From: Jeremy Heffner [jheffner@azavea.com]
Sent: Tuesday, January 19, 2016 5:36 PM
To: CASTRO, CLAUDIA
CC: Robert Cheetham; BELLO, FRANK; Mary Johnson
Subject: Re: IMPORTANT DATED MATERIAL Azavea Presentation for Predictive Policing Pilot Demonstration Project

Claudia --

Thank you for coordinating today's meeting. If there are any additional questions that we can answer, just let us know.

Here is a link to download the presentation:
http://s3.azavea.com/temp/deleteafter/2016-06/nypd/2016_01_19_NYPD_PredictivePolicingPresentation.pdf

Jeremy

--
Jeremy Heffner

Azavea | 340 N 12th St, Suite 402, Philadelphia, PA
jheffner@azavea.com | T 215.701.7712 | F 215.925.2663
Web azavea.com | Blog azavea.com/blogs | Twitter @azavea

We'll be moving on March 1, 2016. Please update your records with our new address:
990 Spring Garden Street, 5th Floor, Philadelphia, PA 19123

On Tue, Jan 19, 2016 at 4:49 PM, CASTRO, CLAUDIA <CLAUDIA.CASTRO@nypd.org> wrote:

> Good afternoon Mr. Cheetham,
>
> As we discussed, can you kindly email a copy of the presentation your firm conducted today.
>
> Regards,
>
> Claudia
>
> Claudia Castro, Adm. P.A.
>
> NYPD Contract Administration Unit
>
> 90 Church Street, Suite 1206
>
> New York, NY 10007
>
> Phone# 646-610-4786
>
> Fax #646-610-5224
>
> **From:** Robert Cheetham [mailto:cheetham@azavea.com]
> **Sent:** Tuesday, January 19, 2016 10:30 AM
> **To:** BELLO, FRANK

Cc: Jeremy Heffner; Mary Johnson; CASTRO, CLAUDIA

Subject: Re: IMPORTANT DATED MATERIAL Azavea Presentation for Predictive Policing Pilot Demonstration Project

Confirmed for me. Jeremy is traveling separately and will likely confirm separately.

Regards,

Robert

On Jan 19, 2016 10:26 AM, "BELLO, FRANK" <FRANK.BELLO@nypd.org> wrote:

Just confirming that today's meeting will be held at 1 Police Plaza Room 1202 not.....90 Church Street..please confirm.

From: CASTRO, CLAUDIA
Sent: Tuesday, January 12, 2016 9:16:00 AM
To: Mary Johnson; Robert Cheetham; Jeremy Heffner
Cc: BELLO, FRANK
Subject: RE: IMPORTANT DATED MATERIAL Azavea Presentation for Predictive Policing Pilot Demonstration Project

Good Morning,

Please note the **location** for the Predictive Policing presentation scheduled for January 19th has changed. The presentation will now be held at:

NYPD Police Dept. Headquarters

1 Police Plaza – 12th Floor, Room 1202 (OMAP Conference Room)

New York, New York 10038

Please allow sufficient time for security clearance. Also, ensure all attendees have submitted signed Individual Non-Disclosure Agreements.

Regards,

Claudia

Claudia Castro, Adm. P.A.

NYPD Contract Administration Unit

90 Church Street, Suite 1206

New York, NY 10007

Phone# 646-610-4786

Fax #646-610-5224

From: Mary Johnson [mailto:mjohnson@azavea.com]
Sent: Friday, December 18, 2015 2:41 PM
To: CASTRO, CLAUDIA
Cc: Robert Cheetham; Jeremy Heffner; BELLO, FRANK
Subject: Re: IMPORTANT DATED MATERIAL Azavea Presentation for Predictive Policing Pilot Demonstration Project

Dear Claudia:

Azavea hereby confirms that we are able to participate in the presentation meeting that NYPD has scheduled for January 19, 2016 at 2:00 PM. We understand that set-up time is at 1:45 PM, and that the meeting will not exceed one (1) hour in duration (ending no later than 3:00 PM). Robert Cheetham, Jeremy Heffner, and Tyler Gilcrest from Azavea will attend.

Thank you for the opportunity. If you need any additional information to support the demonstration project, please feel free to contact us. Best wishes to you and your colleagues for safe and joyous holiday season.

Sincerely,

Mary

On Fri, Dec 18, 2015 at 11:52 AM, CASTRO, CLAUDIA <CLAUDIA.CASTRO@nypd.org> wrote:

Good Afternoon,

Please see attached request for an oral presentation by your firm. Response is due on **December 23, 2015.**

Regards,

Claudia

Claudia Castro, Adm. P.A.

NYPD Contract Administration Unit

90 Church Street, Suite 1206

New York, NY 10007

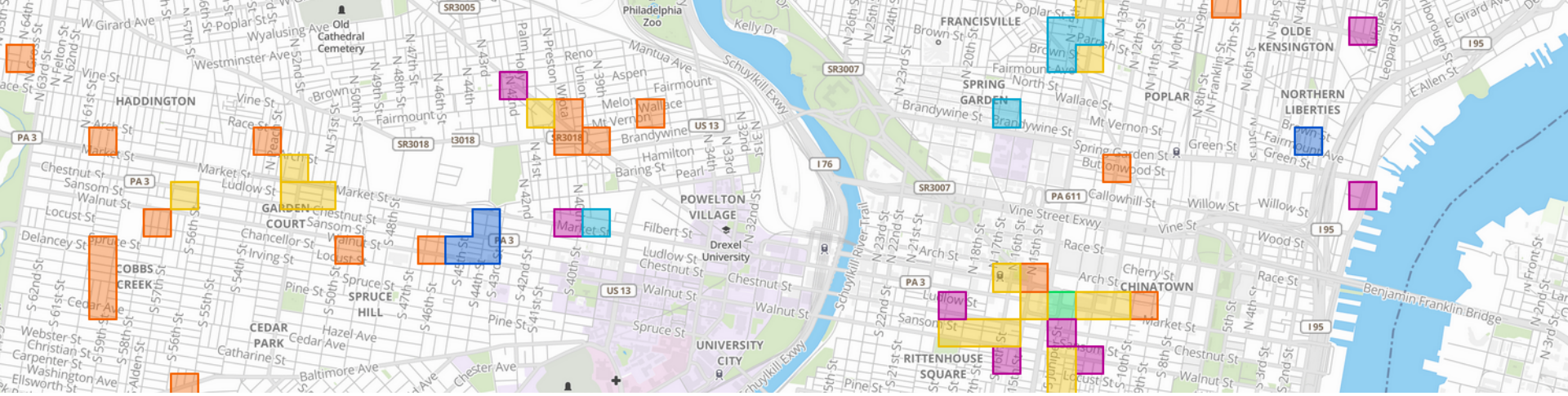
Phone# 646-610-4786

Fax #646-610-5224

--

Mary L. Johnson, Proposal/Bid Development

Azavea | 340 N 12th St, Ste. 402, Philadelphia, PA
mjohnson@azavea.com | T 215.701.7686 | F 215.925.2663
Web azavea.com | Blog azavea.com/blogs | Twitter @azavea



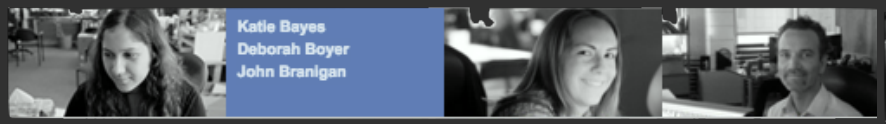
HunchLab

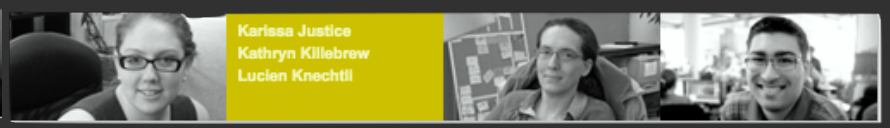
Certified B Corporation
bcorporation.net

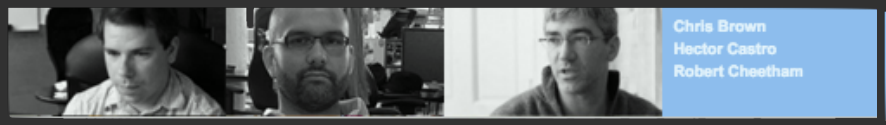
azavea
340 N 12th St, Suite 402
Philadelphia, PA 19107
215.925.2600
info@azavea.com
www.azavea.com

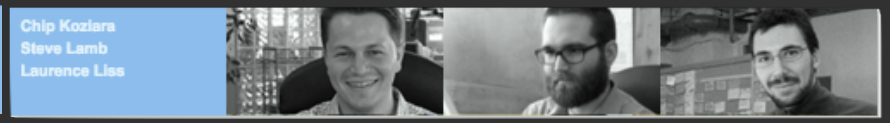
esri Partner Network

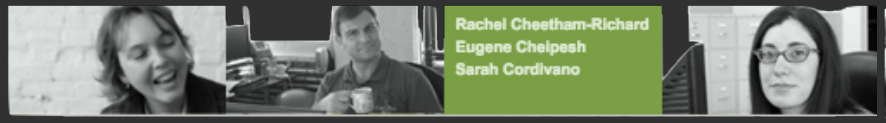
azavea

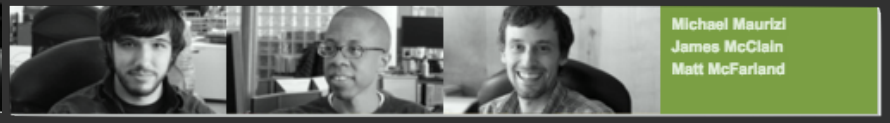

Katie Bayes
Deborah Boyer
John Branigan


Karissa Justice
Kathryn Killebrew
Lucien Knechtli

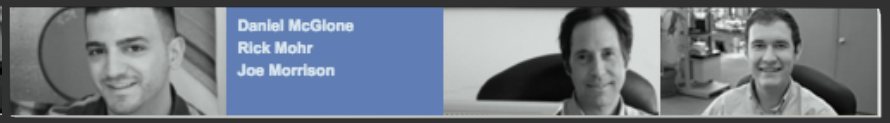

Chris Brown
Hector Castro
Robert Cheetham


Chip Kozlara
Steve Lamb
Laurence Liss

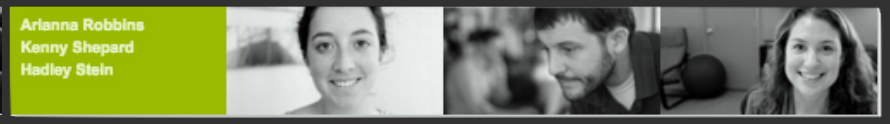

Rachel Cheetham-Richard
Eugene Cheipesh
Sarah Cordivano


Michael Maurizi
James McClain
Matt McFarland

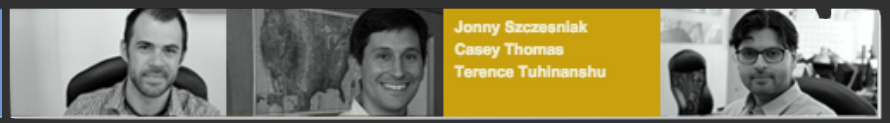

Jonathan Crist
Tyler Dahlberg
Kevin DeLoach


Daniel McGlone
Rick Mohr
Joe Morrison

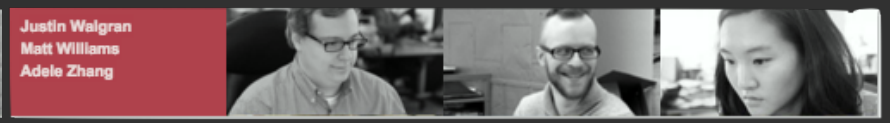

Derek Dohler
Rob Emanuele
Andrew Fink

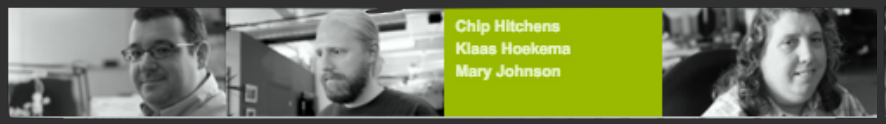

Arianna Robbins
Kenny Shepard
Hadley Stein


Lewis Fishgold
Jeff Franki
Jenny Fung


Jonny Szczesniak
Casey Thomas
Terence Tuhinanshu


Tyler Gilcrest
Sharp Hall
Jeremy Heffner


Justin Walgran
Matt Williams
Adele Zhang


Chip Hitchens
Klaas Hoekema
Mary Johnson


Nathan Zimmerman
Stephanie Zimmerman

47 people
using geodata
to do stuff that matters

B Corporation

- Civic/Social impact
- Donate share of profits

Research-Driven

- 10% Research Program
- Academic Collaborations
- Open Source
- Open Data

azavea

Crime Research

TEMPLE UNIVERSITY

Development of a long term crime forecasting system

RUTGERS Center on Public Security

RTMDx Risk Terrain Modeling Diagnostics

POLICE FOUNDATION

Development of a RCT tool for near repeat interventions

Vision & Demo

Integration

Customization

Modeling

Accuracy

Security

Timeline

New Developments


NEW YORK
POLICE


Harm-focused policing
www.jratcliffe.net
www.cla.temple.edu/cj
@Jerry_Ratcliffe
JERRY RATCLIFFE
Center for Security and Crime Science
Department of Criminal Justice
Temple University

Crime Models

Label	Severity Weight	Patrol Efficacy	Patrol Weight	Relative Weight	
Aggravated Assault	11	25%	2.8	19.6	
Larceny	2	50%	1.0	7.1	
Homicide	14	1%	0.1	1.0	
Robbery	11	25%	2.8	19.6	
Residential Burglary	7	35%	2.4	17.5	
Trespassing	2	75%	1.5	10.7	
Vehicle Accident	2	10%	0.2	1.4	
Simple Assault	3	10%	0.3	2.1	
DWI	5	30%	1.5	10.7	
Gun Crimes	10	25%	2.5	17.9	

Demo

Setup / Integration

Types of Information

Event

Geographic

Temporal

Calculated

Predictive Missions

- Crime predictions based on:
  - Baseline crime levels
    - Similar to traditional hotspot maps
  - Near repeat patterns
    - Event recency (contagion)
  - Risk Terrain Modeling
    - Proximity and density of geographic features
    - Points, Lines, Polygons (bars, bus stops, etc.)
  - Collective Efficacy
    - Socioeconomic indicators (poverty, unemployment, etc.)

Predictive Missions

- Crime predictions based on:
  - Routine Activity Theory
    - Offender: proximity and concentration of known offenders
    - Guardianship: police presence (AVL / GPS) [pending]
    - Targets: measures of exposure (population, parcels, vehicles)
  - Temporal cycles
    - Seasonality, time of month, day of week, time of day
  - Recurring temporal events
    - Holidays, sporting events, etc.
  - Weather
    - Temperature, precipitation

Event

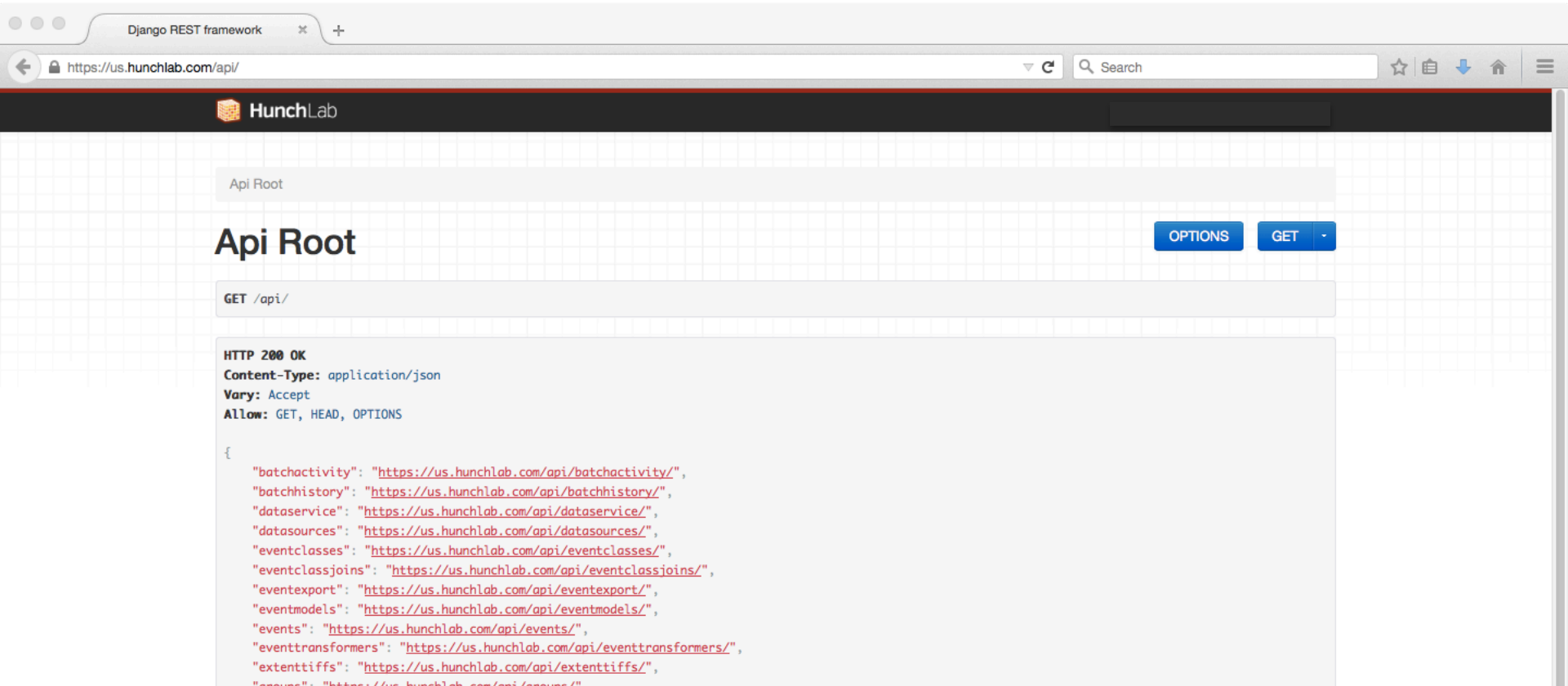
HunchLab was designed to be an open system:

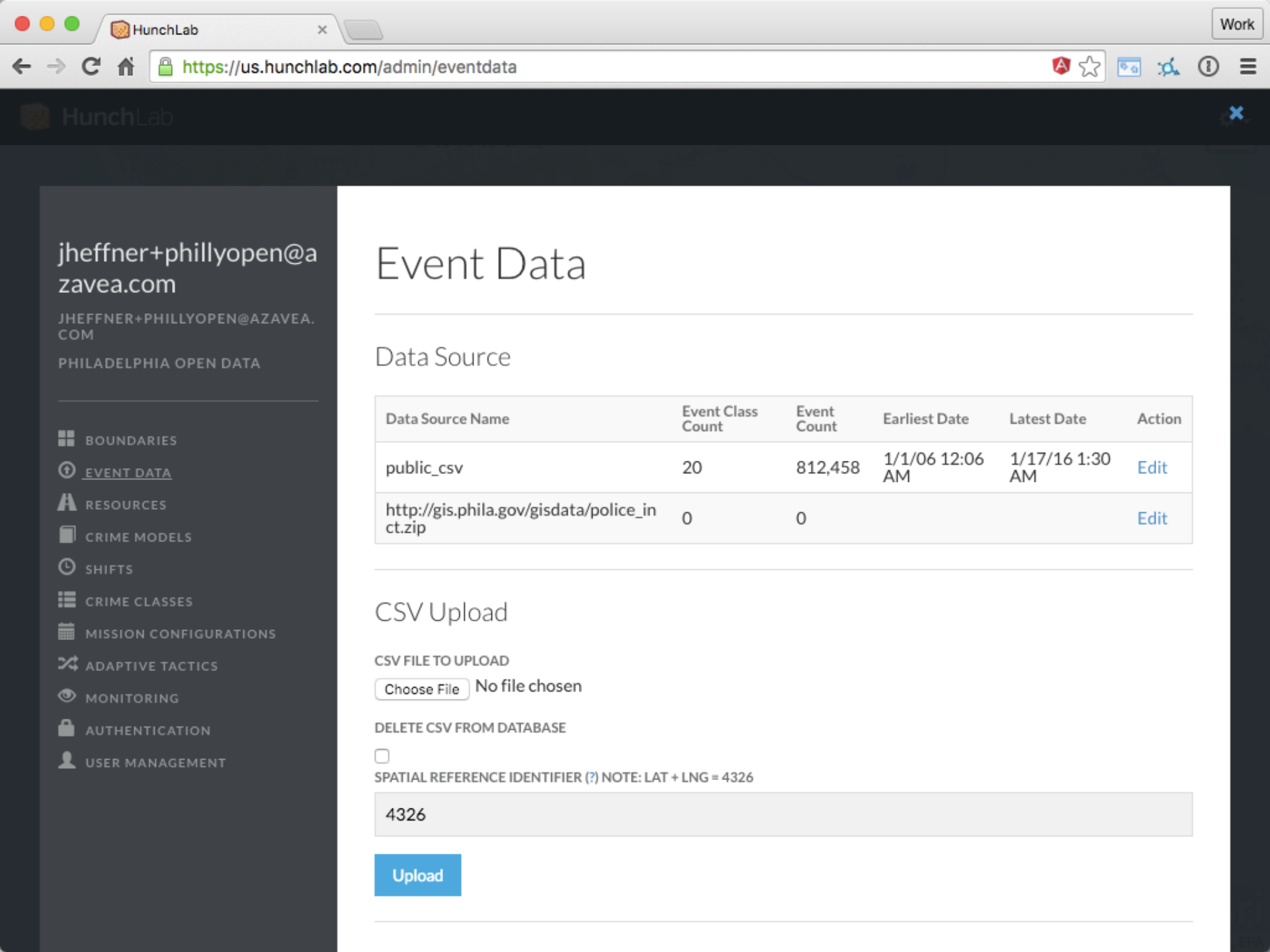
- **Simple CSV for data import (ODBC connection)**
- RESTful API

