Enhancing CCTV's Impact on Crime and Disorder

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Presentation Overview

- Why should CCTV work and how?
- Evaluation results
- Top 10 Lessons
- Questions, answers, and sharing of experiences

What would cameras prevent crime?

- Rational Choice Perspective
  - Criminals weigh costs/benefits of crime
  - Situational Crime Prevention: cameras = formal surveillance
- Public surveillance cameras increase risk of apprehension
  - Active monitoring enables LE to intervene on the spot
- Public surveillance cameras increases risk of detection
  - Footage supports investigative efforts, ID of perpetrator
- What types of crimes should cameras prevent?
  - Street crimes of all types
  - Some argue less impact on violent crime
  - May prevent crime behind closed doors

Does it work and at what cost?

- What can evaluation tell us about CCTV effectiveness?
- When are cameras not effective?
- How are they used in problem solving, apprehensions, investigations, prosecutions?
- Do the results justify the costs?

Impetus

- Cameras increasingly adopted by jurisdictions – often with DHS funding but serving a dual purpose
- Extensive research in the UK, very little in the U.S.
- Agencies need to know if and how public surveillance works
- Proposed/received funding from COPS to explore this question in detail – implementation, use, impact, & cost

Overview of Methodology

- Process Evaluation
  - Camera basics
  - Implementation, monitoring, and placement
- Impact Analysis
  - Structural Break Analysis
  - Differences-in-Differences
- Spatial Analysis
  - Density Mapping
  - Means Center
  - Weighted Displacement Quotient (WDQ)
- Cost-Benefit Analysis

Camera System Basics

WHAT

- Camera Hardware
- Monitoring camera feeds/recordings
  - Active Monitoring
  - Passive Monitoring
  - Central Monitoring
- Transmitting video footage
  - Wired network
  - Wireless network
- Recording and storing video footage

WHY

- Crime Reduction Goals
  - Targeting chronic violent crime
  - Drug crimes
  - Crimes of disorder
  - Responding to crime spike
  - Increasing sense of law enforcement presence
- Solving Crime
- Component of Integrated CompStat Approach
- Expansion of Existing Camera System

Monitoring Techniques

- Passive
  - Relies on pre-programmed camera "tours"
  - Aids in investigations
- Active
  - Identifies suspicious behavior
  - Reveals crimes that would otherwise go unreported
  - Disrupts crimes in progress
  - Focuses on areas of interest to investigations
  - Employs retired officers, light-duty officers, trained civilians

Implementation Differences

City	**Baltimore**	**Chicago**	**Washington**
Number of Cameras	400+	2,000+ (access to over 8,000)	70+
	Reason – data- and technology-driven approach to all crime types	Violent, firearms, drug-related	Recent spike in violent crime
Privacy Policies	Less Restrictive	Less Restrictive	More Restrictive
Monitoring Strategy	Mostly Active; Partially Centralized Dedicated Monitors	Mixed; Decentralized Non-Dedicated Monitors	Mostly Passive; Centralized Supervised Sworn Officers
Network Type	Primarily Wireless	Wireless	Mixed

Impact Analysis

- Structural Break Analysis
  - Detects significant changes
  - User aligns changes with implementation date(s)
  - Enables detection of incrementally implemented interventions
- Difference-in-Differences
  - Compares net change in crime in target area using control area to subtract out other changes at the same time
  - Assume other changes were identical between the treatment and control
- Searched for significant differences in average monthly crime counts within three areas:
  - (1) the target area of the camera (radius of 500 feet);
  - (2) at buffer zones of 500 feet (diffusion zone 500 feet beyond target area)
  - (3) at buffer zones of 1000 feet (displacement zone 1000 feet beyond target area);
- Matched comparison areas for each area selected
  - Land use, historical crime rates, and socio-economic measures to the target area before the intervention

Baltimore's Downtown CitiWatch Area

Significant Changes in Crime, Downtown Baltimore*

Crime	Time from Installation	Pre-Shift Mean	Post-Shift Mean	%Change
Larceny Inside	3 months	36.79	25.03	-31.97%
Larceny Outside	11 months	41.47	27.13	-34.58%
Violent	6 months	21.17	16.36	-22.72%
Total	4 months	119.05	89.47	-24.85%
1000-ft Buffer	5 months	82.83	58.38	-29.52%

*First set of cameras were installed in early May 2005; therefore, the intervention point was determined to be May 2005. The downtown extension cameras were not included in this analysis.

