Predictive Perspectives 2011

IBM

Fighting Crime with Predictive Analytics

How Predictive Analytics Can Help Focus Efforts and Reduce Crime

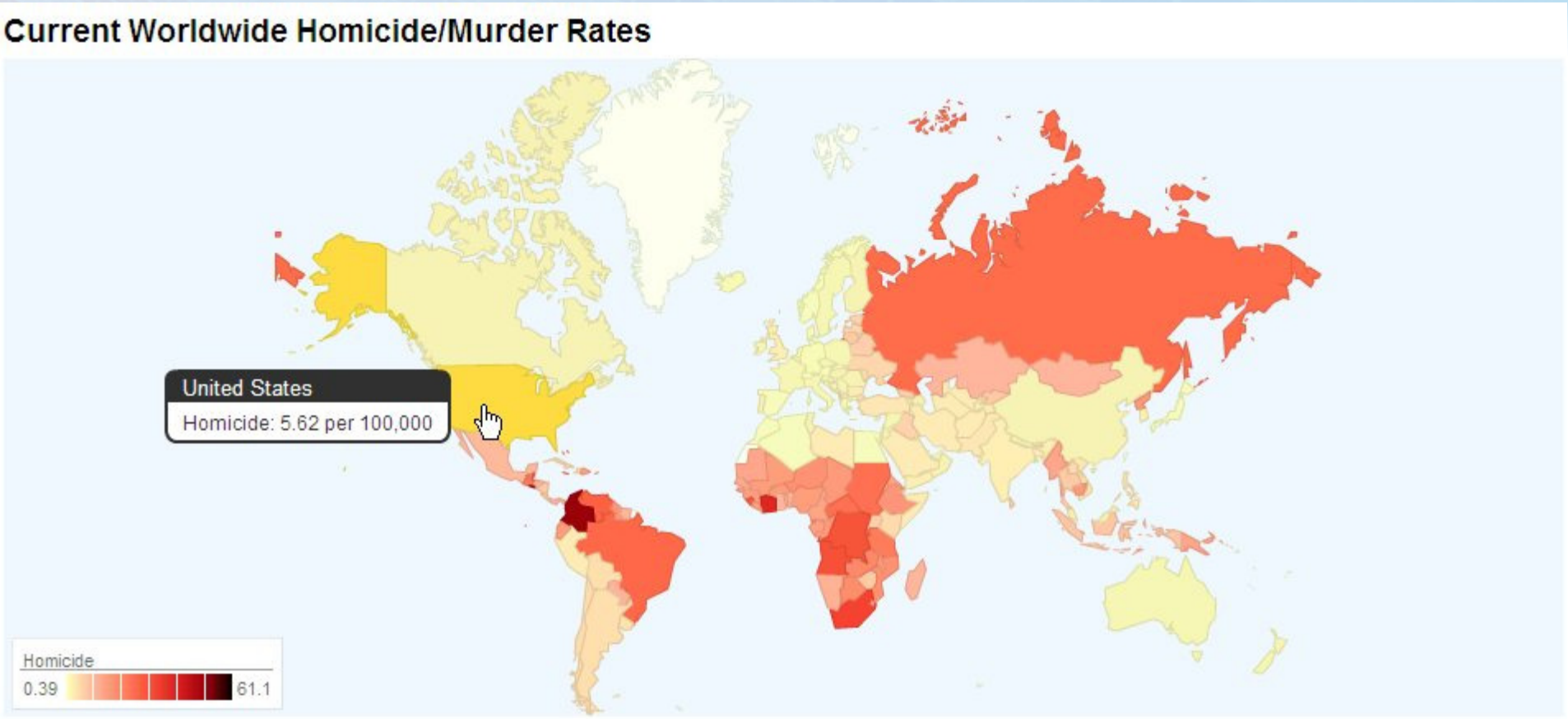
Business Analytics

www.spss.com/perspectives

Introduction

- Trends and Headlines
- How Data is Changing Policing
  - Data explosion
  - Use of Information Technology
- Role of Predictive Analytics in Policing
  - Customer Story: The Richmond Police
- Two Scenarios
  - Profiling
  - Decisioning
- Wrap Up

A View into Crime: A Global View



Recent Headlines

Police face cuts as economy falters

Baltimore Police Sue Over City Budget Cuts

Police vs. City Council on Oakland budget cuts

Budget cuts force city police to park cycles; sale next?

