

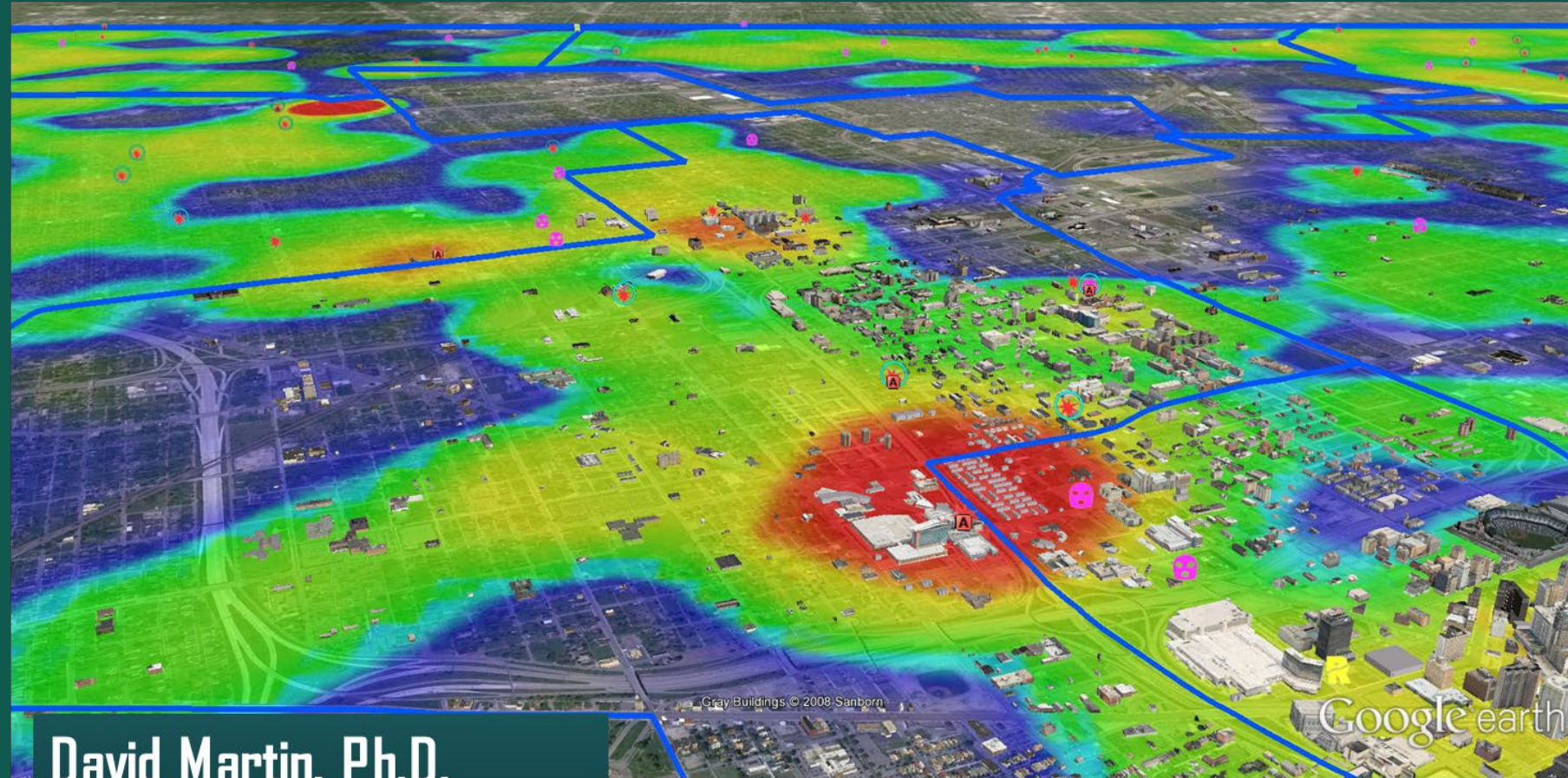


**STRENGTHENING THE BIG DATA
& ANALYTICS ECOSYSTEM**
WAYNE STATE UNIVERSITY

September 19, 2018

“Putting the Cop on The Dot”

Big Data Applications for Policing



David Martin, Ph.D.
Center for Urban Studies

Big Data in Policing

- 911 – Calls for Service
- Crime Reports
- Offenders / Victims / Other People
- Property / Leads Online
- Police Car GPS
- GPS Tracking of Released Offenders
- Surveillance Video
- License Plate Scanners (ALPR)
- ShotSpotter Gunshot Detection
- Social Media



Case: Reducing Crime through Evidence-Based Methods

No.	Strategy
1	Hot spots policing
2	Predictive policing
3	3 rd party policing
4	Problem-oriented policing
5	Active CCTV monitoring and response
6	Broken windows policing
7	Stop, question and frisk (aka stop and search)
8	Community-oriented policing
9	Procedural justice
10	Focused deterrence



