



**7th International
Evidence-Based Policing
Conference
Tuesday 8th July 2014**



**Using GPS Tracking to Reduce
Homicides and Shootings in
Trinidad & Tobago:
A Randomized Trial**

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TTPS-Cambridge Collaboration

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Presentation Outline

- ▣ Targeting : evidence-based analysis
- ▣ Testing: research design and experiment
- ▣ Test Results without tracking dosage
- ▣ Two Challenges in Using Results

Targeting:

Where & When is Violent Crime Clustered

in Trinidad and Tobago?



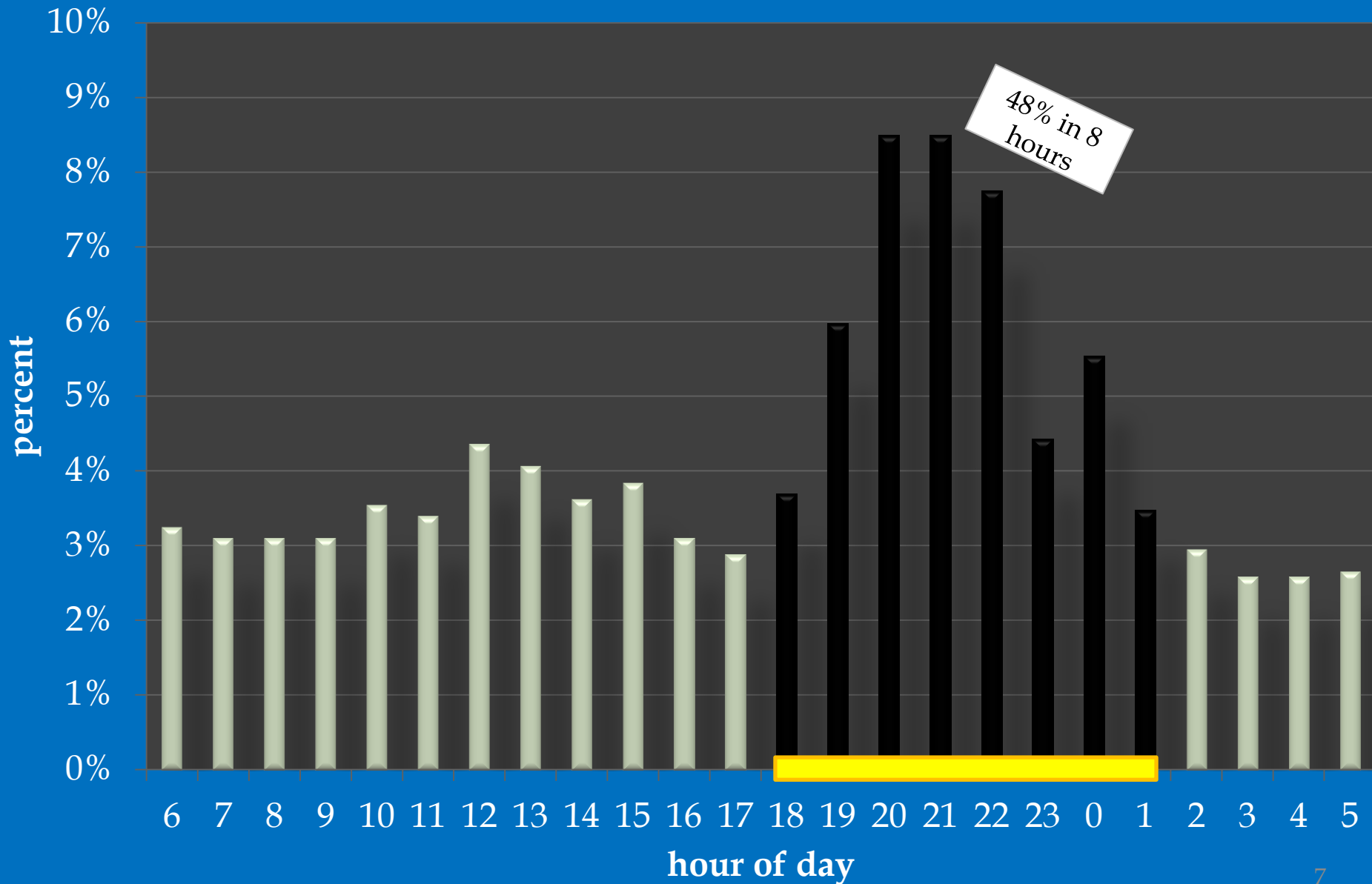
All Crime in 1% of T&T

- ▣ Most violent crimes concentrated in hot spots
- ▣ 81% of Homicides in 4 Divisions
- ▣ Hot times for Homicides 6pm - 2am
- ▣ High rate of Homicides for 15 years
- ▣ Firearms used in 70% of all Homicides
- ▣ TTPS mandated to reduce violent crime by 50% over 3 years (2013-2015)