Amid Police Budget Cuts, Ohio Judge Urges Public to Arm Themselves

Trends Impacting Use of Predictive Analytics in Policing

- Explosion of electronically-available data
  - Electronic record-keeping
  - Warehousing
  - Linkage

Information Explosion

In volume.

15 petabytes

Amount of new information being generated every day, 8x more than the information in all U.S. libraries.

200 billion

More than 200 billion emails are sent every day.

988 exabytes

Amount of digital information that will exist in 2010—equivalent to a stack of books from the sun to Pluto and back.

In variety.

80%

New data growth that is unstructured content, generated largely by email, with increasing contribution by documents, images, video and audio.

30 billion

By 2010, up to 30 billion RFID tags will be produced globally, embedded into products, passports, buildings—even animals.

$5.7 million

For every 1,000 knowledge workers it employs, a company loses $5.7 million annually in time wasted reformatting information between applications.

Police Departments Capitalize on Information Technology

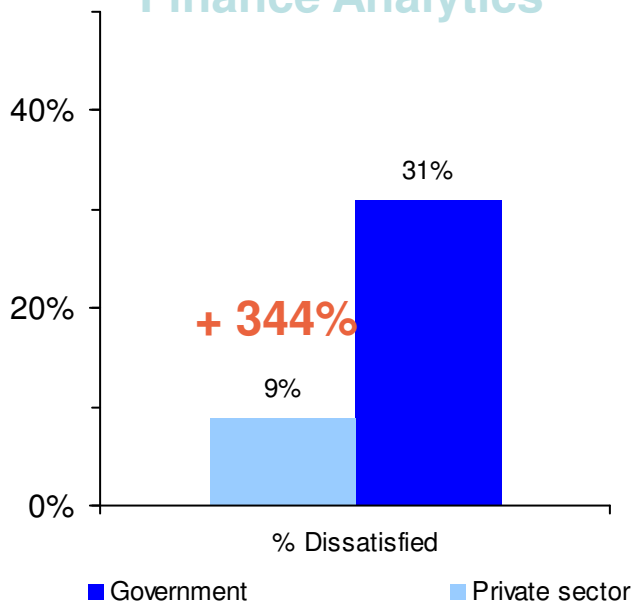
Finnish Defence Forces: SOA service reuse enables a projected 80% reduction in time required to develop new C4 systems. Consolidation and virtualization leads to a projected 75% reduction in required infrastructure.

NYPD Crime Information Warehouse: Gives officers mobile access to more than 120 million criminal complaints, arrests and 911 records, as well as 5 million criminal records, parole files and photographs.

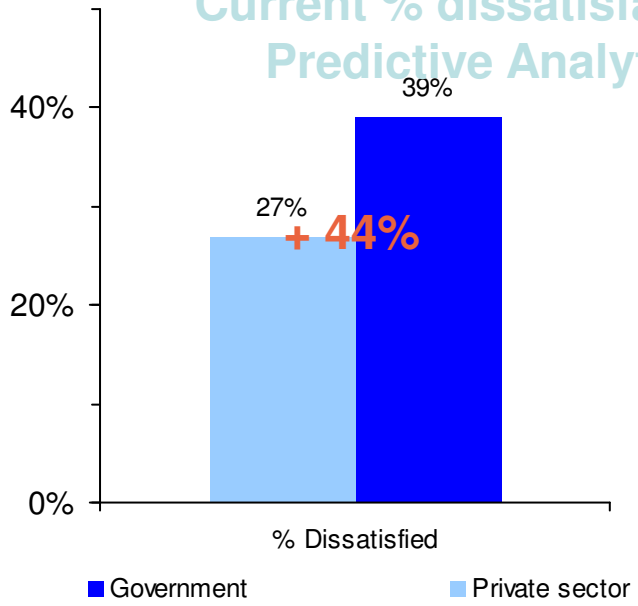
Informed, Real-Time Decisions at the Point of Impact

Public Sector CFOs View of Analytical Capabilities

Current % dissatisfaction: Finance Analytics



Current % dissatisfaction: Predictive Analytics



"We tend to react well but anticipate poorly" – Canadian CFO

Source: IBM Global CIO Study 2010; March 2010 (at www-935.ibm.com/services/uk/cfo/cfostudy2010)

Crime Prediction and Prevention

- Analyze crime statistics, predict incidents in time and space and facilitate collaboration within and across policing departments.
  - **Planning tools:** allow municipalities to analyze history, set future objectives and metrics, and build execution plans.
  - **Scorecards and dashboards:** enable municipalities to monitor and respond to key metrics.
  - **Reports and analysis:** guide users to the issues to be addressed or resolved quickly.
  - **Predictive analytics:** profile crimes and criminals to improve solved crime rates and optimize resource usage.