Baltimore's Greenmount Area

Significant Changes in Crime, Greenmount Area, Baltimore*

Crime Type	Area	Before	After	Change	Difference-in-Differences
All Crime	Treatment	64.00	50.76	-13.24	
	Comparison	40.42	35.39	-5.03	-8.22†

*Camera installation occurred in early August 2005; therefore, the intervention point was determined to be August 2005.
†Significant at $p<.05$.

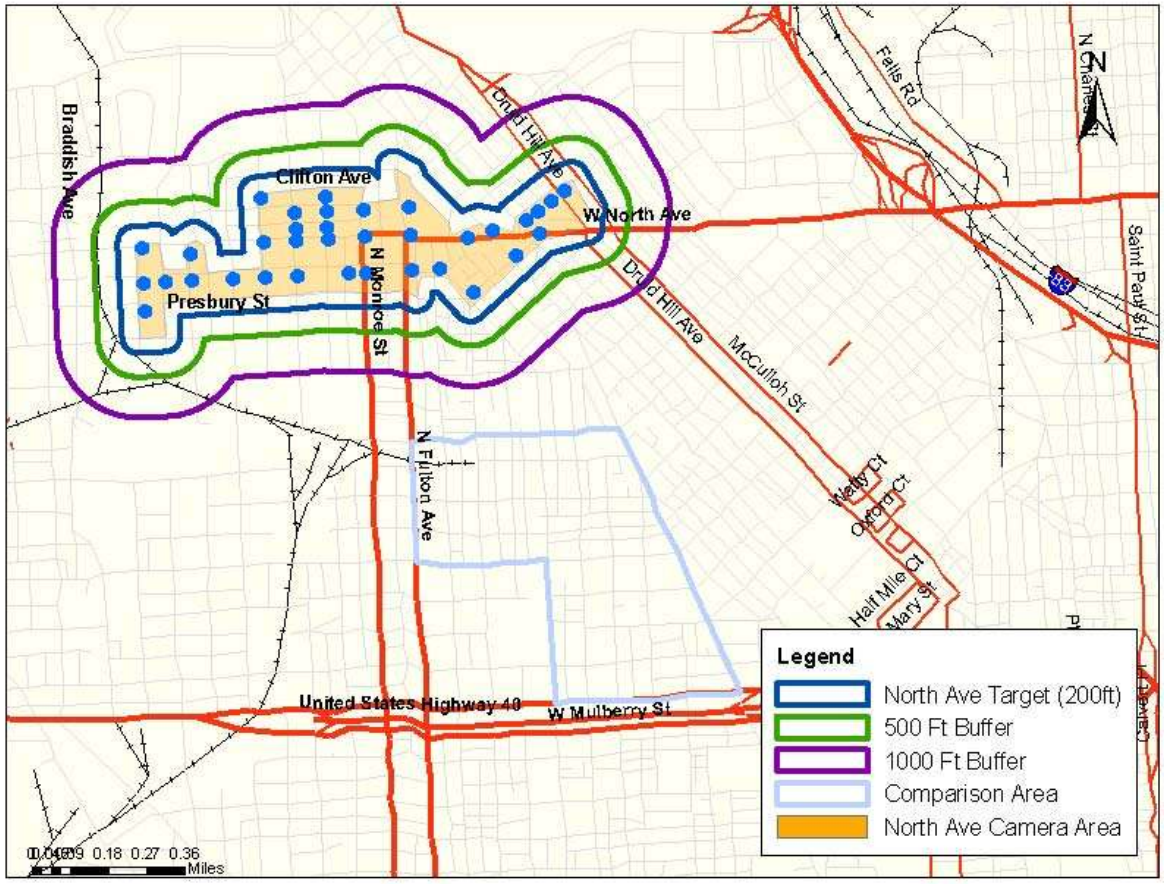
Baltimore's Tri-District Area

Significant Changes in Crime, Tri-District Area, Baltimore*

Crime Type	Area	Before	After	Change	Difference-in-Differences
All Crime	Treatment	37.61	29.12	-8.49	
	Comparison	32.53	36.38	+3.86	-12.35†
Larceny Inside	Treatment	3.39	1.54	-2.83	
	Comparison	1.97	1.65	-0.32	-1.54†
Robbery	Treatment	3.84	2.08	-1.77	
	Comparison	3.47	3.77	+0.30	-2.06†

*Camera installation occurred in early March 2006; therefore, the intervention point was determined to be March 2006.
†Significant at $p<.05$.