Hot Spots Policing and Diffusion of Benefits

- Methods: SQL, PHP, various APIs → Web Apps
- Interactive dashboards and mapping
- Risk Identification – Hot areas/places/people
- Forecasts based on historical and real-time data
- Target patrols to “hot spots” {neighborhood, apart complex, bar, etc.}
- Focus crime prevention & problem-solving
- Real time analytics / better understanding of potential causal factors
CompStat report, statistical analysis

Tools:

- Real-Time Crime Mapping Tools and Crime Feed





DPD Compstat

Crime Statistics

[Citywide Profile](#)

[Real-Time Crime Feed](#)

[NEW Real-Time Crime Feed](#)

[YTD Stats for City and Precincts](#)

[Long-Term Trend Analysis](#)

[Precinct YTD Comps](#)
[SCA YTD Comps](#)

[Precinct Weekly Comps](#)
[SCA Weekly Comps](#)

[Scout Car Area Stats](#)

Pro-Active Policing

[Special Attentions and Traffic Inv](#)

Top Problematic Locations

[Greenlight Locations](#)
[All Gas Stations - Past 90 Days](#)

[Apartments and Multi Unit Housing - P](#)

[Downtown Parking Lots - Past 180 Da](#)

[Top 224-Dope Locations](#)
[224-Dope Heat Map](#)

[Mental Run Summary and Top Locatic](#)

911 Response

[911 Response Time Overview](#)

[Precinct Response Time Statistics](#)
[Daily](#) [By Shift](#) [Travel Time 20 Mins+](#)

[Response Times Comparisons](#)

[CAD 911 Feed/Stats](#)

[Day/Hour Call Volume Analysis](#)

Offender Tracking

[MDOC Crusaders List](#) [High Impact People](#)
[Felony Warrants](#)
[Offender Tracking](#)

[MDOC Notification Feed](#)

Crime Mapping

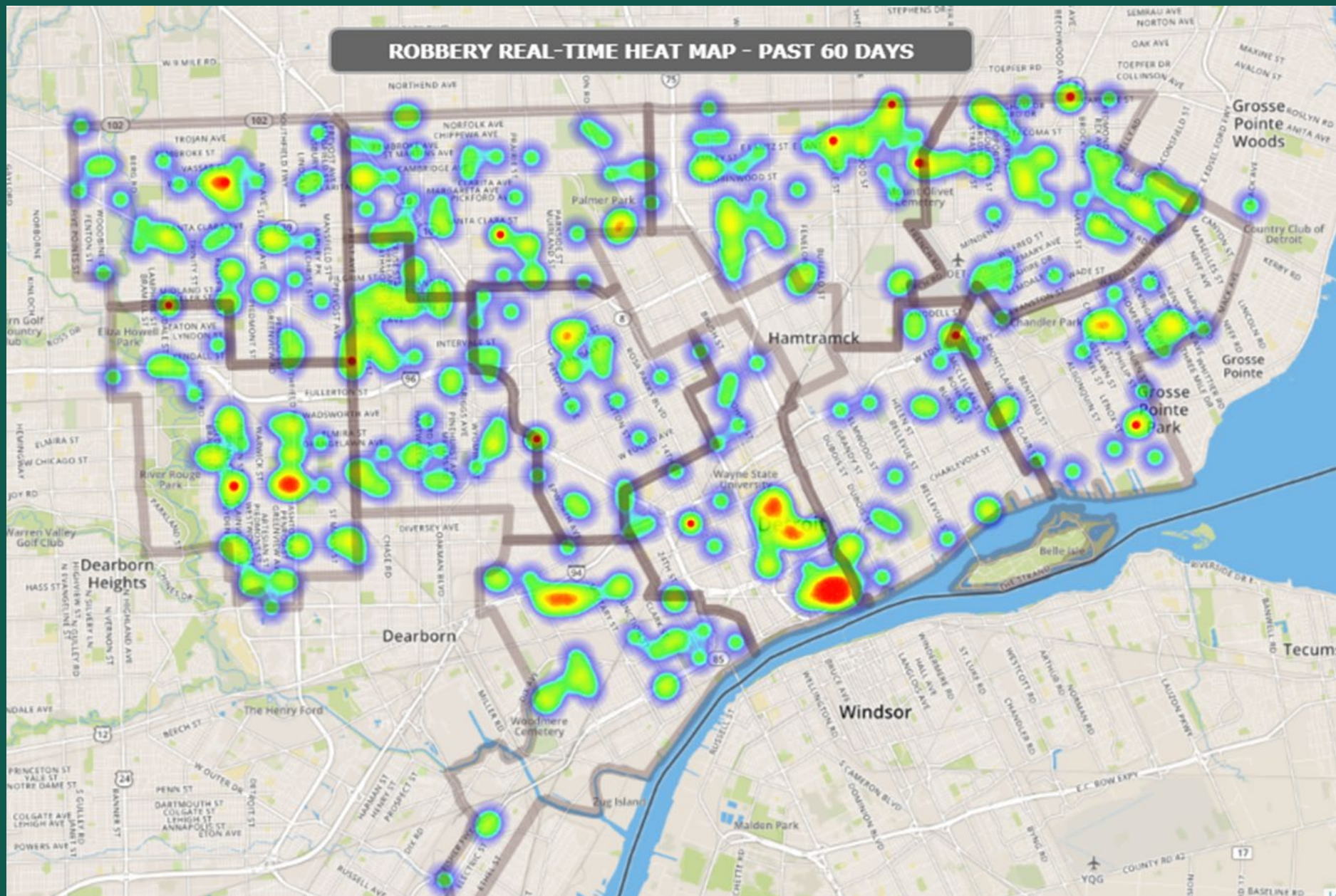
[Real-Time Crime Heat Mapping](#)