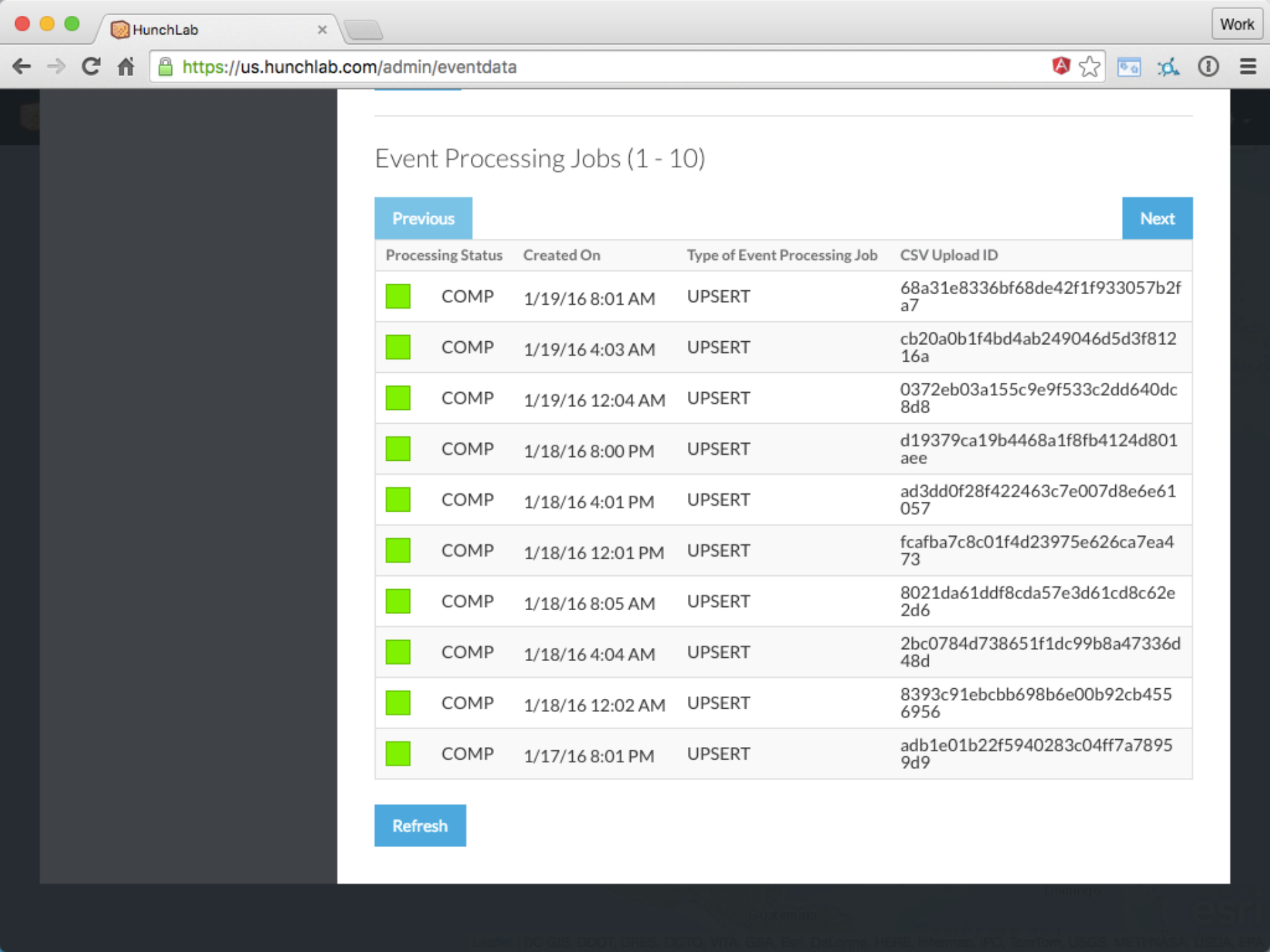
id	datetimefrom	datetimeto	class	pointx	pointy	report_time	address	last_updated	datasource
1	2012-01-01T12:00:00-5:00	2012-01-01T13:00:00Z	residburg	0	0	2012-01-01T14:50:00Z	340 N 12th St, Philadelphia, PA 19107	2012-01-01T23:50:45Z	testcsv
2	2012-01-01T12:00:00Z	2012-01-01T13:00:00Z	residburg	0	0	2012-01-01T14:50:00Z	340 N 12th St, Philadelphia, PA 19107	2012-01-01T23:50:45Z	testcsv

HunchLab was designed to be an open system:

- Simple CSV for data import
- **RESTful API**




HunchLab
Work
https://us.hunchlab.com/admin/eventdata
HunchLab
jheffner+phillyopen@azavea.com
JHEFFNER+PHILLYOPEN@AZAVEA.COM
PHILADELPHIA OPEN DATA
BOUNDARIES
EVENT DATA
RESOURCES
CRIME MODELS
SHIFTS
CRIME CLASSES
MISSION CONFIGURATIONS
ADAPTIVE TACTICS
MONITORING
AUTHENTICATION
USER MANAGEMENT
Event Data
Data Source
Data Source Name
Event Class Count
Event Count
Earliest Date
Latest Date
Action
public_csv
20
812,458
1/1/06 12:06 AM
1/17/16 1:30 AM
Edit
http://gis.phila.gov/gisdata/police_inct.zip
0
0
Edit
CSV Upload
CSV FILE TO UPLOAD
Choose File
No file chosen
DELETE CSV FROM DATABASE
SPATIAL REFERENCE IDENTIFIER (?) NOTE: LAT + LNG = 4326
4326
Upload



Event Processing Jobs (1 - 10)

Previous Next

Processing Status	Created On	Type of Event Processing Job	CSV Upload ID
COMP	1/19/16 8:01 AM	UPSERT	68a31e8336bf68de42f1f933057b2fa7
COMP	1/19/16 4:03 AM	UPSERT	cb20a0b1f4bd4ab249046d5d3f81216a
COMP	1/19/16 12:04 AM	UPSERT	0372eb03a155c9e9f533c2dd640dc8d8
COMP	1/18/16 8:00 PM	UPSERT	d19379ca19b4468a1f8fb4124d801aee
COMP	1/18/16 4:01 PM	UPSERT	ad3dd0f28f422463c7e007d8e6e61057
COMP	1/18/16 12:01 PM	UPSERT	fcafba7c8c01f4d23975e626ca7ea473
COMP	1/18/16 8:05 AM	UPSERT	8021da61ddf8cda57e3d61cd8c62e2d6
COMP	1/18/16 4:04 AM	UPSERT	2bc0784d738651f1dc99b8a47336d48d
COMP	1/18/16 12:02 AM	UPSERT	8393c91ebcbb698b6e00b92cb4556956
COMP	1/17/16 8:01 PM	UPSERT	adb1e01b22f5940283c04ff7a78959d9

Refresh

AzaveaDev 9:46 AM (2 hours ago)

to list-hunchlab2.

Critical issues

- None

Issues

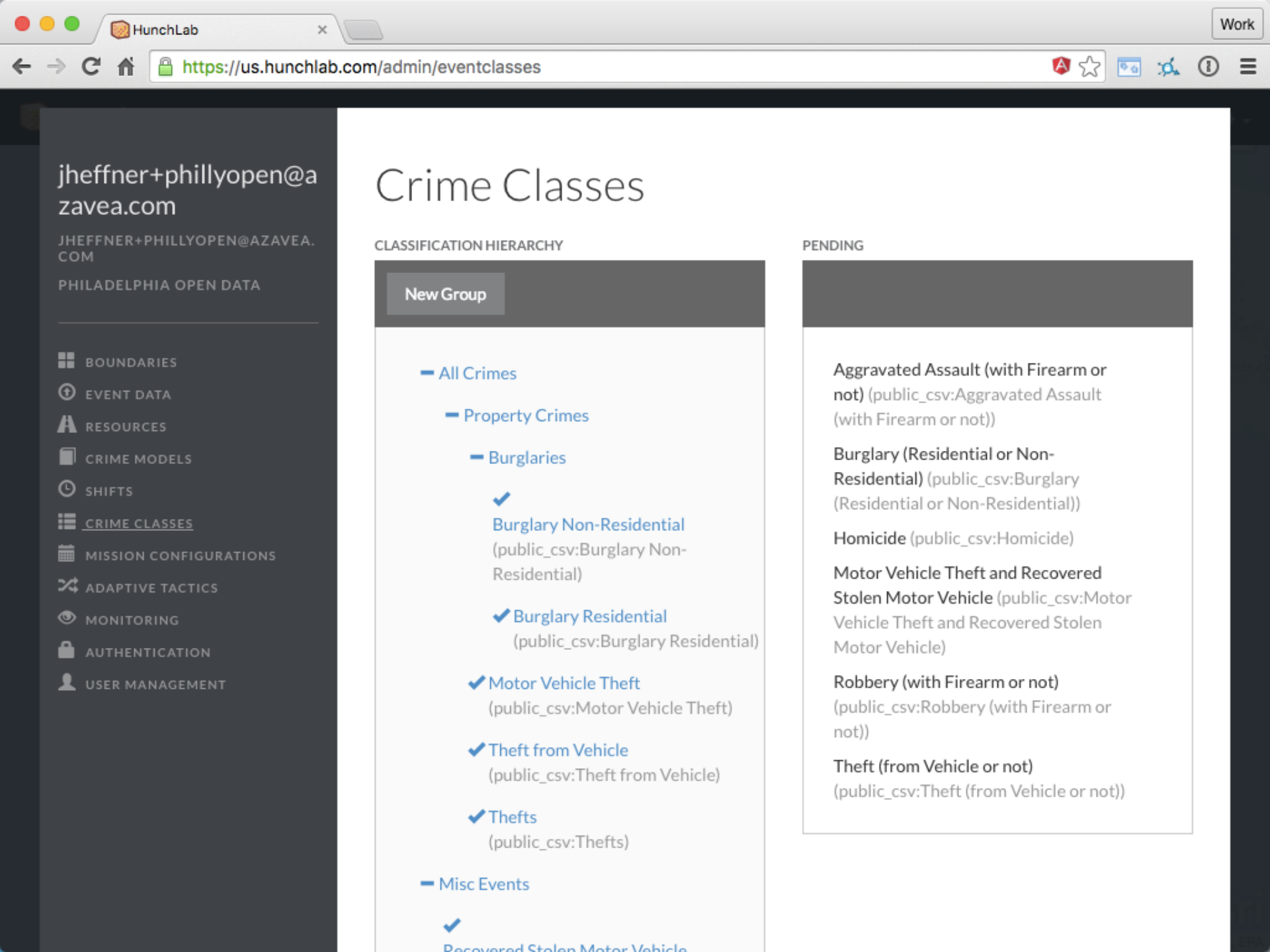
STAGING

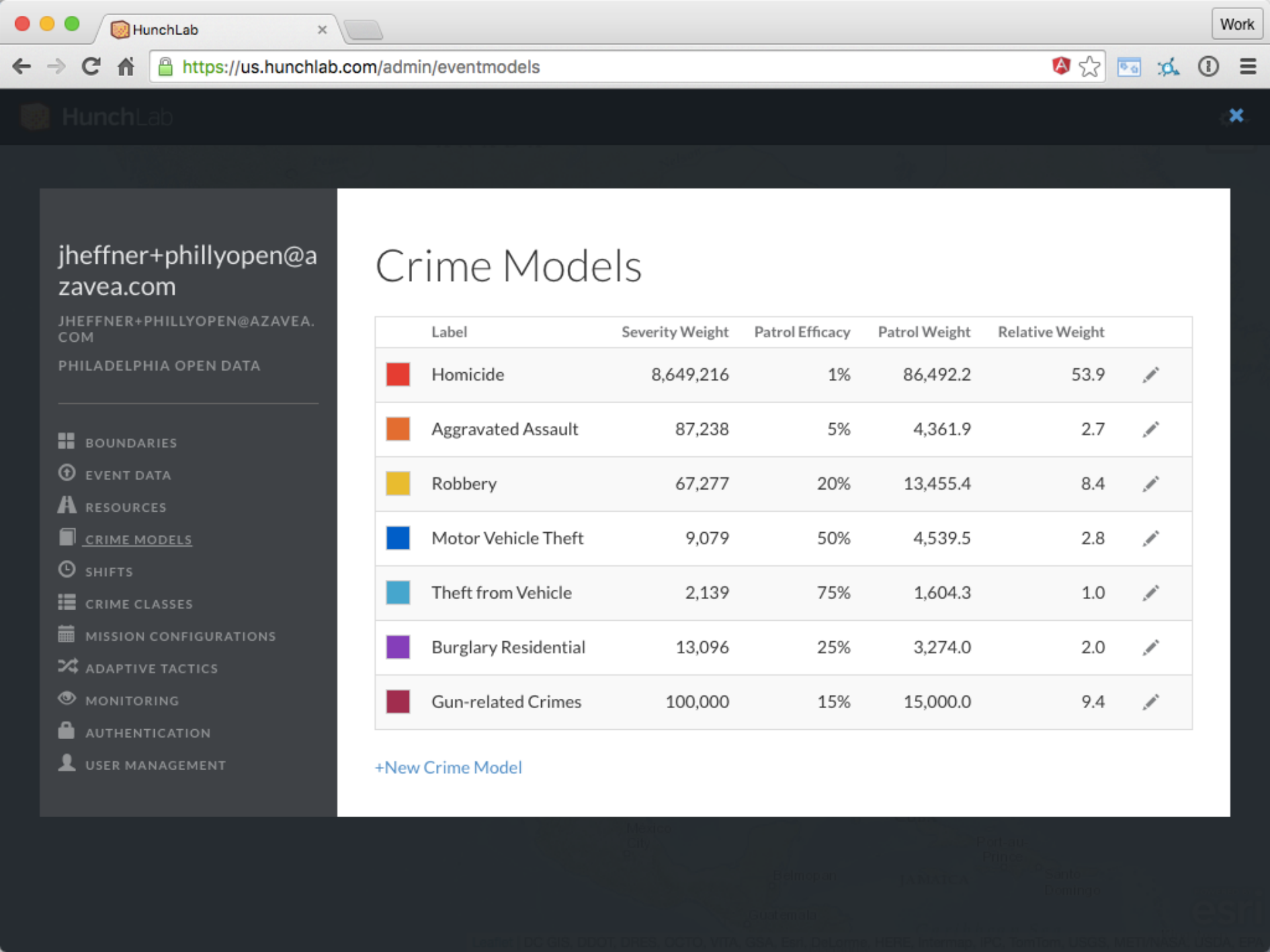
- Philly Open Data
  - Last import occured over 72 hours ago

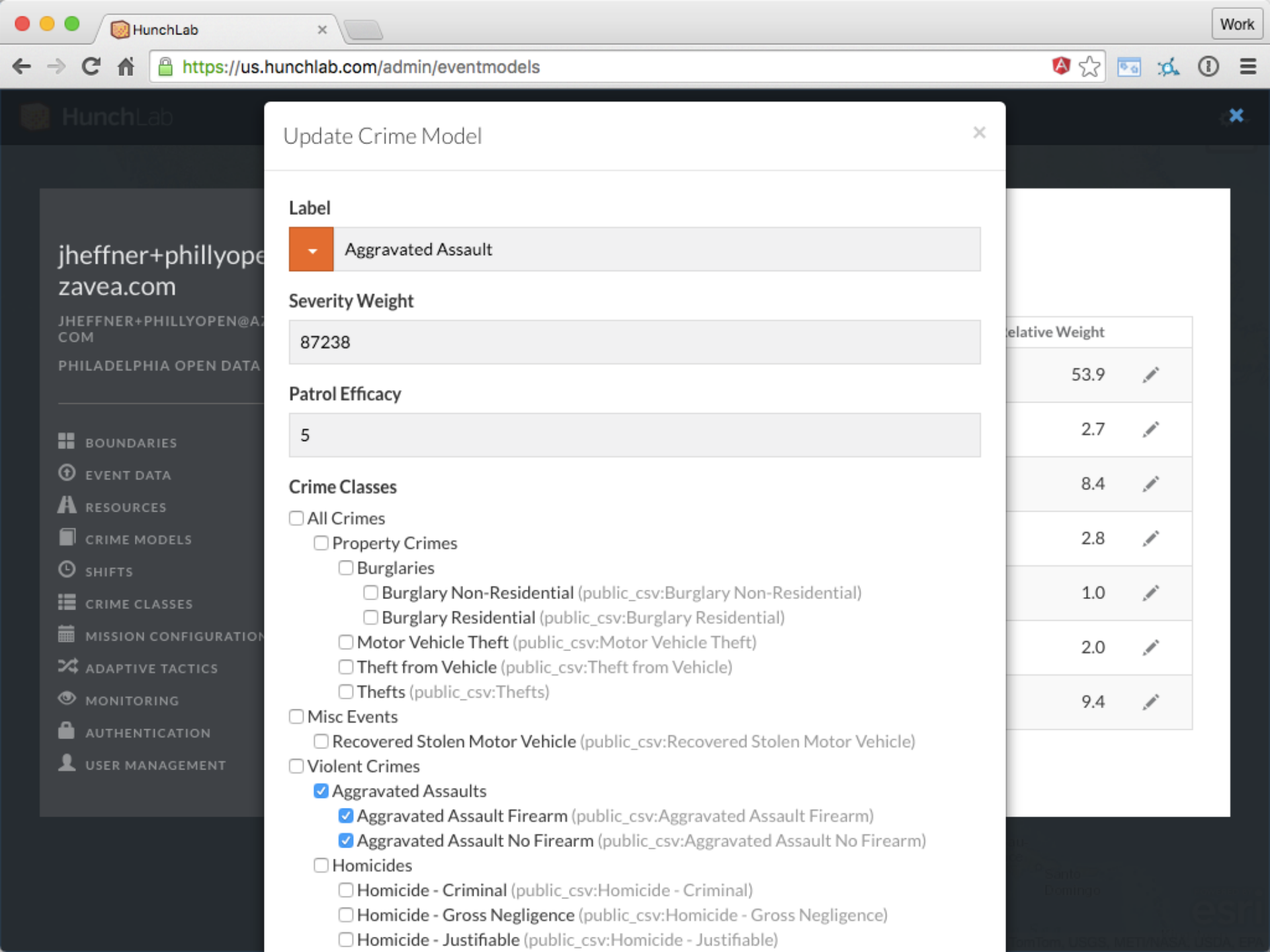
Long-running issues

STAGING

- Philly Open Data
  - An Event Model has an outdated stats model: https://staging.hunchlab.com/api/eventmodelclassconfigs/philadelphia-assault/versions/50e83d2e-c834-4ee9-9825-09cda8cb2348/
  - An Event Model has an outdated stats model: https://staging.hunchlab.com/api/eventmodelclassconfigs/philadelphia-burglary/versions/39fe5f6f-1fbb-4eb7-9c41-266e9725b173/
  - An Event Model has an outdated stats model: https://staging.hunchlab.com/api/eventmodelclassconfigs/philadelphia-homocide/versions/a1bfd6f0-bc94-4c58-b0eb-80a0f536f9f0/
  - An Event Model has an outdated stats model: https://staging.hunchlab.com/api/eventmodelclassconfigs/philadelphia-mvt/versions/e9864542-b0c3-4a0a-9f0d-42d64fabe9d6/
  - An Event Model has an outdated stats model: https://staging.hunchlab.com/api/eventmodelclassconfigs/philadelphia-robbery/versions/6b524afd-c01d-48b7-902e-810506279b93/
  - An Event Model has an outdated stats model: https://staging.hunchlab.com/


HunchLab
Work
https://us.hunchlab.com/admin/eventclasses
jheffner+phillyopen@azavea.com
JHEFFNER+PHILLYOPEN@AZAVEA.COM
PHILADELPHIA OPEN DATA
BOUNDARIES
EVENT DATA
RESOURCES
CRIME MODELS
SHIFTS
CRIME CLASSES
MISSION CONFIGURATIONS
ADAPTIVE TACTICS
MONITORING
AUTHENTICATION
USER MANAGEMENT
Crime Classes
CLASSIFICATION HIERARCHY
New Group
All Crimes
Property Crimes
Burglaries
Burglary Non-Residential (public_csv:Burglary Non-Residential)
Burglary Residential (public_csv:Burglary Residential)
Motor Vehicle Theft (public_csv:Motor Vehicle Theft)
Theft from Vehicle (public_csv:Theft from Vehicle)
Thefts (public_csv:Thefts)
Misc Events
PENDING
Aggravated Assault (with Firearm or not) (public_csv:Aggravated Assault (with Firearm or not))
Burglary (Residential or Non-Residential) (public_csv:Burglary (Residential or Non-Residential))
Homicide (public_csv:Homicide)
Motor Vehicle Theft and Recovered Stolen Motor Vehicle (public_csv:Motor Vehicle Theft and Recovered Stolen Motor Vehicle)
Robbery (with Firearm or not) (public_csv:Robbery (with Firearm or not))
Theft (from Vehicle or not) (public_csv:Theft (from Vehicle or not))