Baltimore's North Avenue Area



- **No significant findings**

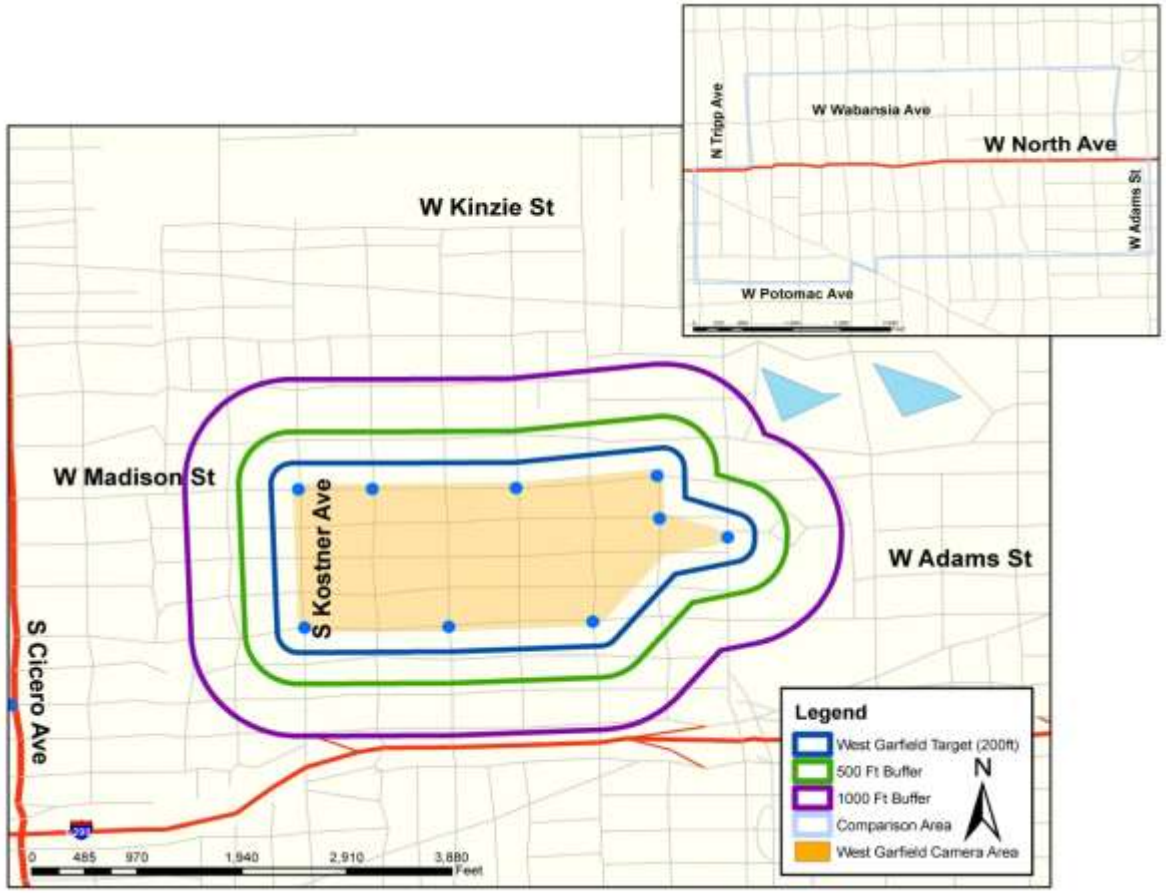
Chicago's Humboldt Park Area

Significant Changes in Crime, Humboldt Park, Chicago*

Crime Type	Area	Before	After	Change	Difference-in-differences
All Crime	Treatment	301.39	243.53	-57.86	
	Comparison	349.57	330.00	-19.57	-38.30†
Violent	Treatment	33.00	23.19	-9.81	
	Comparison	29.57	25.62	-3.95	-5.87†
Drug	Treatment	115.22	77.31	-37.91	
	Comparison	120.57	116.14	-4.43	-33.49†
Robbery	Treatment	11.52	8.53	-2.99	
	Comparison	11.43	11.61	+0.18	-3.17†
Weapons	Treatment	3.96	2.58	-1.37	
	Comparison	3.78	4.56	+0.77	-2.15†

