

CMPD's Predictive Crime Analytics Implementation

Harold Medlock
Deputy Chief
Charlotte-Mecklenburg Police Department



Agency Background Information

- Estimated Population: 777,827
- Land Area: 438 square miles
- 1725 Sworn Officers
- 500 Non-sworn personnel



Primary Project Goals

- Provide customized role-based delivery of crime data and predictive analytics to Officers and Command Staff
- Support resource deployment through the use of real-time information
- Achieve better visualization of crime patterns and trends



Project Timeline

- June 2009 RFP issued
- November 2009 Contract awarded to IBI for Law Enforcement Analytics (LEA) Solution
- January 2010 Project began
- May 2010 Operational Data Store (ODS) live
- September 2010 Operational Dashboards live
- October 2010 Predictive Dashboard live

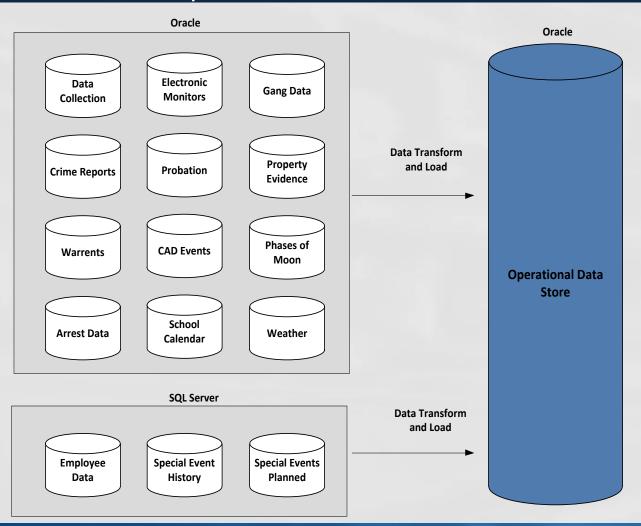


Operational Data Store and Reporting Packages

- Operational Data Store (ODS) Consolidates over a dozen major data sources to support real-time information delivery
- Command Level Reports Fourteen report packages automated and electronically distributed to Captains & Commanders to support Monday morning briefings and weekly CompStat sessions
- Electronic Monitoring Reports Crime scene correlation reports delivered daily to Detectives

CHARLOTTE-MECKLENBURG POLICE DEPARTMEN

Operational Data Store



CHARLOTTE-MECKLENBURG POLICE DEPARTMEN

Command Level Report

% CHANGE AND RANK PART ONE CRIMES

Through week ending 10/17/2010

Curr Qtr: 10/1/2010 - 10/17/2010 Prev Qtr: 10/1/2009 - 10/17/2009 Curr Yr: 1/1/2010 - 10/17/2010 Prev Yr: 1/1/2009 - 10/17/2009