[Google Earth Map Layers](#)

Quick Maps

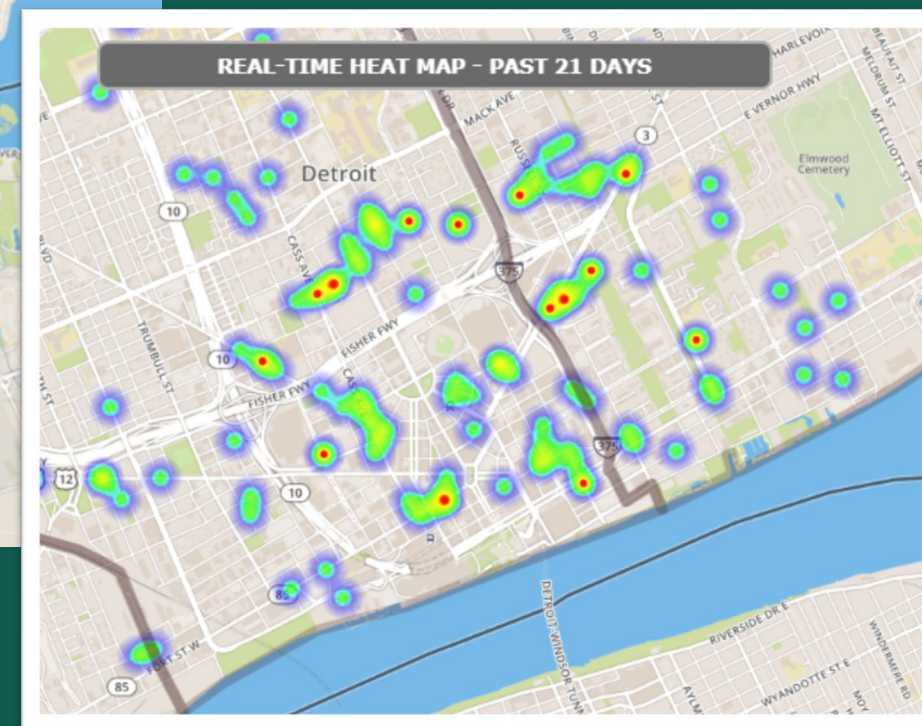
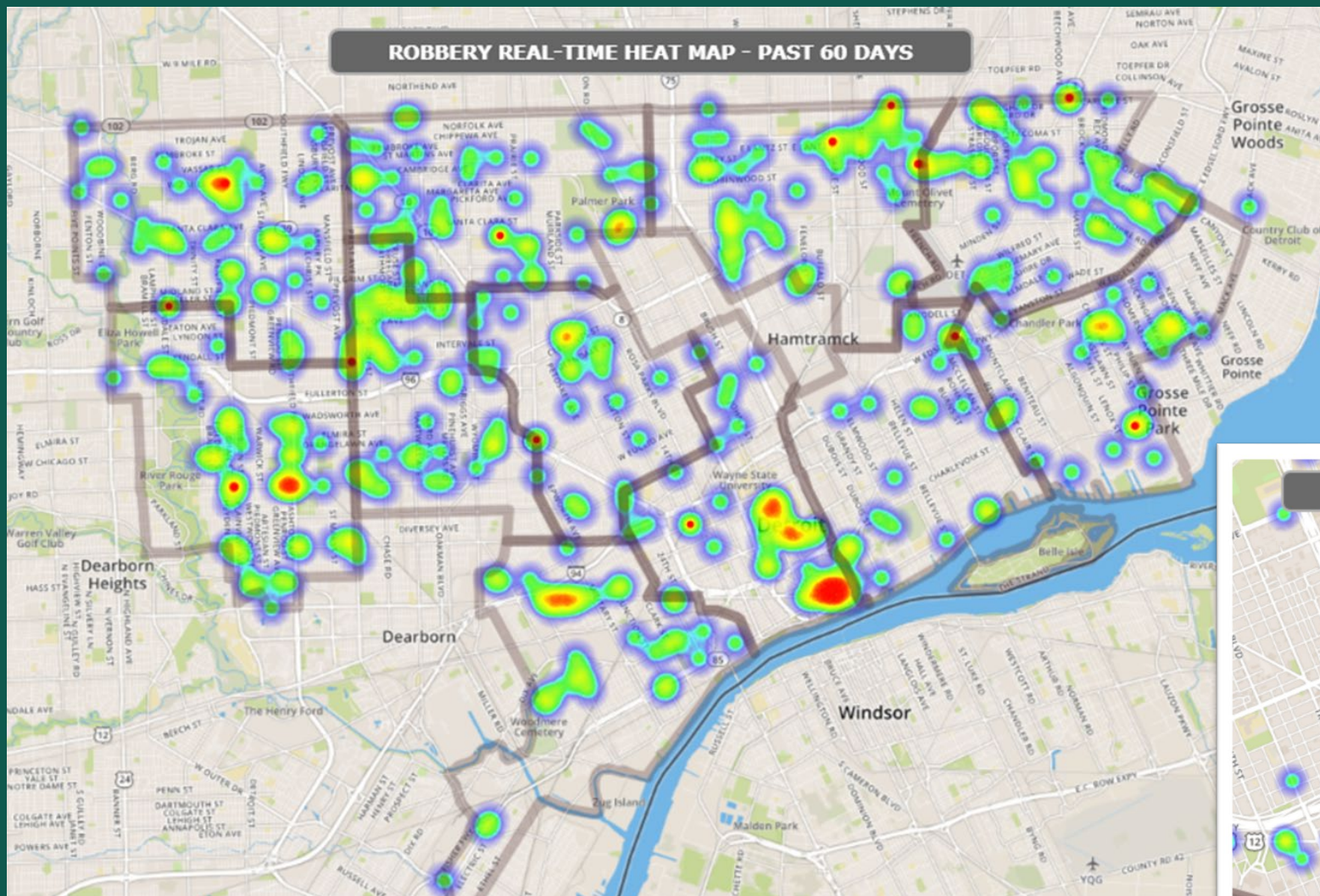
[Robbery - Past 14 Days](#)
[Aggravated Assault w/ Gun- Past 14 Days](#)
[Aggravated Assault - Past 14 Days](#)
[Burglary - Past 14 Days](#)
[Auto Theft - Past 14 Days](#)
[Vehicle Recoveries - Past 30 Days](#)
[224-DOPE Complaints](#)