Spatial and Temporal Concentrations of Homicides in Trinidad & Tobago

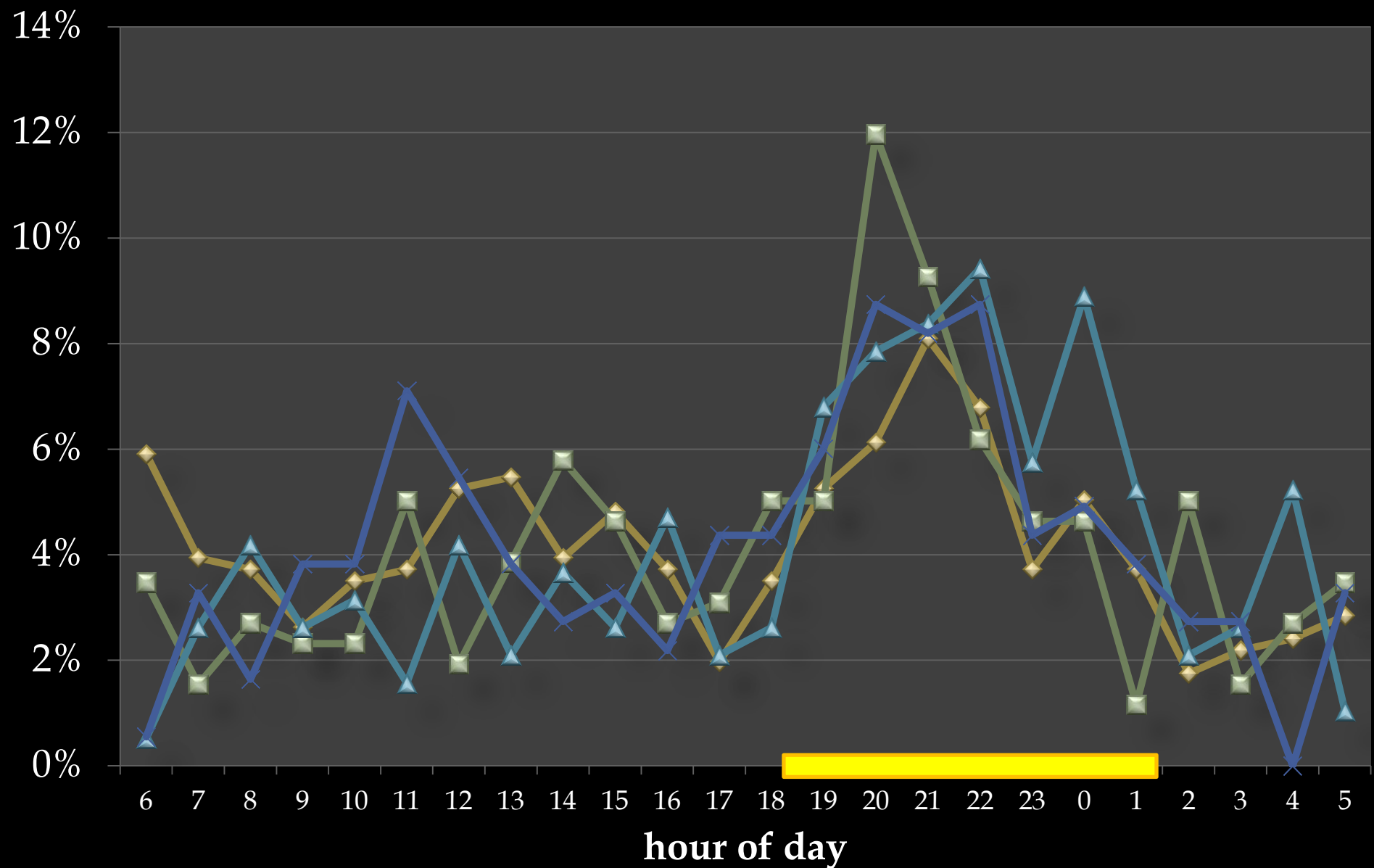
n = 1354

Homicides by Time of Day (n=1354) All Divisions



Top 4 Divisions (81% of all Homicides)

◆ Port of Spain ■ Northern ▲ North Eastern ✕ Western



TESTING: DESIGN FOR TTPS Hotspots Patrol Experiment

HYPOTHESIS:

“More patrol time in hot spots of violent crimes will reduce harm levels from that crime.”

ORGANIZATIONAL FRAMEWORK:

40 Police station districts selected by CoP on recommendation of Cambridge team

UNIT OF ANALYSIS: Police Districts

ELIGIBILITY CRITERIA:

Districts located in Trinidad and ranked in top 40 for total number of violent crimes reported by district from Jan 1st 2012 – July 15th 2013

TTPS Hotspots Patrol Experiment

DESIGN:

Districts ranked in descending order from highest to lowest in pairs based on total number of violent crimes.

RANDOM ASSIGNMENT:

After pairing, one district randomly assigned within each pair.

TIMING: 90 days (Sep – Nov 2013) with June – Aug as baseline for before-after analysis.

BUFFER ZONES:

None – no room.

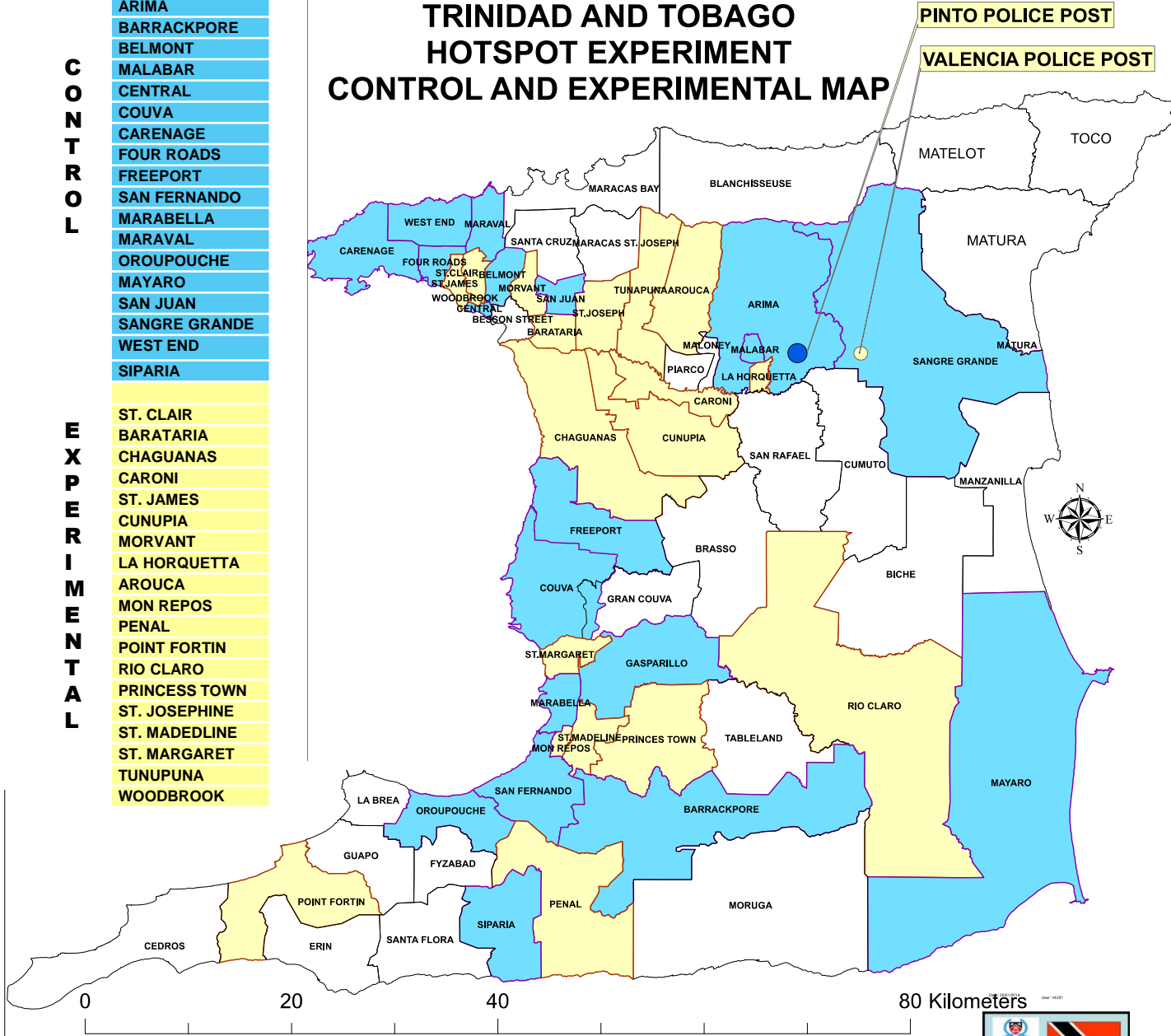
2013 TRINIDAD AND TOBAGO HOTSPOT EXPERIMENT CONTROL AND EXPERIMENTAL MAP

**C
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- GASPARILLO
- ARIMA
- BARRACKPORE
- BELMONT
- MALABAR
- CENTRAL
- COUVA
- CARENAGE
- FOUR ROADS
- FREEPORT
- SAN FERNANDO
- MARABELLA
- MARAVAL
- OROUPOUCHE
- MAYARO
- SAN JUAN
- SANGRE GRANDE
- WEST END
- SIPARIA

