

City-Wide Surveillance – A Global Perspective

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Agenda

- What is city-wide surveillance?
- The research
- VMS technology for city-wide surveillance
- Real city-wide applications and success factors
- Summary

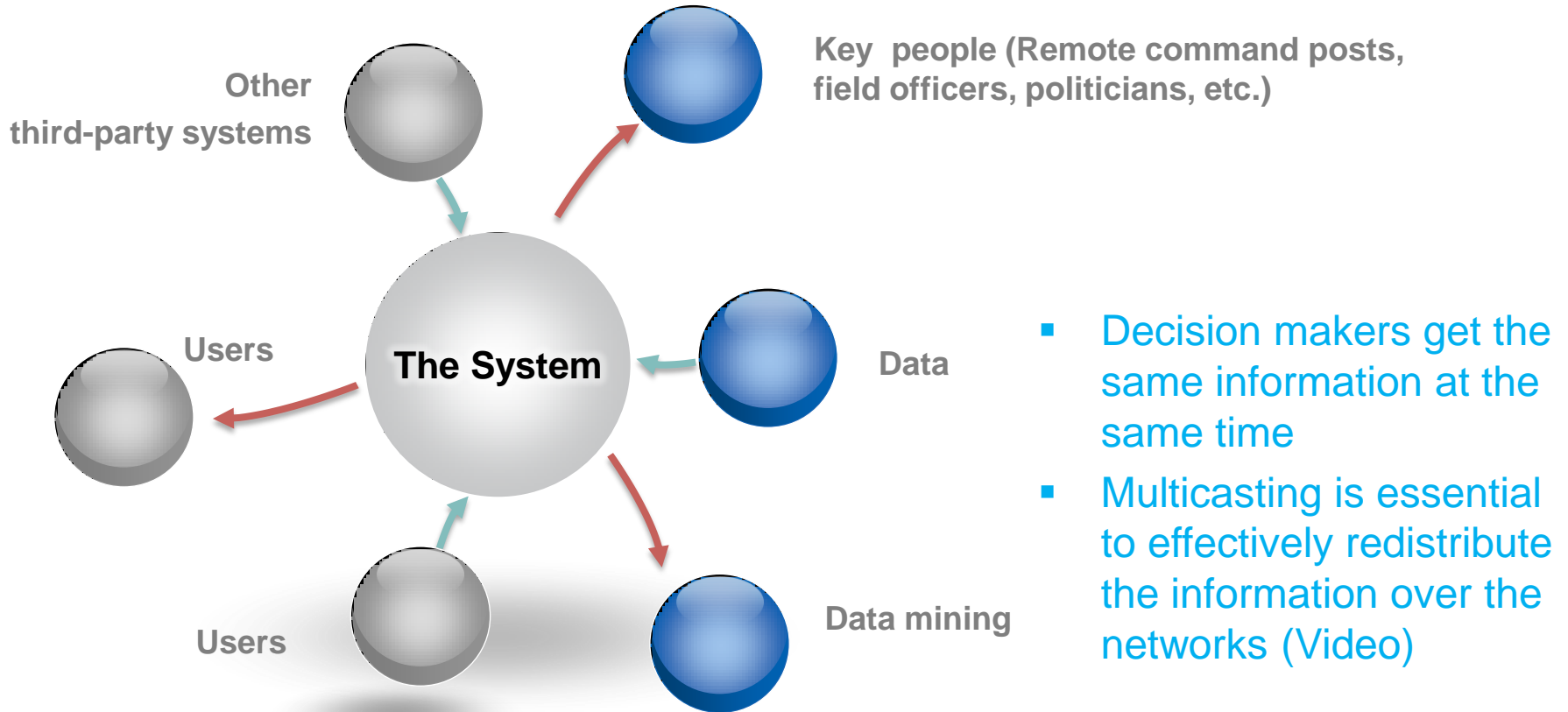
Defining City-Wide Surveillance And Looking At The Research

What Is City-Wide Surveillance?

- Centered around video surveillance systems in public spaces
- Revolves around emergency management, police department and/or city/county initiatives
- Typically linked to first responder systems (CAD, traffic surveillance, etc.) and used for emergency management
- Real-time multimedia information **sharing** between various independent organizations (often transit authorities, housing authorities, school districts, etc.)
- Video verification for field operations



City-Wide Surveillance System – What Does It Do?



