**



**Blue Cow Kitchen**; Zagat rating 23 (very good to excellent). <http://www.zagat.com/r/blue-cow-kitchen-los-angeles>.

**This fashionable American restaurant with open air patio gives you a classic LA feel with a view of skyscrapers.** Stumbling distance from the conference, it is located just outside our meeting space. Happy hour runs from 4:30-6:30 with limited food and beverage choices. **Staff escorts are Stacy B. and Mary;** meet outside **conference meeting room at 6:30.**

Tuesday, Oct. 1, 2013

8:00 – 9:00 am

Registration

8:00 – 9:30 am

Coffee & Carbs

9:00 – 10:30 am

Panel 5: Deviance in the Boardroom

**Defection in an enterprise conspiracy: Exit and opportunism in equity funding**

Robert Faulkner, University of Massachusetts Amherst

Eric Cheney, Central Washing University

**Twisting trust: Social networks, due diligence and loss of capital in a Ponzi Scheme**

Becky Nash, California State University, Long Beach

Martin Bouchard, Simon Fraser University

Aili Malm, California State University, Long Beach

**White collars and black ties: Interlocking social circles of elite corporate offenders**

Andrea Schoepfer, Gisela Bichler and Stacy Bush

California State University, San Bernardino

10:30 – 11:30 am

Brunch

11:30 – 12:30 pm

Panel 6: Birds of a Feather? Homophily among Co-offenders

**The structure of age homophily in co-offending groups**

Peter J. Carrington, University of Waterloo

**Ethnic homophily and triad closure: Mapping internal gang structure using exponential random graph models**

James A. Densley, Metropolitan State University

Thomas U. Grund, Université de Montréal

12:30 – 12:40 pm

10 min. break

12:40 – 1:40 pm

Panel 7: Homicidal Tendencies

**The scope and shape of individual-level illegal firearm networks in Quebec**

Carlo Morselli, Université de Montréal

**Murder networks: The search for suitable homicide co-offenders among gang members**

Martin Bouchard and Evan C. McCuish, Simon Fraser University (SFU)

Raymond Corrado, SFU and University of Bergen

**(POSTER BRIEF) Does violence roll downhill? An analysis of inter- and intra-gang violence among Bloods and Crips of LA County**

Jasmin Randle, CSUSB

Tuesday, Oct. 1, 2013 (cont'd)

**1:40 – 2:15 pm**            **Full Coffee Break (with snacks)**

**2:15 – 3:00 pm**            **Panel 8: Illicit Drug Markets**

**Expected losses: A multilevel analysis of drug seizures in the world-economy**  
Remi Boivin, Université de Montréal

**(POSTER BRIEFS) Crossing borders: Mexican DTOs' influence on interstate gang structure**, Stacey Goldberg, CSUSB  
**Current projects at the ICON Lab**  
Christopher Bates, CSULB

**3:00 – 3:10 pm**            **10 min. break**

**3:10 – 4:30 pm**            **Concluding Remarks: It's a Wrap!**

**Factoring for the network when developing and implementing crime control initiatives**

Aili Malm, California State University, Long Beach  
Gisela Bichler, California State University, San Bernardino

**Google Ideas Initiatives**  
Scout Sinclair Brody, Google

**Business Meeting**  
Carlo Morselli, Université de Montréal

**4:30 – 6:30 pm**            **Happy Hour(s) at the Omni Bar!**

#### Dinner Suggestions



**Pete's**; Zagat rating 21 (very good to excellent); Diners' Choice winner 2013  
<http://www.petescafe.com>

Indoor and sidewalk patio seating is available at this 1930's American Bistro. Though fine dining is possible, the menu includes gourmet versions of homestyle comfort food. Located in the Arts District and in walking distance to the Last Bookstore in LA (<http://lastbookstorela.com>) this restaurant is at the heart of the LA renaissance movement. Address: 400 S. Main St., Los Angeles, CA 90013.



**Blossom**; Yelp rating 4 stars.  
<http://www.blossomrestaurant.com/html/about.html>

This cozy Vietnamese restaurant offers authentic food in a contemporary atmosphere in the heart of the revitalizing Arts District. Address: 426 S Main St, Los Angeles, CA 90013.

## GETTING AROUND AND FINDING FOOD

Navigating around Bunker Hill is easy: if you traveled down a hill, you left the area. You can hire a cab at the entrance of the hotel or behind the hotel on Grand Avenue (taxi waiting area). Nothing is very far.