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- ST. CLAIR
- BARATARIA
- CHAGUANAS
- CARONI
- ST. JAMES
- CUNUPIA
- MORVANT
- LA HORQUETTA
- AROUCA
- MON REPOS
- PENAL
- POINT FORTIN
- RIO CLARO
- PRINCESS TOWN
- ST. JOSEPHINE
- ST. MADELINE
- ST. MARGARET
- TUNUPUNA
- WOODBROOK



VALENCIA AND PINTO POLICE POST
INCLUDED IN THEIR POLICE STATION DISTRICT



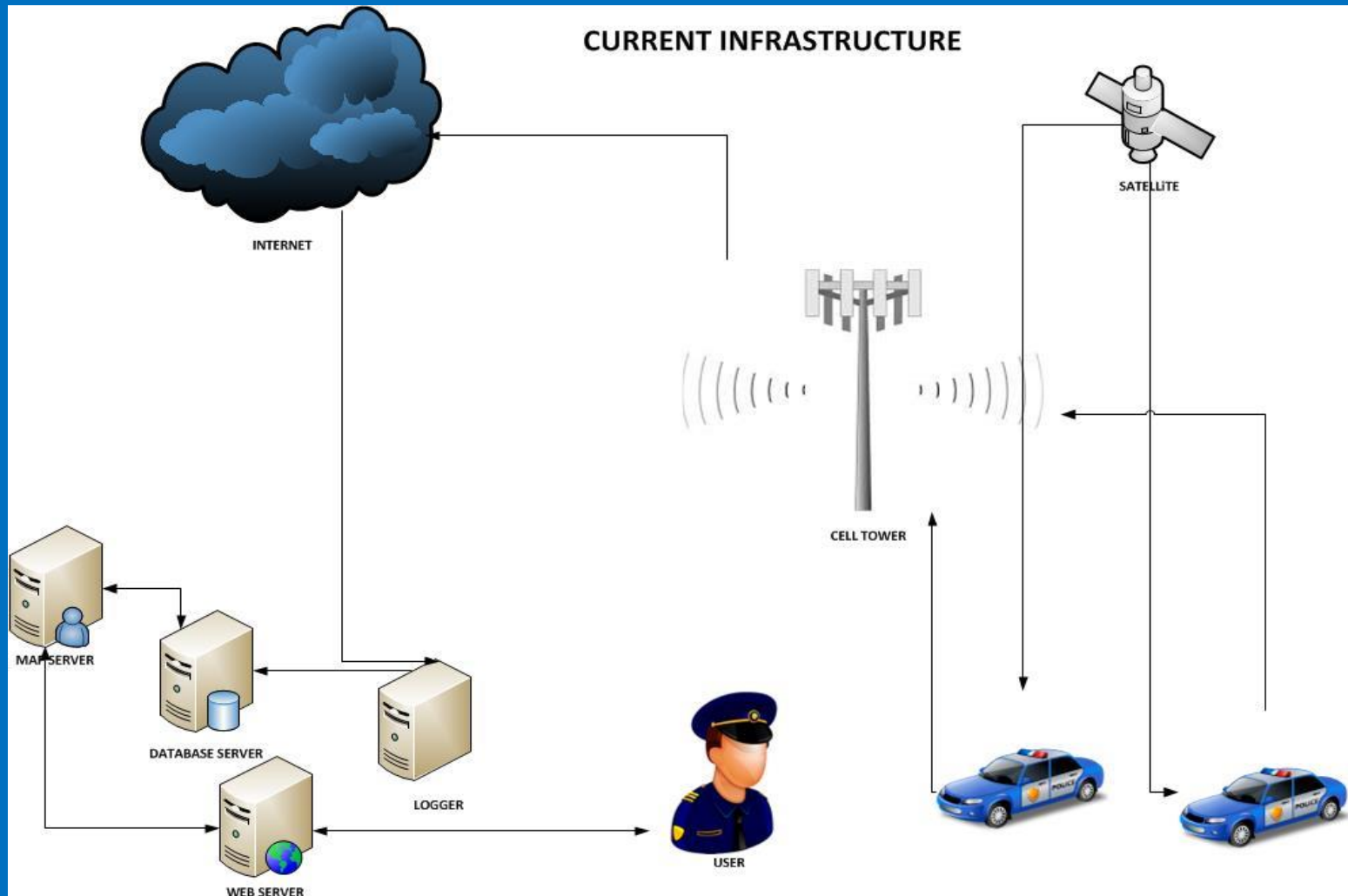
Strategy Tested

- ▣ All three “Triple Ts” of Evidence-Based Policing
 - **Targeting** – Police districts by scaling up from spots to district level
 - **Testing** – through Randomized Controlled Trial (RCT)
 - **Tracking** – with GPS fitted patrol vehicles and feeding back data to patrol officers at CompStat meetings

First District-Level Test

- ▣ Over 30 Experiments Testing Hot Spots Patrols
- ▣ Comparing HOT SPOTS with more or less patrol
- ▣ Not one comparing entire station districts
- ▣ Not one focusing on gun crime
- ▣ Not one with GPS-based CompStats