HunchLab
Work
https://us.hunchlab.com/admin/eventmodels
HunchLab
jheffner+phillyopen@azavea.com
JHEFFNER+PHILLYOPEN@AZAVEA.COM
PHILADELPHIA OPEN DATA
BOUNDARIES
EVENT DATA
RESOURCES
CRIME MODELS
SHIFTS
CRIME CLASSES
MISSION CONFIGURATIONS
ADAPTIVE TACTICS
MONITORING
AUTHENTICATION
USER MANAGEMENT
Crime Models
Label
Severity Weight
Patrol Efficacy
Patrol Weight
Relative Weight
Homicide 8,649,216 1% 86,492.2 53.9
Aggravated Assault 87,238 5% 4,361.9 2.7
Robbery 67,277 20% 13,455.4 8.4
Motor Vehicle Theft 9,079 50% 4,539.5 2.8
Theft from Vehicle 2,139 75% 1,604.3 1.0
Burglary Residential 13,096 25% 3,274.0 2.0
Gun-related Crimes 100,000 15% 15,000.0 9.4
+New Crime Model


HunchLab
Work
https://us.hunchlab.com/admin/eventmodels
HunchLab
jheffner+phillyope
zavea.com
JHEFFNER+PHILLYOPEN@A
COM
PHILADELPHIA OPEN DATA
BOUNDARIES
EVENT DATA
RESOURCES
CRIME MODELS
SHIFTS
CRIME CLASSES
MISSION CONFIGURATION
ADAPTIVE TACTICS
MONITORING
AUTHENTICATION
USER MANAGEMENT
elative Weight
53.9
2.7
8.4
2.8
1.0
2.0
9.4
Update Crime Model
Label
Aggravated Assault
Severity Weight
87238
Patrol Efficacy
5
Crime Classes
All Crimes
Property Crimes
Burglaries
Burglary Non-Residential (public_csv:Burglary Non-Residential)
Burglary Residential (public_csv:Burglary Residential)
Motor Vehicle Theft (public_csv:Motor Vehicle Theft)
Theft from Vehicle (public_csv:Theft from Vehicle)
Thefts (public_csv:Thefts)
Misc Events
Recovered Stolen Motor Vehicle (public_csv:Recovered Stolen Motor Vehicle)
Violent Crimes
Aggravated Assaults
Aggravated Assault Firearm (public_csv:Aggravated Assault Firearm)
Aggravated Assault No Firearm (public_csv:Aggravated Assault No Firearm)
Homicides
Homicide - Criminal (public_csv:Homicide - Criminal)
Homicide - Gross Negligence (public_csv:Homicide - Gross Negligence)
Homicide - Justifiable (public_csv:Homicide - Justifiable)

Geographic

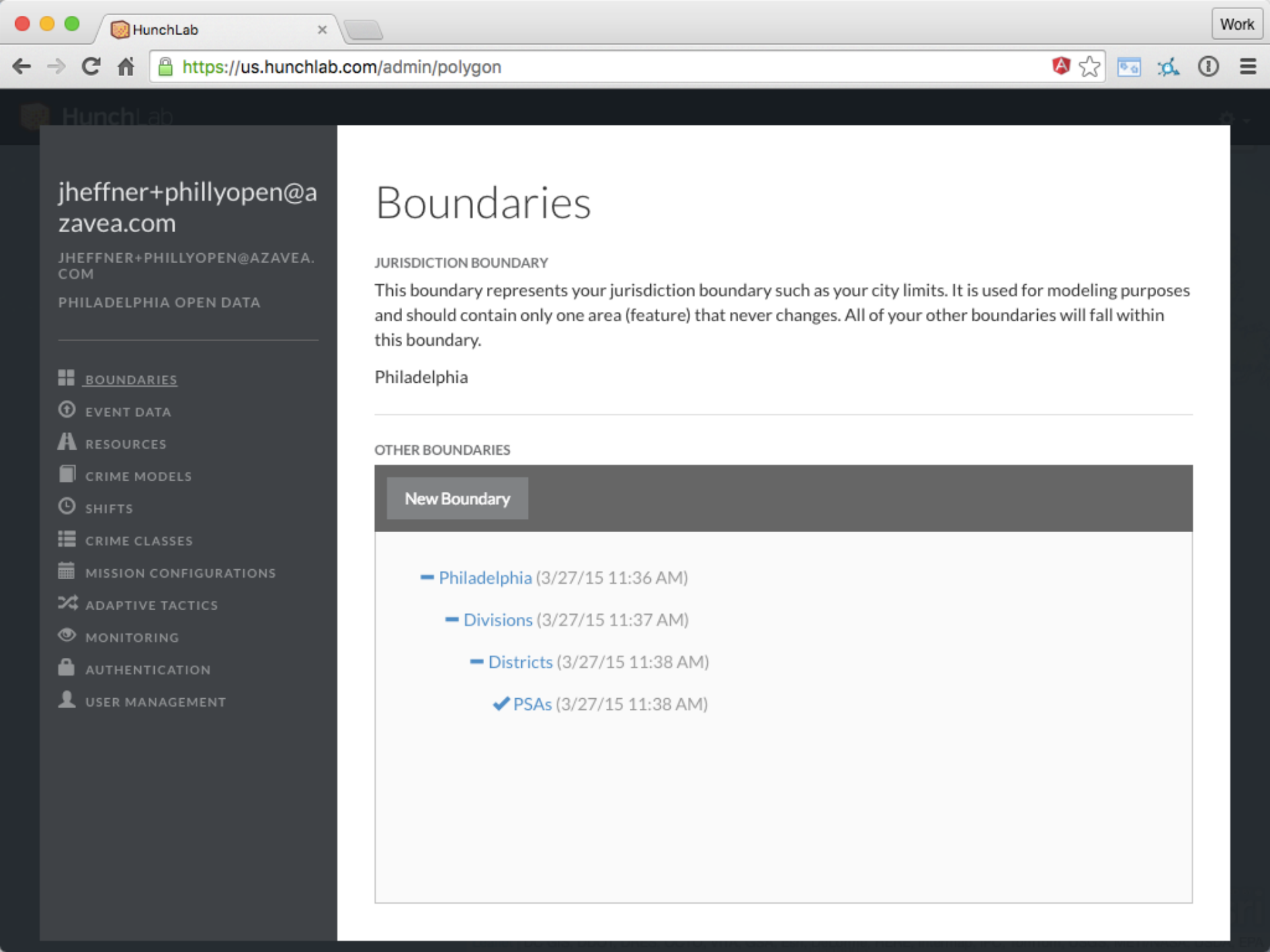
Temporal

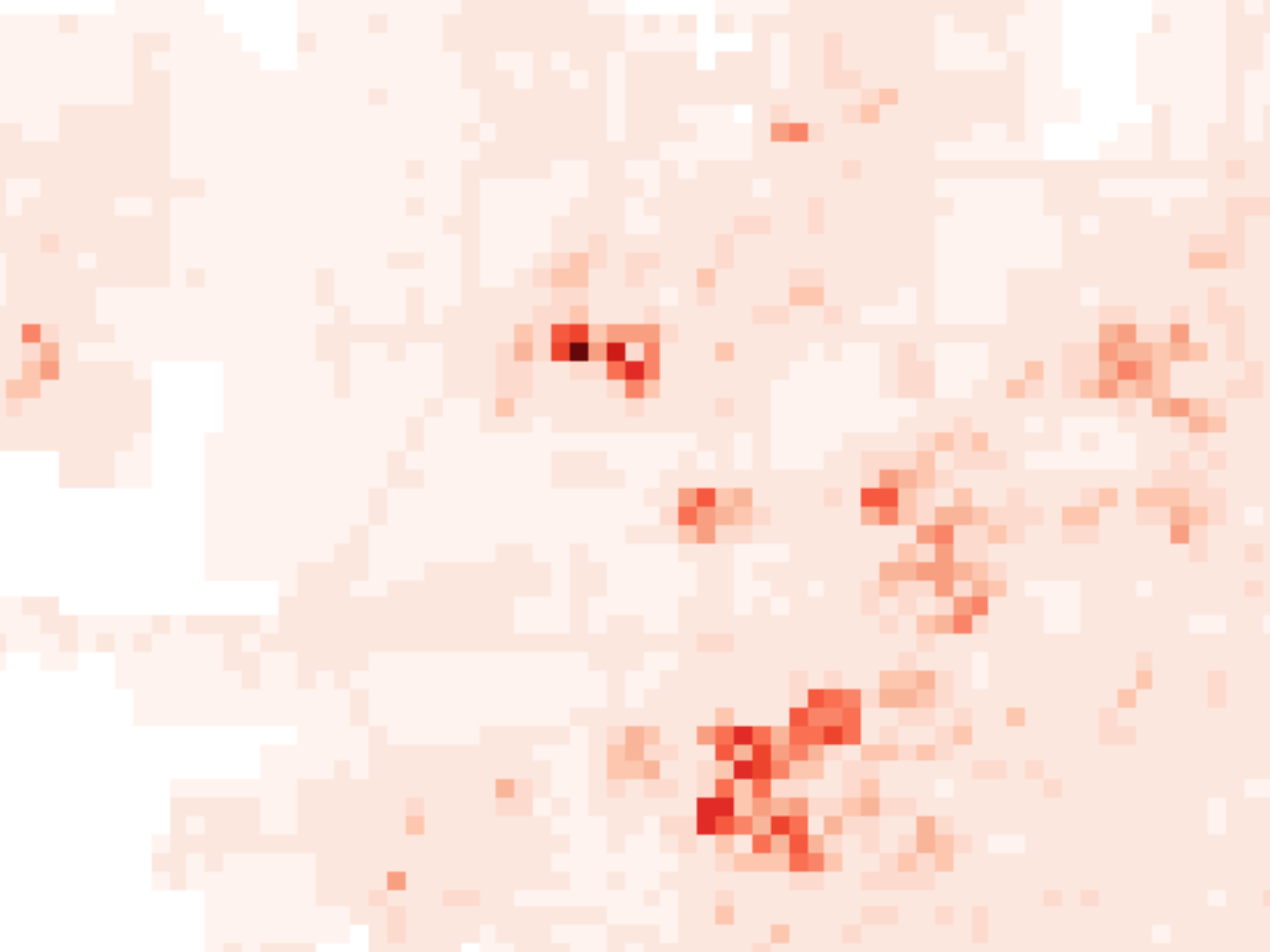
Calculated

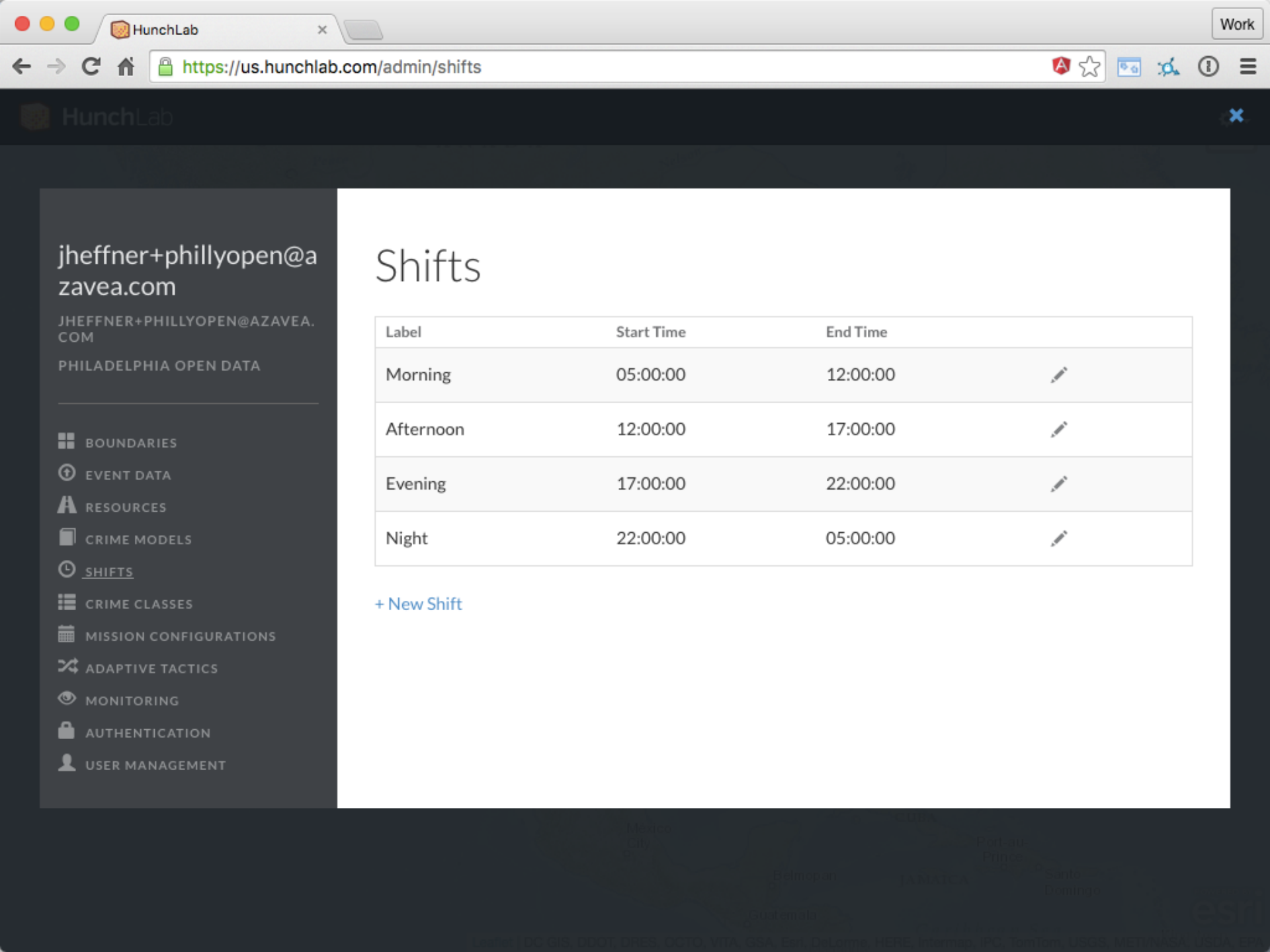
Setup / Customization

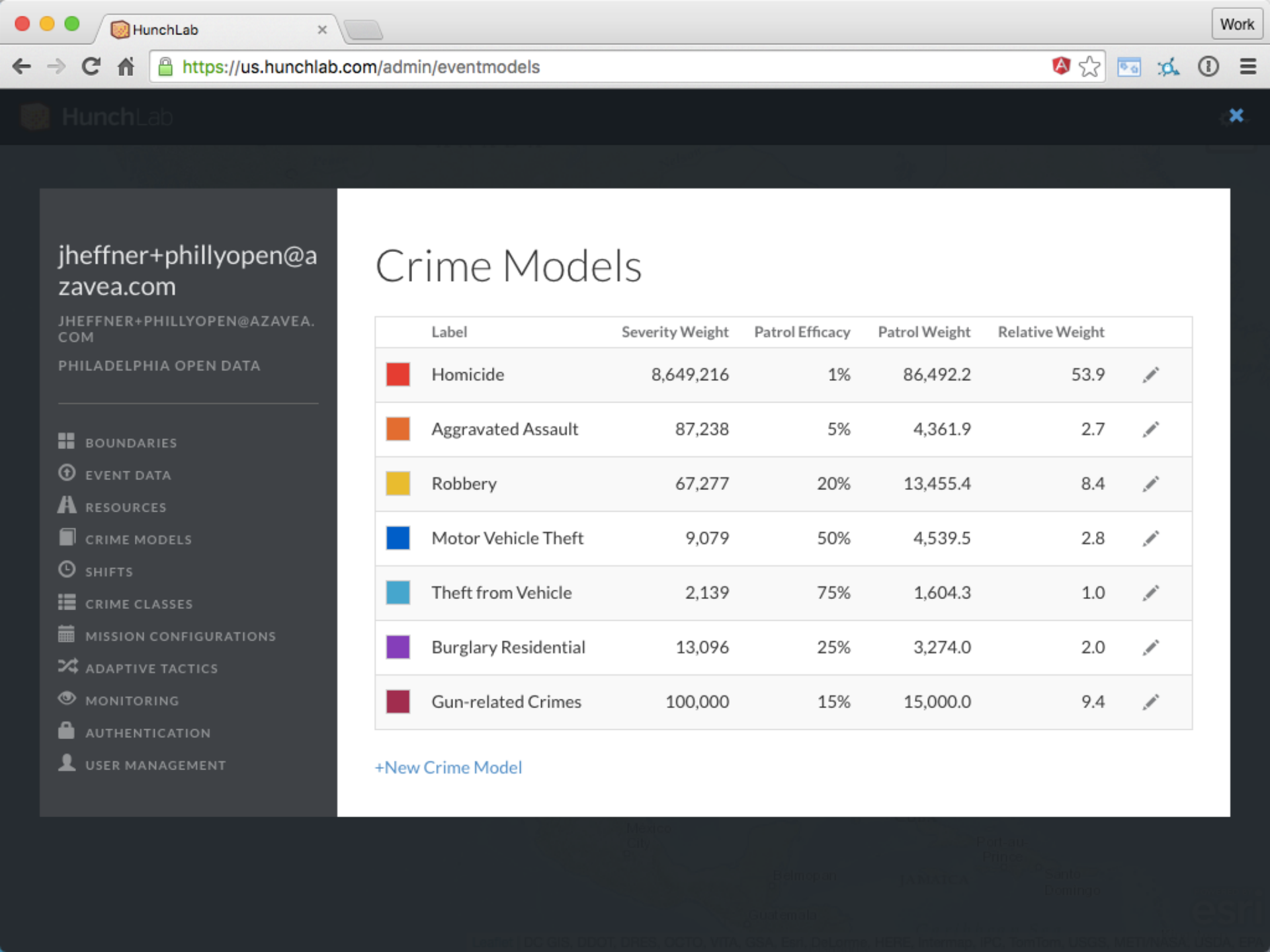
Predictive Missions

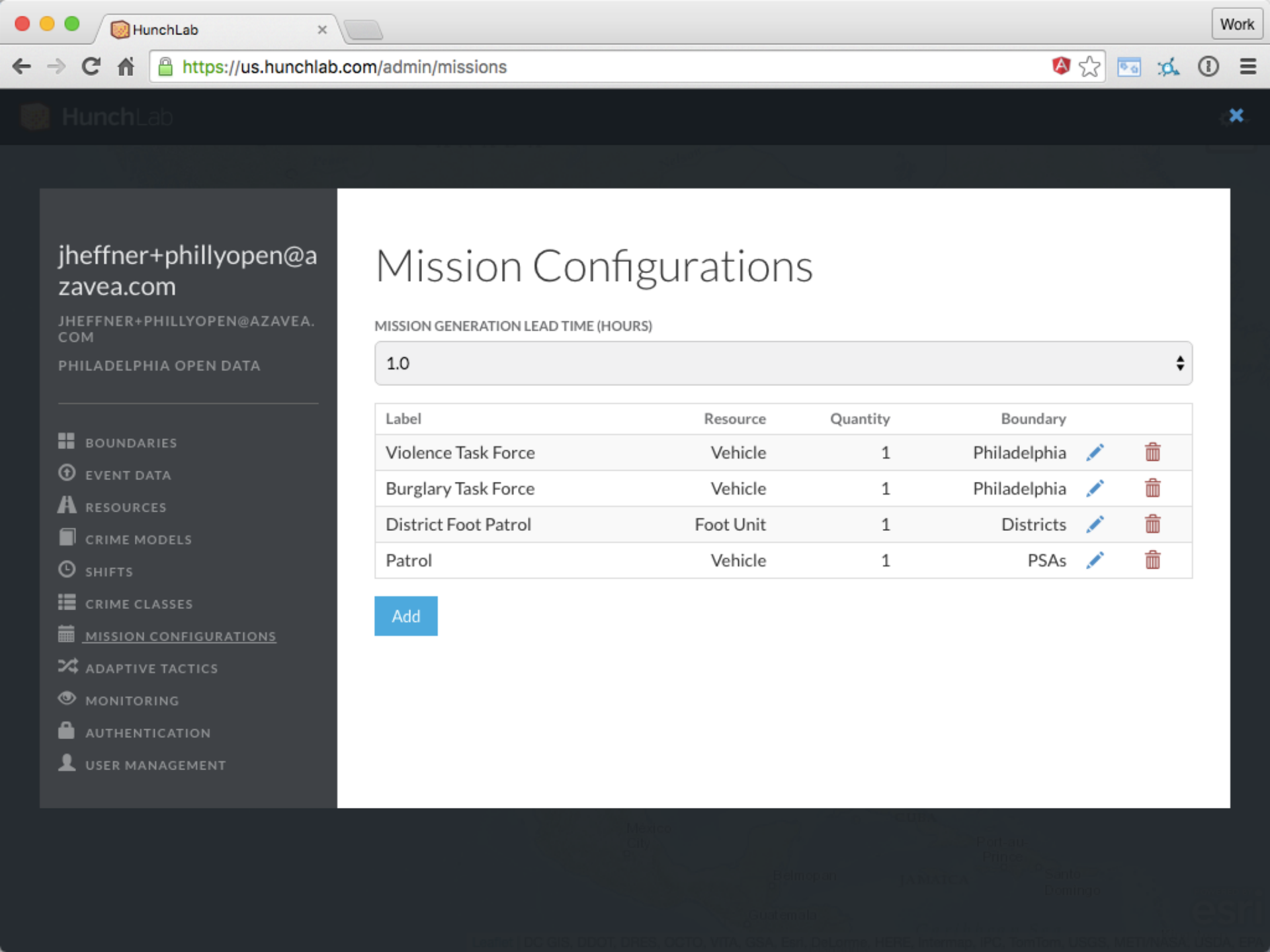
- Given
  - Specific Time Period
    - Day, shift, etc.
  - Specific Priorities
    - Crime types with specific weightings
  - Specific Resources
    - Quantity of patrol vehicles, foot patrols, etc.
- Determine
  - Optimal areas for patrol