= Top 5 beats and Top 1 division with highest decreases

= Top 5 beats and Top 1 division with highest increases

QUARTER-TO-DATE						YEAR-TO-	DATE			
	1	1		1	Patrol				Patrol	

								North/					North/
					Beat		Division	Patrol		Beat		Division	Patrol
				Beat	Rank	Division	Rank	South	Beat	Rank	Division	Rank	South
		Division	Beat	% Change	(1 to 39)	% Change	(1 to 13)	Rank	% Change	(1 to 39)	% Change	(1 to 13)	Rank
ecre	ases	Division	061 1	-21.8%	5	70 Olldligo	(110 10)	runn	-2.6%	35	70 Change	(1 (0 10)	Runk
crea	ses	Eastway	0612	15.2%	26	-16.4%	3	3	-6.9%	32	-10.8%	9	4
			0613	-35.0%	1				-22.2%	6			
	Northeas	t	071 1	-20.6%	7				-7.3%	31			
	Service	North Tryon	071 2	-20.0%	8	-19.9%	2	2	-11.8%	23	-10.6%	10	5
	Area		0713	-18.8%	9				-13.2%	19			
			141 1	-3.2%	18				1.0%	37			
		University City	1412	16.9%	27	8.7%	9	5	-21.7%	7	-3.2%	13	6
			1413	12.9%	24				19.3%	39			
			1111	-9.4%	15				-13.4%	18			
		North	1112	28.6%	31	4.2%	6	4	-17.8%	10	-14.0%	6	3
			1113	1.7%	21				-10.7%	26			
	Northwes		021 1	-15.2%	11			-10.8%	25				
	Service		0212	-18.2%	10	-20.5%	1	1	-13.0%	21	-17.2%	2	1
	Area		0213	-25.0%	2				-24.4%	1			
			271 1	31.4%	33				-13.5%	16			
		Freedom	271 2	-10.5%	14	11.5%	10	6	-22.7%	5	-15.0%	5	2
			2713	23.4%	30				-7.3%	30			
		Hickory Grove	121 1	58.1%	37	39.6%			-21.5%	8			
			121 2	-2.6%	19		13	7	0.5%	36	-8.2%	3	7
			1213	90.5%	38				-3.9%	34			
			171 1	48.5%	36			4	-23.4%	3	-16.7%		_
	Southeas		171 2	-21.1%	6	5.9%			-11.1%	24			2
	Service		1713	10.7%	23				-16.6%	13			
	Area		161 1	-9.3%	16	0.70/	_		-16.8%	11	40.50		
		Providence	1612	6.3%	22 25	0.7%	5	2	-13.4%	17	-10.5%	11	6
			1613	14.3%					1.1%	38			
		South	221 1 221 2	118.8% -24.5%	39 3	4.4%	7	3	-12.9% -23.6%	22	-17.3%	1	1
		South	2212	-24.5%	13	4.4%	'	3	-23.6%	20	-17.3%	' '	'
			011 1	21.1%	28				-13.1%	9			
		Central	0112	0.0%	20	12.0%	11	5	-14.3%	15	-15.2%	4	3
		Central	0112	22.2%	29	12.076	- ''	5	-10.3%	27	-15.276	*	3
	Southwes	,,	261 1	29.5%	32				-5.3%	33			
	Service		261 2	-23.7%	4	-4.3%	4	1	-14.5%	14	-13.7%	7	4
	Area	VICSIOVCI	2613	-13.5%	12	4.576	7		-22.9%	4	-13.770	'	7
	Aica		211 1	-7.7%	17				-16.7%	12			
		Steele Creek	2112	39.5%	35	18.7%	12	6	-8.1%	29	-11.3%	8	5
		S.SS.O GIOGR	2113	38.3%	34				-9.3%	28			



CHARLOTT

Electronic Monitoring Reports

Electronic Monitoring Potential Hits 20101018 to 20101019 **BEAT: 0213** COMPLAINT#: 20101018-1620-04 INCIDENT TYPE: Auto Theft DATE TIME FROM: 10/18/2010 1620 BEAT: 0213 ADDRESS: 2601 WILKINSON BV DATE TIME TO: 10/18/2010 1620 INVESTIGATOR: CLEARANCE STATUS: Open DATE HIT MINIMUM MAXIMUM CLOSEST CLOSEST **FURTHEST** OFFENDER NAME PID CALCULATED ORG **PINGS** DATE TIME DATE TIME DATE TIME DISTANCE DISTANCE Maxwell, Jasmine 320906 10/18/2010 1623 10/18/2010 1623 10/18/2010 1623

EM Hits by Beat for Response **Area Commanders**

COMPLAINT#:

20101019-1817-00

INCIDENT TYPE: ADDRESS:

Residential Burglary 1301 EFFINGHAM RD DATE TIME FROM: DATE TIME TO:

10/19/2010 1630 10/19/2010 1817 BEAT:

0213

INVESTIGATOR:

OFFENDER NAME

Bruce, Robert

Electronic Monitoring Potential Hits 20101018 to 20101019

INCIDENT TYPE: Auto Theft

COMPLAINT#:

20101018-0941-03

INCIDENT TYPE: Auto Theft

ADDRESS:

3101 FINCHER BV

DATE TIME FROM: DATE TIME TO:

10/17/2010 2300 10/18/2010 0700 BEAT: 1113

PID

228816

CLEARANCE STATUS: Open

INVESTIGATOR: Cherry Jr, J.M.(000768)

Smith, Alphonso

OFFENDER NAME

DATE HIT

MINIMUM DATE TIME

10/17/2010 2240

MAXIMUM DATE TIME 10/18/2010 0719

CLOSEST DATE TIME 10/18/2010 0231 CLOSEST FURTHEST DISTANCE DISTANCE

EM Hits by Crime Type for

Detectives

COMPLAINT#:

20101018-1620-04

INCIDENT TYPE:

Auto Theft

DATE TIME FROM:

10/18/2010 1620

BEAT: 0213

ADDRESS:

2601 WILKINSON BV

DATE TIME TO:

10/18/2010 1620

INVESTIGATOR:

CLEARANCE STATUS: Open

MINIMUM

MAXIMUM

CLOSEST

CLOSEST FURTHEST

19

DISTANCE

495

DATE HIT

CALCULATED

10/20/2010

ORG PINGS

PINGS

229

ORG

CMPD

DATE TIME

DATE TIME

DISTANCE 198 198

OFFENDER NAME Maxwell, Jasmine

PID 320906 CALCULATED 10/20/2010 CMPD

10/18/2010 1623

10/18/2010 1623

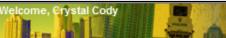
DATE TIME 10/18/2010 1623



Operational Dashboards

- Virtual Roll Call Dashboard Allows Patrol Officers to share information through BLOGS and APB's
- Subjects of Interest Dashboard Highlights priority offenders and warrants for Patrol Officers
- Current Crime Events Dashboard Allows Officers to monitor calls for service and crime activity in real-time
- CompStat Dashboard Allows Supervisors to monitor Beat Goals and visualize Officer Initiated Activities in relation to Part 1 crimes

Virtual Roll Call



CMPD PREDICTIVE CRIME ANALYTICS

List of Stolen Vehicles for 10/16 to 10/18

INTREPID

ECLIPSE

EXPLORER

CIVIC

F250

DR200SET

BRUTE FORCE

WARRIOR 350

Model

CAPRICE CLASSIC

CMPD Portal

Virtual Roll Call

Current Crime Events

CMPD Live

- Filter

Division Independence Division ▼

Refresh

Refresh Every 30 - Minutes

2112

20101017-1518-01

New	<u>BLOG</u>	Entry
Inden	ahda	nce Di

vision News Briefs >=10/18

Subject

(!) RA1 - ZONE CHECK 6300 E. INDEPENDENCE **BOULEVARD**

RA2 - ZONE CHECK 7806 HUMMINGBIRD LANE

RA1 - ZONE CHECK 7200 MONROE ROAD

RA2 - ZONE CHECK REF. LFA'S

RA2 - B&E'S SARDIS FOREST AREA

RA1 - ZONE CHECK 7316 WALLACE ROAD

RA1 - ZONE CHECK 5040 CORONADO DR

RA3 - LFA LOCATIONS RA2 - LFA LOCATIONS

RA1 - LFA LOCATIONS

RA3 - ZONE CHECK 7330 BRIARDALE DRIVE RA2 - ZONE CHECK 512 WRYE FOREST COURT

RA1 - B&E BOLO ASHLEY PLACE APARTMENTS

Set Default Filter

Make

CHEVROLET

KAWASAKI

YAMAHA

HONDA

FORD

FORD

MITSUBISHI

DODGE

SUZUKI

WHITE

	<u>Color</u>	Year	Tag/State	Beat	Complaint #	
	BLUE	1990	U22350 / SC	1211	20101018-1126-06	4
	SILVER	2004	YWR2968 / NC		20101018-1126-05	
	BLACK	2009	3Y7951 / NC	1113	<u>20101018-1014-01</u>	Ξ
	GREEN, DARK	2006			20101018-0941-03	
	BLUE, DARK				20101018-0941-03	
	WHITE	2001	ZVE7287 / NC	2713	20101018-0814-06	
	WHITE	1996	TREVP / VA	1713	20101018-0636-01	
	BLUE	2004	ZXD8571 / NC	0211	20101017-1801-02	