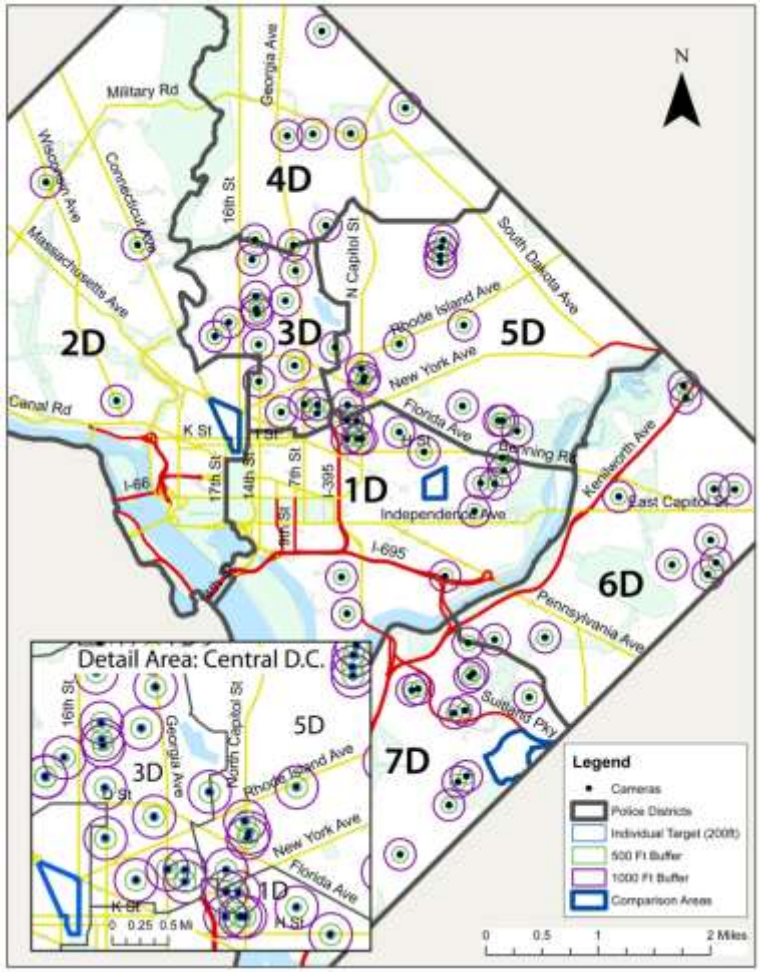
*First camera installation on July 31, 2003 and, therefore, intervention line inserted at August 2003.
†Significant at $p<.05$.