- Decision makers get the same information at the same time
- Multicasting is essential to effectively redistribute the information over the networks (Video)

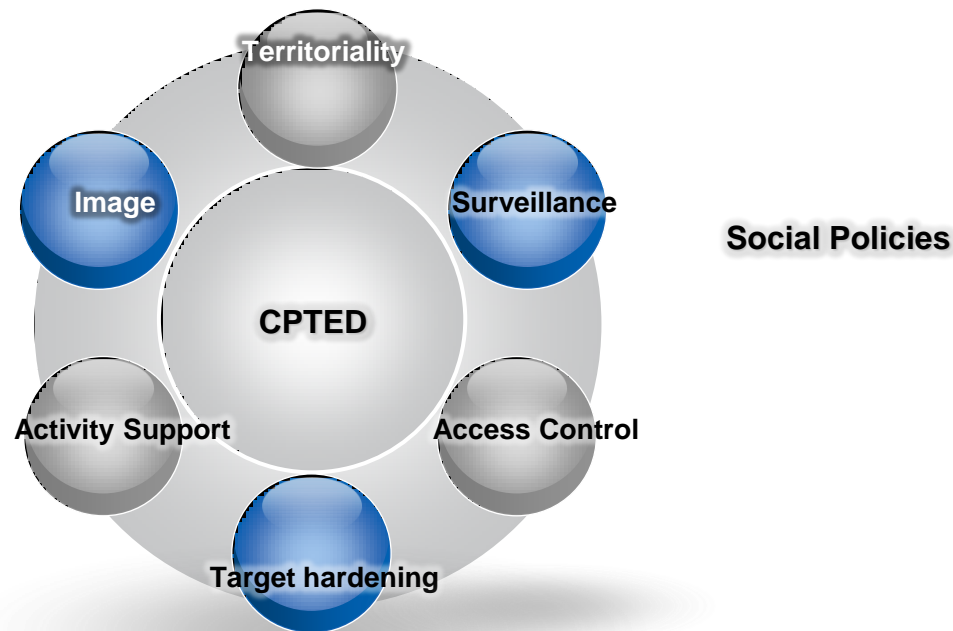
City-Wide Surveillance – The Research

- Digital video surveillance used more and more for real-time and forensic data mining.
- Video surveillance can effectively:
 - “Shape” crime by driving it into areas where there is field advantage.
 - Helps solve major cases (it is an effective forensic tool).
 - Help the police do more with less (“Beam the crime scene to me Scotty...”).
- New technologies in CCTV (IP cameras, better resolution and higher light sensitivity, standards, etc.) have not yet fully impacted the current research literature and studies.



City Wide Surveillance – The Research (2)

- Crime Prevention Through Environmental Design (CPTED) concepts are more and more looked at and are viewed as effective methods and tools in crime prevention.
- Reflects a more “Global” approach
- Video Surveillance is part of the solution. Social policies and community involvement ultimately contribute to the success of such projects.



Exploring Video Surveillance Technology for City-Wide Applications

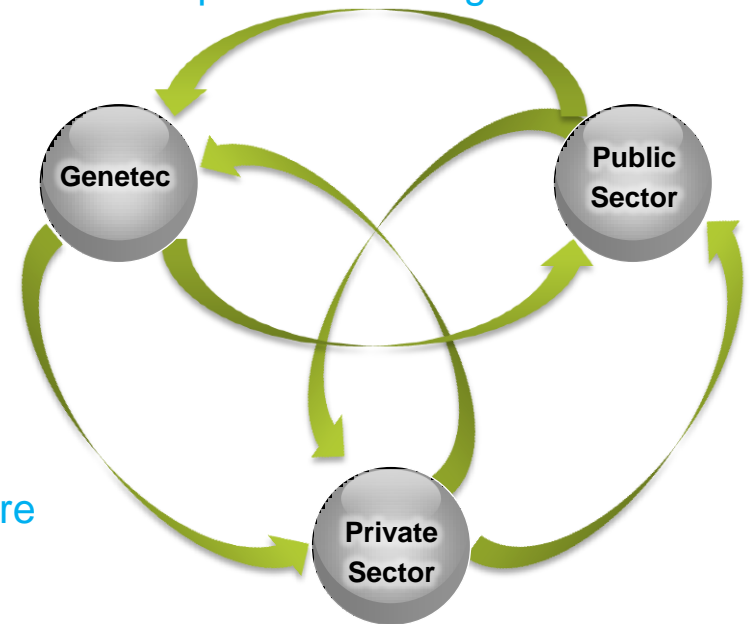
VMS Technology for City-Wide Surveillance