### Downtown L.A. Locations

- Restaurants/Bars
- Entertainment/Leisure
- ★ Omni Hotel

1. L.A. Department of Water Building (1/4 of a mile lap around)
2. Dorothy Chandler Pavilion
3. Grand Park
4. Disney Concert Hall
5. Patina Restaurant
6. Nick & Stef's Steakhouse
7. California Pizza Kitchen
8. Blue Cow
9. McCormick & Schmick's Seafood and Steaks
10. Chaya Downtown
11. Los Angeles Central Library
12. Pitfire Artisan Pizza
13. The Standard
14. Daily Grill
15. Gallery Bar
16. Casey's Irish Pub
17. The Perch
18. Café Pinot

See below for more information about the restaurants listed. Please note they are arranged by distance from the meeting site.

**California Pizza Kitchen**, located at: 330 S Hope St, Los Angeles, CA 90071; <http://www.cpk.com/menu/> (behind hotel, across the street)

**Nick & Stef's Steakhouse**, located at: 330 S Hope St #100, Los Angeles, CA 90071; [http://www.patinagroup.com/restaurant.php?restaurants\\_id=6](http://www.patinagroup.com/restaurant.php?restaurants_id=6) (behind hotel, across the street)

**McCormick & Schmick's Seafood & Steaks**, located at: 400 S Hope St, Los Angeles, California 90071; <http://www.mccormickandschmicks.com> (down the hill one block)

**Café Pinot**, located at: 700 W 5th St, Los Angeles, CA 90071; [http://www.patinagroup.com/restaurant.php?restaurants\\_id=41](http://www.patinagroup.com/restaurant.php?restaurants_id=41) (1.5 blocks)

**Chaya Downtown**, located at 525 S Flower St, Los Angeles, CA 90017; PH (213) 236-9577; <http://www.thechaya.com/downtown-la/> (few blocks)

**Daily Grill**, located at 612 S Flower St #220, Los Angeles, CA 90017; PH (213) 622-4500; <http://dailygrill.com/locations/daily-grill-downtown-los-angeles-california> (few blocks)

**Sushi Gen**, located at 422 E 2nd St., Los Angeles, CA; PH (213) 617-0552; <http://sushigen.org/> (Old Bank District)

**Pitfire Pizza**, located at 108 W 2<sup>nd</sup> St., Los Angeles, CA 90012; PH (213) 808-1200; <http://www.pitfirepizza.com/> (near city hall/ LA Times)

## ABSTRACTS

### Panel 1: Network Resilience

#### **Guns for hire: North America's intra-continental gun trafficking networks**

Christian Leuprecht, Royal Military College of Canada  
Andrew Aulthouse, Queen's University

Since Canada is adjoins the largest weapons market in the world, it should not come as a surprise that guns used to commit criminal acts in Canada originate almost exclusively in the United States. But how do such weapons make their way across the border: individuals, small networks, sophisticated cartels? Constructing gun trafficking networks from news and arrest reports of individuals participating in Canada-US gun trafficking between 2007 and 2013, this study identifies brokers and their role, and patterns in the way guns were being procured, transported across the border, and distributed once in Canada. It is hypothesized that since guns—in contrast to drugs, for instance—are readily and legally available in the United States, instead of finding a few complex multiplayer networks, we would expect to uncover many simple chain and hub networks, with brokers operating with a high degree and betweenness centrality. On the one hand, that should make them relatively easy to detect, disrupt and dismantle. Alternatively, it means that this strategy is likely to prove nugatory because it is quick and easy for networks to regenerate. Unable to manipulate either the supply or flow of guns, the best policy option is to depress domestic demand.

#### **Dark network resilience in a hostile environment: Optimizing centralization and density**

Sean Everton and Dan Cunningham, Naval Postgraduate School

Scholars are increasingly turning their attention to factors contributing to the resiliency of dark networks (i.e., covert and illegal networks). Some have explored the relationship between resilience and centralization, most concluding that decentralized networks are more resilient than hierarchical ones (Arquilla and Ronfeldt 2001; Bakker, Raab and Milward 2011; Barabási and Bonabeau 2003; Sageman 2004). Others have noted that networks with numerous internal ties but few external ones are generally more secure (Everton 2013; Everton and Cunningham 2014) and thus, more resilient (Berman 2009; Hafez 2004). The problem is that dark networks can get too much of a good thing: those that become too decentralized or too encapsulated (or both) are generally less effective in carrying out operations, suggesting that they must seek to maintain a balance between decentralization and hierarchy, and a balance between internal and external connections (Everton 2012). In this paper, we draw on a unique longitudinal network data set of the Noordin Top terrorist network from 2001-2010 in order to explore how the network varied along these two dimensions to see if one or the other (or both) helped contribute to both its longevity and its ultimate demise.