YTH2853 / NC

ĒΑ

All Points B	ulletin Independ	ence Division	New APB		
Туре	Offense	Complaint No	Contact	Detail	
(!) PERSON	HOMICIDE (6)	20100812-1157-02	Whitworth, James	MURDER OCCURRED IN THE METRO DIVISION AT 1215 EFFINGHAM ROAD ON 08/12/2010MURDER WARRANTS OUTSTANDING ON SUSPECT:THOMAS LEE DAVISB/M DOB 3/10/1969 5'6" 200 LBSTRANSIENTCONT	*
(!) PERSON	ARMED ROBBERY (20100912-2033-02	Sloop, Michael	Armed Robbery / Kidnapping Subject hid in the back of the victims car at the Harris Teeter on Central, the car was later found a few blocks away.	
PERSON	ARMED ROBBERY (a)	20101015-1950-00	Whetzel, Ryan	In reference to the armed robbery from	

2002

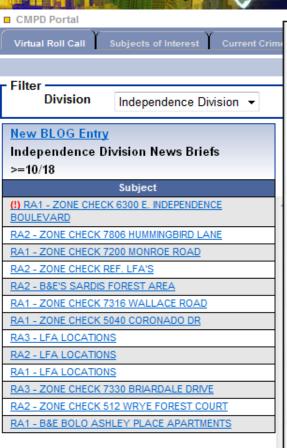


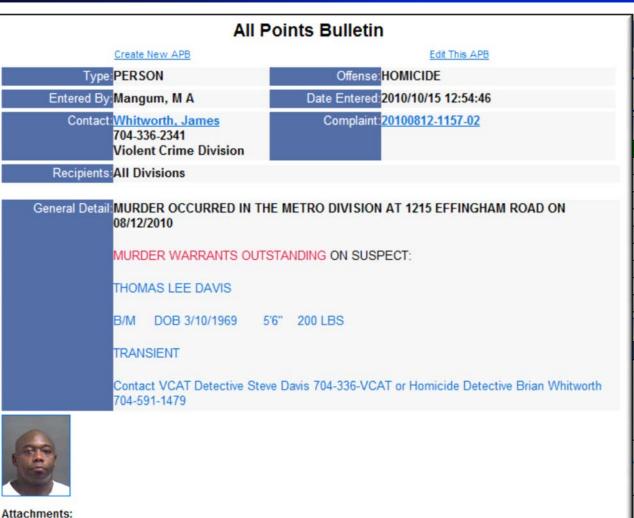
Robbery Unit is seeking help in identifying