SEPTEMBER 19, 2018

STRENGTHENING THE BIG DATA & ANALYTICS ECOSYSTEM @ WSU



Weekly Offense Statistics			
Row	Week-Year	Period End Date	Number of Offenses
1	1 - 2013	01-06-2013	7
2	2 - 2013	01-13-2013	0
3	3 - 2013	01-20-2013	2
4	4 - 2013	01-27-2013	1
5	5 - 2013	02-03-2013	3
6	6 - 2013	02-10-2013	2
7	7 - 2013	02-17-2013	3
8	8 - 2013	02-24-2013	1
9	9 - 2013	03-03-2013	1
10	10 - 2013	03-10-2013	1
11	11 - 2013	03-17-2013	1
12	12 - 2013	03-24-2013	4
13	13 - 2013	03-31-2013	2
14	14 - 2013	04-07-2013	3
15	15 - 2013	04-14-2013	4
16	16 - 2013	04-21-2013	3
17	17 - 2013	04-28-2013	1
18	18 - 2013	05-05-2013	1
19	19 - 2013	05-12-2013	6
20	20 - 2013	05-19-2013	5
21	21 - 2013	05-26-2013	7
22	22 - 2013	06-02-2013	2
23	23 - 2013	06-09-2013	8
24	24 - 2013	06-16-2013	3
25	25 - 2013	06-23-2013	6
26	26 - 2013	06-30-2013	4
27	27 - 2013	07-07-2013	5
28	28 - 2013	07-14-2013	4
29	29 - 2013	07-21-2013	2
30	30 - 2013	07-28-2013	5
31	31 - 2013	08-04-2013	4
32	32 - 2013	08-11-2013	10
33	33 - 2013	08-18-2013	2
34	34 - 2013	08-25-2013	5