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**Panel 2: Social Relations of Crime Groups—Terrorists and Organized Crime**

**Criminal interaction orders: Towards a theory of criminal encounters**

Andrew Goldsmith and Russell Brewer, Flinders University

In this paper, we explore some of the conditions that potentially challenge the idea and experience of networks as durable, observable organizing entities in the context of criminal and other illicit activities. We do so with the understanding that the existing conceptual apparatus of network analysis may not be adequate to the changing environment in which criminal activities are conducted. New expressions of hyper-mobility and technologies of social coupling and de-coupling (mobile communication technologies, online identities, etc.), are redefining how social life occurs and is organized, including in the sphere of organized crime and terrorist activities. Following the work of Mimi Sheller (2004) and Harrison White (1992), we examine examples of encounters of criminal significance, using the idea of ‘ambage’ – the idea taken from White’s (1992) work that “social actors are never simply one thing, but always carry with them multiple identifications and capacities to ‘play’ different parts at once” (Sheller 2004, 48). This concept is analyzed through comparing forms of criminal connection, drawing upon inter alia Granovetter’s notion of ‘weak ties.’ The idea of ‘criminal encounter’ is proposed as a way of describing looser, less definite forms of connection for criminal purposes, as well as for examining the implications of hyper-mobility and mobile publics for the structural understanding of new manifestations of organized crime.

**Cooperation in criminal organizations: Kinship and violence as credible commitments**

Paolo Campana and Federico Varese, University of Oxford

The paper argues that kinship ties and sharing information on violent acts can be interpreted as forms of ‘hostage-taking’ likely to increase cooperation among co-offenders. The paper tests this hypothesis among members of two criminal groups, a Camorra clan based just outside Naples, and a Russian Mafia group that moved to Rome in the mid-1990s. The data consist of the transcripts of phone intercepts conducted on both groups by the Italian police over several months. After turning the data into a series of network matrices, we use Multivariate Quadratic Assignment Procedure to test the hypothesis. We conclude that the likelihood of cooperation is higher among members who have shared information about violent acts. Violence has a stronger effect than kinship in predicting tie formation and thus cooperation. When non-kinship-based mechanisms fostering cooperation exist, criminal groups are likely to resort to them.

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### **Panel 3: The Business of Policing**

#### **Preventing crime online: A social network based analysis of a carding forum**

David Décary-Hétu and Dominique Laferrière, Université de Montréal

Over the past few years, researchers have described the constant growth of a complex virtual criminal underworld where personal and financial data is bought and sold. These transactions often occur in online chat rooms or in discussion forums where individuals post what they want or need and wait for other possible business partners to answer. The threat that such illicit markets pose has been described numerous times. These include the increased access to stolen data, the lowering of the barriers to entry for this type of delinquency and the internalization of this form of delinquency. To prevent and control the growth of such markets, an approach based on the disruption of criminal networks has been suggested as the best practice that should be adopted by law enforcement agencies. These Sybil attacks as they are known require that law enforcement agencies target the trust and fluidity of markets using fake profiles. To do so, police departments can build up the reputation of these fake profiles and then default on their partners randomly to reduce the general trust in the market. They can alternatively attack the reliability and trust of specific market participants in order, once again, to disrupt the trust in markets. While the effectiveness of these prevention techniques has been suggested by many researchers, we have yet to hear of a case where they were successfully used to disrupt an online illicit market. This paper seeks to provide law-enforcement agencies with a more detailed analysis of these techniques in order to ease the adoption of such prevention methods. Using social network analysis, the feasibility of these prevention techniques will be evaluated in the case of a large stolen data forum where financial data was bought and sold online. This paper will provide the necessary framework that law-enforcement agencies could use to prepare and build their prevention action against market participants.