CMPD PREDICTIVE CRIME ANALYTICS







Subjects of Interest



CMPD PREDICTIVE CRIME ANALYTICS

■ CMPD Portal

Filter

Division

Independence Division ▼

Set Default Filter

Refresh

Refresh Every 30 v Minutes

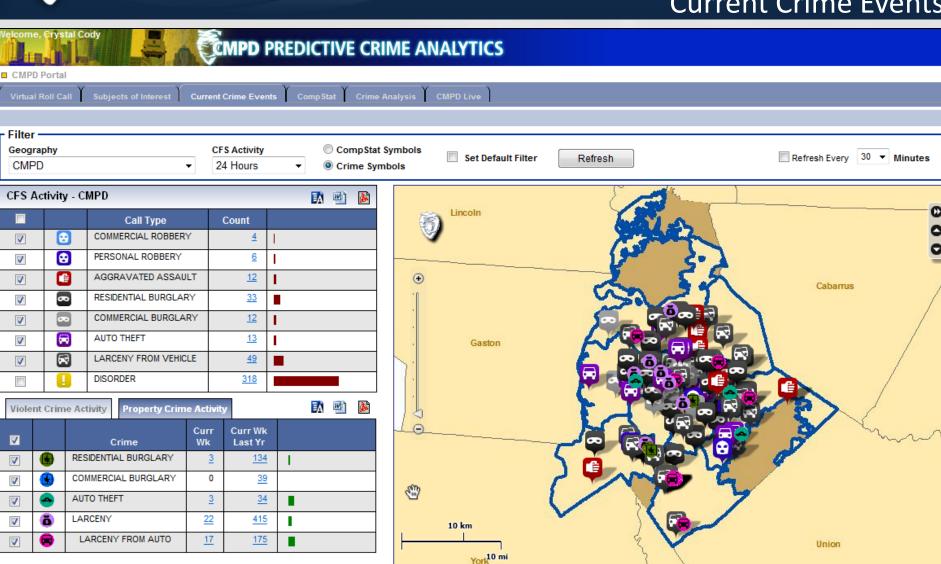
Priority Offenders	<u>Ge</u>	t All Divisions	
<u>Name</u>	Image	<u>Division</u>	Case Manager
CURETON, JALEN 05/12/1993 B/M		INDEPENDENCE	HELMS, C B 704-841-1477 Independence Division
FULLER, THEODORE ANTONIO 12/10/1990 B/M	8	INDEPENDENCE	HELMS, C B 704-841-1477 Independence Division
MCCULLOUGH, LORENZO ROBINSON 07/22/1976 B/M		INDEPENDENCE	HELMS, C B 704-841-1477 Independence Division
DI LOI W	EN.		

Threats To Offi	cers	
Name	Image	
REAL, NORBERTO GARCIA 12/09/1979 BLACK/MALE		1
GREGORY, JEFFREY ALAN 02/07/1964 WHITE/MALE		
RED, CALIFORNIA (WILLIAM B. LOWERY) 08/19/1970 BLACK/MALE		-

Priority Crime Warrants	All Warrants must be verified prior to	taking action.	
<u>Name</u>	<u>Charge</u>	<u>Date</u> Issued	<u>Beat</u>
SHINE, DERRICK BERNARD 08/21/1978 B/M	RESISTING PUBLIC OFFICER	10/14/2010	1711
WENTZ, LAFAYETTE 11/01/1986 B/M	PROBATION VIOLATION	10/06/2010	1711



Current Crime Events





Calls for Service Activity

Call for Service Activity LARCENY FROM VEHICLE

Current Time 4 Hours

Complaint #	<u>Type</u> <u>Code</u>	<u>Type</u> <u>Description</u>
20100928-0529-01	LA-VEHC	LARCENY FROM VEHICLE
20100928-0555-00	LA-VEHC	LARCENY FROM VEHICLE
20100928-0748-00	LA-VEHC	LARCENY FROM VEHICLE
20100928-0757-00	LA-VEHC	LARCENY FROM VEHICLE
20100928-0910-02	LA-VEHC	LARCENY FROM VEHICLE
20100928-0934-03	LA-VEHC	LARCEN
20100928-0959-01	LA-VEHC	LARCEN
20100928-1005-05	LA-VEHC	LARCEN'

Event Details

Complaint No: 20100928-0529-01

Sub-Type

Code

REPORT

JST-OCC

REPORT

REPORT

REPORT

Location: 3201 FORESTBROOK DR 1

Event Type: LA-VEHC REPORT LARCENY FROM VEHICLE

Disposition: OO/CASE

Entry Remarks

ALT# 828-855-5169 -080.91827 +35.23719

SEE REF SOMEONE BROKE INTO HER RED CHEVY COBALT SOMETIME

Location

3201 FORESTBROOK DR 1

3308 TULIP TREE LN

6035 NATIONS FORD RD 102

7833 CALIBRE CROSSING DR

419 ORCHARD TRACE LN 8

Beat

2711

2612

2111

1712

0713

Disposition

00/CASE

00/CASE

00/CASE

00/CASE

OVER THE NIGHT...STOLE HER GPS

05:29:52

ALARM TIMER EXTENDED: 0

From: 9/20/2010

To: 10/17/2010

CompStat Symbols



- Filter

Geography

LARCENY FROM AUTO

CompStat

Ol Activities

Refresh



Subjects of Interest Current Crime Events CompStat Crime Analysis CMPD Live Virtual Roll Call