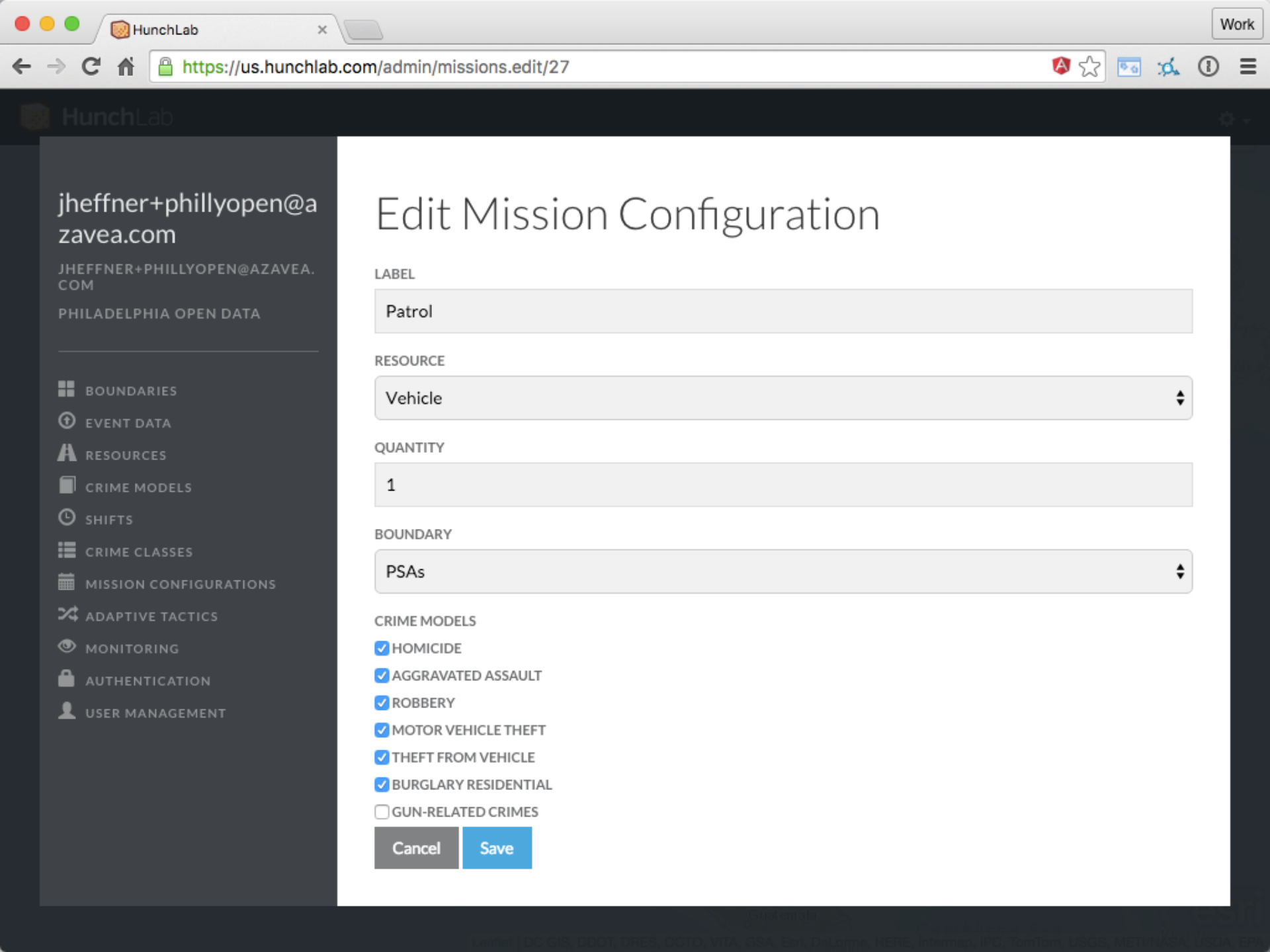

HunchLab
Work
https://us.hunchlab.com/admin/polygon
jheffner+phillyopen@azavea.com
JHEFFNER+PHILLYOPEN@AZAVEA.COM
PHILADELPHIA OPEN DATA
BOUNDARIES
EVENT DATA
RESOURCES
CRIME MODELS
SHIFTS
CRIME CLASSES
MISSION CONFIGURATIONS
ADAPTIVE TACTICS
MONITORING
AUTHENTICATION
USER MANAGEMENT
Boundaries
JURISDICTION BOUNDARY
This boundary represents your jurisdiction boundary such as your city limits. It is used for modeling purposes and should contain only one area (feature) that never changes. All of your other boundaries will fall within this boundary.
Philadelphia
OTHER BOUNDARIES
New Boundary
Philadelphia (3/27/15 11:36 AM)
Divisions (3/27/15 11:37 AM)
Districts (3/27/15 11:38 AM)
PSAs (3/27/15 11:38 AM)




HunchLab
Work
https://us.hunchlab.com/admin/shifts
HunchLab
jheffner+phillyopen@azavea.com
JHEFFNER+PHILLYOPEN@AZAVEA.COM
PHILADELPHIA OPEN DATA
BOUNDARIES
EVENT DATA
RESOURCES
CRIME MODELS
SHIFTS
CRIME CLASSES
MISSION CONFIGURATIONS
ADAPTIVE TACTICS
MONITORING
AUTHENTICATION
USER MANAGEMENT
Shifts
Label
Start Time
End Time
Morning
05:00:00
12:00:00
Afternoon
12:00:00
17:00:00
Evening
17:00:00
22:00:00
Night
22:00:00
05:00:00
+ New Shift


HunchLab
Work
https://us.hunchlab.com/admin/eventmodels
HunchLab
jheffner+phillyopen@azavea.com
JHEFFNER+PHILLYOPEN@AZAVEA.COM
PHILADELPHIA OPEN DATA
BOUNDARIES
EVENT DATA
RESOURCES
CRIME MODELS
SHIFTS
CRIME CLASSES
MISSION CONFIGURATIONS
ADAPTIVE TACTICS
MONITORING
AUTHENTICATION
USER MANAGEMENT
Crime Models
Label
Severity Weight
Patrol Efficacy
Patrol Weight
Relative Weight
Homicide 8,649,216 1% 86,492.2 53.9
Aggravated Assault 87,238 5% 4,361.9 2.7
Robbery 67,277 20% 13,455.4 8.4
Motor Vehicle Theft 9,079 50% 4,539.5 2.8
Theft from Vehicle 2,139 75% 1,604.3 1.0
Burglary Residential 13,096 25% 3,274.0 2.0
Gun-related Crimes 100,000 15% 15,000.0 9.4
+New Crime Model


HunchLab
Work
https://us.hunchlab.com/admin/missions
HunchLab
jheffner+phillyopen@azavea.com
JHEFFNER+PHILLYOPEN@AZAVEA.COM
PHILADELPHIA OPEN DATA
BOUNDARIES
EVENT DATA
RESOURCES
CRIME MODELS
SHIFTS
CRIME CLASSES
MISSION CONFIGURATIONS
ADAPTIVE TACTICS
MONITORING
AUTHENTICATION
USER MANAGEMENT
Mission Configurations
MISSION GENERATION LEAD TIME (HOURS)
1.0
Label
Resource
Quantity
Boundary
Violence Task Force
Vehicle
1
Philadelphia
Burglary Task Force
Vehicle
1
Philadelphia
District Foot Patrol
Foot Unit
1
Districts
Patrol
Vehicle
1
PSAs
Add


HunchLab
Work
https://us.hunchlab.com/admin/missions.edit/27
HunchLab
jheffner+phillyopen@azavea.com
JHEFFNER+PHILLYOPEN@AZAVEA.COM
PHILADELPHIA OPEN DATA
BOUNDARIES
EVENT DATA
RESOURCES
CRIME MODELS
SHIFTS
CRIME CLASSES
MISSION CONFIGURATIONS
ADAPTIVE TACTICS
MONITORING
AUTHENTICATION
USER MANAGEMENT
Edit Mission Configuration
LABEL
Patrol
RESOURCE
Vehicle
QUANTITY
1
BOUNDARY
PSAs
CRIME MODELS
HOMICIDE
AGGRAVATED ASSAULT
ROBBERY
MOTOR VEHICLE THEFT
THEFT FROM VEHICLE
BURGLARY RESIDENTIAL
GUN-RELATED CRIMES
Cancel
Save

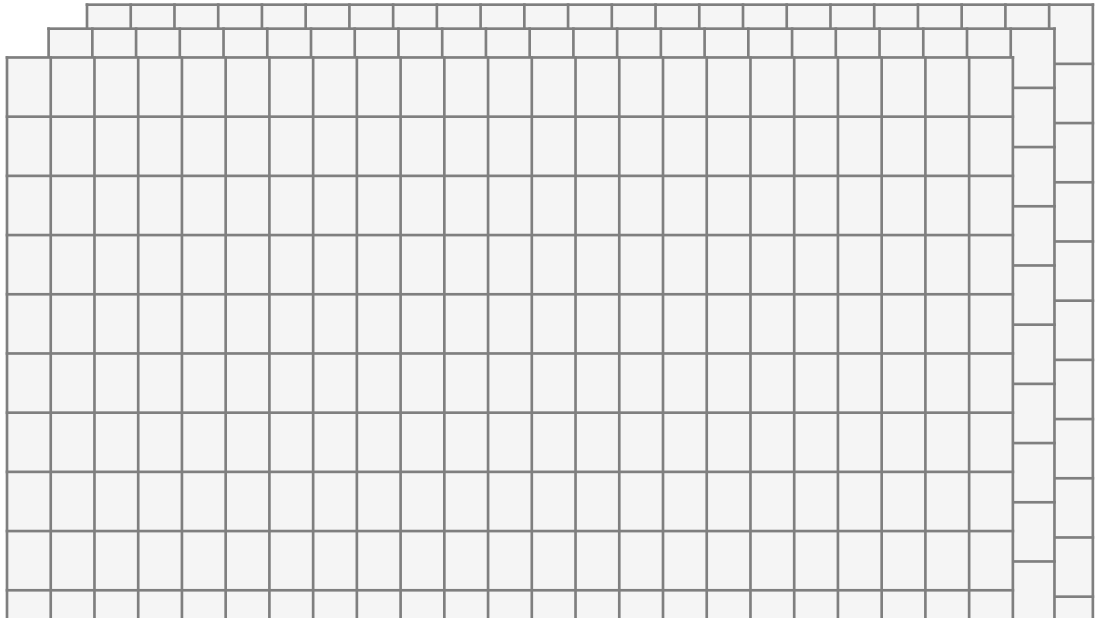
Demo Mission Sets

Modeling

Warm-up Variables

Training Examples

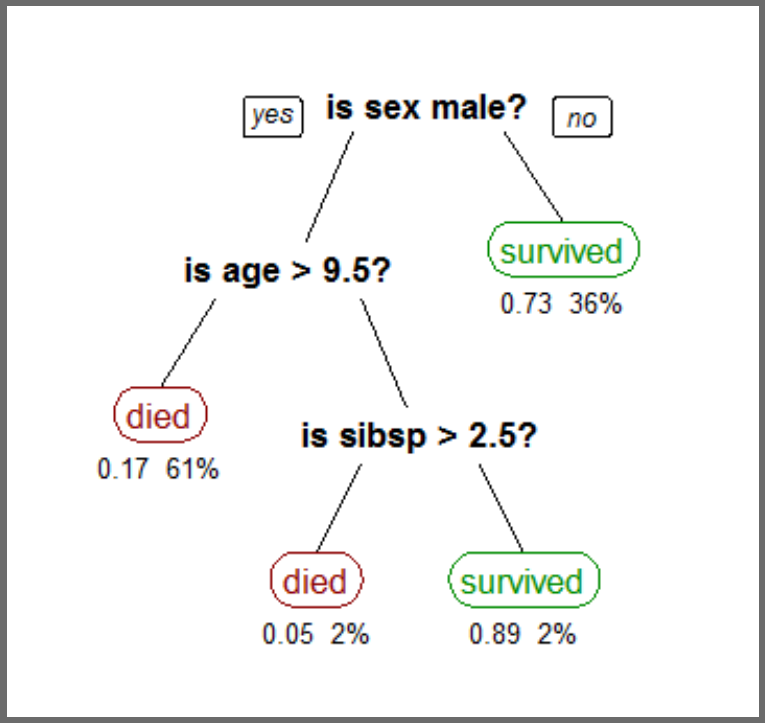
Testing Examples



crimes	weights	prior7	prior364	dayssincelast	bardist	dow
0	1	0	0	365	>2000ft	Monday
0	1	0	1	234	>2000ft	Monday
0	0.5	1	3	3	750ft	Tuesday
1	0.5	1	3	3	750ft	Tuesday
0	0	0	2	43	500ft	Wednesday
0	0.13	0	2	74	500ft	Friday
1	0.32	0	2	74	500ft	Friday
2	0.55	0	2	74	500ft	Friday

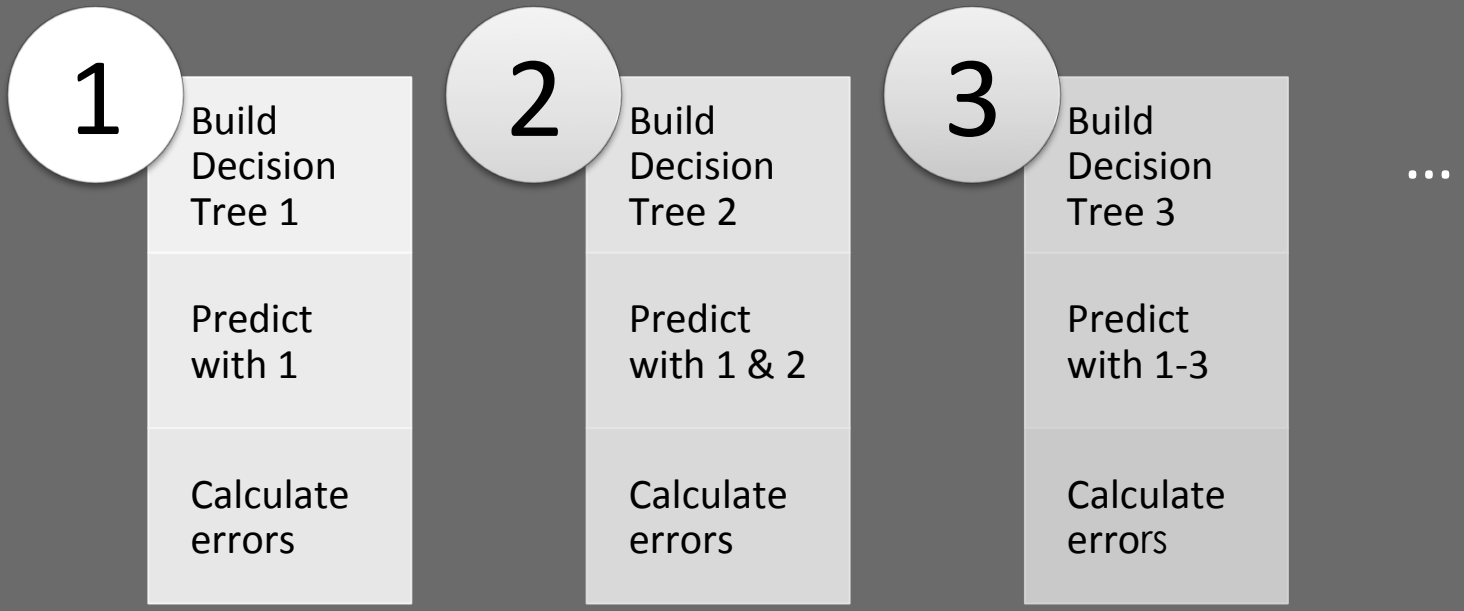
term: decision tree

A machine learning algorithm that recursively partitions a data set based upon variable values forming a tree-like structure.

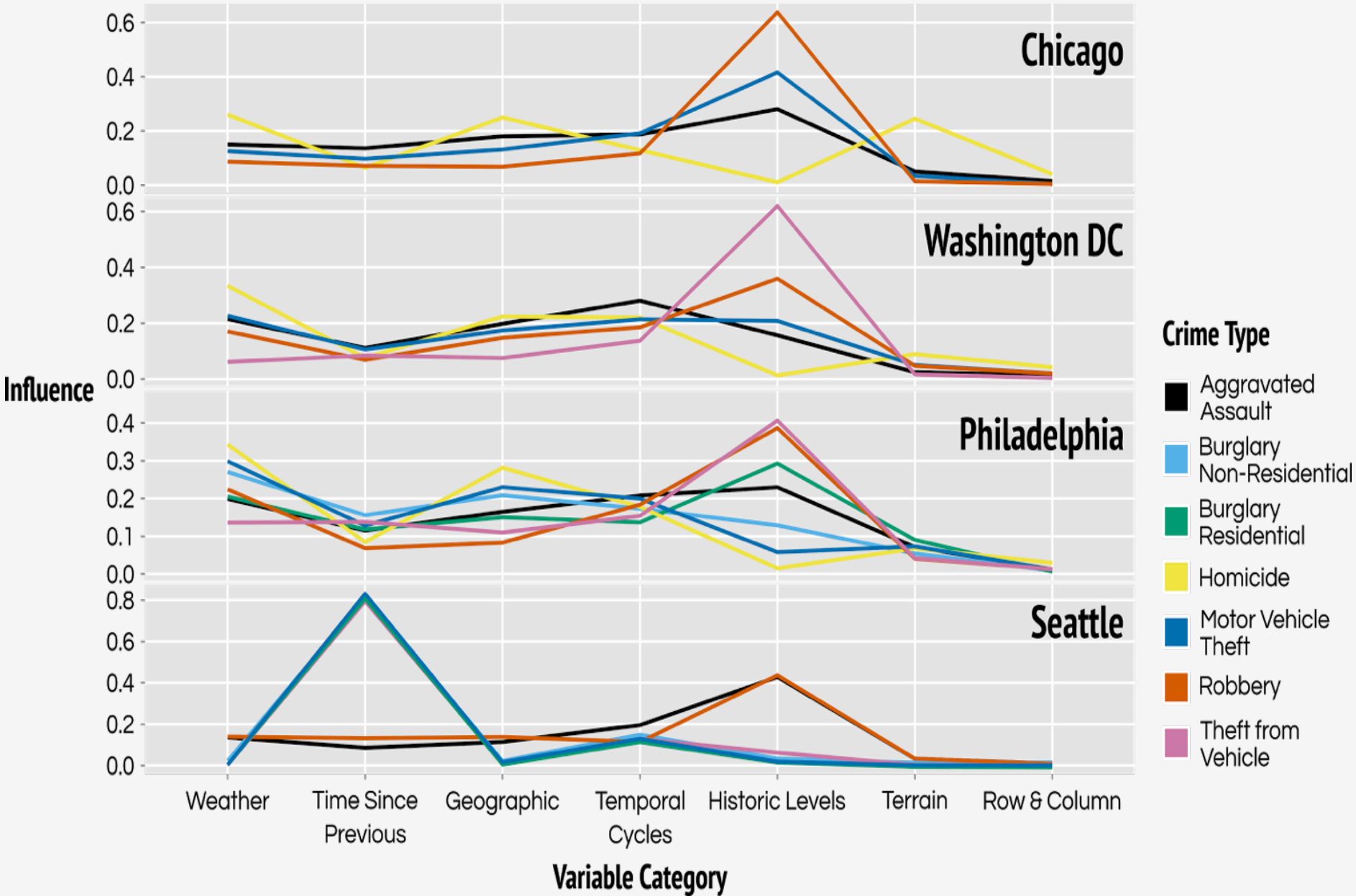


term: gradient boosting machine (GBM)

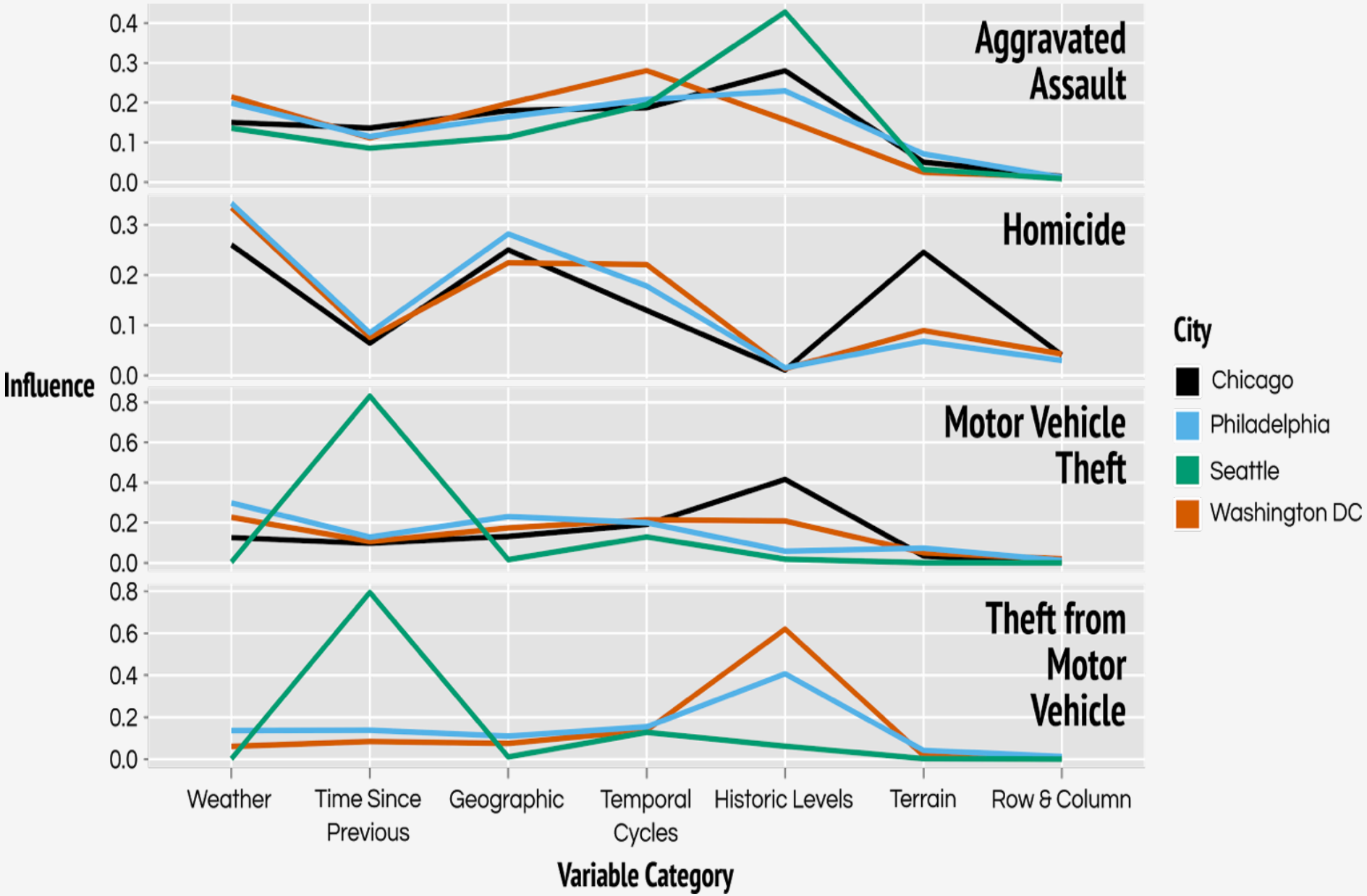
A machine learning algorithm that uses a series of weaker models (typically decision trees) that are trained upon the residuals of prior iterations (boosting) to form one stronger model.