Crime Prediction and Prevention

What Can Predictive Analytics Do For You?

- Deliver a foundation for more proactive law enforcement /policing.
- Provide greater predictive analysis and data mining from disparate data sources.
- Respond to inquiries, requests for services and investigative actions in a timely manner and increase citizen satisfaction.
- Increase quality of decisions by providing more insightful, actionable reporting.
- Redeploy resources effectively to meet objectives that evolve over time.
- Reduce operational and IT costs by providing self-service reporting and analysis to users.

Richmond Police Department

Effective force deployment lowers cost and crime

Challenge

- Needed a solution that could identify trends and patterns that might indicate how to best deploy forces to prevent crime or determine whether or not a threat is real.

Solution

- **Using IBM SPSS, analysts are able to identify actionable patterns and make high quality decisions by fully exploiting huge data sets.**
  - Incident reports
  - Crime tips
  - Calls for service

Results

- **Facilitated the deployment of officers to where they were most needed.**
- **Identified minor crimes likely to escalate into violence.**
- **Accelerated the criminal investigation process.**

Richmond Police Department

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"IBM SPSS Modeler and data mining represent a revolution in our ability to access previously unobtainable data, and pull meaning and value from it. This is as close to a crystal ball as we are ever going to get."

Colleen McCue, program manager for the Department's Crime Analysis Unit

Applying Predictive Analytics
Examples of Usage Scenarios

- Profiling
  - Using all available data to create profiles of crimes and criminals to improve solved crime rates
- Decisioning
  - Using predictive analytics to proactively manage resource deployment

Profiling Scenario

BUSINESS SCENARIO: POLICING - PROFILING

Johnny is arrested for breaking into a car

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Will he become a repeat offender?

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Crime Data

Crime record notes and call logs

Surveillance Data

Communication Data

Financial Data

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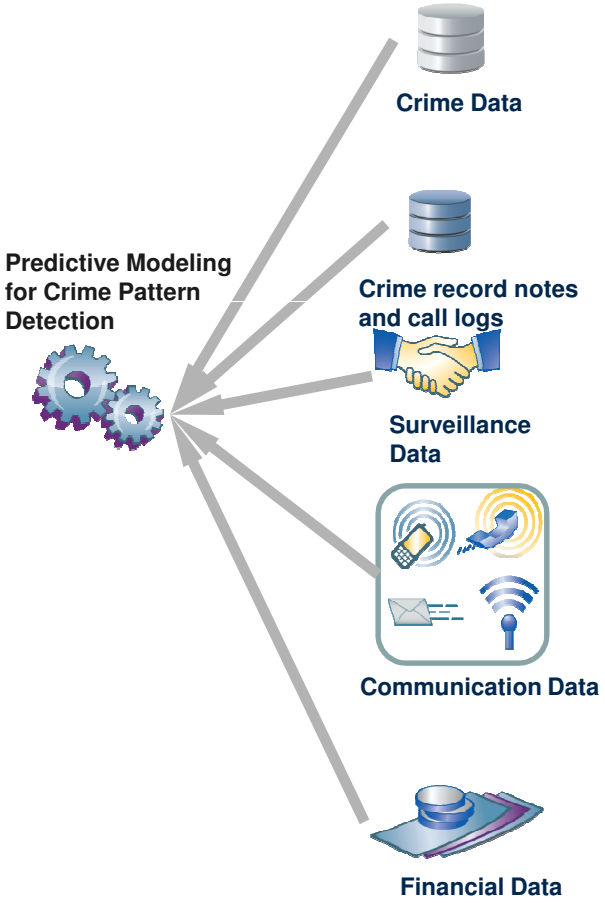