Number of Offenses by Week

Larceny-Auto



Offense Categories

[Homicide](#)
[CSC 1 & 3](#)
[Robbery](#)
[Aggravated Assault](#)
[Violent Offenses](#)
[Burglary](#)
[Larceny](#)
[Larceny-Auto](#)
[Auto Theft](#)
[Property Offenses](#)



Two Week COMPSTAT Crime Statistics

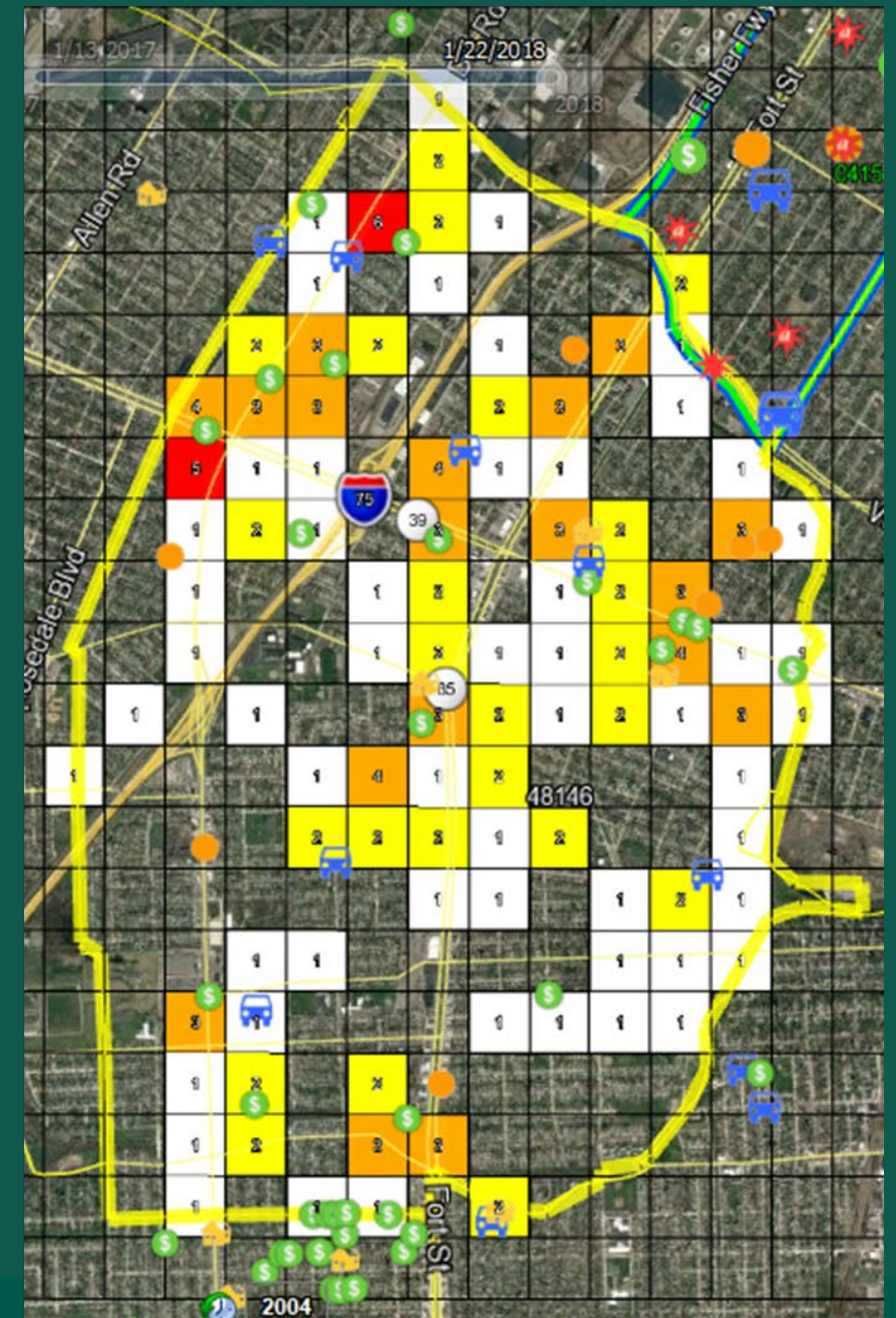
Comparisons thru September 18, 2018

Code	Description	Bi-Weekly Comps				Monthly Comps				YTD Comps		
		This Week 38	Past Period Weeks 36/37	Prev Period Weeks 34/35	Percent Change	This Month Sep	Last Month Aug	Prev Month Jul	Percent Change	This Year 2018	Last Year 2017	Percent Change
11	CSC 1ST DEGREE - ORAL / ANAL	0	0	0	0%	0	0	0	0%	1	0	0%
12	ROBBERY	0	0	0	0%	0	1	0	0%	2	5	-60% ▼
13	AGGRAVATED / FELONIOUS ASSAULT	0	0	1	-100% ▼	0	1	3	-67% ▼	13	6	117% ▲
	VIOLENT OFFENSES	0	0	1	-100% ▼	0	2	3	-33% ▼	16	11	45% ▲
22	BURGLARY	0	0	0	0%	0	0	1	-100% ▼	3	7	-57% ▼
23	LARCENY - OTHER	1	12	12	0%	14	29	43	-33% ▼	211	84	151% ▲
24	MOTOR VEHICLE THEFT	0	3	1	200% ▲	3	3	4	-25% ▼	36	9	300% ▲
	PROPERTY OFFENSES	1	15	13	15% ▲	17	32	48	-33% ▼	250	100	150% ▲
	TOTAL MAJOR OFFENSES	1	15	14	7% ▲	17	34	51	-33% ▼	266	111	140% ▲



Problem-Solving

Research Base Crime Factors



Case: Optimizing Deployment

- “Rule of 60”
- Optimize response time
- Deployment based on workload patterns