Time Frame

5.2

100.0%

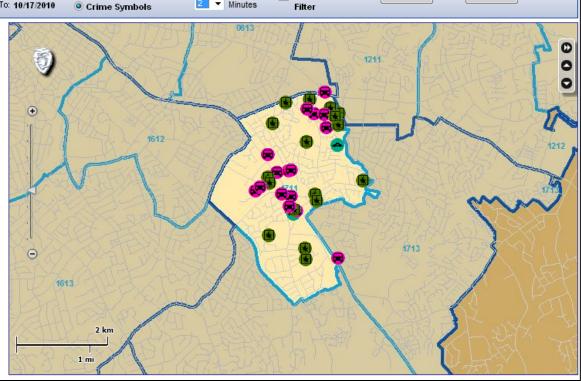
4.0

Independence Division - Beat 1711 ▼ CompStat 28-Day ▼							
RA1 RA2 RA3 Beat Goals Q4 2010 ▼							
Independence Division - Be	Q	TD	Rolli	ng 28			
Crime	Goal %	% Chg.	Avg/Wk	% Chg.	Avg/Wk		
ROBBERY	-50%	-66.7%	.4	-62.5%	.8		
RESIDENTIAL BURGLARY	-32%	75.0%	5.2	13.3%	4.3		

180.0%

-33%

Vic	olent Cr	ime Stats Property Crime State	5	₽ A	*
Map	Inc	dependence Division - Beat 1711	Com	pStat 28 Da	y
		Crime	Current	Prev Yr	Chg.
7	•	RESIDENTIAL BURGLARY	<u>18</u>	<u>17</u>	6%
V	•	STORAGE SHED BURGLARY	0	0	0%
	•	COMMERCIAL BURGLARY	3	3	0%
V	0	AUTO THEFT	2	8	-75%
	ŏ	LARCENY	<u>40</u>	<u>26</u>	54%
V	-	LARCENY FROM AUTO	<u>18</u>	<u>6</u>	200%
	•	SHOPLIFTING	3	8	-63%
	ō	VEHICLE TAG STOLEN	<u>6</u>	3	100%



Set Default

Filter

Refresh Every

2 ▼ Minutes

CompStat Symbols

From: 10/1/2010

To: 10/19/2010



Filter

Geography

RESIDENTIAL BURGLARY

LARCENY FROM AUTO

Officer Initiated Activities

Refresh

OI Activities



Time Frame

5.2

5.2

13.3%

100.0%

4.3

4.0

Independence Division	▼ Quar	ter-To-Date		₹		
RA1 RA2 RA3 Beat Goals Q4 2010 ▼						
Independence Division - Be	Q.	TD	Rolli	ng 28		
Crime	Goal %	% Chg.	Avg/Wk	% Chg.	Avg/Wk	
ROBBERY	-50%	-66.7%	.4	-62.5%	.8	

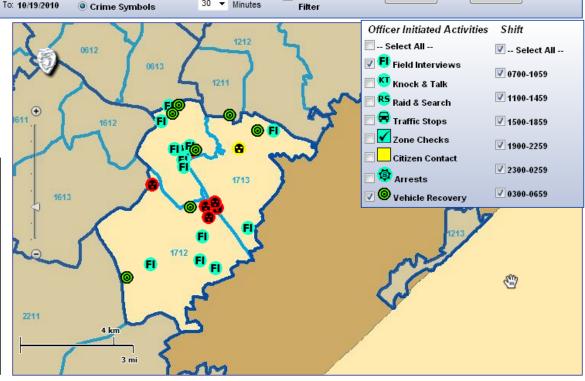
75.0%

180.0%

-32%

-33%

Violent Crime Stats Property Crime Stats					
Мар	Independence Division		QTR to Date		
		Crime	Current	Prev Yr	Chg.
V	-	HOMICIDE	0	0	0%
	8	RAPE	0	0	0%
V	•	ROBBERY	7	7	0%
V	8	COMMERCIAL ROBBERY	<u>1</u>	0	0%
V	•	PERSONAL ROBBERY	<u>6</u>	7	-14%
V	•	HOME INVASION	<u>1</u>	0	0%
	•	AGGRAVATED ASSAULT	2	<u>10</u>	-80%
	•	ADW-GUN	0	<u>3</u>	-100%