#### **Framing technological innovations as legitimate: The role of networks in influencing the endorsement and use of on-officer video cameras**

Jacob T. N. Young and Justin Ready, Arizona State University

On-officer videos, or body cameras, provide objective accounts of interactions among police officers and the public. However, getting endorsement from patrol officers is difficult, as these devices are often perceived as systematic attempts to limit discretion and sanction line officers for trivial policy violations. At the same time, police leadership tends to view this emerging technology as an avenue for resolving untruthful citizen complaints and prosecuting offenses where victims and witnesses are reluctant to testify. These incongruent cognitive-frames between leadership and line officers are a cultural barrier to the utilization of innovative technologies. As a consequence, there is a disjuncture between the organizational goals, which seek to legitimate their authority through objective data collection for evidentiary purposes, and the agents whose actions are expected to realize these goals. Understanding the mechanisms that lead to the deconstruction of these barriers is essential for the integration of technology into organizations. We propose that a social learning process is at play, whereby officers' experiences with particular types of crime incidents and their shared involvement in these events with other officers influence their use and opinions of body cameras. Using affiliation data collected from a large police department in Southwestern US over a three-month period, we examine whether interactions with other officers provides a conduit for facilitating cognitive frames of cameras as legitimate.

**Panel 3: The Business of Policing (Cont'd)**

**Crime control networks on the Los Angeles waterfront: Overcoming structural barriers and building resilient partnerships**

Russell Brewer, Flinders University

This article investigates the intricacies of public/private crime control networks at the Ports of Los Angeles and Long Beach (the Port Complex)—one of the world’s most active waterfronts. Government authorities routinely work together (through interagency partnership), and enlist external private stakeholders (through co-production) to enhance their crime prevention capabilities. This research explores the nature of this engagement on the waterfront, and using social network analysis, maps the extent to which public and private actors can (and do) mobilize their network connections in a crime control capacity. The findings clearly illustrate a distinct structural separation of power across this network depicting a concentration of control amongst some government ‘elites’, with other stakeholders (namely, those from the private sector) assuming ‘peripheral’ network positions. However, far from being disadvantaged, this article highlights the ability (and resiliency) of peripheral network actors to overcome such structural deficits and effectively mobilize connections across the entire network. It is argued that this resiliency was achieved only through the tremendous efforts of some private actors who strategically positioned themselves as ‘brokers’ of information and ‘conduits’ of exchange. These crucial actors were instrumental in terms of building norms of trust and reciprocity across the network, and in doing so facilitated efforts at co-production and partnership where it would not otherwise have been possible.

**Panel 4: Gaining Prominence: A Matter of Whom *and* Where**

**Overlapping crime: Stability and specialization of co-offending relationships**

Thomas U. Grund, Rémi Boivin, and Carlo Morselli, Université de Montréal

Dyadic analyses of relationships between criminals have mostly ignored the multiplex nature of social ties. Criminals are frequently related to each other in more than one way. For example, individuals might steal a car together, are involved in a drug deal or co-offend in some other criminal domain. Whereas many studies indicate substantive differences in types of criminal activities, the analyses of criminal networks lack such differentiation. This study attempts to provide a more complete assessment of co-offending networks by incorporating the multifaceted ways in which criminal actors are related with each other and how these different types of relationships interact. Drawing on a large dataset of arrests in Quebec between 2003 and 2009, we focus on co-offending stability and specialization and illustrate how co-offending networks based on different types of criminal activities overlap. We portray a pattern of co-offending, which extends debate of criminal specialization/versatility to the dyadic level. Our study illustrates the ways in which the frequency and spectrum of crime include a relational component. More generally, the article emphasizes the need to consider the semantics of network ties, and further, the association between different types of networks, which ultimately offers a reassessment of social structure.