- Free up patrols for “proactive” or “hot spots” policing

Tools:

- Minimum Deployment Report
- Response Time Dashboard
- Interactive Proactive Policing Map



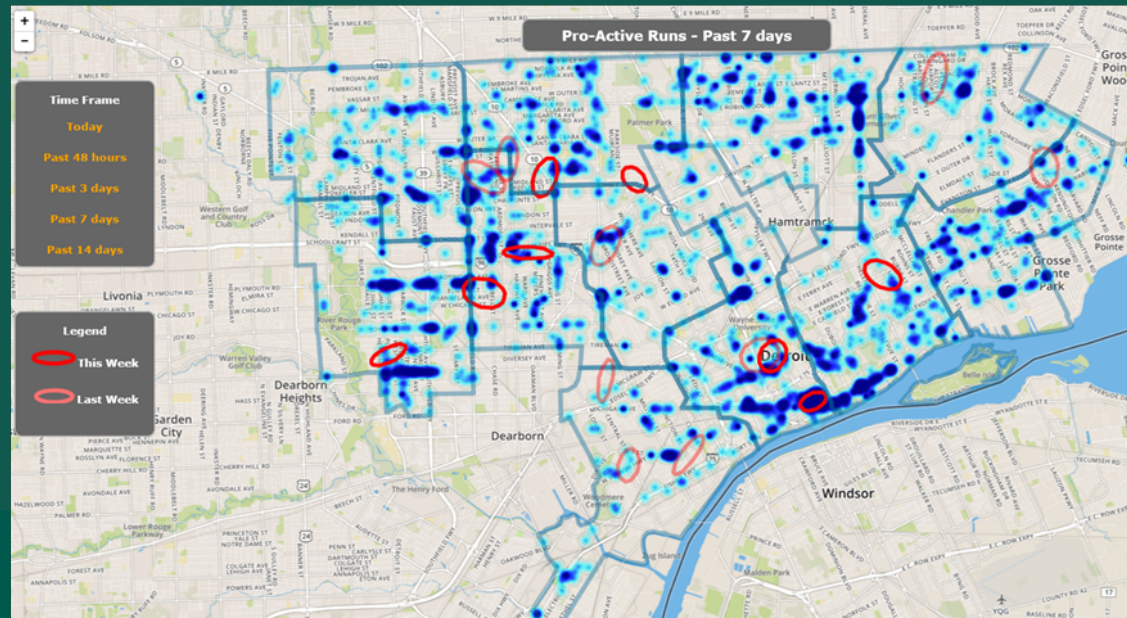
SEPTEMBER 19, 2018

911 Call Volume Analysis (28 days)
2/18/2018 thru 3/18/2018

Total Number of Calls by Day and Hour for Selected Period

Day / Hour	12am	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Total
Monday	550	490	476	324	263	284	304	443	603	620	726	781	782	784	709	879	976	936	930	764	730	723	663	542	15282
Tuesday	506	460	398	347	277	272	287	475	557	653	751	766	783	755	776	852	924	854	823	838	777	713	662	611	15137
Wednesday	522	479	434	375	289	273	340	472	545	614	681	747	803	806	784	853	964	913	795	797	790	755	720	628	15379
Thursday	607	463	473	350	274	262	299	449	545	577	603	721	816	802	764	868	932	916	798	740	827	773	753	658	15270
Friday	575	521	479	395	332	321	365	475	545	671	697	735	744	778	750	802	935	1039	926	839	789	911	741	707	16072
Saturday	673	654	610	534	529	405	318	350	477	673	633	664	689	732	710	680	867	847	904	747	769	818	688	739	15710
Sunday	737	662	588	607	464	349	298	342	452	580	518	588	589	650	682	641	755	738	696	629	616	698	587	587	14053
Total	4170	3729	3458	2932	2428	2166	2211	3006	3724	4388	4609	5002	5206	5307	5175	5575	6363	6243	5882	5354	5298	5391	4814	4472	106903