Current GIS Infrastructure



Crime Hot Spots

Small clusters of high crime addresses



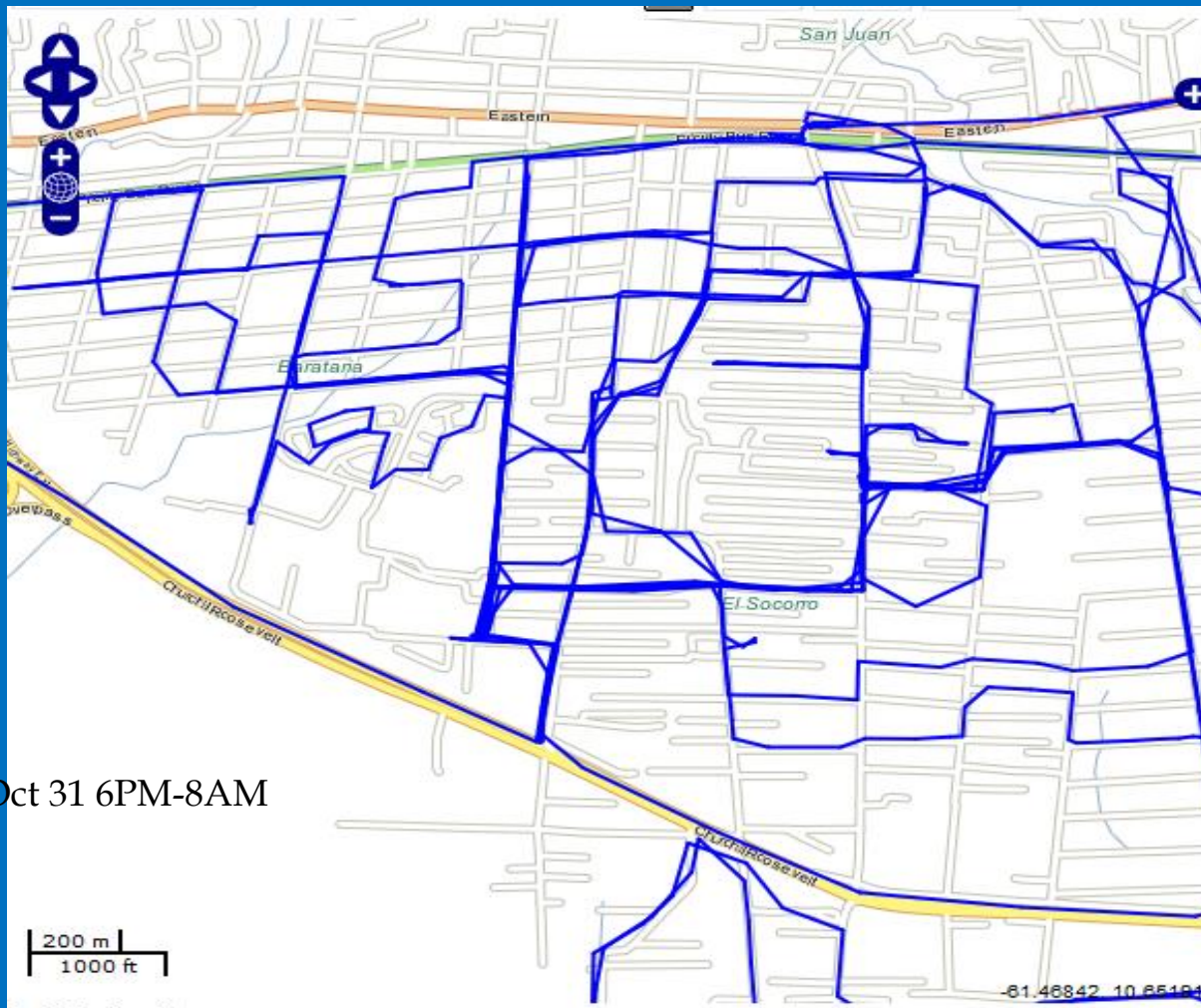
GEOFENCED
Crime Hot Spot Locations

TRACKING WITH GPS

Shift A - Vehicle PDA2265

Barataria - Oct 31, 2013 6pm-8am

Journey map (kind used during experiment)



Oct 31 6PM-8AM

GPS Used as a Management Tool

- ▣ Quantitative data- Raw GPS Data

- ▣ Graphical representation of:
 - Total patrol time by officers
 - Total hotspot patrol
 - Individual hotspot patrol
 - 'Hot time' patrol

GPS Used as a Management Tool

- ▣ Improved crime plotting
- ▣ Historically plotted based on Officer reports, addresses etc.
- ▣ Crime scene attendants issued with handheld GPS units and take coordinates of all serious crimes which are then plotted in GIS



District CompStat

Feedback to
patrol officers at
District level
COMPSTAT

Monitor patrol
levels and set
priorities.



What We Know

- ▣ Bi-weekly COMPSTAT Meetings happened in E Stations about 85% of the time
- ▣ Never in Control Stations
- ▣ All E stations had hot spots maps – no C maps
- ▣ No way for C stations to patrol their own
- ▣ No GPS output to Controls

What We Don't Know

- ▣ How many minutes of hot spots patrols were delivered in E vs. C stations
- ▣ How many arrivals and departures
- ▣ Mean minutes per visit
- ▣ “Koper Curve” after each patrol visit
- ▣ Total patrol minutes in E vs. C stations

But GPS data were used

- ▣ “Hawthorne experiment”
- ▣ Much like a placebo
- ▣ Even though data were problematic,
- ▣ They were used in Compstat discussions
- ▣ Informal feedback that total patrol was up in E

GPS Measurement of patrol time

AROUCA STATION

Shift Commanders

Team A) - Ag Cpl Ramey

Team B) - Cpl Pitt-Lee

Team C) - Ag Cpl Alcala

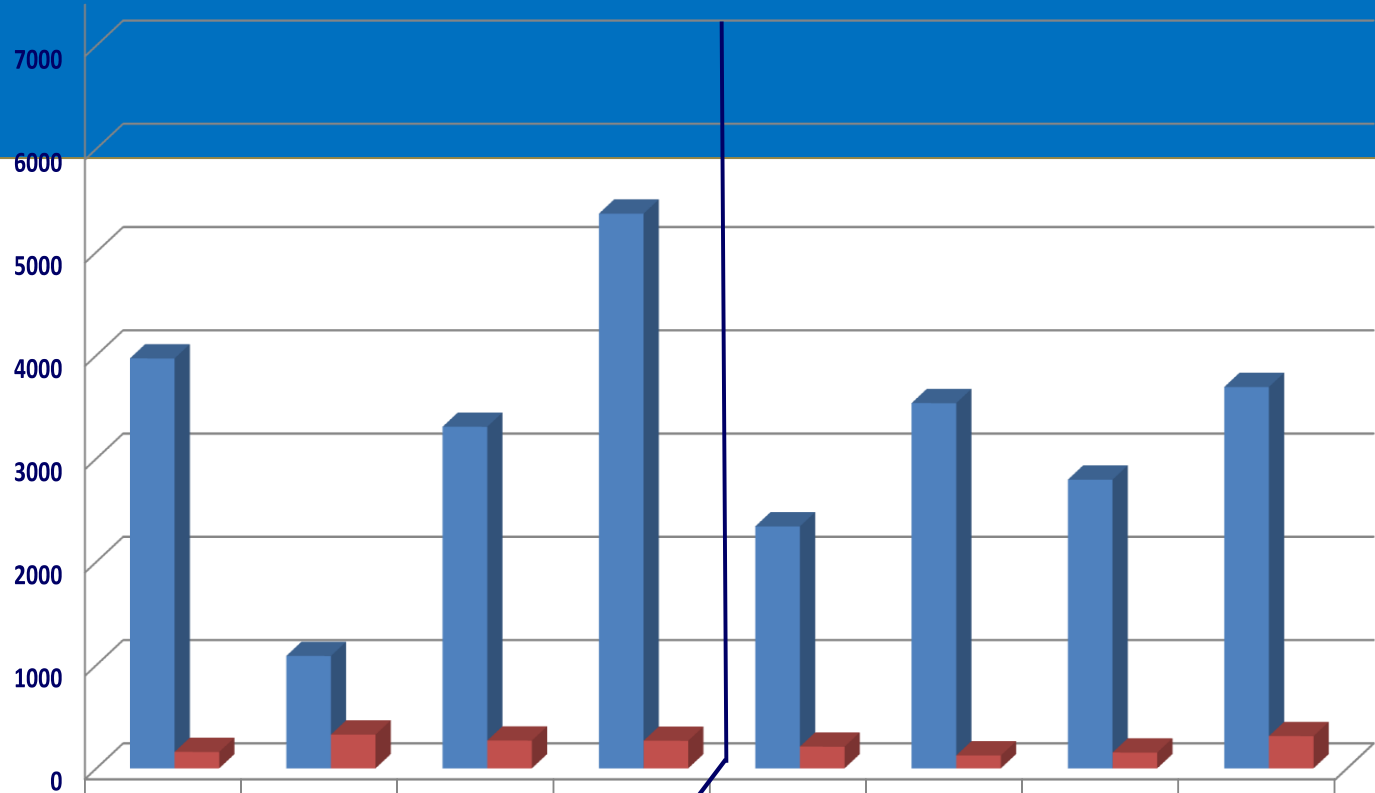
Team D) - Cpl Hutchinson

Station vehicle patrol time in the district and in the hot spots over the past fortnight

Vehicles PCZ9419, PCZ604, PCZ9265

Total patrol & hotspots patrol

Number of Minutes



Total Patrol Time

Total Patrol Time In Hotspots Per Shift (Min.)