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#### **Panel 4: Gaining Prominence: A Matter of Whom *and* Where (Cont'd)**

##### **The use of actor attributes and centrality measures to identify key actors: A case study of a drug trafficking network**

David Bright, Catherine Greenhill, and Alison Ritter, University of New South Wales  
Carlo Morselli, Université de Montréal

Social Network Analysis (SNA) conducted on criminal networks can aid in the identification of key players. This type of information can be used to shed light on important structural elements, and on strategic patterns of connectivity. It can also assist law enforcement in the identification of interventions to dismantle or disrupt criminal networks. The majority of SNA studies on criminal networks to date have focused on the use centrality measures (such as degree or betweenness centrality) to identify key actors. Some authors (e.g., Robins (2009)) have lamented the use of mathematical approaches to the neglect of node level attributes such as knowledge, skills, and information. Indeed, some research has recognized that actors can be key for reasons unrelated to centrality scores. For example, some actors are important because of node level features such as the specific functional roles they play in the network (e.g., (Bright, Greenhill, & Levenkova, 2013). According to the network capital construct (Schwartz & Rouselle, 2009), network members can be critical to the network because they have access to tangible and intangible commodities such as drugs, money and skills. Actors who possess multiple commodities add more to network capital than members with less access to such commodities. We combine node-level attributes with node positioning factors such as centrality scores to describe a drug trafficking network that operated in Australia in the 1990s. We identify actors who are key to the network by virtue of their position in the network, their attributes, and combinations of these factors. Implications for law enforcement practice are discussed.

##### **A micro-level study of criminal activity space**

Mohammad A. Tayebi, Uwe Glässer, Justin Song, and Patricia L. Brantingham, Simon Fraser University

Environmental criminology theories, such as routine activity theory and crime pattern theory, emphasize the importance of human activity in crime patterns. The existing approaches to defining activity space of offenders, such as kernel density or distance decay functions, assign a value to each point in the map referring to the probability that an offender may commit a future crime at that point. These approaches ignore different environmental characteristics like road networks or crime attractors and generators. However, as discussed extensively in the literature, many offences do occur close to road networks, and major hotspots are usually located in close proximity to crime attractors. Therefore, considering these factors in defining the activity space of offenders is essential to provide a representation of activity space which is more precise and applicable to operational police tasks.

In this research we study activity space of known offenders at the micro-level, by considering detailed environmental characteristics. Using known home and crime locations of an offender and inferring most likely traveled trajectories, we define an offender's probabilistic activity space, which can be used for predicting locations of future crimes. For the experimental evaluation, we use a large real-world crime dataset, including all police-reported crime incidents in the time period 2001-2006 in the regions of British Columbia, Canada policed by the RCMP.

## Panel 5: Deviance in the Boardroom

### **Defection in an enterprise conspiracy: Exit and opportunism in equity funding**

Robert Faulkner, University of Massachusetts Amherst

Eric Cheney, Central Washing University

Using historical data from the Equity Funding corporate fraud case we construct and analyze the social relations of a classic enterprise conspiracy. Graphs are used to show the differential social relations comprising Equity Funding and its conspirators in fraudulent action. The Equity Funding case reveals two types of enterprise conspiracy defection: defection by exit or defection by opportunism. While structural locations within the conspiracy predict defections by opportunism, structural locations on the fringes of the Equity Funding network predict defections by exit. We conclude by discussing how insights into the social structure of defection in white-collar crime conspiracy can be an aid in criminal investigation.

### **Twisting trust: Social networks, due diligence and loss of capital in a Ponzi Scheme**

Becky Nash, California State University, Long Beach

Martin Bouchard, Simon Fraser University

Aili Malm, California State University, Long Beach

Many investments, legal or illegal, take place in risky and uncertain environments. In these situations, potential investors rely on information from trusted sources, such as social ties and their own due diligence to make decisions on whether to invest, and the amount to be invested. The implications for investment opportunities that are in fact illegal, such as Ponzi schemes, have rarely been examined. Two opposing views on the effects of trust in social ties and performing due diligence on investing decisions exist. Some researchers argue that relying on social ties and conducting due diligence can protect an investor from malfeasance. However, others suggest that these factors can be the cause of malfeasance, especially when the fraudsters have succeeded in gaining the trust of investors. This study examines trust in social networks and conducting due diligence and their effects on a specific case, the Eron Mortgage fraud which deceived 2,285 investors for \$240 million in British Columbia, Canada. A detailed survey of 559 victims of that fraud is used to examine the characteristics associated with two dependent variables, *initial* investment (to measure the effects of social ties and due diligence at the beginning of the fraud) and *net loss* (to measure their effects throughout and up to the end of the fraud, are examined). The findings suggest that constituents of both trust and performing due diligence are risk factors in predicting amounts invested, with temporal differences. Performing due diligence and institutional-based trust increases initial investment, while process-based and characteristic-based trust are positively associated with loss of capital.