CWS systems are some of the most complex surveillance systems out there:

- Need for interoperability and independence at the same time
- Need for large deployments
- Mission critical systems
- Protection of private information
- Increase police productivity and safety
- User interface enhancing operations

City-Wide Surveillance and Federation – Learning with Our Partners

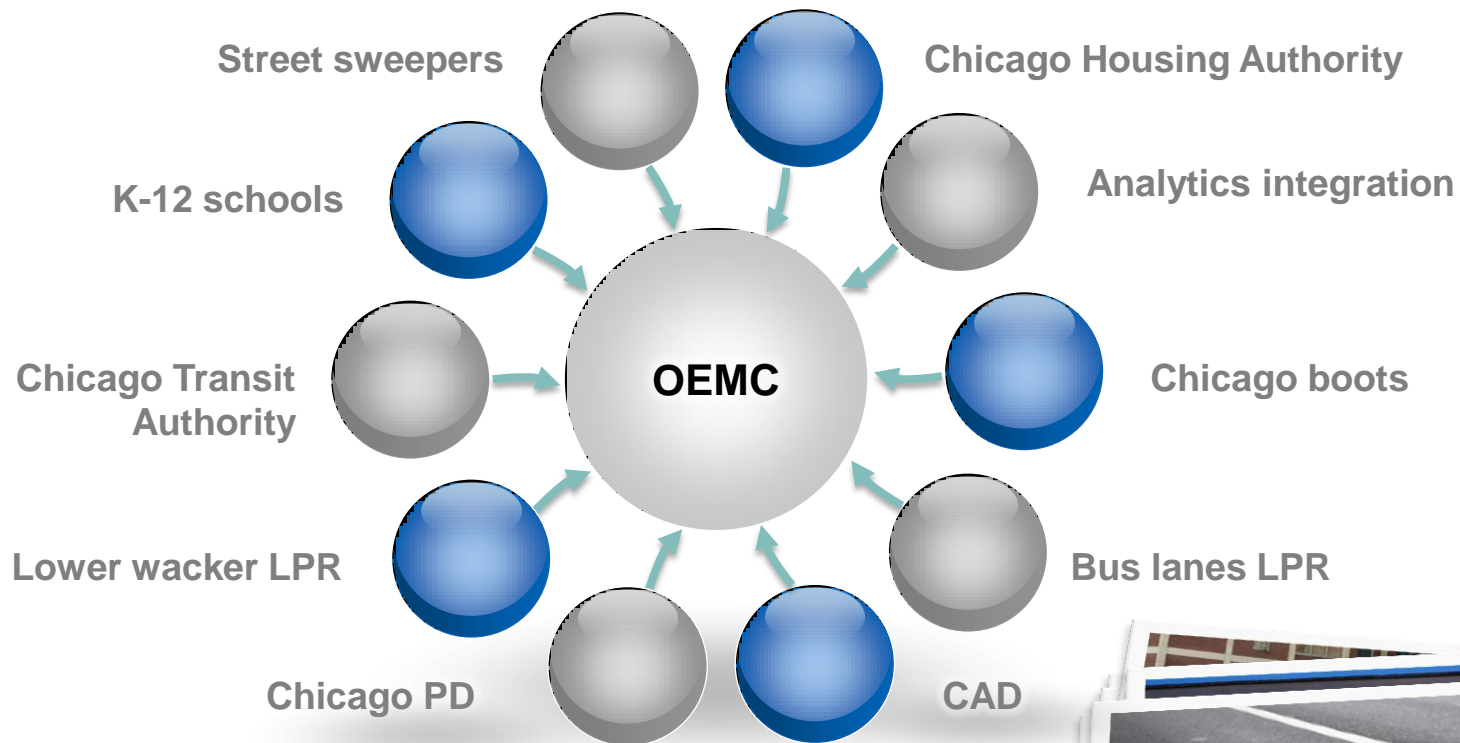
- Federation was initially designed to enable public / private cooperation
- Federation evolved/morphed into a system that enabled different public sector agencies to exchange real-time multimedia information
- This was more difficult than expected. Why?:
 - Inter-agency rivalry
 - Different budget cycles and constraints
 - Different upgrade and maintenance policies
 - Different IT operating policies
 - Different and sometimes incompatible infrastructure
- CWS need to be more than a “Pseudo Federated Architecture” and offer forward and backward compatibility, ability to configure and maintain your system independently, span across multiple domains, etc...