Chicago's West Garfield Park Area



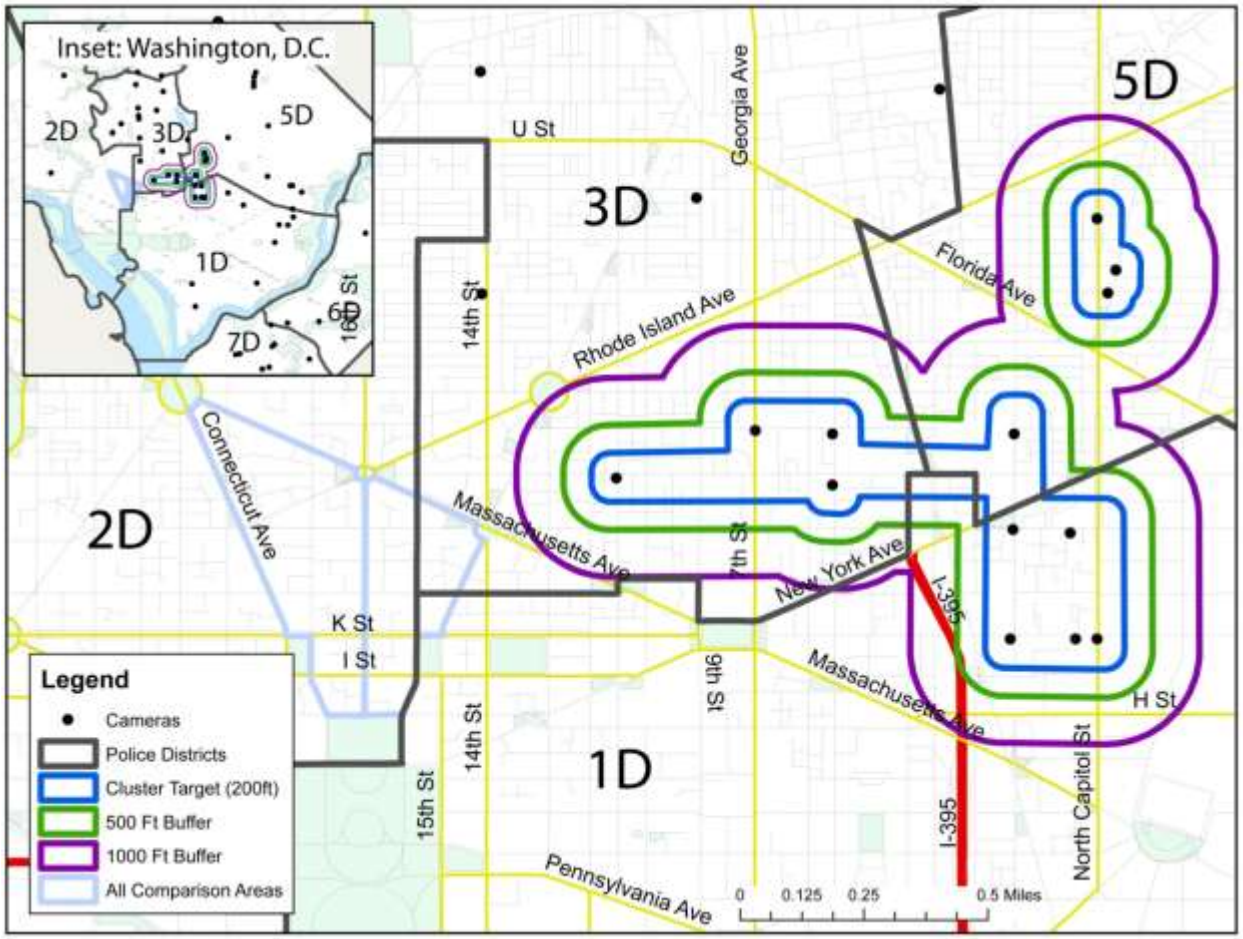
- **No significant findings**

DC's Individual Cameras



- Crime in each area pooled together (i.e., target, 500-ft, and 1000-ft buffers)
- No significant findings

DC's Cluster Camera Area



- 13 cameras in close proximity
- No significant findings
- BUT crime did go down – just can't attribute it to cameras

Crime Displacement and Diffusion of Benefits

- Spatial displacement of crime after camera installation
  - Crime moves outside viewshed of camera
  - Crime moves into similar crime target areas
- Diffusion of benefits following camera installation
  - Cameras have deterrent effect beyond viewshed
  - Distance at which cameras no longer influence crime

Cost-Benefit Analysis

- Why conduct a CBA?
  - Extension of Impact Analysis
  - Common Unit of Analysis
  - Can Inform Decision-Making Among City Stakeholders

Costs and Benefits, Baltimore

- **Cost** of the Intervention
  - Initial Start-up Costs
    - Infrastructure
    - Installation
    - Equipment
  - On-Going Costs
    - Monitoring
    - Maintenance
    - Equipment

- **Benefits** of the Intervention
  - Averted Criminal Justice Costs
    - Law Enforcement
    - Court
    - Incarceration
  - Averted Victimizations
    - Tangible Costs
      - Medical and Mental Health Treatment
      - Lost Earnings
    - Intangible Costs
      - Pain and Suffering
      - Reduced Quality of Life

CBA Results: Total Crime Costs and Benefits, Baltimore

- Total costs over observation period:
  - $8.06 million ≈ $224,000/month
- Benefits over observation period:
  - $12 million ≈ $334,000/month
- Benefit-Cost ratio (benefit per dollar cost):
  - $1.49

CBA Results: Total Crime Costs and Benefits, Chicago

- Total costs over observation period:
  - $6,845,000 ≈ $190,000/month
- Benefits over observation period:
  - $29.4 million ≈ $815,000/month
- Benefit-Cost Ratio (Benefit per Dollar Cost):
  - $4.29

CBA Considerations: Public Safety and Societal Benefits

- Incorporates public safety system & victim benefits:
  - Governments do not accrue benefits of averted crimes to victims in their budgets
  - Considering public safety system benefits only:
    - Baltimore: from $334,000 per month to $237,000
      from $1.49 to $1.06
    - Chicago: from $815,000 per month to $533,000
      from $ 4.29 to $2.81