3970

1088

3308

5372

2343

3537

2796

3693

159

327

269

267

210

125

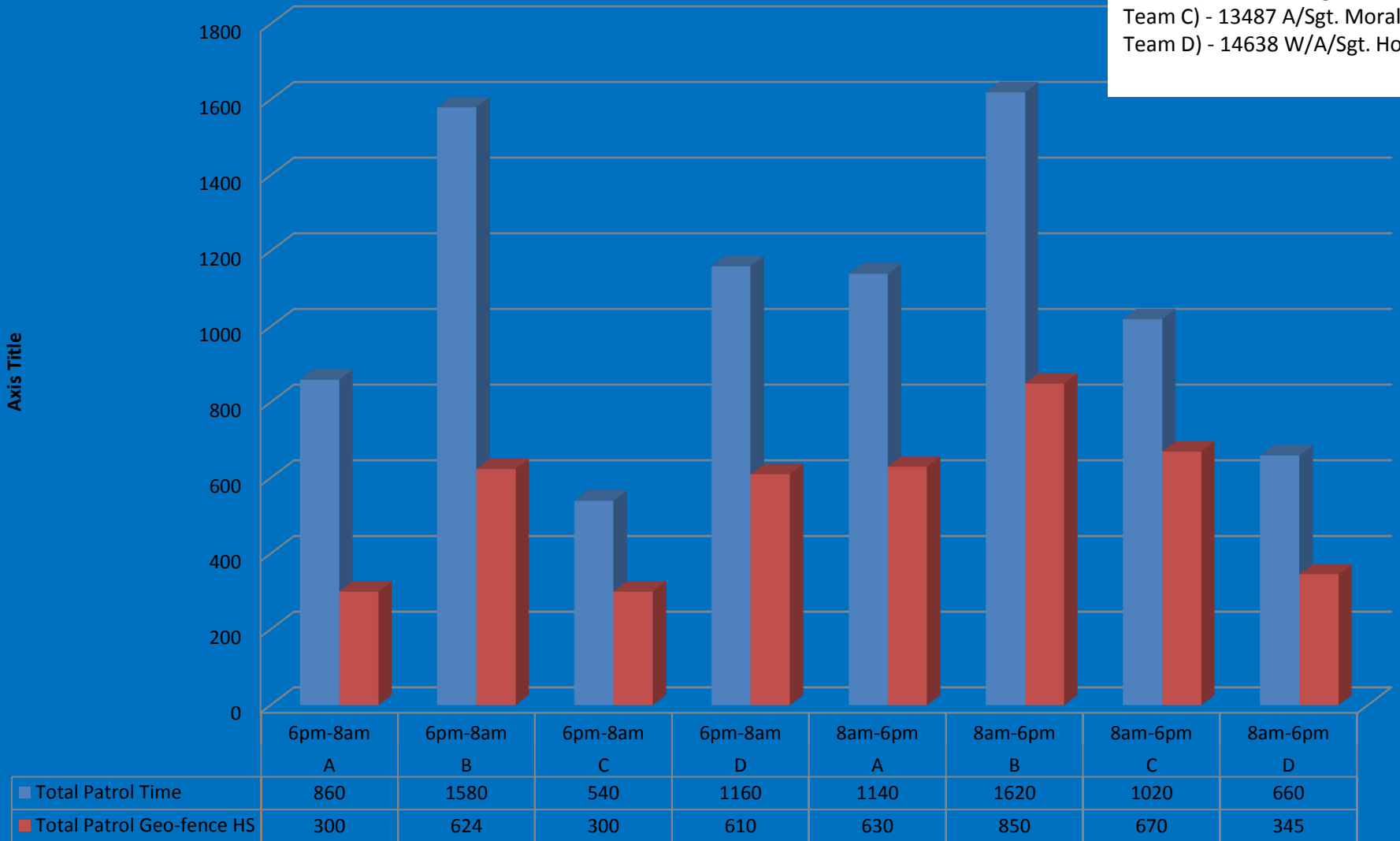
153

312

GPS Measurement of patrol time

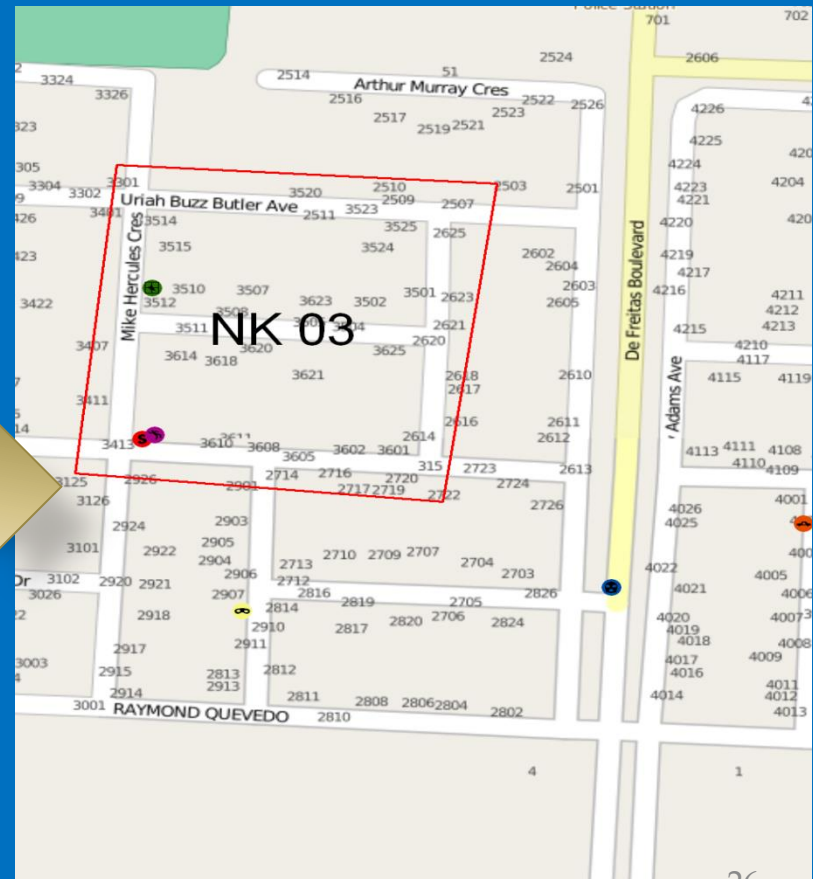
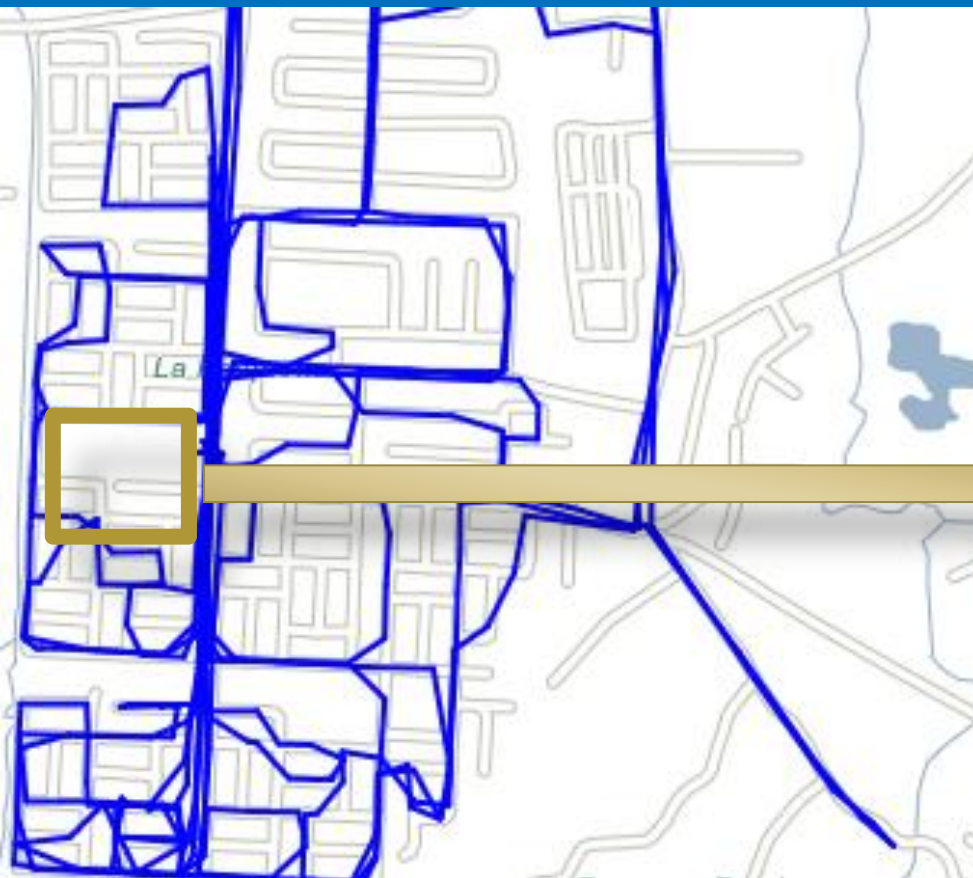
Ratio of Patrols in and out HotSpots in Minutes