City-Wide Surveillance and Federation – Learning with Our Partners

True Federation	CWS Requirements	Pseudo Federated Architecture
Search meta data across all systems	Forensics and data strategies are success factors for CWS	Limited to video only in a single system
Backward and forward compatibility	The systems need to be able to operate and be maintained independently	All systems need to be on the same version (Up or Down)
Ability to configure and maintain your system independently	Each system/agency has different needs, budget cycles, policies	Each user needs to be created and/or synchronized between systems
Federate video, events, access control, intrusion	CWS to be effective needs to integrate multiple systems	Only video
Increased scalability. 1000s of sites	CWS deploy large numbers of cameras	Scalability is limited to 100 sites
Ability to get one stream out of the system and multicast locally (hundreds of users can view the same camera)	Large number of users looking at the same video	One stream per user
Spans across different networks	Network flexibility	Will not cross domains

City-Wide Surveillance - Complexity beyond Federation



City-Wide Surveillance - You Need To Be Scalable On Multiple Levels

Scalability is key not only from a total number of cameras perspective

- Systems need to be able to handle a very large number of cameras, federated or not.
- Systems needs to be able to handle hundreds or even thousands of users that can be connected at any time.
- Systems need to be able to handle a large amount of events.



In an environment where you can have 5 cameras blink in and out every 5 seconds (out of a 2000+ camera system), because of a wireless network , you can generate 172K events per day. If you have 500 users connected as an administrator (which means they could receive all events), you could have 86M events of traffic in 24 hours.

City-Wide Surveillance – High Reliability And Availability

City-wide deployments are mission critical systems

- Up time of system has to be beyond the three nines: 99.9%
- Networked solutions and monitored solutions
- In-service upgrades
- Edge-recording capabilities



After the London bombings, 20% of the video recording streams were not available for forensics. High availability and monitoring requirements are key for CWS.