Set

Default

Refresh Every

30 ▼ Minutes

CHARLOTTE-MECKLENBURG POLICE DEPARTME

Predictive Dashboard

- Created predictive dashboard for the following major crime categories:
 - Commercial Robbery
 - Personal Robbery
 - Aggravated Assault
 - Residential Burglary
 - Commercial Burglary
 - Auto Theft
 - Larceny from Auto



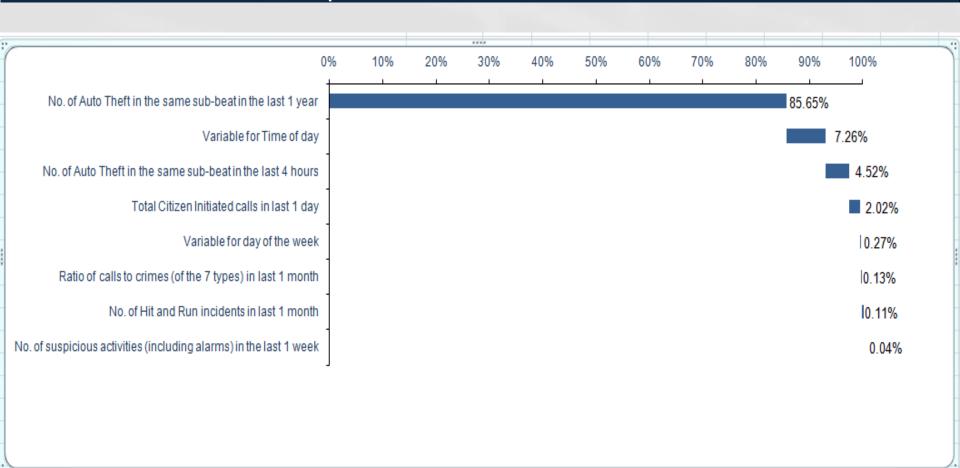
Predictive Dashboard (Continued)

- Built predictive models based on a series of inputs:
 - Historical geographic crime patterns
 - Recent criminal activity (within past 24-48 hours)
 - Day of week and time of day
 - Weather conditions
 - Recent call for service activity
 - School holidays
 - Special Events