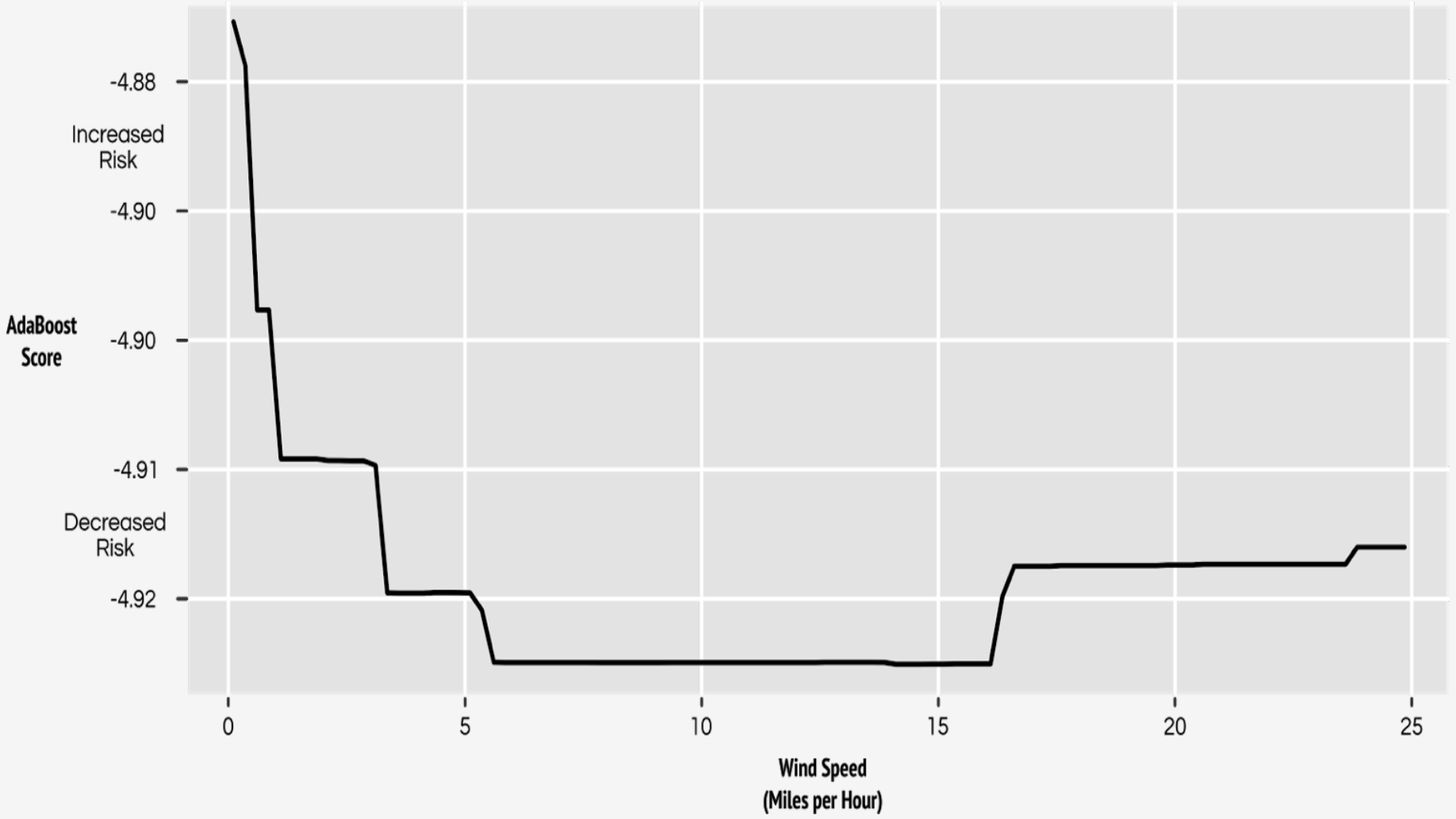
Variation across Crime Types



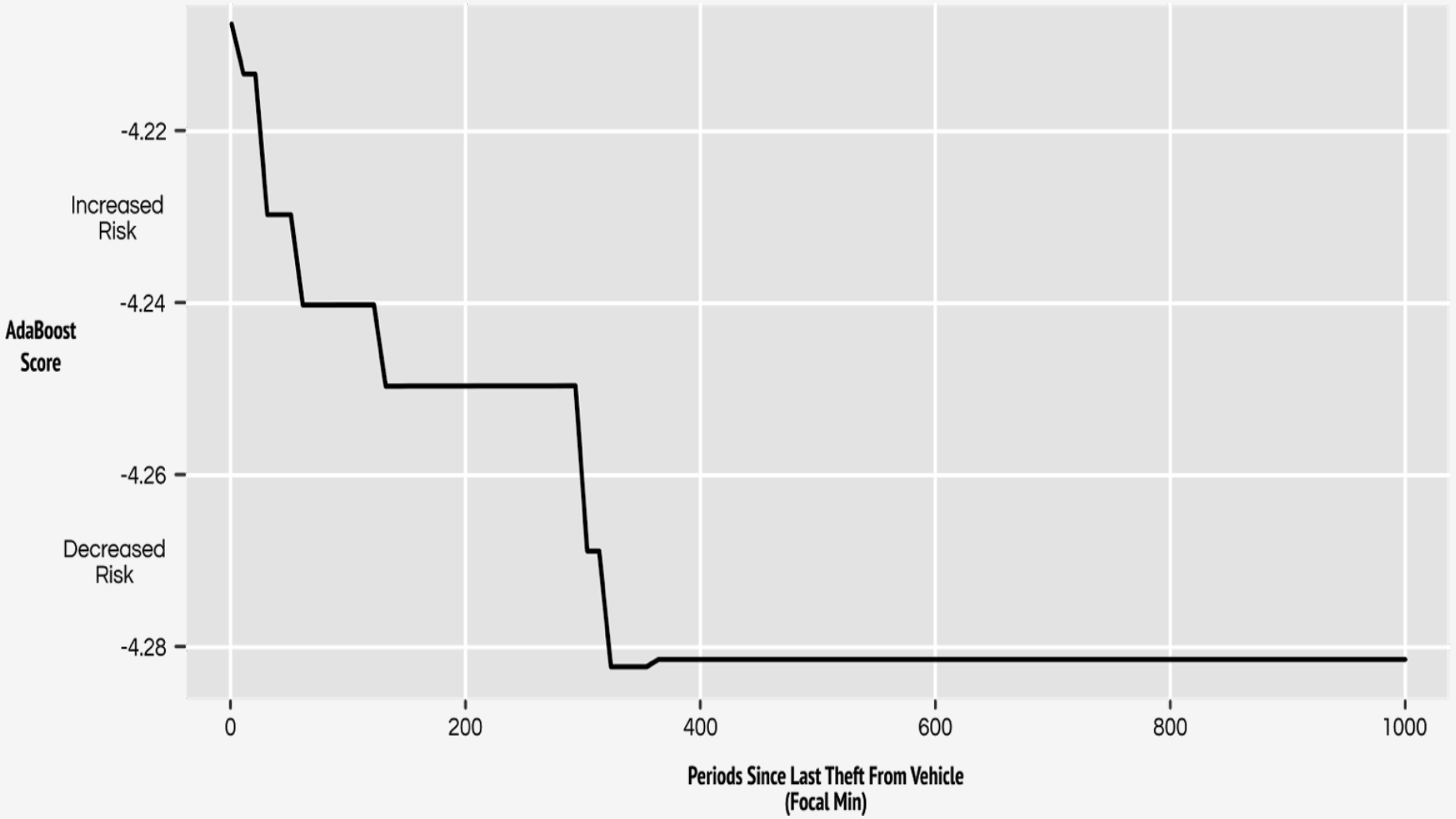
Variation across Cities



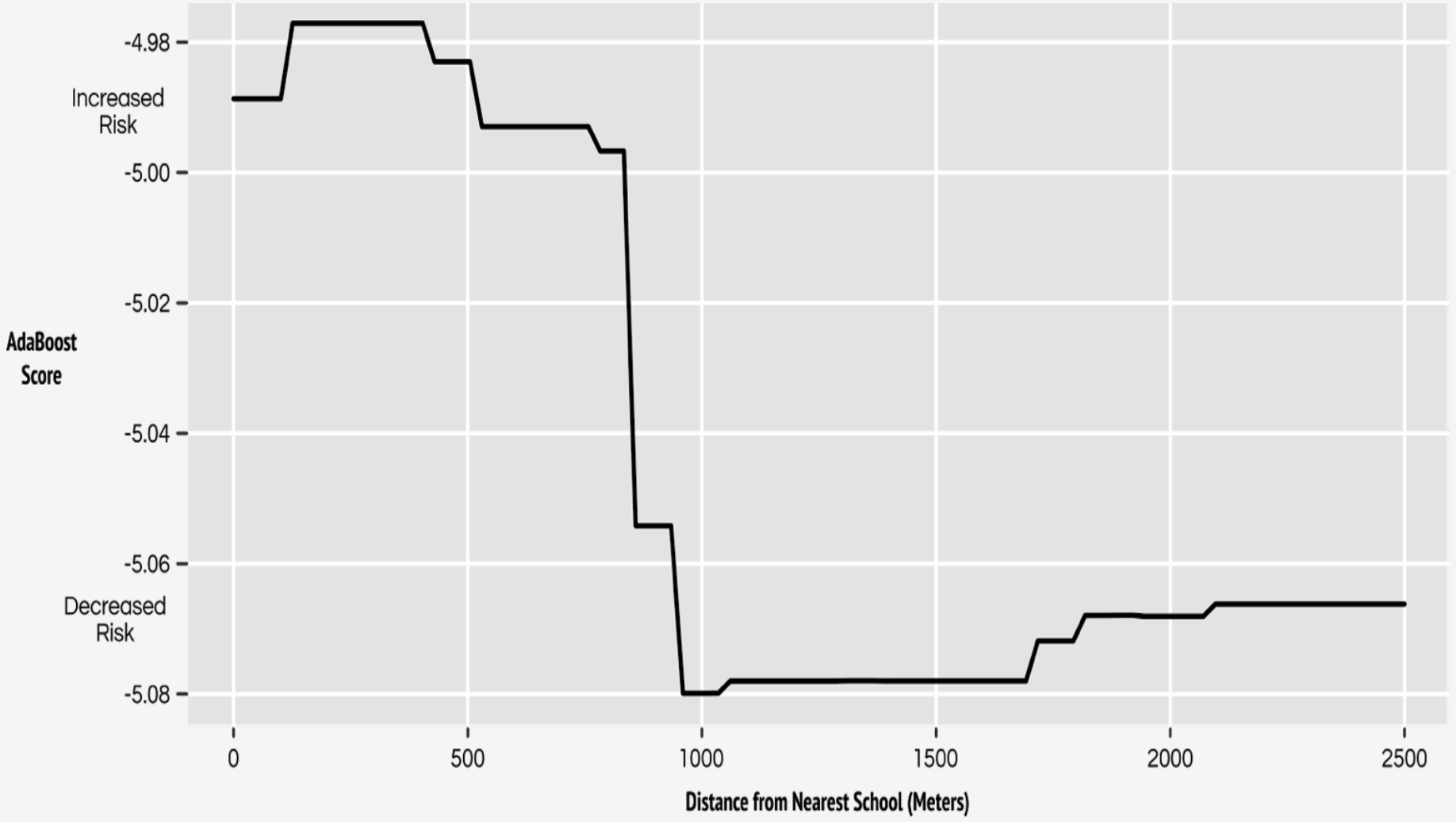
Wind Speed & Aggravated Assault (Chicago)

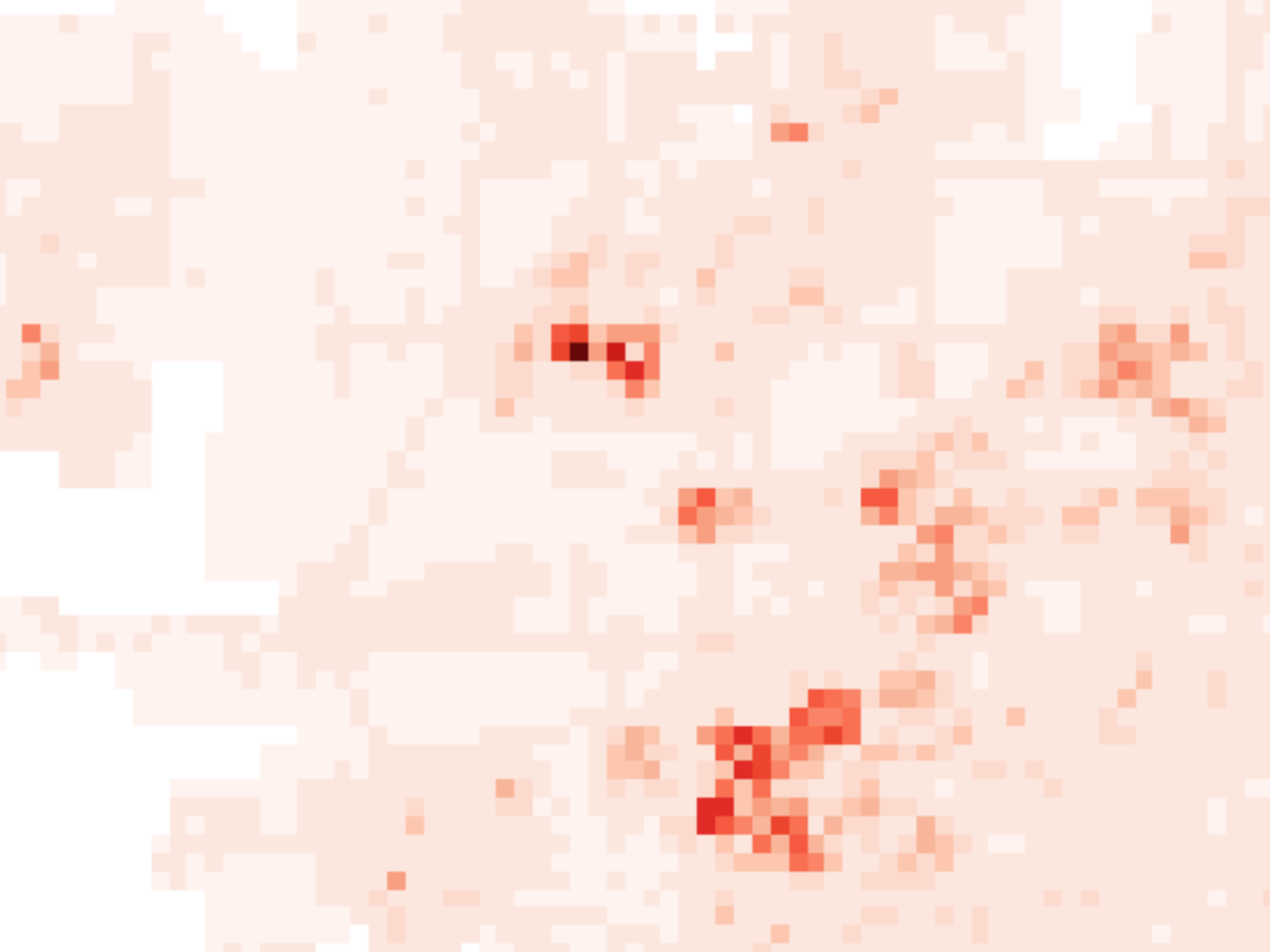


Time Since Last & Theft From Vehicles (Seattle)



MVT and Distance from School (Philadelphia)