City-Wide Surveillance – Private Information Integrity

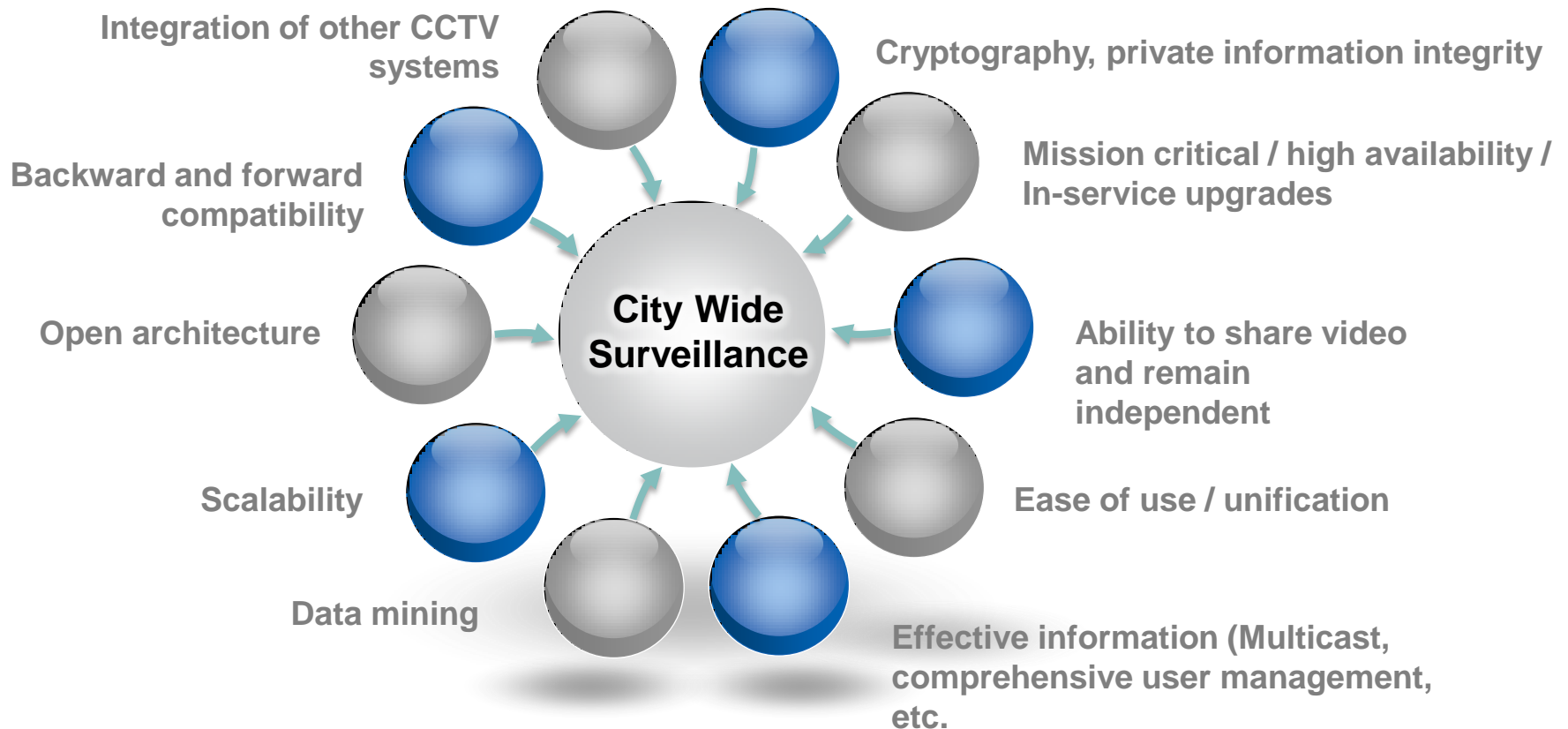
CWS systems privacy concerns and requirements:

1. VMS systems need to provide complete traceability.
2. Video cannot be tampered with and should address the complete chain of custody
3. Cryptography and security certificates need to be part of VMS systems for CWS
4. You want to be able to certify that the system is implementing publicly stated policy



City-Wide Surveillance – Technological Requirements for The VMS

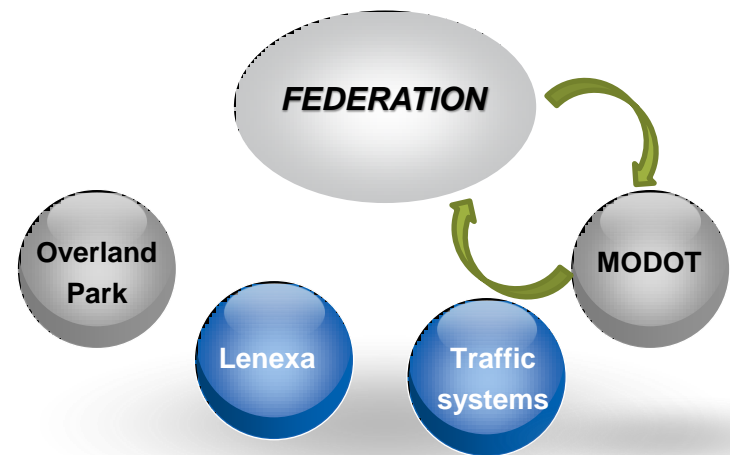
VMS manufacturers have a lot of work cut out for them



Real City-Wide Applications And Success Factors

Kansas City Example – Federation As An Enabler

- Kansas city is evolving into a city-wide project.
- City of Overland Park / City of Lenexa /PDs were all using Omnicast independently.
- Traffic management systems, MODOT, interstate/highway systems also started using Omnicast mainly because of the Federation.
- Federation is seen as the main driver to “bring it all together”.
- Each entity wanted to manage their own cameras but also wanted to SHARE them with the others.
- Today, you have 15 to 20 different systems that are and want to be part of this whole CWS initiative.