Total Calls by Day/Shift					Percent Share by Day/Shift					Average Runs per Day/Shift					Number of Patrol Units Needed by Day/Shift				
Day / Shift	12am to 8am	8am to 4pm	4pm to 12am	Total	Day / Shift	12am to 8am	8am to 4pm	4pm to 12am	Total	Day / Shift	12am to 8am	8am to 4pm	4pm to 12am	Total	Day / Shift	12am to 8am	8am to 4pm	4pm to 12am	Total
Monday	3134	5884	6264	15282	Monday	21%	39%	41%	14%	Monday	784	1471	1566	3821	Monday	130.6	245.2	261.0	636.8
Tuesday	3022	5893	6222	15137	Tuesday	20%	39%	41%	14%	Tuesday	756	1473	1556	3784	Tuesday	125.9	245.5	259.3	630.7
Wednesday	3184	5833	6362	15379	Wednesday	21%	38%	41%	14%	Wednesday	796	1458	1591	3845	Wednesday	132.7	243.0	265.1	640.8
Thursday	3177	5696	6397	15270	Thursday	21%	37%	42%	14%	Thursday	794	1424	1599	3818	Thursday	132.4	237.3	266.5	636.3
Friday	3463	5722	6887	16072	Friday	22%	36%	43%	15%	Friday	866	1431	1722	4018	Friday	144.3	238.4	287.0	669.7
Saturday	4073	5258	6379	15710	Saturday	26%	33%	41%	15%	Saturday	1018	1315	1595	3928	Saturday	169.7	219.1	265.8	654.6
Sunday	4047	4700	5306	14053	Sunday	29%	33%	38%	13%	Sunday	1012	1175	1327	3513	Sunday	168.6	195.8	221.1	585.5
Totals	24100	38986	43817	106903	Totals	23%	36%	41%	100%	Totals	6025	9747	10954	26726	Totals	1004.2	1624.4	1825.7	4454.3



Total Number of Calls by Day and Hour for Selected Period

Day / Hour	12am	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Total
Monday	101	119	102	80	64	57	69	86	84	67	115	113	152	111	79	137	153	156	133	128	117	148	154	133	2658
Tuesday	106	130	94	83	63	68	46	63	98	79	127	107	152	114	116	147	150	146	148	154	139	144	114	118	2706
Wednesday	95	96	102	72	77	59	65	85	74	83	119	97	70	97	119	122	143	118	161	126	123	172	117	177	2569
Thursday	118	90	82	51	54	79	70	90	62	66	98	87	130	111	114	117	163	137	153	123	155	165	164	144	2623
Friday	123	69	95	78	102	44	60	77	69	102	100	144	151	110	126	160	173	132	137	195	129	198	161	129	2864
Saturday	139	142	109	117	85	80	61	68	79	76	107	107	109	102	110	157	112	136	151	165	186	168	135	160	2861
Sunday	115	134	134	121	63	74	50	66	56	78	95	110	116	108	93	132	127	119	135	150	147	164	196	140	2723
Total	797	780	718	602	508	461	421	535	522	551	761	765	880	753	757	972	1021	944	1018	1041	996	1159	1041	1001	19004

Total Calls by Day/Shift

Day / Shift	12am to 8am	8am to 4pm	4pm to 12am	Total
Monday	678	858	1122	2658
Tuesday	653	940	1113	2706
Wednesday	651	781	1137	2569
Thursday	634	785	1204	2623
Friday	648	962	1254	2864
Saturday	801	847	1213	2861
Sunday	757	788	1178	2723
Totals	4822	5961	8221	19004

Percent Share by Day/Shift

Day / Shift	12am to 8am	8am to 4pm	4pm to 12am	Total
Monday	26%	32%	42%	14%
Tuesday	24%	35%	41%	14%
Wednesday	25%	30%	44%	14%
Thursday	24%	30%	46%	14%
Friday	23%	34%	44%	15%
Saturday	28%	30%	42%	15%
Sunday	28%	29%	43%	14%
Totals	25%	31%	43%	100%