Team Commanders
 Team A) - 14614 A/Sgt. Sooklalsi
 Team B) - 12943 A/Sgt. Mason
 Team C) - 13487 A/Sgt. Morali
 Team D) - 14638 W/A/Sgt. Home



GPS Used as a Management Tool

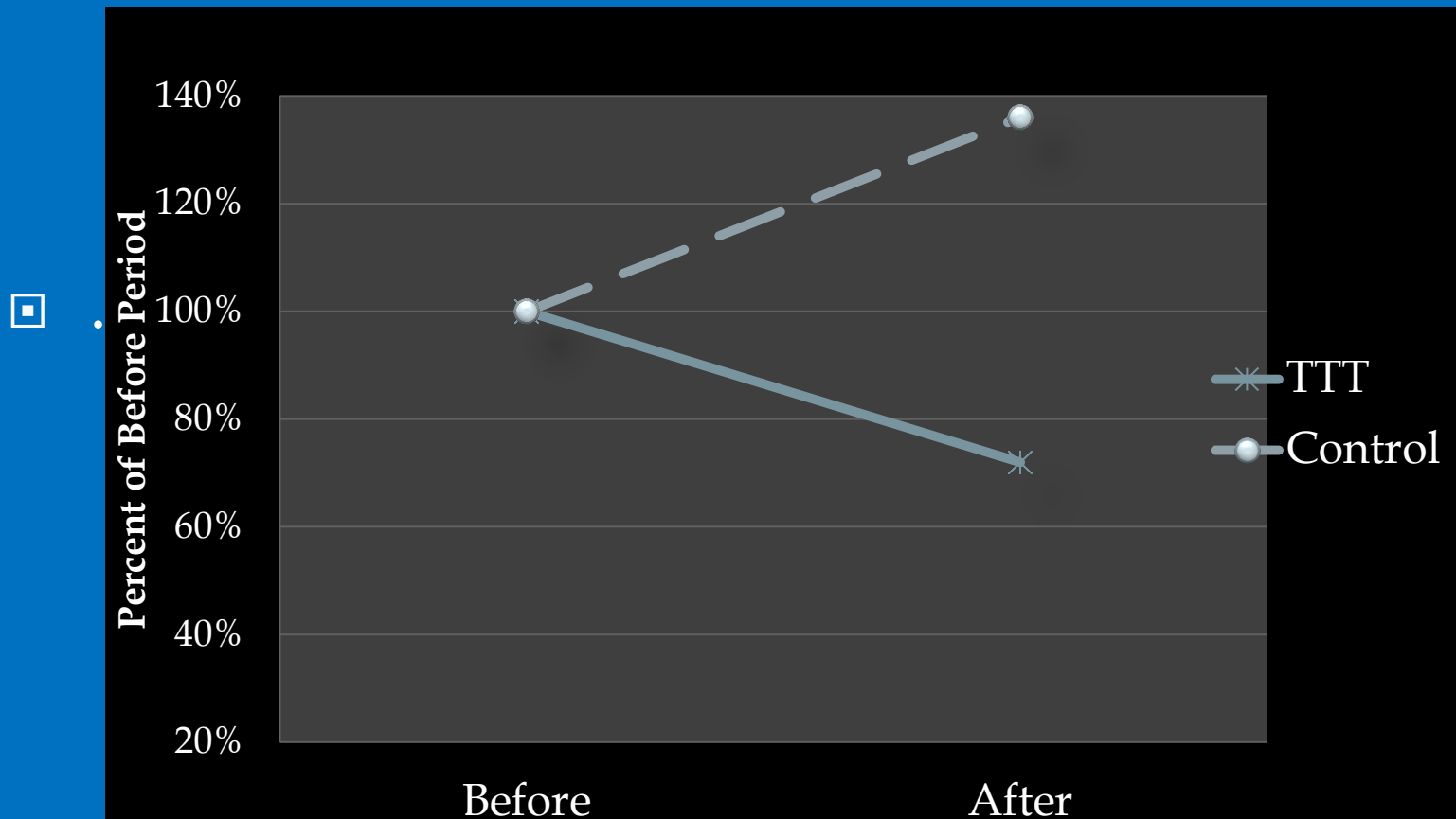
Journey Maps were Compared with Hotspots Maps at COMPSTAT