### **White collars and black ties: Interlocking social circles of elite corporate offenders**

Andrea Schoepfer, Gisela Bichler, and Stacy Bush, California State University, San Bernardino

Focusing on business leaders in control of Fortune 500 companies, this study examines corporate interlock among chief executive officers (CEOs) with security exchange commission (SEC) violations and CEOs without. Using affiliation networks built from publicly available information, the structure of corporate relations was analyzed for rates of participation (outdegree centrality), organizational influence (indegree centrality), and brokerage (betweenness centrality). The findings suggest that a single, integrated network exists. However, within these interlocking directorates, a substantial degree of cohesion exists among *subsets* of executives suggesting the presence of distinct social circles. Only a few organizations and individuals were found to link the subset of offending CEOs to their law-abiding counterparts. Moreover, SEC violators were more socially isolated thereby increasing the influence of weak ties to active executives playing a controlling role within the network. Limitations are discussed.

## Panel 6: Birds of a Feather? Homophily among Co-offenders

### The structure of age homophily in co-offending groups

Peter J. Carrington, University of Waterloo

This paper examines age homophily among co-offenders, using data on approximately 440,000 co-offenses recorded by police in Canada during 2006-09. Log-linear models for social mobility tables are applied to an 86-by-86 table of frequencies of co-offending among year-of-age groups from 3 to 88 years old. The results indicate strong age homophily for co-offenders of all ages, but decreasing with age. There is further structuration into four age groups: children (3-11 years), youth (12-17 years), young adults (18-45 years), and older adults (46-88 years). The “Fagin” hypothesis that offenders below the age of criminal responsibility are particularly attractive as co-offenders for older offenders is disconfirmed.

### Ethnic homophily and triad closure: Mapping internal gang structure using exponential random graph models

James A. Densley, Metropolitan State University

Thomas U. Grund, Université de Montréal

Previous studies indicate the importance of similarities between street gang members in terms of ethnicity for mapping the patterns of co-offending relationships within gangs. Individual members are more likely to co-offend with other members who are from the same ethnicity. Past studies, however, do not appropriately account for the fact that correlation between attributes of co-offending gang members may be driven by alternative mechanisms. Most importantly, the presence of clustering in networks can dramatically affect the assessment and make us believe that homophily is important while in fact it is not. In this article, we recreate the internal structure of a London-based street gang with exponential random graph models (ERGM). Our results refine the role of ethnicity for co-offending within gangs. While homophily is still prevalent, the effect diminishes when triad closure is considered. Furthermore, ethnic homophily is more pronounced for some ethnic groups than for others, which supports the notion it is driven by preferences and not by opportunities. Lastly, we extend existing ERGM specifications and investigate the interaction between ethnic homophily and triad closure. Findings indicate that ethnic homophily is even stronger when it is embedded in triads. Using additional computer simulations we illustrate the complex interplay of homophily and triad closure in gangs.

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## Panel 7: Homicidal Tendencies

### **The scope and shape of individual-level illegal firearm networks in Quebec**

Carlo Morselli, Université de Montréal

This study presents the first results of a survey of incarcerated and non-incarcerated individuals who had experiences in acquiring illegal firearms in Quebec over the past twenty years. Data were gathered from a sample of 250 respondents, within which 150 respondents reported having acquired firearms illegally in the province. The survey captures information about: the individual experience; the pool of guns acquired by respondents; the transactions in which these guns were acquired; and the personal networks of contacts through which transactions took place. By examining illegal firearm access at the individual level, we can generate an understanding of market competition and network structure. Past network research demonstrated that individual success toward purposive outcomes is determined extensively by the quality or shape of a person's social network—diffused or brokerage-like networks are generally more useful than closed or clique-like networks. Two hypotheses extend from such an outlook. The first hypothesis maintains that if illegal firearm acquirers have diffused networks for acquisition, the illegal firearm market offers greater flexibility and more opportunities. The alternative hypothesis suggests that if illegal firearm acquirers are restricted to limited sources or clique-like networks of firearm sources, the illegal firearm market is restricted and is thus overly concentrated around closed networks. In short, the market is expected to be more competitive in the former individual-level scenario than it is in the latter. Determining how the illegal firearm market is structured in Quebec's strictly controlled firearm market is essential for orienting policies and practices within and beyond such settings.