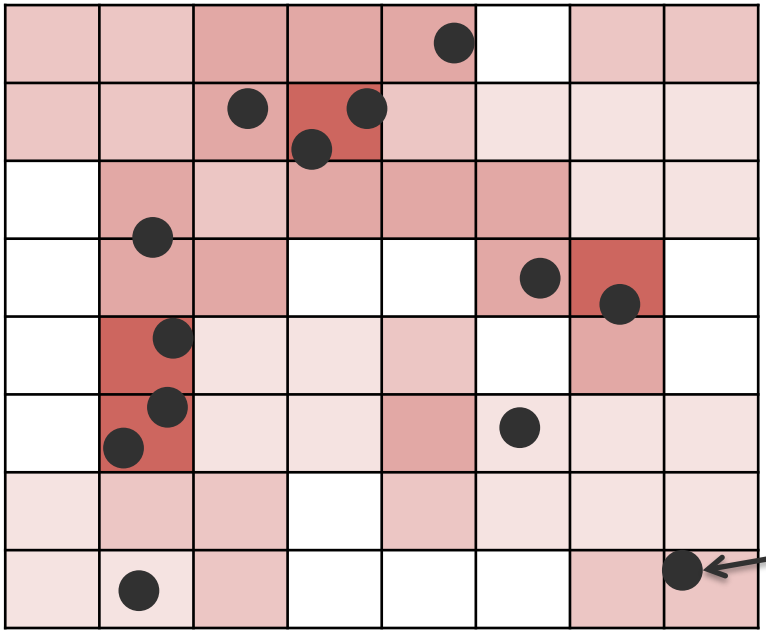


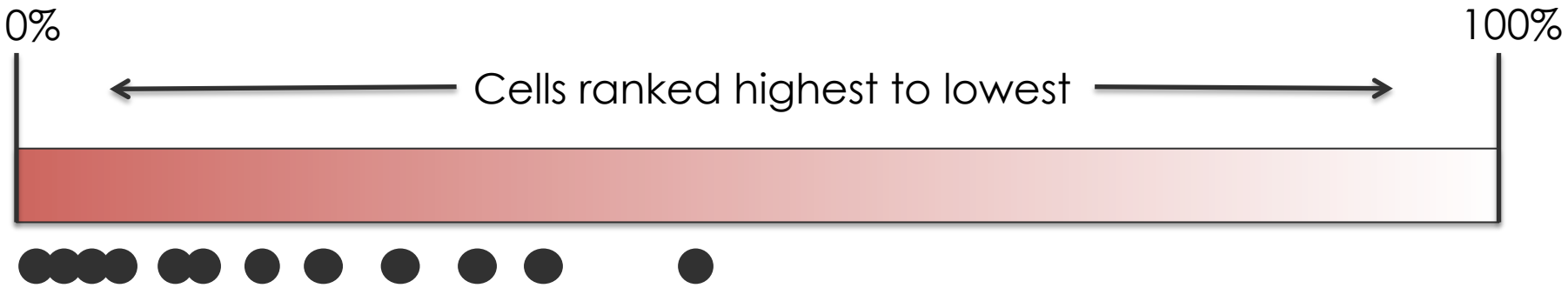
Accuracy

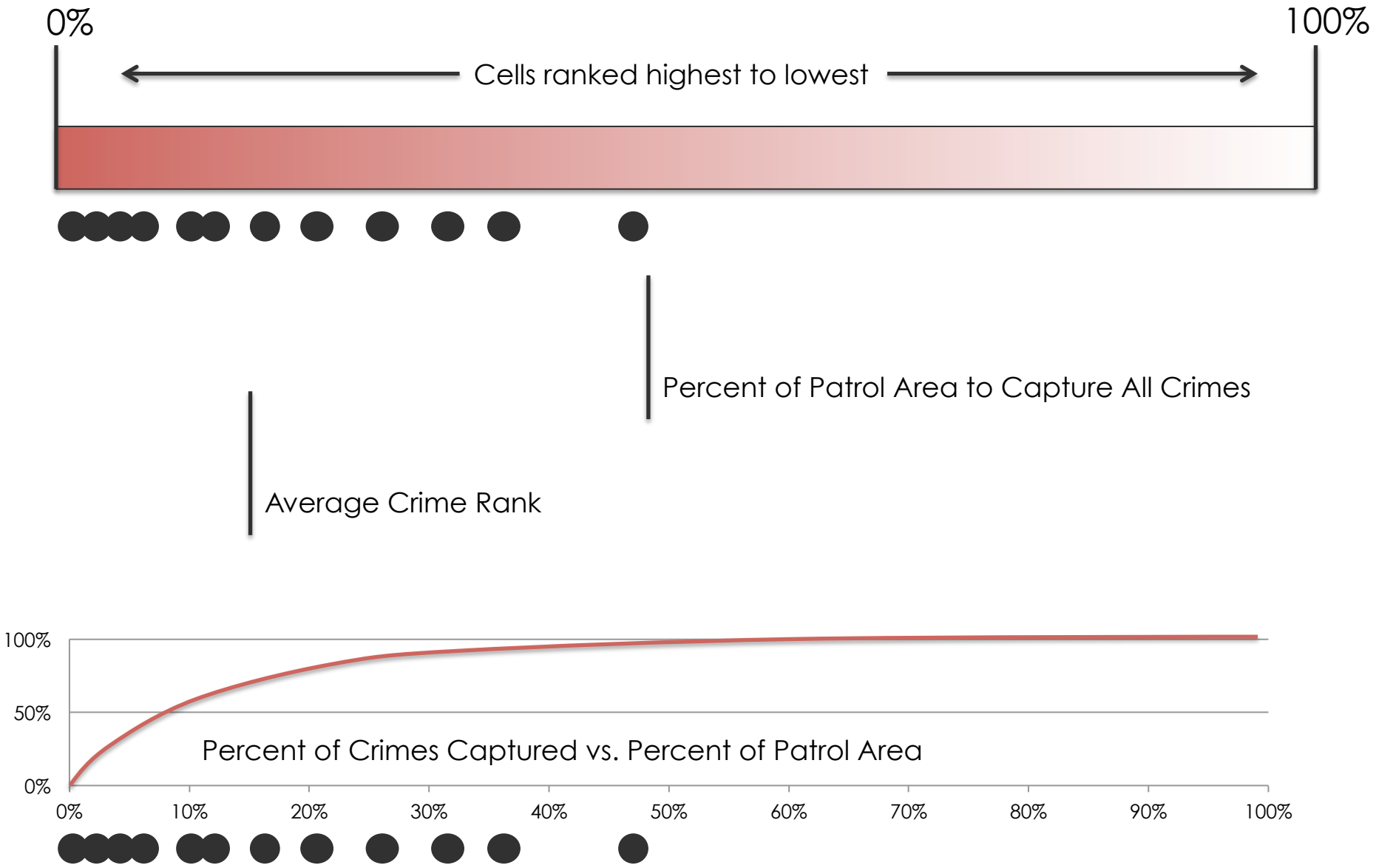
Accuracy

- Time Period
  - 1 period ahead predictions over 90 days
- Models
  - HunchLab selected model (ensemble)
  - Six baseline models
    - Counts
      - 28 day
      - 56 day
      - 364 day
    - Kernel Densities
      - 28 day
      - 56 day
      - 364 day
- Metrics

A map represented as a grid of cells






0%
100%
Cells ranked highest to lowest
Percent of Patrol Area to Capture All Crimes
Average Crime Rank
100%
50%
0%
Percent of Crimes Captured vs. Percent of Patrol Area
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%