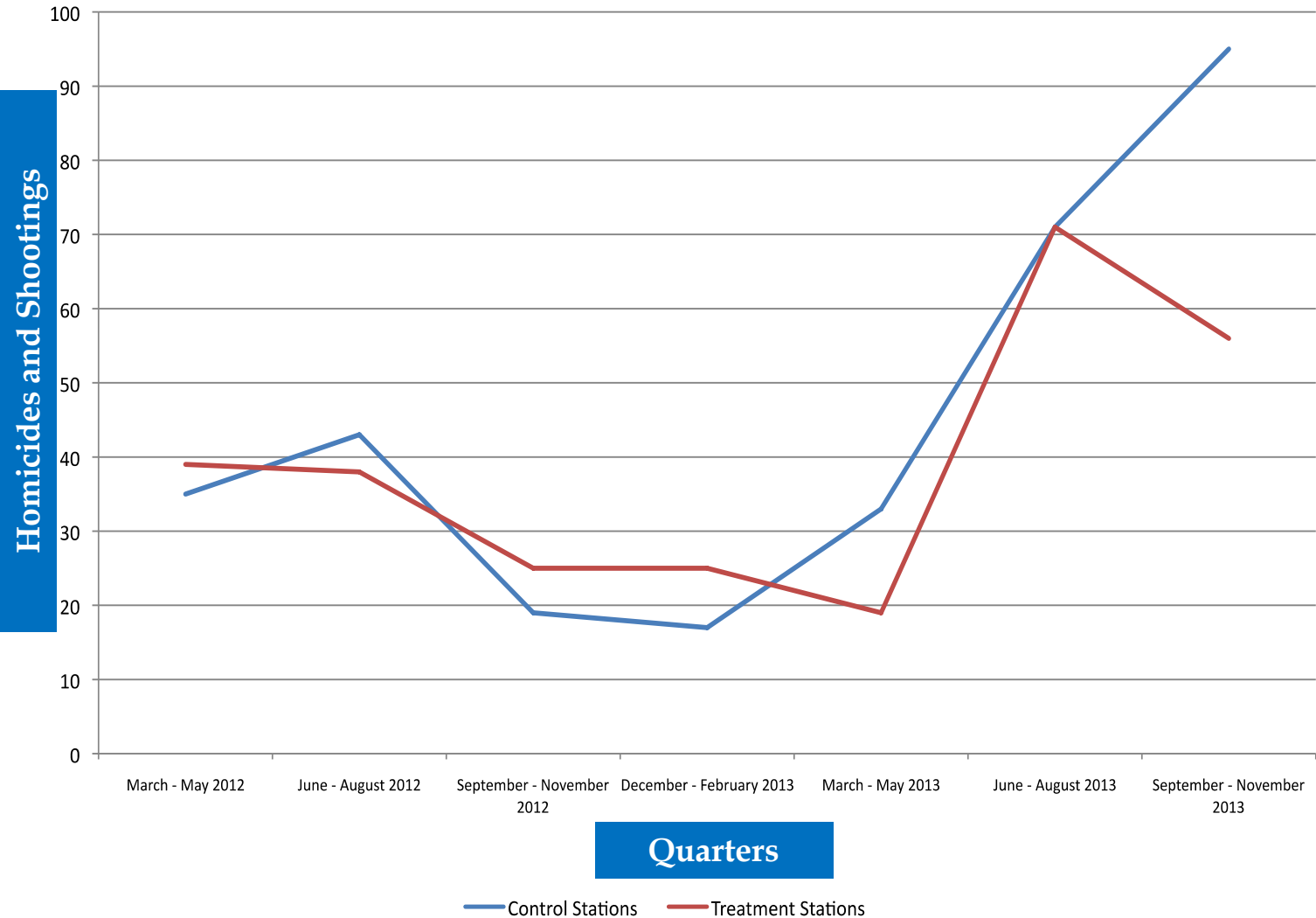
Test Results

Without Tracking Dosage

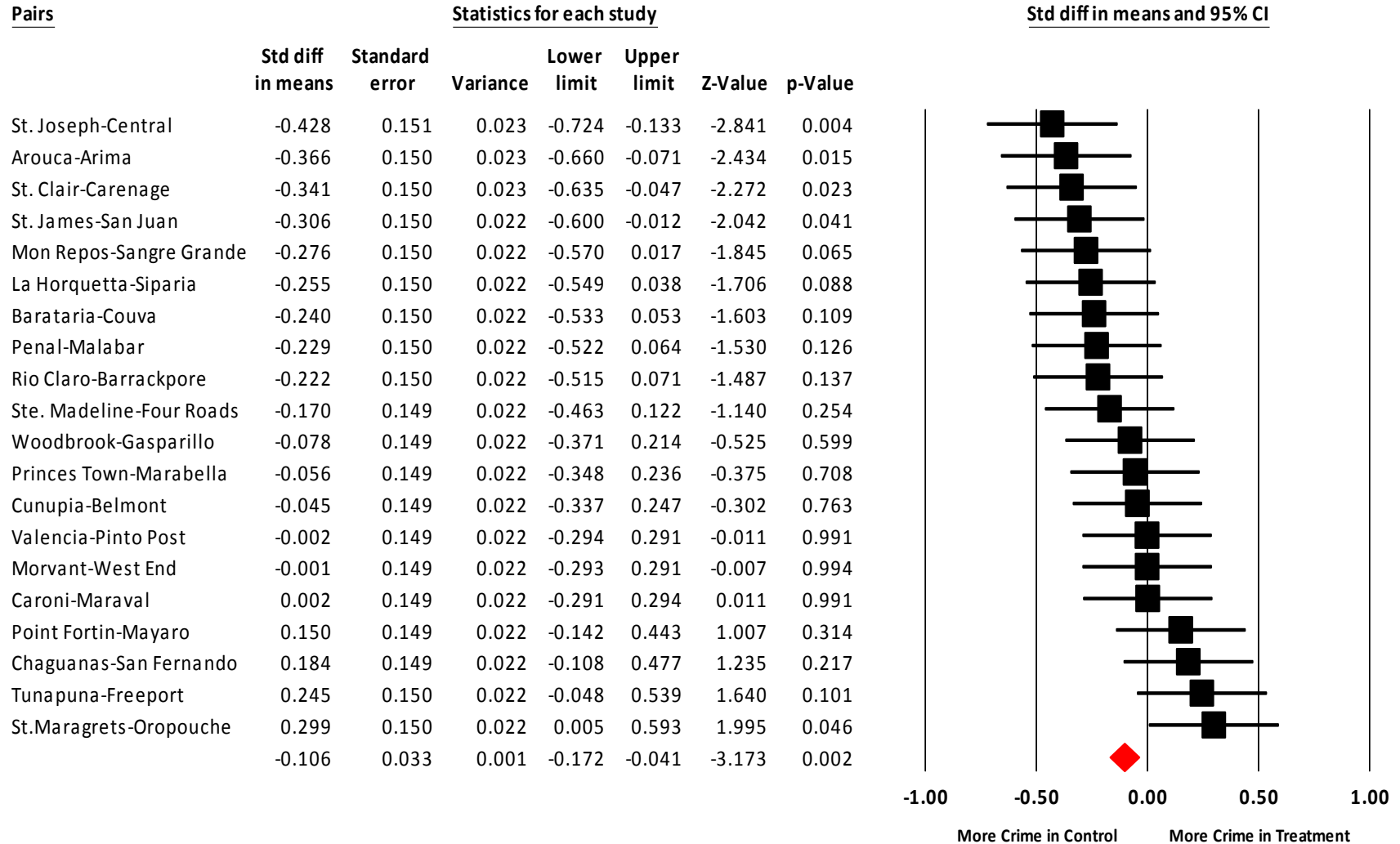
41% reduction in Homicides and Shootings compared with the control group