### **Murder networks: The search for suitable homicide co-offenders among gang members**

Evan C. McCuish and Martin Bouchard, Simon Fraser University (SFU)

Raymond Corrado, SFU and University of Bergen

Although some research has started to examine the “murder networks” of gangs at the aggregate level, little is known about homicide co-offending at the individual gang member level. One question of particular interest is whether and how much gang members who participate in murders are different from those who do not. To address this, the current study constructed the co-offence network of 18 members of a prominent gang, referred to as the BC Gang. To compare the network centrality of homicide and non-homicide offenders all co-offenders ( $n = 137$ ) of these focal individuals were gathered for a 14 year period. Although our focus was on homicide, all offences were considered in constructing the network. The co-offence network was measured at seven time periods (before and after each murder) to examine the impact homicide on the evolution of the network. The results show that although 25 percent of the 137 total co-offenders are BC gang members ( $n = 34$ ), 100 percent of homicide offenders were from this particular gang ( $n = 13$ ). The network contained 8 components at the final measurement period, but all 13 homicide offenders were connected to one component of 48 individuals. This component contained 69 percent of all gang members, including the most central individuals in the network. A look at the evolution of the network shows that homicide offenders emerged from network isolates at the time of the first murder, becoming the most central individuals six years later, at time of the second murder. Implications for gang homicide investigations will be discussed.

## Panel 8: Illicit Drug Markets

### Expected losses: A multilevel analysis of drug seizures in the world-economy

Remi Boivin, Université de Montréal

Drug traffickers constantly face uncertainty: with a few exceptions (e.g. Chin, 2009), they cannot be sure that their shipments will go undetected and reach destination. Problems (e.g. seizures, arrests) are always possible. Much empirical research, both qualitative and quantitative, has supported the idea that traffickers take these risks into account when they plan their activities. However, discussions are often limited to two general observations: 1) potential gains are enormous and 2) law enforcement efforts have a limited impact on drug markets. A much less investigated issue is how drug traffickers evaluate risk and how they consequently adapt to situations. This paper investigates several factors that could influence the evaluation of risk made by drug traffickers. We assume that traffickers compare expected costs and benefits on the basis of the limited information available to them before taking action (Becker, 1968; Caulkins & Maccoun, 2003; Clarke & Cornish, 1985; Cornish & Clarke, 1986). Decisions to take action should therefore be understood from the decision maker's point of view: no matter how realistic an evaluation might be, a decision to take action or to refrain from it is taken. A special focus is put on structural factors that could be related to risk: traffickers operate in a larger context of relations between countries. Just as immediate conditions may influence decisions, some contexts are more favorable to criminal activity than others. For example, the use of a cargo ship instead of human "mules" allows larger quantities of drugs to be transported in every shipment. Similarly, the 2000 miles-long land border between Mexico and the United States is probably more appealing to traffickers than the 9500 miles distance from Australia. The use of multilevel models allows considering the impact of both situational and contextual (structural) factors on a key element in drug trafficking: the size of shipments. Drug traffickers are expected to modulate the size of their shipments depending on their evaluation of risk and potential gains.