Memphis PD: Case Study

- The Memphis model is viewed as a success
- Crime DROPPED 25% since 2006
- Reasons for their success are numerous but mainly centered around:
 1. End user is open to new technology.
 2. PD communicates openly to the public and media.
 3. The technology is integrated with the policing method.
- The Real Time Crime Center provides real-time data and is at the center of the system.
- This system is viewed positively by the community now.



Communicating To The Public and Making The Tax-Payer's Money Visible

VISION RMS

Memphis Police Department
Crime Analysis
600 Jefferson



To: Director Larry Godwin
From: Crime Analysis
Date: February 11, 2011
RE: Daily Crime Statistics

- Cameras are OVERT
- Effort is done to show progress
- BAD areas have become GOOD areas
- The downtown area is completely different now.

SUMMARY - Below you will find the daily Part One Crime statistics from February 1 - February 10, 2010/2011

Month To Date	2010	2011	Number	% Change	+/-
Raines Station	163	141	-22	-13.50%	-
Mt. Moriah Station	124	126	2	1.61%	+
Airways Station	111	85	-26	-23.42%	-
Ridgeway Station	83	72	-11	-13.25%	-
South Main Station	48	31	-17	-35.42%	-
Old Allen Station	163	148	-15	-9.20%	-
Union Station	120	97	-23	-19.17%	-
Tillman Station	126	114	-12	-9.52%	-
Appling Farm Station	83	72	-11	-13.25%	-
Totals	1,021	886	-135	-13.22%	-

2010	2011
16.0%	15.9%
12.1%	14.2%
10.9%	9.6%
8.1%	8.1%
4.7%	3.5%
16.0%	16.7%
11.8%	10.9%
12.3%	12.9%
8.1%	8.1%

SUMMARY - Below you will find the daily Part One Crime statistics from January 1 - February 10, 2010/2011

Year To Date	2010	2011	Number	% Change	+/-
Raines Station	654	630	-24	-3.67%	-
Mt. Moriah Station	605	655	50	8.26%	+
Airways Station	478	493	15	3.14%	+
Ridgeway Station	323	378	55	17.03%	+
South Main Station	217	156	-61	-28.11%	-
Old Allen Station	839	690	-149	-17.76%	-
Union Station	513	508	-5	-0.97%	-
Tillman Station	556	601	45	8.09%	+
Appling Farm Station	374	342	-32	-8.56%	-
Totals	4,559	4,453	-106	-2.33%	-

2010	2011
14.3%	14.1%
13.3%	14.7%
10.5%	11.1%
7.1%	8.5%
4.8%	3.5%
18.4%	15.5%
11.3%	11.4%
12.2%	13.5%
8.2%	7.7%

MTD - Part One Crime statistics from February 1 - February 10, 2006/2010/2011
YTD - Part One Crime statistics from January 1 - February 10, 2006/2010/2011

	2010	2011	1 Year Chg	2006	2006-2011 Trend
MTD Part 1 Total	1,021	886	-13.22%	1,467	-39.60%
YTD Part 1 Total	4,559	4,453	-2.33%	7,044	-36.78%

Usage of LPR Technology in Memphis

License plate recognition (LPR) is deployed in both fixed and mobile installs:

1. LPR was originally going to be focused on stolen cars, DMV (expired/revoked licenses, etc).
2. The LPR system gradually started being used for other issues: warrants, sex offenders, drug trafficking, etc.
3. It is used for crime investigation data mining (Investigation purposes, inventory of potential witnesses, etc.)
4. Gang member activity
5. The LPR system is integrated to multiple databases now.

Data mining on the LPR system is done for every major crime. Most crimes are committed by people who drove to the scene. (66% of Major Crimes in the US involve an automobile – Houck & Siegel 2010). Data mining and can be used to detect behavioral patterns.

Summary

- Success in CWS must be approached from a global perspective
- Video surveillance systems for city-wide deployments need to be:
 1. *Scalable*
 2. *Reliable*
 3. *Flexible*
 4. *Simple but not simplistic*
- Other important success factors include:
 1. *Global approach (Combined with Policing Methods, Environmental Design, etc.)*
 2. *Community involvement*
 3. *Data mining*
 4. *Sharing infrastructure between entities*

Thank You

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