Reflection on Trend



Difference in Differences Data



Half (10) Had Predicted Benefit

	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
St. Joseph-Central	-0.428	0.151	0.023	-0.724	-0.133	-2.841	0.004
Arouca-Arima	-0.366	0.150	0.023	-0.660	-0.071	-2.434	0.015
St. Clair-Carenage	-0.341	0.150	0.023	-0.635	-0.047	-2.272	0.023
St. James-San Juan	-0.306	0.150	0.022	-0.600	-0.012	-2.042	0.041
Mon Repos-Sangre Grande	-0.276	0.150	0.022	-0.570	0.017	-1.845	0.065
La Horquetta-Siparia	-0.255	0.150	0.022	-0.549	0.038	-1.706	0.088
Barataria-Couva	-0.240	0.150	0.022	-0.533	0.053	-1.603	0.109
Penal-Malabar	-0.229	0.150	0.022	-0.522	0.064	-1.530	0.126
Rio Claro-Barrackpore	-0.222	0.150	0.022	-0.515	0.071	-1.487	0.137
Ste. Madeline-Four Roads	-0.170	0.149	0.022	-0.463	0.122	-1.140	0.254

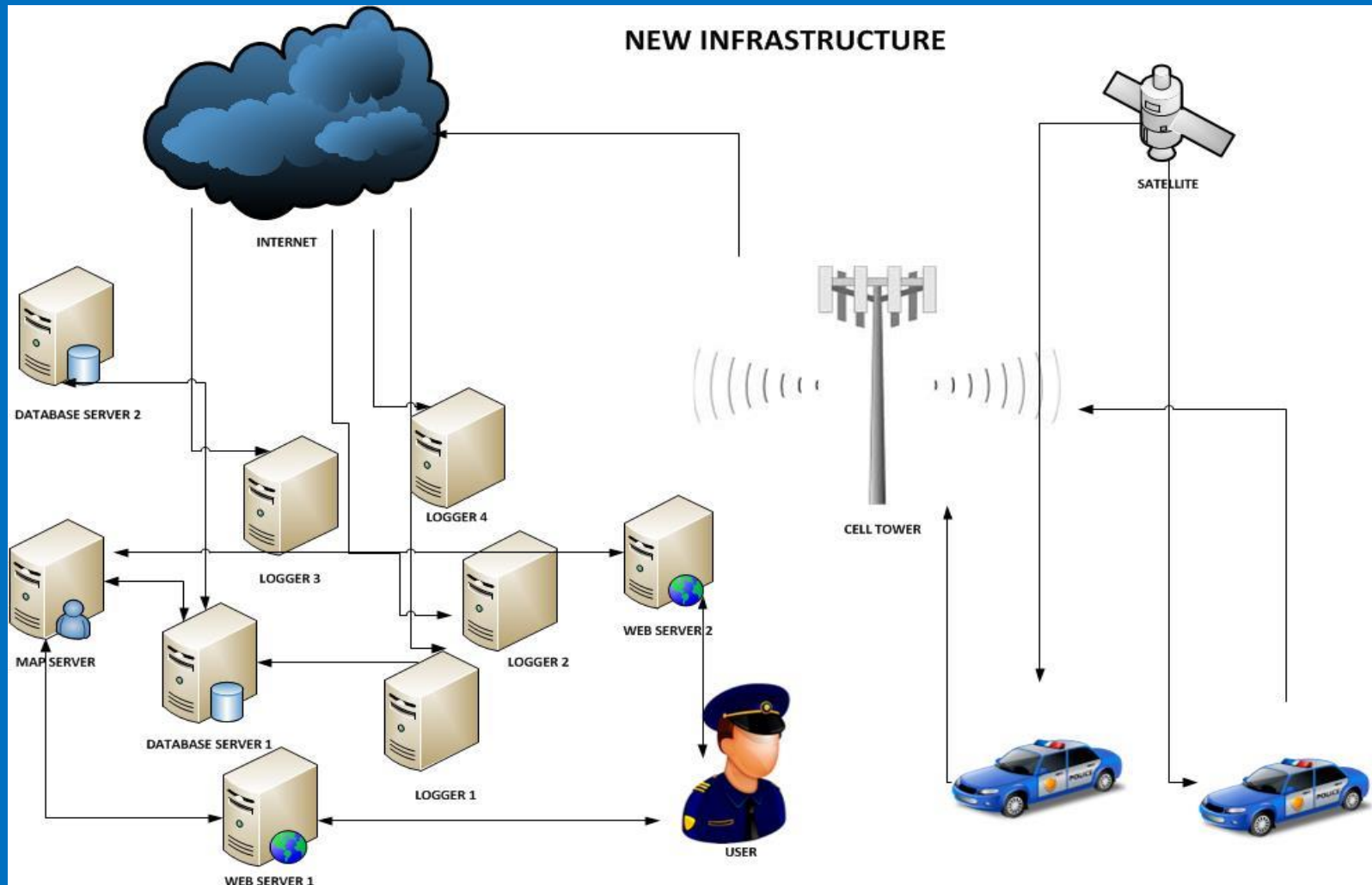
5 Did Worse, Not Better

	Std diff in means	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Caroni-Maraval	0.002	0.149	0.022	-0.291	0.294	0.011	0.991
Point Fortin-Mayaro	0.150	0.149	0.022	-0.142	0.443	1.007	0.314
Chaguanas-San Fernando	0.184	0.149	0.022	-0.108	0.477	1.235	0.217
Tunapuna-Freeport	0.245	0.150	0.022	-0.048	0.539	1.640	0.101
St. Maragrets-Oropouche	0.299	0.150	0.022	0.005	0.593	1.995	0.046

Experiment to Policy

- ▣ Expansion of Hotspots Policing to control stations and further 5 high crime stations.
- ▣ 45 Station districts in total, covering 90% of Trinidad and Tobago's Homicides in 2013.
- ▣ GPS technology a key feature of tracking the efficiency of patrol

New Infrastructure



Two Challenges

1. Getting the GPS data right, legitimate
2. Getting the patrol delivered with concentrations at hot times in hot spots

THANK YOU



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