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	Dark network resilience in a hostile environment: Optimizing centralization and density (presented by Dan Cunningham <a href="mailto:dtcunnin@nps.edu">dtcunnin@nps.edu</a> )	Sean Everton, Naval Postgraduate School <a href="mailto:sfeverto@nps.edu">sfeverto@nps.edu</a>
2	Criminal interaction orders: Towards a theory of criminal encounters	Andrew Goldsmith, Flinders University <a href="mailto:andrew.goldsmith@flinders.edu.au">andrew.goldsmith@flinders.edu.au</a>
	Cooperation in criminal organizations: Kinship and violence as credible commitments (presented by Paolo Campana <a href="mailto:paolo.campana@sociology.ox.ac.uk">paolo.campana@sociology.ox.ac.uk</a> )	Federico Varese, University of Oxford <a href="mailto:federico.varese@sociology.ox.ac.uk">federico.varese@sociology.ox.ac.uk</a>
3	Preventing crime online: A social network based analysis of a carding forum	David Décarry-Héту, Université de Montréal <a href="mailto:david.hetu@gmail.com">david.hetu@gmail.com</a>
	Framing technological innovations as legitimate: The role of networks in influencing the endorsement and use of on-officer video cameras	Jacob T.N. Young, Arizona State University <a href="mailto:Jacob.Young.1@asu.edu">Jacob.Young.1@asu.edu</a>
	Crime control networks on the Los Angeles waterfront: Overcoming structural barriers and building resilient partnerships	Russell Brewer, Flinders University <a href="mailto:russell.brewer@flinders.edu.au">russell.brewer@flinders.edu.au</a>
4	Overlapping crime: Stability and specialization of co-offending relationships	Thomas Grund, Université de Montréal <a href="mailto:thomas.u.grund@gmail.com">thomas.u.grund@gmail.com</a>
	The use of actor attributes and centrality measures to identify key actors: A case study of a drug trafficking network	David Bright, University of New South Wales <a href="mailto:david.bright@unsw.edu.au">david.bright@unsw.edu.au</a>
	A micro-level study of criminal activity space	Mohammad A. Tayebi, Simon Fraser University <a href="mailto:tayebi@cs.sfu.ca">tayebi@cs.sfu.ca</a>
5	Defection in an enterprise conspiracy: Exit and opportunism in equity funding	Eric Cheney, Central Washington University <a href="mailto:cheneye@cwu.edu">cheneye@cwu.edu</a>
	Twisting trust: Social networks, due diligence and loss of capital in a Ponzi Scheme	Becky Nash, California State University, Long Beach <a href="mailto:beckyn@sfu.ca">beckyn@sfu.ca</a>
	White collars and black ties: Interlocking social circles of elite corporate offenders	Gisela Bichler, California State University, SBDO <a href="mailto:gbichler@csusb.edu">gbichler@csusb.edu</a>
6	The structure of age homophily in co-offending groups	Peter Carrington, University of Waterloo <a href="mailto:pjc@connect.uwaterloo.ca">pjc@connect.uwaterloo.ca</a>
	Ethnic homophily and triad closure: Mapping internal gang structure using exponential random graph models	James Densley, Metropolitan State University <a href="mailto:james.densley@metrostate.edu">james.densley@metrostate.edu</a>
7	The scope and shape of individual-level illegal firearm networks in Quebec	Carlo Morselli, Université de Montréal <a href="mailto:carlo.morselli@umontreal.ca">carlo.morselli@umontreal.ca</a>
	Murder networks: The search for suitable homicide co-offenders among gang members (presented by Martin Bouchard <a href="mailto:mbouchard@sfu.ca">mbouchard@sfu.ca</a> )	Evan C. McCuish, Simon Fraser University <a href="mailto:ecm2@sfu.ca">ecm2@sfu.ca</a>
8	Expected losses: A multilevel analysis of drug seizures in the world-economy	Remi Boivin, Université de Montréal <a href="mailto:remi.boivin@umontreal.ca">remi.boivin@umontreal.ca</a>

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1	Drone effects: Structural change in Al Qa'ida communications	Stacy Bush, California State University, SBDO <a href="mailto:bushs303@coyote.csusb.edu">bushs303@coyote.csusb.edu</a>
2	Supermarkets: Conflict cessation and weapons trade	Juan Franquez, California State University, SBDO <a href="mailto:j.franquez@yahoo.com">j.franquez@yahoo.com</a>
3	Responding to embargoes: A pulse model of weapons flow	Jennifer Hagala, California State University, SBDO <a href="mailto:hagala3675@yahoo.com">hagala3675@yahoo.com</a>
4	In and out of Africa: Illicit small arms trade, 1997-2010	Mary Wood, California State University, SBDO <a href="mailto:woodm306@coyote.csusb.edu">woodm306@coyote.csusb.edu</a>
5	Taming the steel horse I ride: Identifying the problematic links in commuter rail systems	Janet Enriquez, California State University, SBDO <a href="mailto:janetenriquez@yahoo.com">janetenriquez@yahoo.com</a>
6	Does violence roll downhill? An analysis of inter- and intra-gang violence among Bloods and Crips of LA County	Jasmin Randle, California State University, SBDO <a href="mailto:randj301@coyote.csusb.edu">randj301@coyote.csusb.edu</a>
7	Crossing borders: Mexican DTOs influence on interstate gang structure	Stacey Goldberg, California State University, SBDO <a href="mailto:goldbers@coyote.csusb.edu">goldbers@coyote.csusb.edu</a>
8	Current projects at the ICON Lab	Christopher Bates, California State University, Long Beach <a href="mailto:christopherjbates@gmail.com">christopherjbates@gmail.com</a>

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