Summary and Limitations

- Cameras can have impact on crime
  - Caveat: are we sure it was the cameras?
- Why do they work in some neighborhoods and not others?
  - Active monitoring
  - Sufficient concentrations
  - Integration into LE/investigative activities
- Costs: careful consideration to planning and procurement activities
  - Costs of cameras themselves are minimal compared to the costs of installation, maintenance, and monitoring
  - Caveat: less cost-beneficial when societal benefits are removed

Assess your Needs and Budget

- Many options available for surveillance systems
  - Covert/overt (signs, lighting)
  - Fixed/PTZ
  - monitored/programmed
  - wired/wireless
- Determining the appropriate options depends on:
  - Purpose
  - Budget
  - Camera location
- How may cameras???

Evaluation Findings

- Questions on Evaluation?

Solicit Stakeholder Input

- Jurisdictional leaders - city/county manager, mayor, city council
- Law enforcement
  - Useful tool or threat to autonomy?
- Community members
  - Privacy concerns
  - Placement issues
  - Decreased property value
- Public involvement and education is key
- Case studies: failed attempts to implement camera systems - what can we learn?

Lessons on Planning, Implementation, & Use

- Review of lessons learned across study sites
- Audience should share lessons too!

Plan Ahead for Maintenance & Infrastructure Costs

- Vendors don't always detail entire system cost
  - Obtain multiple bids
  - Learn from your peers
- Camera value depends on continued functionality
- Routine maintenance includes:
  - Replacing cameras regularly
  - Readjusting antennae
  - Clearing viewsheds
- Infrastructure/hardware has 5-year life cycle

Plan Ahead for Staffing Costs

- Costs include staffing and operating system
- Uniformed or civilian staff must:
  - Monitor cameras

    and/or
  - Retrieve footage
- Additional hiring:
  - officers/trained monitors
  - technical staff

Choose Camera Locations to Maximize Viewsheds & Crime Prevention Potential

- Placement is important, but potentially controversial
- Strategies include:
  - Mapping crime to identify hotspots
  - Consulting commanders
  - Soliciting input/feedback from public
  - Camera saturation/blanketing distribution
- Ideal locations may not be feasible
  - physical and manmade obstructions
  - mounting permission challenges
- Caveat: You will never please everyone!

Develop a Sound Privacy Policy

- Protect anonymity and personal privacy
- Respect private property
- Prevent discrimination
- Codify and disseminate policies
- Train supervisors and monitors
- Ensure evidence quality and integrity

Balance Privacy Protection with System Utility Carefully

- Access to video feeds must be available
- Restrictive regulations may inhibit active monitoring
- Jurisdictions should draft policies to maximize utility
- Decision-makers can:
  - Learn from experiences of other jurisdictions
  - Consult with legal counsel early

Weigh the Costs and Benefits of Using Active Monitoring

- Benefits of active monitoring
  - Real-time identification of suspects, witnesses
  - Prevention or disruption of crimes
  - Ability to dispatch officers quickly
  - Provide responders with key information re: safety
- Costs of active monitoring:
  - Cost!

Integrate Camera Systems with Existing Practices and Procedures

- Deploy officers just beyond camera viewsheds
- Enhance investigations
- Incorporate systems into CompStat programs
- Employ portable cameras

Set and Manage Realistic Expectations for Video Footage Quality

- Even the best system has limitations
- Footage quality may be impacted by
  - Darkness
  - Inclement weather
  - Equipment damage
  - Dirt collecting on lens

Set and Manage Realistic Expectations for System Usage

- All Cameras cannot always be monitored
- Pre-programmed tours may miss incidents
- Educate on how to use and present footage
- Cameras are a *supplement* to investigations

Integrate with Other Technology

- Systems can enhance information available
- Jurisdictions have successfully integrated systems with:
  - Gunshot detection systems
  - Incident mapping software
  - License plate recognition software
- Possibility exists for future developments
  - video analytics (e.g., muzzle flash, furtive movements)
  - facial recognition

Incorporate Video Evidence with Witness Testimony in Court

- Footage cannot replace witness testimony
- Presents completely objective view
- Most attorneys recommend using available footage
- CSI effect: need to manage jurors' expectations
- Footage often needs authentication/explanation
- Footage can confirm or refute testimony

Use Surveillance Systems to Complement, but not Replace

- Systems support and enhance policing
- Images can provide information on:
  - People
  - Circumstances
  - Incidents
- Cameras *leverage* police knowledge, activities - they don't replace them

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