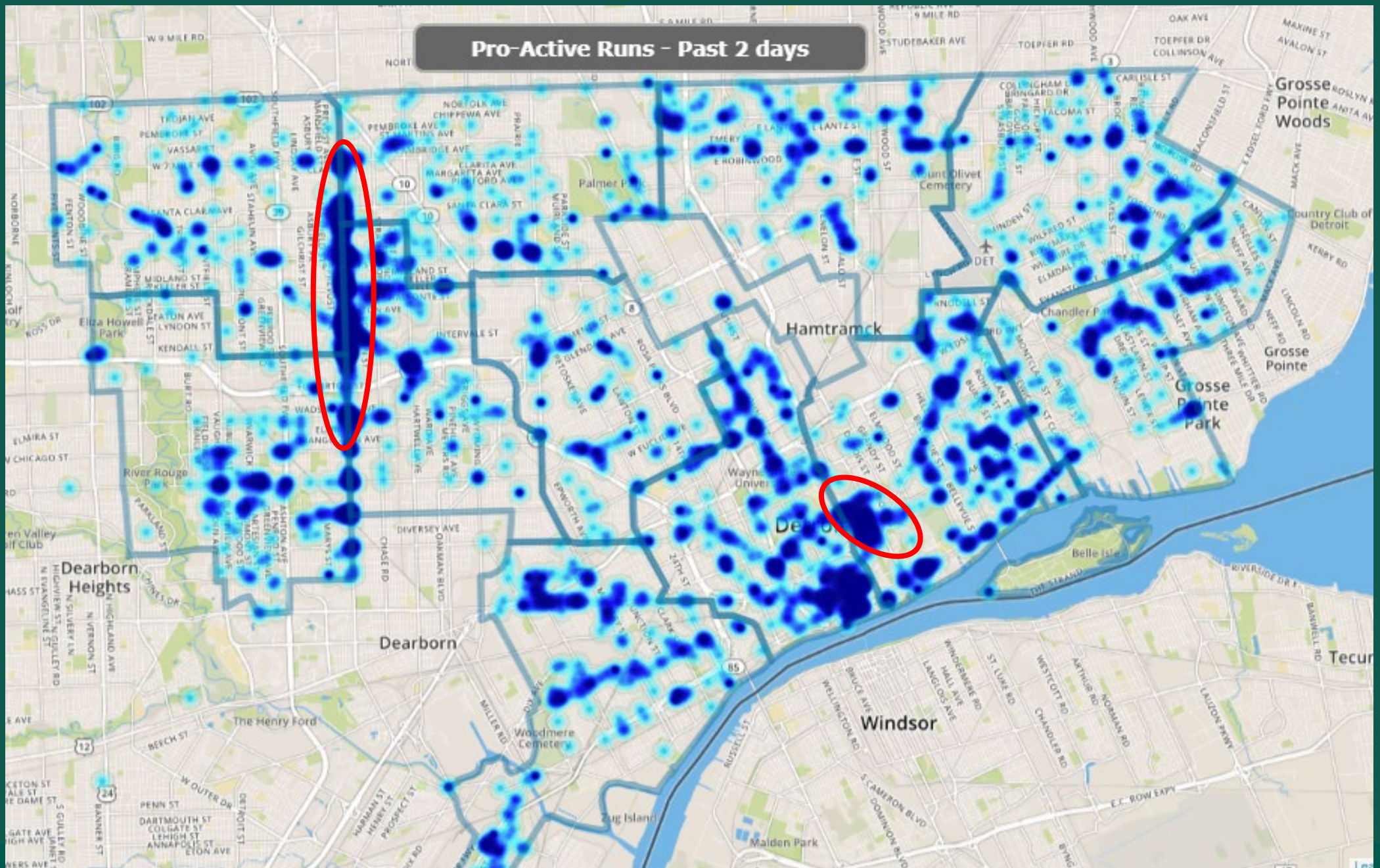
Average Runs per Day/Shift

Day / Shift	12am to 8am	8am to 4pm	4pm to 12am	Total
Monday	170	215	281	665
Tuesday	163	235	278	677
Wednesday	163	195	284	642
Thursday	159	196	301	656
Friday	162	241	314	716
Saturday	200	212	303	715
Sunday	189	197	295	681
Totals	1206	1490	2055	4751

Number of Patrol Units Needed by Day/Shift

Day / Shift	12am to 8am	8am to 4pm	4pm to 12am	Total
Monday	28.3	35.8	46.8	110.8
Tuesday	27.2	39.2	46.4	112.8
Wednesday	27.1	32.5	47.4	107.0
Thursday	26.4	32.7	50.2	109.3
Friday	27.0	40.1	52.3	119.3
Saturday	33.4	35.3	50.5	119.2
Sunday	31.5	32.8	49.1	113.5
Totals	200.9	248.4	342.5	791.8





SEPTEMBER 19, 2018

STRENGTHENING THE BIG DATA & ANALYTICS ECOSYSTEM @ WSU

Impact

- 64% reduction in major crime in Midtown area since 2009
-- compared with 18% national decline.
- Highly significant declines in predatory crimes such as robbery, carjacking and auto thefts.
- Greatly improved response times for police (and EMS)
- Increased focus on “proactive policing” and crime prevention