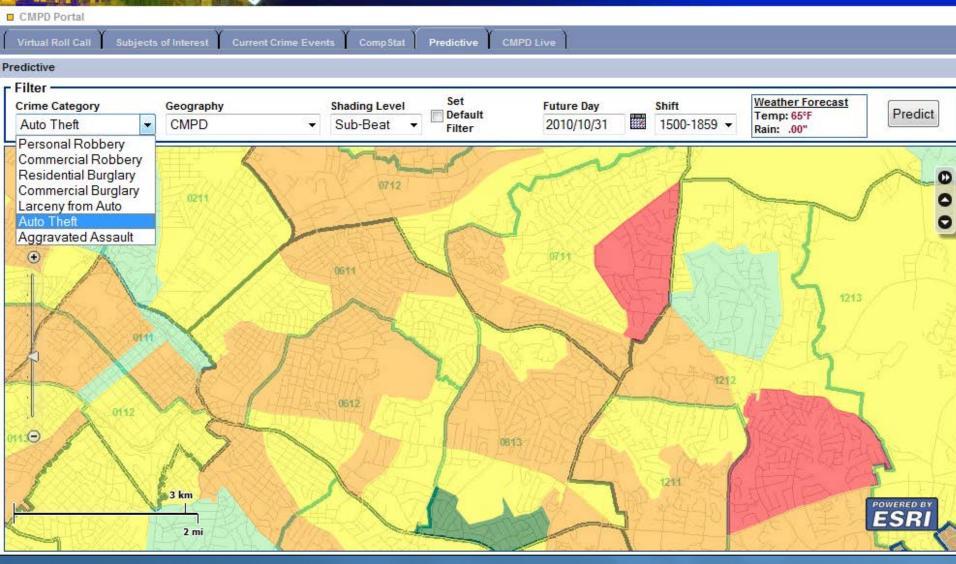
CHARLOTTE MECKLENBURG POLICE DEPARTMENT

Example Auto Theft Model Factors



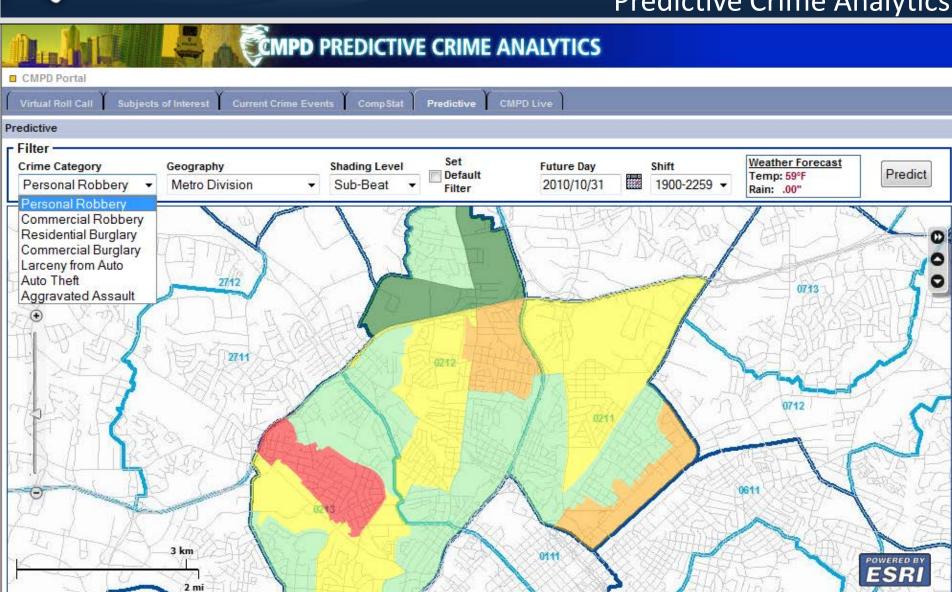
Predictive Crime Analytics

MPD PREDICTIVE CRIME ANALYTICS





Predictive Crime Analytics





CHARLOTTE-MECKLENBURG POLICE DEPARTMENT Results

- Real-time Hotspot location information is now at the fingertips of frontline officers and commanders
- Synchronizes jurisdiction-level resource deployment
- Increased arrests
- Increased communication and collaboration between frontline officers and analysis team
- Increased accountability across the board
- Liberates analysts to do other activities that drive down crime
- Single version of the TRUTH... Everyone is on the same page



HARLOTTE-MECKLENBURG POLICE DEPARTME

Measure of Success

"When the system indicated a strong probability of burglaries within the Valleydale Corridor neighborhoods on weekdays between 11 am and 3 pm, I immediately assigned an officer to this area, with backup from the division's Burglary Suppression Unit and response area coordinators. Soon after, the officer received a call regarding a possible burglary at a vacant house in this targeted zone. The team moved in and quickly apprehended five subjects inside that residence."

-- Sergeant Lisa Carriker, RA2, Freedom Division, CMPD







CHARLOTTE-MECKLENBURG POLICE DEPARTMEN

Next Steps

- Implement Additional Operational Dashboards to Better Allocate Officers based on Overtime/Offtime and Current Call Level Activity
- Implement Additional Predictive Models for Violent Crimes
- Implement "Top 10" Alerts that give Patrol Officers Real-Time Insight into Potential Threats on Current CFS
- Explore Real-Time Integration with Pawn Data, License Plate
 Readers & Video Surveillance System
- Explore Citizen-Facing Applications for Better Transparency



CHARLOTTE-MECKLENBURG POLICE DEPARTMENT







Questions? Comments?