Example Results

- St. Louis County, MO
- Seattle, WA

94.5%
Robbery

95.6%
Gun Crimes

--%
Homicide

95.3%
Aggravated Assault

92.1%
Simple Assault

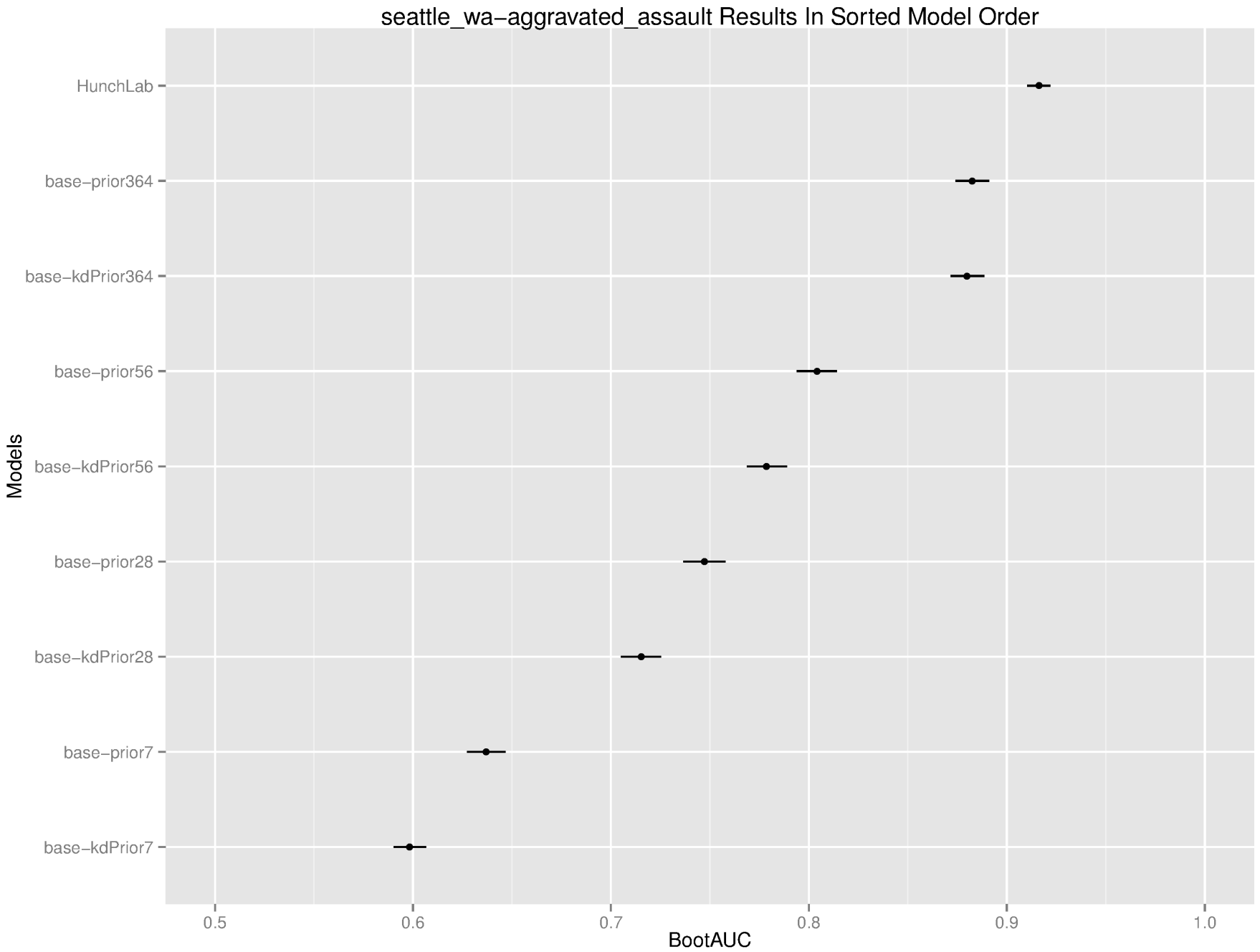
93.0%
Residential Burglary

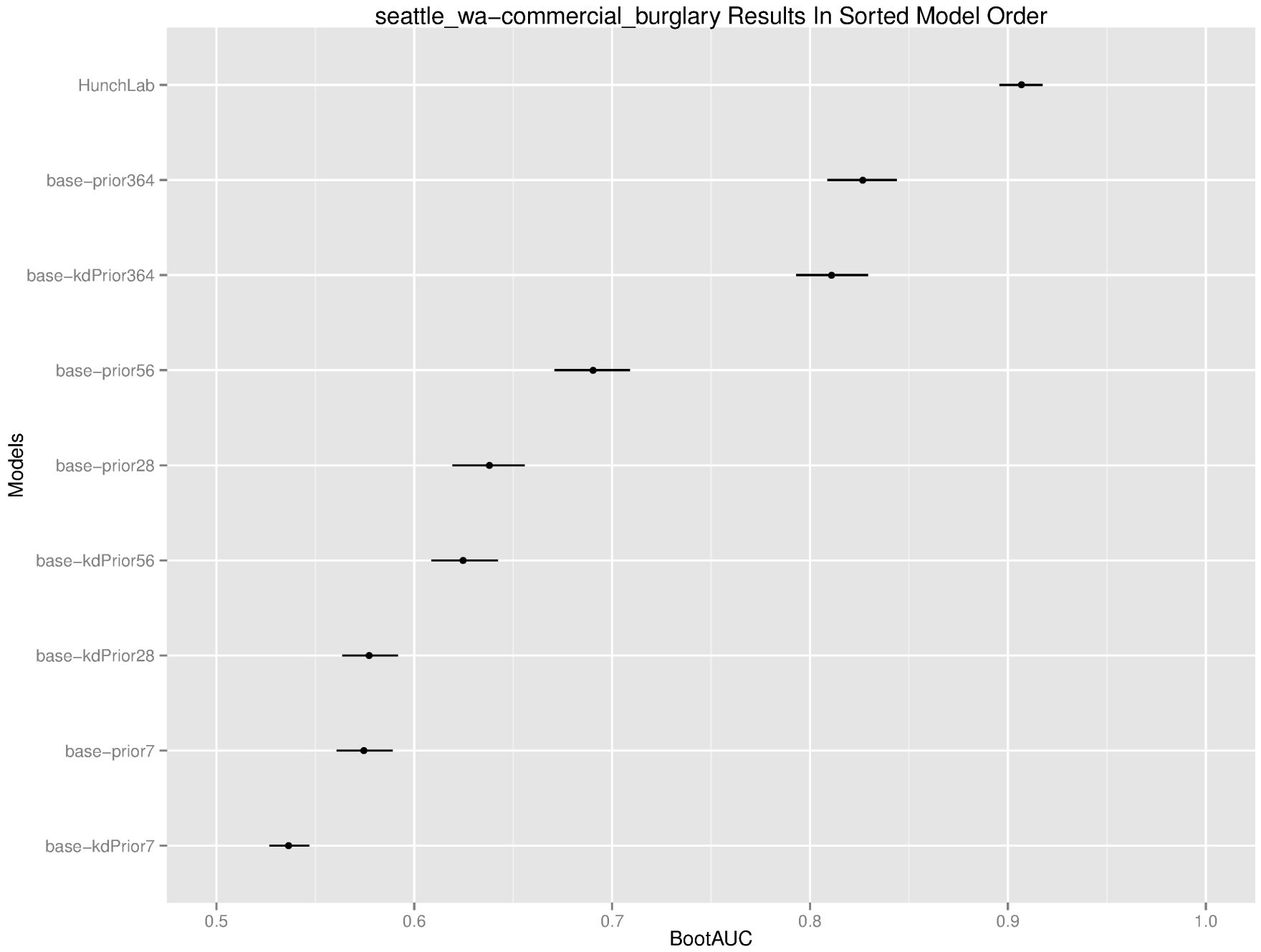
91.7%
Trespassing

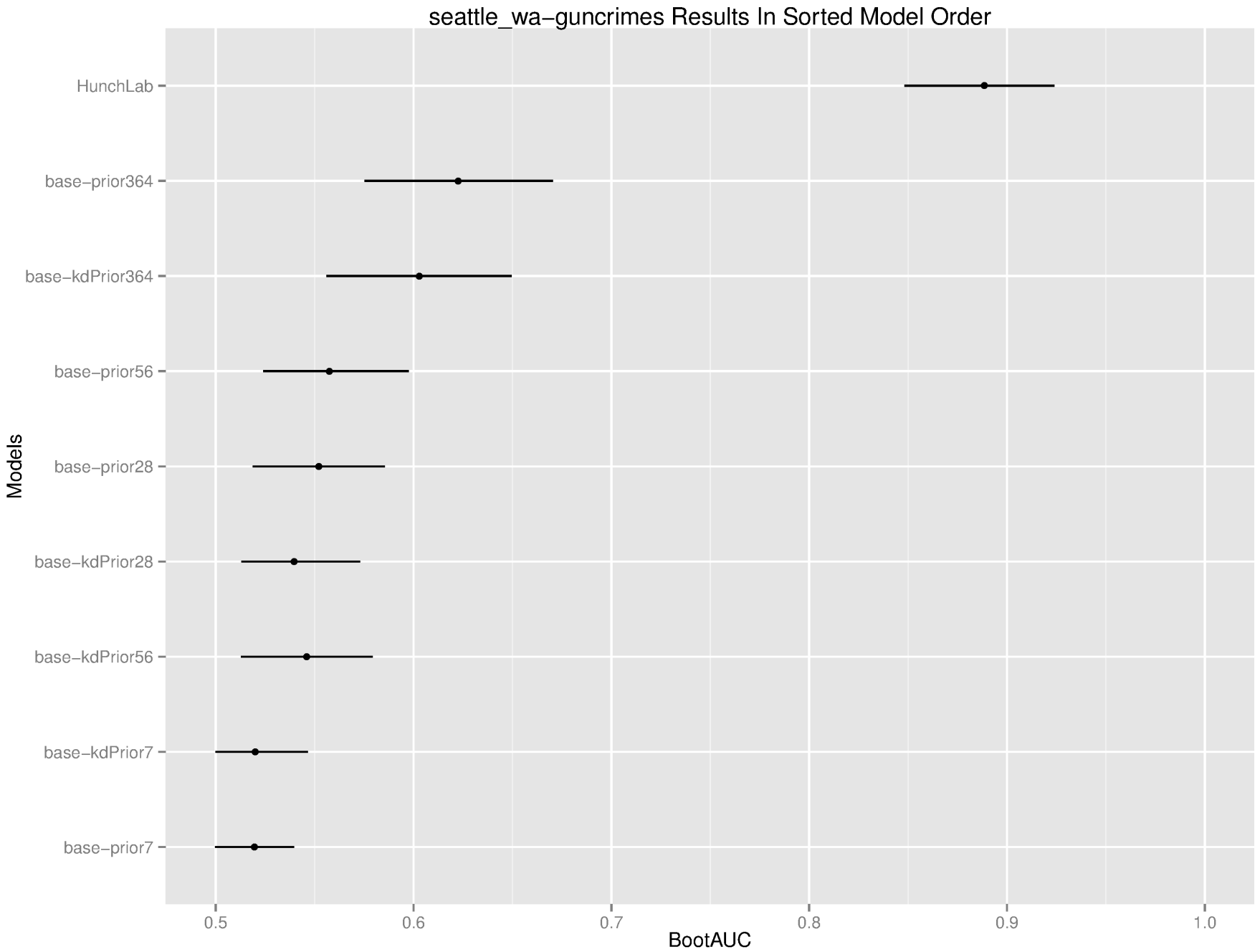
93.8%
DWI

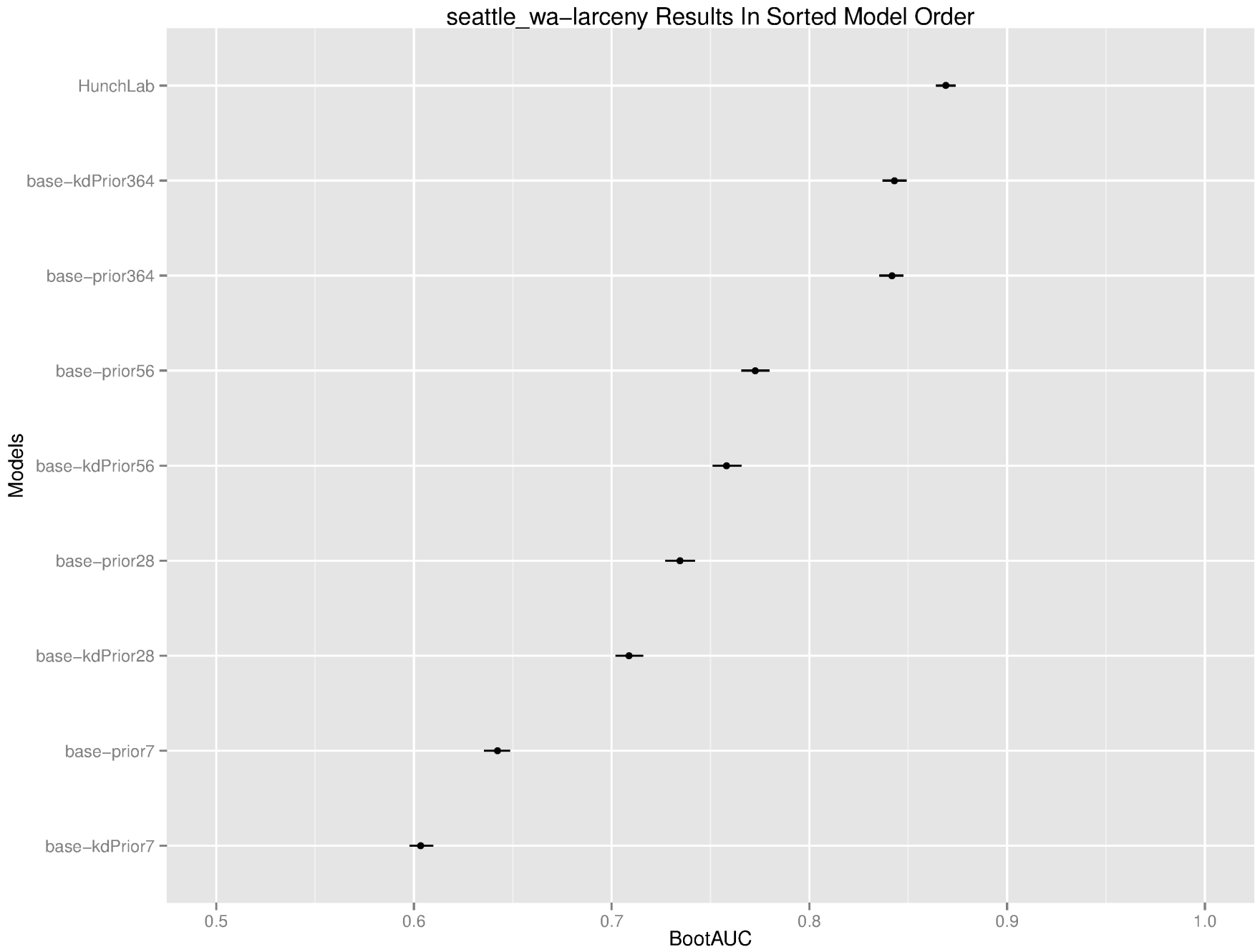
91.2%
Vehicle Accidents

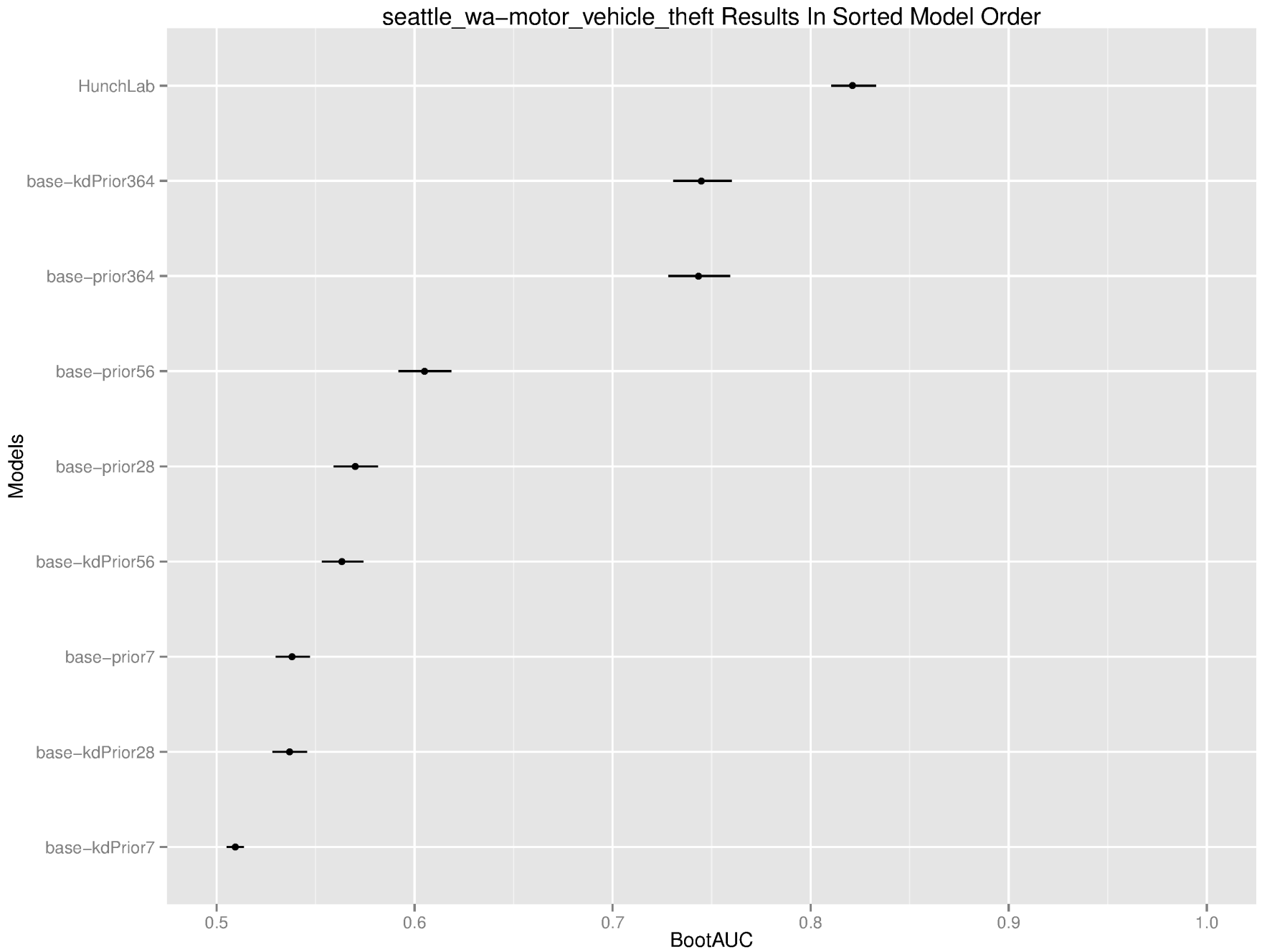
93.5%
Larceny from Vehicle

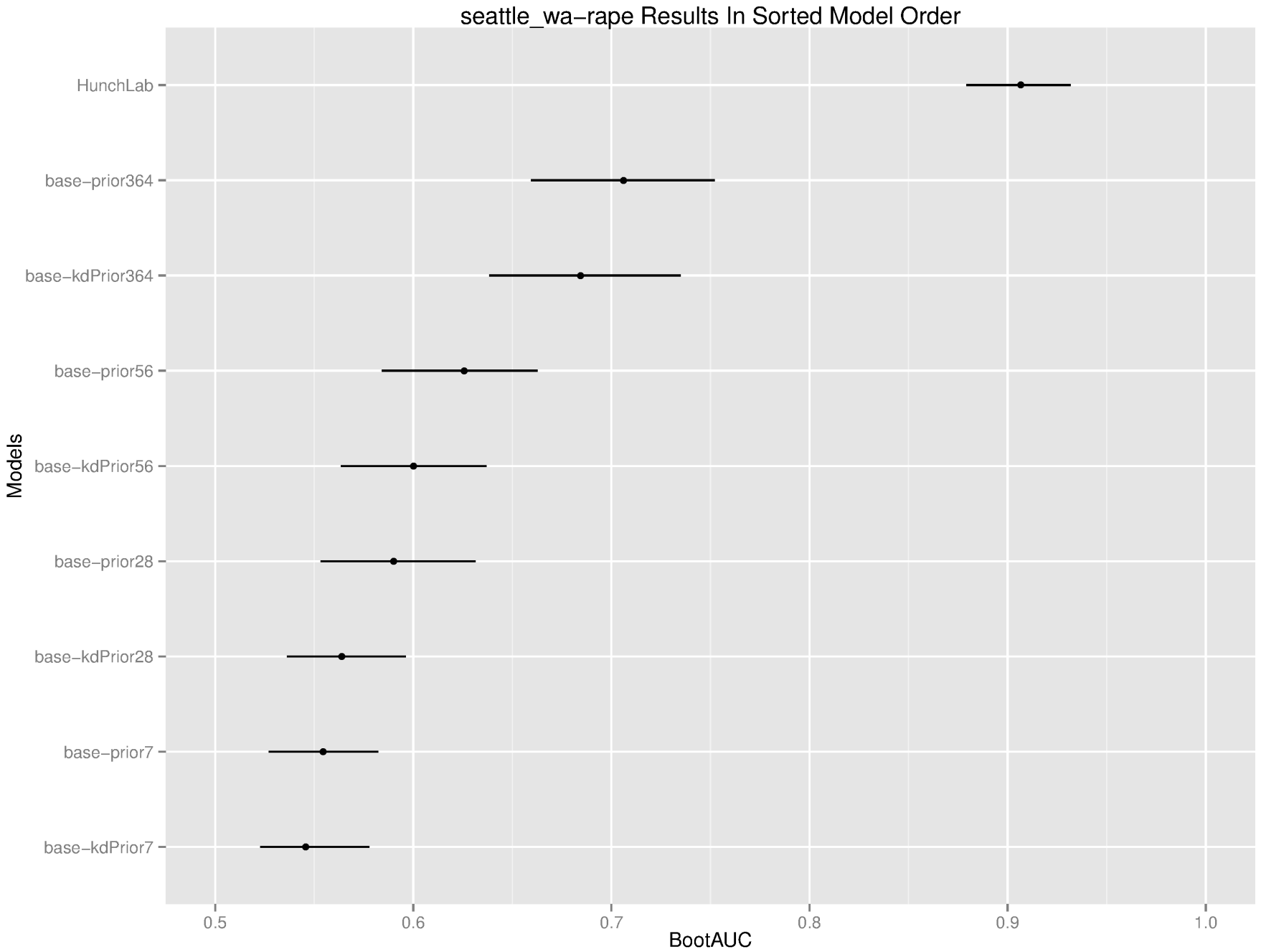

seattle_wa−aggravated_assault Results In Sorted Model Order
HunchLab
base−prior364
base−kdPrior364
base−prior56
base−kdPrior56
base−prior28
base−kdPrior28
base−prior7
base−kdPrior7
Models
0.5
0.6
0.7
0.8
0.9
1.0
BootAUC

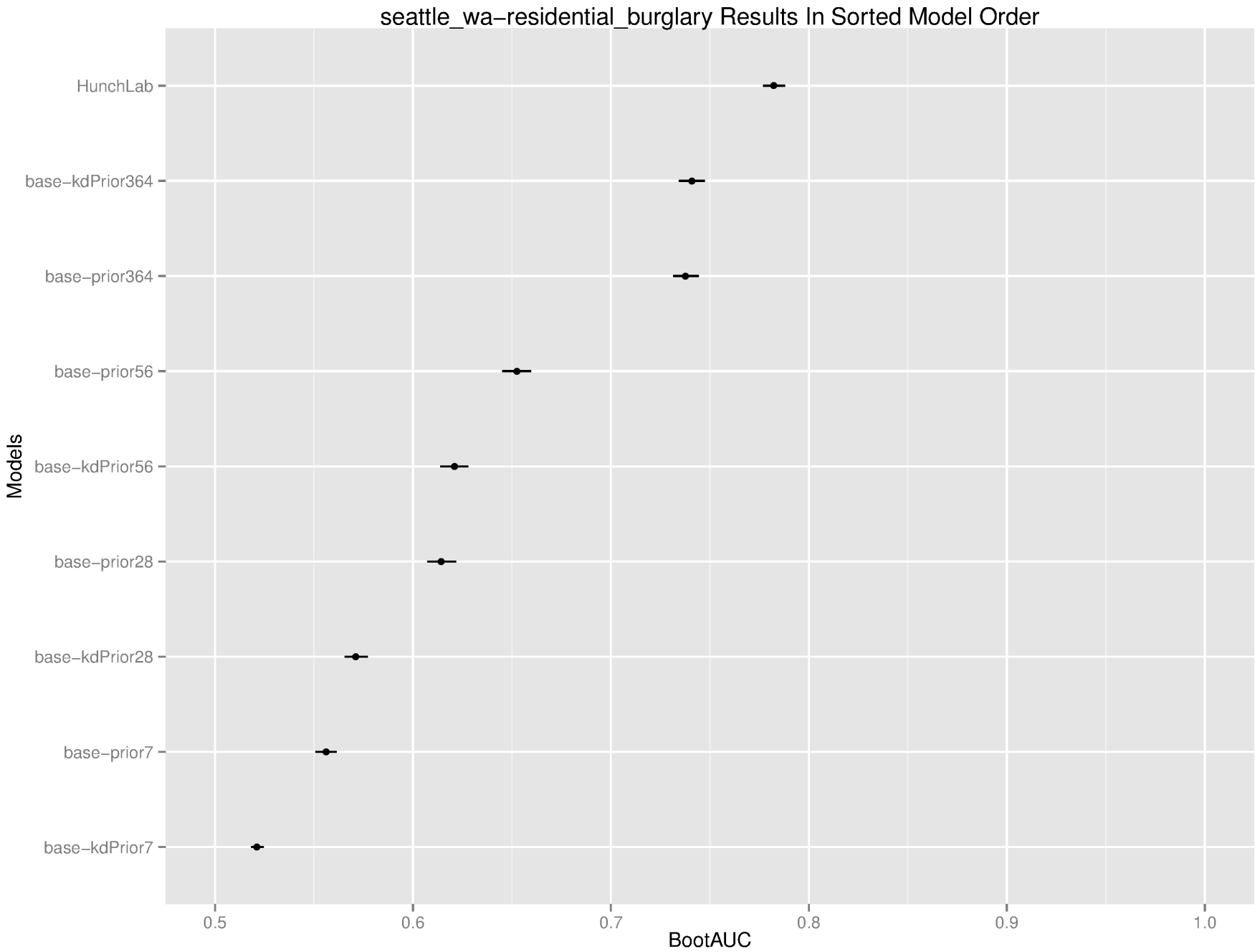

seattle_wa−commercial_burglary Results In Sorted Model Order
HunchLab
base−prior364
base−kdPrior364
base−prior56
base−prior28
base−kdPrior56
base−kdPrior28
base−prior7
base−kdPrior7
Models
0.5
0.6
0.7
0.8
0.9
1.0
BootAUC

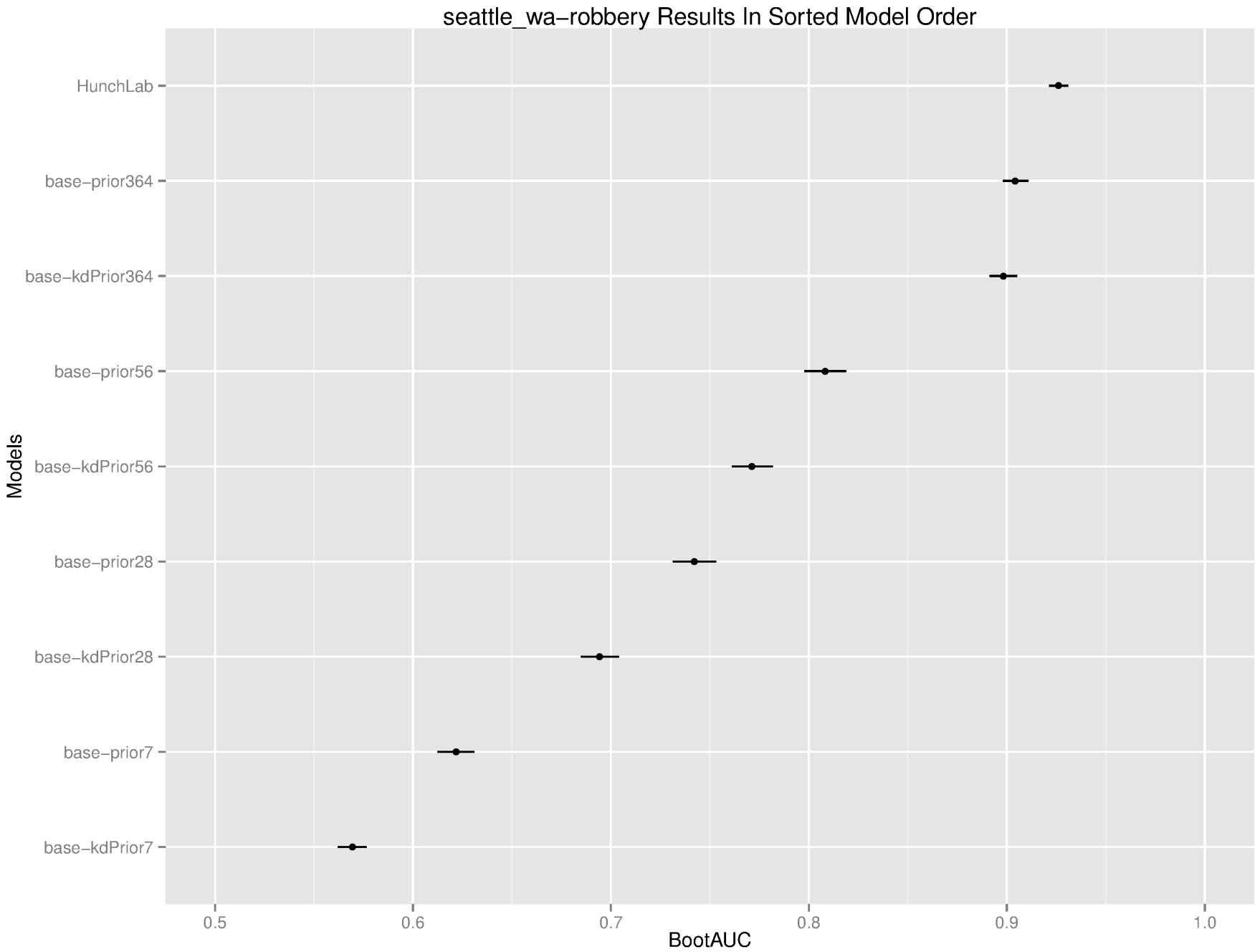

seattle_wa−guncrimes Results In Sorted Model Order
HunchLab
base−prior364
base−kdPrior364
base−prior56
base−prior28
base−kdPrior28
base−kdPrior56
base−kdPrior7
base−prior7
Models
0.5
0.6
0.7
0.8
0.9
1.0
BootAUC

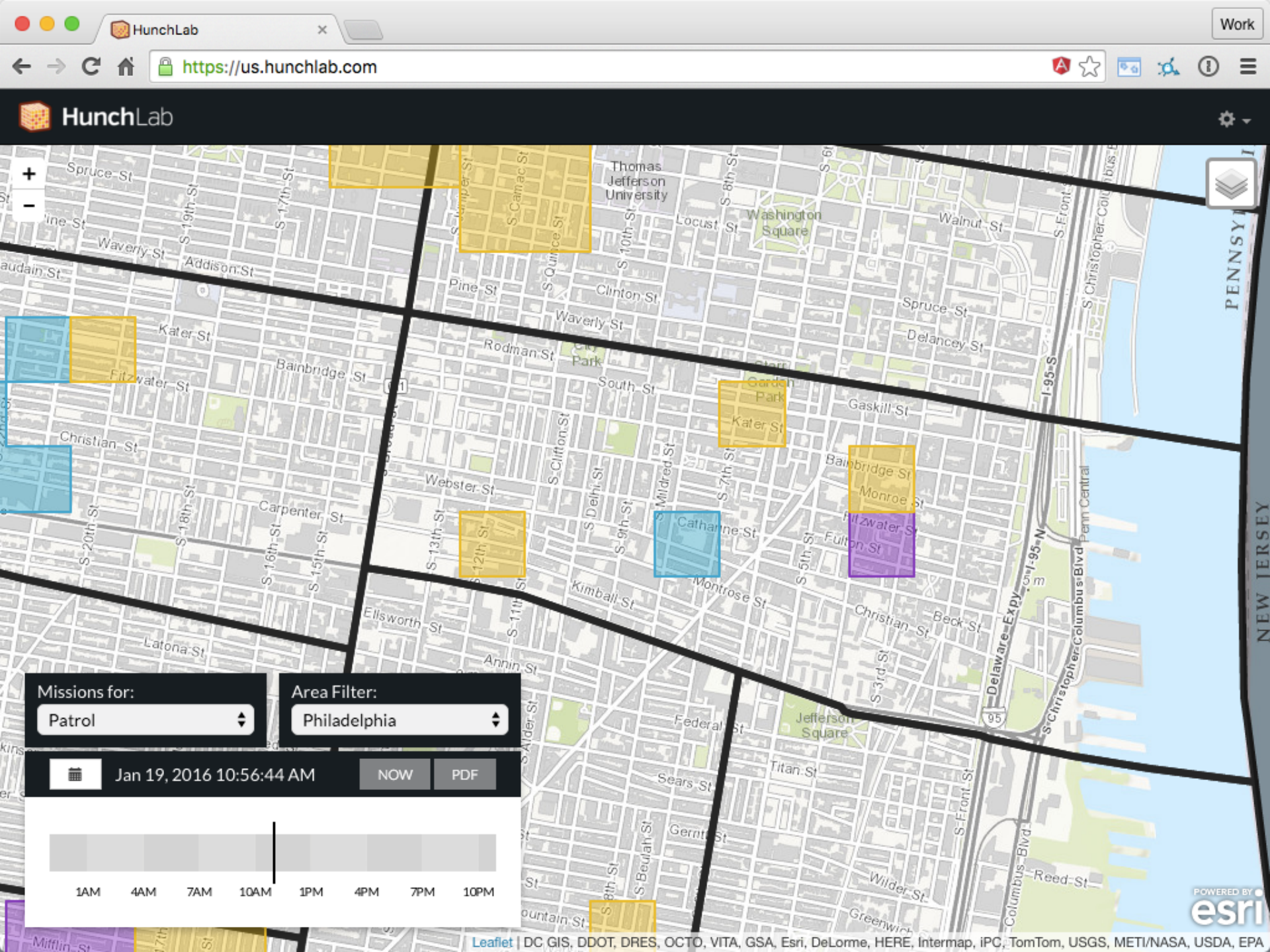

seattle_wa−larceny Results In Sorted Model Order
HunchLab
base−kdPrior364
base−prior364
base−prior56
base−kdPrior56
base−prior28
base−kdPrior28
base−prior7
base−kdPrior7
Models
0.5
0.6
0.7
0.8
0.9
1.0
BootAUC


seattle_wa−motor_vehicle_theft Results In Sorted Model Order
HunchLab
base−kdPrior364
base−prior364
base−prior56
base−prior28
base−kdPrior56
base−prior7
base−kdPrior28
base−kdPrior7
Models
0.5
0.6
0.7
0.8
0.9
1.0
BootAUC


seattle_wa−rape Results In Sorted Model Order
HunchLab
base−prior364
base−kdPrior364
base−prior56
base−kdPrior56
base−prior28
base−kdPrior28
base−prior7
base−kdPrior7
Models
0.5
0.6
0.7
0.8
0.9
1.0
BootAUC


seattle_wa−residential_burglary Results In Sorted Model Order
HunchLab
base−kdPrior364
base−prior364
base−prior56
base−kdPrior56
base−prior28
base−kdPrior28
base−prior7
base−kdPrior7
Models
0.5
0.6
0.7
0.8
0.9
1.0
BootAUC


seattle_wa−robbery Results In Sorted Model Order
HunchLab
base−prior364
base−kdPrior364
base−prior56
base−kdPrior56
base−prior28
base−kdPrior28
base−prior7
base−kdPrior7
Models
0.5
0.6
0.7
0.8
0.9
1.0
BootAUC

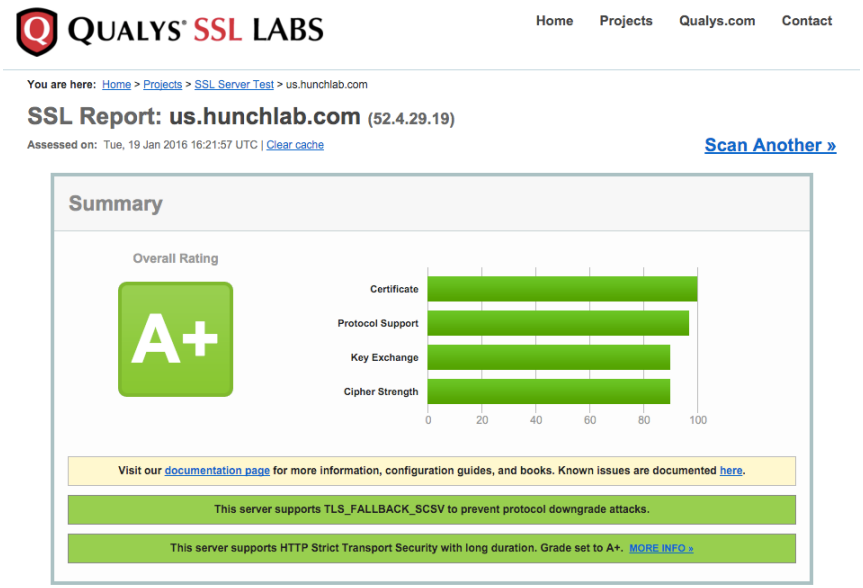

HunchLab
Work
https://us.hunchlab.com
HunchLab
Missions for:
Patrol
Area Filter:
Philadelphia
Jan 19, 2016 10:56:44 AM
NOW
PDF
1AM
4AM
7AM
10AM
1PM
4PM
7PM
10PM
Thomas Jefferson University
Washington Square
Rittenhouse Square Park
Jefferson Square
Spruce St
Pine St
Locust St
Walnut St
Delancey St
Waverly St
Clinton St
Rodman St
South St
Gaskill St
Kater St
Bainbridge St
Monroe St
Fitzwater St
Fulton St
Catharine St
Webster St
Carpenter St
Christian St
Kimball St
Montrose St
Ellsworth St
Latona St
Annin St
Federal St
Titan St
Sears St
Gerritt St
Wilder St
Reed St
Beck St
Greenwich
Columbus Blvd
Delaware Expy
I-95-S
I-95-N
Penn Central
S Christopher Columbus Blvd
S Front St
S Camac St
S Quince St
S Clifton St
S Delhi St
S Mildred St
S 6th St
S 7th St
S 10th St
S 11th St
S 12th St
S 13th St
S 15th St
S 16th St
S 17th St
S 18th St
S 19th St
S 20th St
S 3rd St
S 5th St
PENNSYLVANIA
NEW JERSEY
Leaflet | DC GIS, DDOT, DRES, OCTO, VITA, GSA, Esri, DeLorme, HERE, Intermap, iPC, TomTom, USGS, METI/NASA, USDA, EPA
POWERED BY esri

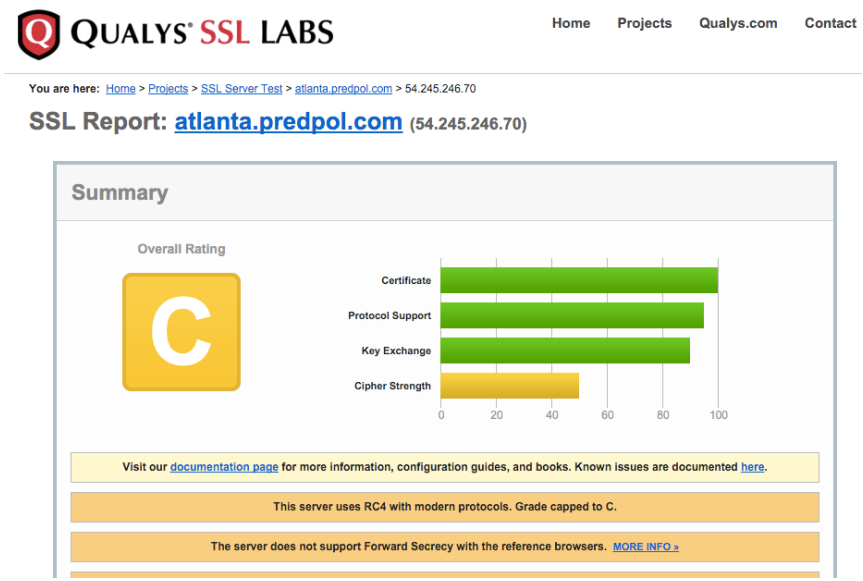
Security / Architecture

- Managed subscription service
  - Hosting, security fixes, updates, 2nd tier support, training
- Hosted within Amazon Web Services
  - Redundantly hosted in multiple data centers in US
    - Availability Zone concept
  - Highly secure environment
  - Multi-tenant application
  - Infrastructure as code
    - Reproducible & auditable
    - Could run stack within a client's AWS account

- Aligning with CJIS guidelines
  - CJIS is not a certification, per se
  - Examples
    - Encryption in transit/rest within datacenter
    - Access audit logs
      - HunchLab API logs
      - AWS administration audit logs
    - Two factor authentication for admins
    - Password policies / SAML delegation

- Browser -> HunchLab servers communication
  - TLS 1.1/1.2 encryption
  - FIPS 140-2 recommended ciphers

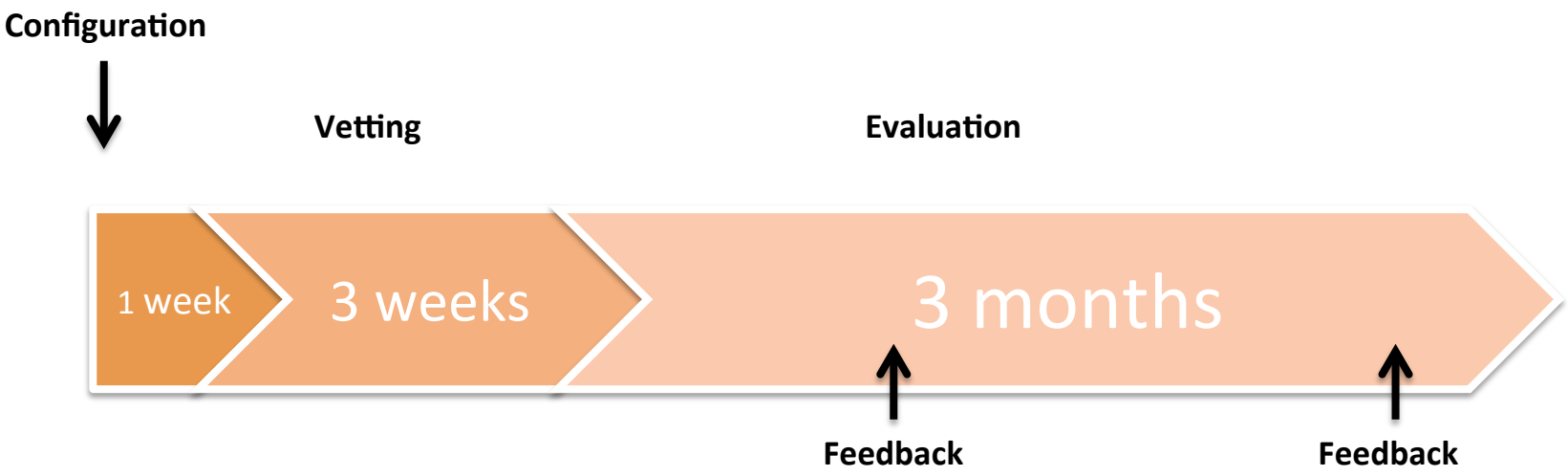




Implementation / Timeline

HunchLab

Pilot Program



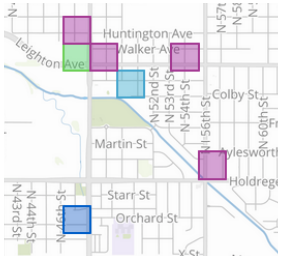
When	What	Who
Sprint 1	**OBJECTIVE: Project Planning & Integration Requirement Fulfillment**	
	Kickoff meeting	**Both**
	Crime data requirements meeting	**Both**
	Contextual geographic/temporal data requirements meeting	**Both**
	Authentication requirements meeting	**Both**
	Define CSV template or database view structure	**Both**
	Create crime database view or CSV export routine	**Client**
Sprint 2	**OBJECTIVE: Integration configuration**	
	Create integration utility	**Azavea**
	Create HunchLab administrative accounts for client	**Azavea**
Sprint 3	**OBJECTIVE: Live Data Integration**	
	Deployment of integration utility	**Both**
	Integration utility support	**Azavea**
	Validation of imported event data	**Both**
	Validation of authentication system	**Both**
	Administrative Training (1st Pass)	**Azavea**
	Configure system-level settings	**Azavea**
Sprint 4	**OBJECTIVE: Model Configuration**	
	Configure crime classifications	**Both**
	Configure polygon hierarchies	**Both**
	Configure models	**Both**
	Configure police resources	**Both**
	Configure shifts	**Both**
	Configure contextual geographic variables (optional)	**Azavea**
	Support configuration work	**Azavea**
Sprint 5	**OBJECTIVE: System training and validation**	

New Developments

Predictive Accuracy

Usable Software

Predictive Missions



+ Effective Tactics

= Harm Reduction

Advisor

POLICE FOUNDATION

Advancing Policing Through Innovation and Science

5 THINGS YOU NEED TO KNOW ABOUT HOT SPOTS POLICING & THE "KOPER CURVE" THEORY

"Hot spots" policing is highly effective, and many police leaders use the term to describe their policing strategy. This is not surprising in that a substantial amount of crime is produced in a few small areas (i.e., streets segments or blocks). In some cases, as much as 50% of calls for service or incidents of crime can be found in less than 5% of places (e.g., blocks) (Weisburd, D., 2015). However, while hot spots policing may positively impact crime, police leaders should consider using the "Koper Curve" Principle to maximize crime reduction and increase community satisfaction and legitimacy. The Koper Curve, emanating from the Minneapolis Hot Spots Policing experiment and tested in Sacramento, suggests that random 10-15 minute patrols at least every two hours in hot spots optimized deterrence.

1 "HOT SPOTS" POLICING IS EFFECTIVE

Research has demonstrated that hot spots policing can be an effective crime reduction strategy. This finding is confirmed in George Mason University's Evidence-Based Policing Matrix and in the U.S. DOJ's CrimeSolutions.gov, a "what works" clearinghouse.

2 WHAT OFFICERS DO IN HOT SPOTS MATTERS

Simply telling officers to patrol hot spots, to increase misdemeanor arrests in those areas or to remain stationary in those areas for prolonged periods of time is costly and impractical. The Koper Curve offers a more practical and efficient approach.

3 PROACTIVE 10-16 MINUTE STOPS IN HOT SPOTS MAXIMIZES DETERRENCE

Intermittent patrol of micro-hot spots (street segments or blocks) of 10-16 minutes at least every two hours extends deterrence. According to Koper (1995), the likelihood of crime or disorder within 30 minutes after a patrol drive through was 15%; for stops of 10-16 minutes, the likelihood was reduced to 4%, causing deterrence to "peak."

4 HOT SPOT VISITS OR STOPS MUST BE RANDOM AND INTERMITTENT

To ensure that the patrols do not become predictable and therefore avoidable, patrols in micro-hot spots should be random and intermittent, as opposed to regularly scheduled, e.g., every two hours. CAD and Automated Vehicle Locators (AVLs) can be used to monitor and deploy patrol in hot spots.

5 THE BENEFITS OF USING KOPER CURVE THEORY GO BEYOND CRIME REDUCTION

In addition to reducing Part I crimes in hot spots, using the Koper Curve Principle to guide deployment and patrol strategy makes better use of officer time. By increasing visibility and positive community engagement within hot spots, agencies are likely to enhance community trust and legitimacy, which may further impact crime reduction and improve satisfaction.

When combined with situational and problem-oriented policing strategies implemented by patrol officers and other units or officers, hot spots policing using the Koper Curve Principle can enhance policing effectiveness, thereby substantially reducing crime not only in hot spots, but possibly the jurisdiction overall. Law enforcement leaders should remember it is also important for patrol and community policing units to engage the community using problem-solving approaches to eliminate conditions that may facilitate crime, including vacant properties, poor lighting, nuisance and public order offenses, and debris and graffiti.

The Police Foundation is the oldest nationally-known, non-profit, non-partisan, and non-membership-driven organization dedicated to improving America's most noble profession – policing. The Police Foundation has been on the cutting edge of police innovation for 45 years since it was established by the Ford Foundation as a result of the President's Commission on the Challenge of Crime in a Free Society.

POLICE FOUNDATION

www.policefoundation.org | 202.833.1460 | follow us on Twitter @PoliceFound

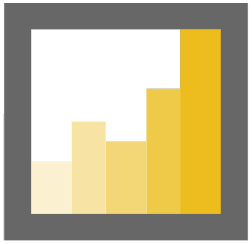
PROACTIVE 10-16 MINUTE STOPS IN HOT SPOTS MAXIMIZES DETERRENCE

5 Things You Need To Know About Hot Spots Policing & The "Koper Curve" Theory, Police Foundation

Mission Cell Treatments

Count	Treatment	Category
167	High Visibility Patrol of Streets	1
16	Conducted a Traffic Stop	2
18	Made Contact and Conversation with Public	3
2	Completed a Field Interview Sheet	4
4	Made contact with a Business Owner	5
0	Provided Crime Prevention Information	6
68	Stationary and Visible, writing reports	7
5	Other (foot patrol)	8
11	Null	9
1, 7 or 1, 2 or 1, 3 basic combination used		

Source: Greensboro PD



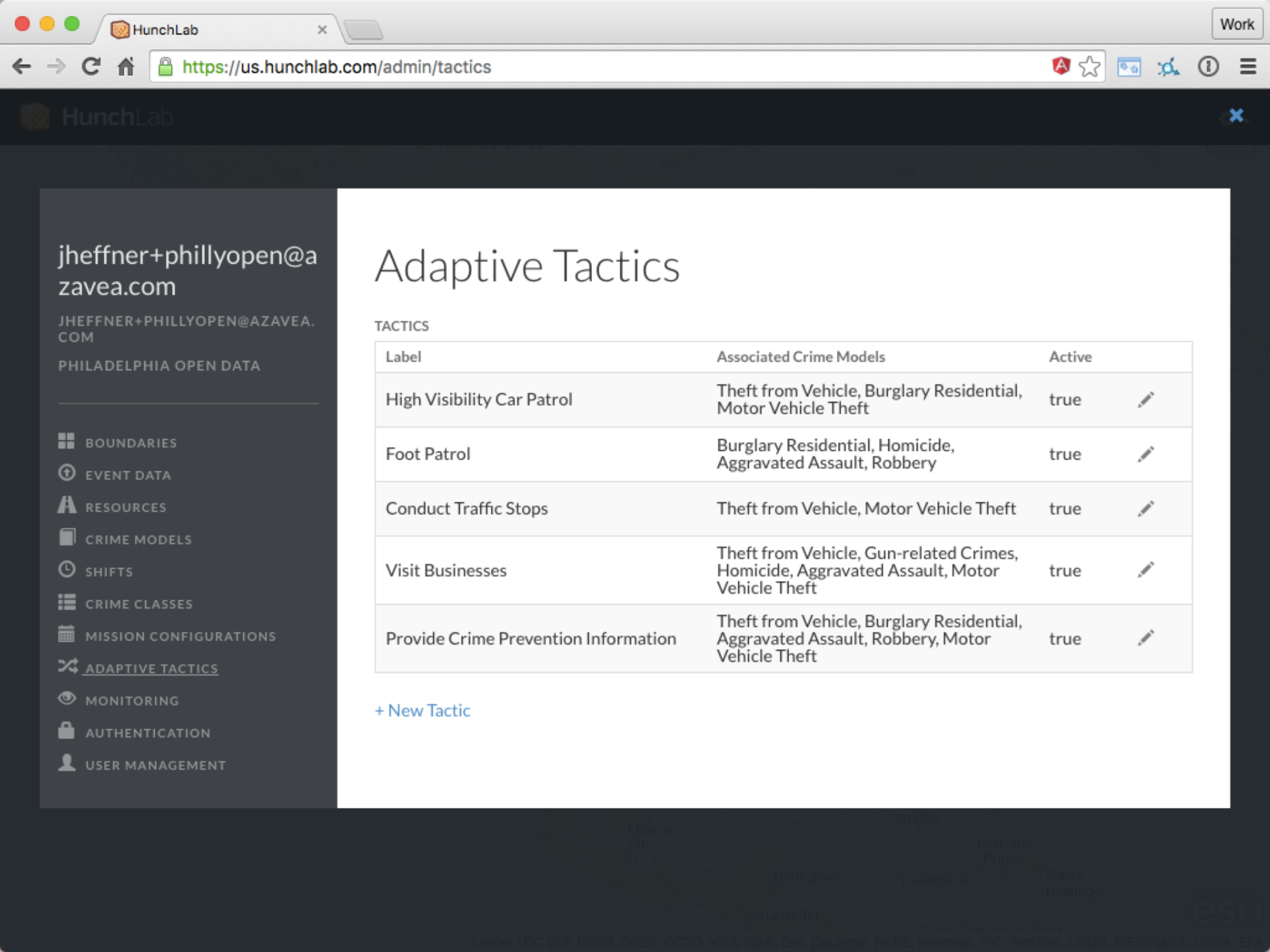
Adaptive Tactic

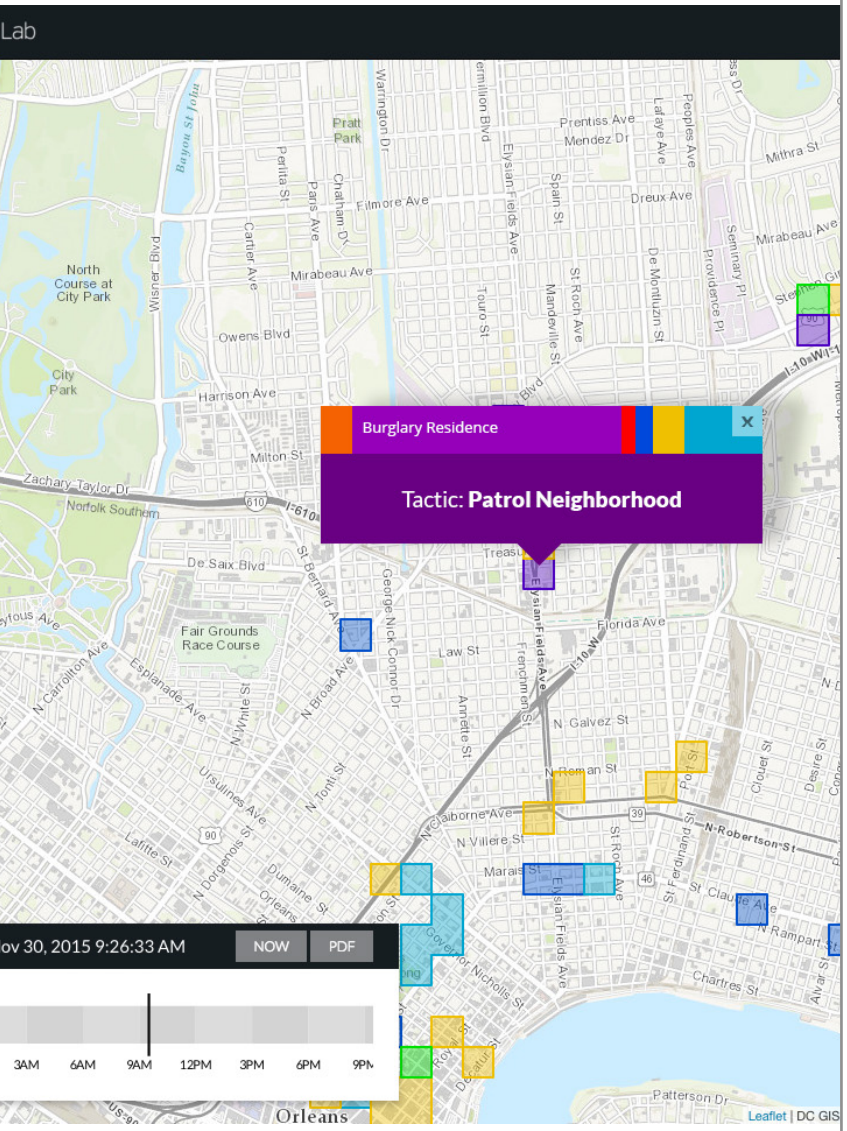
Idea is to respond to residential burglary missions with one of:

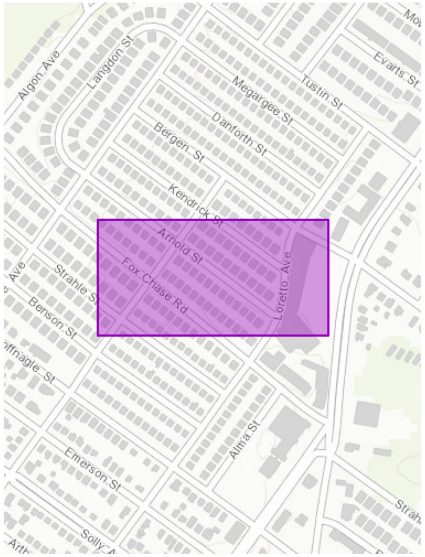
- High visibility patrol
- Foot patrol
- Foot patrol w/ literature distribution

Want recommendations on-the-fly for each burglary mission

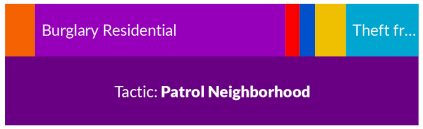
Advisor keeps track of outcomes and balances applying the current “best” response with exploring the other options

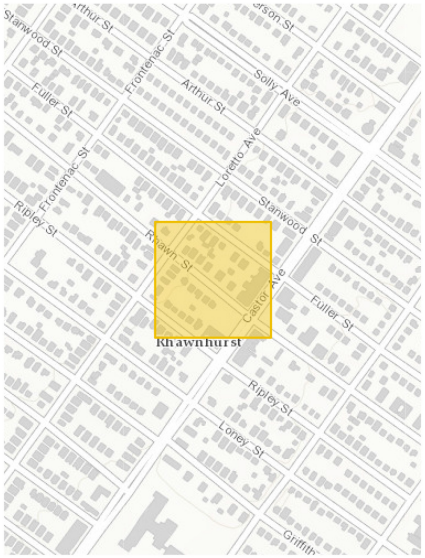

HunchLab
Work
https://us.hunchlab.com/admin/tactics
HunchLab
jheffner+phillyopen@azavea.com
JHEFFNER+PHILLYOPEN@AZAVEA.COM
PHILADELPHIA OPEN DATA
BOUNDARIES
EVENT DATA
RESOURCES
CRIME MODELS
SHIFTS
CRIME CLASSES
MISSION CONFIGURATIONS
ADAPTIVE TACTICS
MONITORING
AUTHENTICATION
USER MANAGEMENT
Adaptive Tactics
TACTICS
Label
Associated Crime Models
Active
High Visibility Car Patrol
Theft from Vehicle, Burglary Residential, Motor Vehicle Theft
true
Foot Patrol
Burglary Residential, Homicide, Aggravated Assault, Robbery
true
Conduct Traffic Stops
Theft from Vehicle, Motor Vehicle Theft
true
Visit Businesses
Theft from Vehicle, Gun-related Crimes, Homicide, Aggravated Assault, Motor Vehicle Theft
true
Provide Crime Prevention Information
Theft from Vehicle, Burglary Residential, Aggravated Assault, Robbery, Motor Vehicle Theft
true
+ New Tactic





Mission Area 1





Mission Area 2

Sidekick Demo

HunchLab