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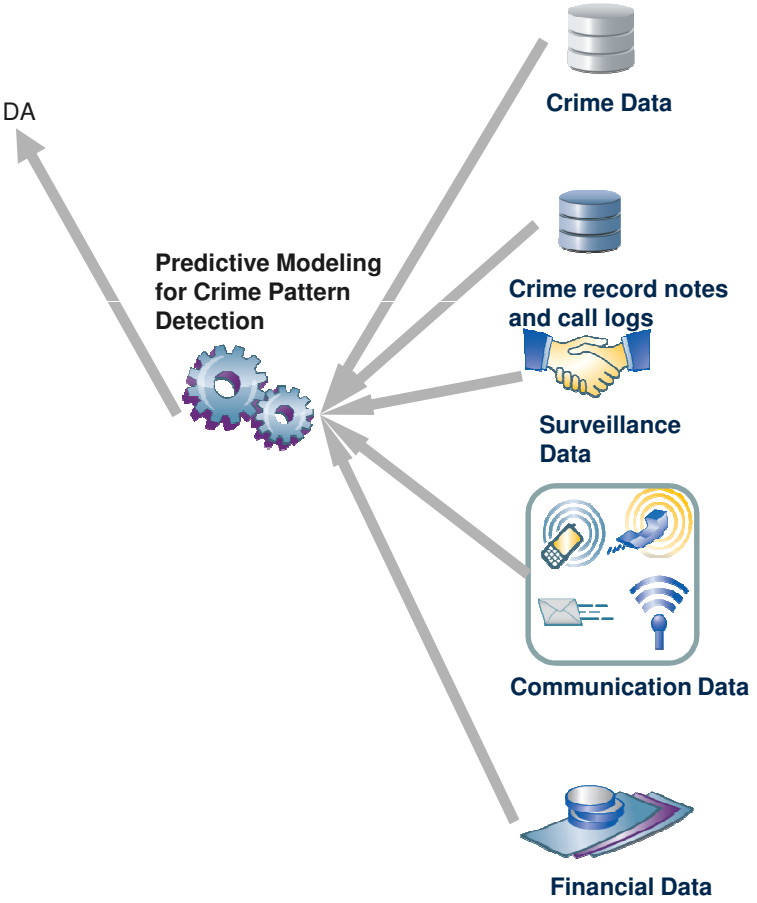

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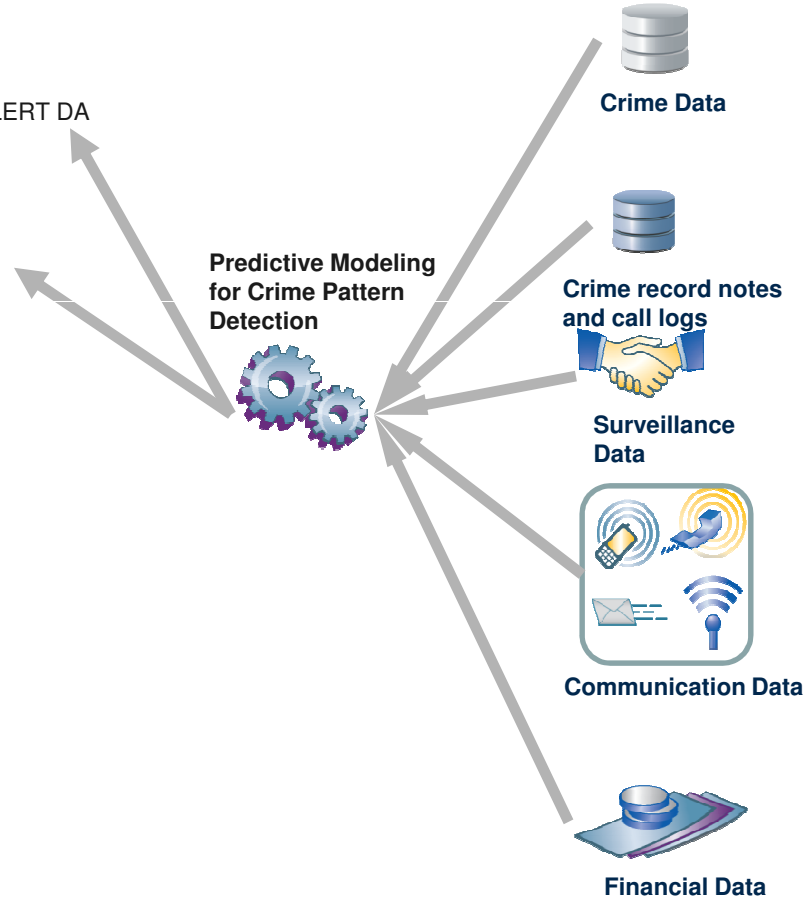

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Predictive Modeling for Crime Pattern Detection

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Crime record notes and call logs

Surveillance Data

Communication Data

Financial Data

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Surveillance Data

Communication Data

Financial Data

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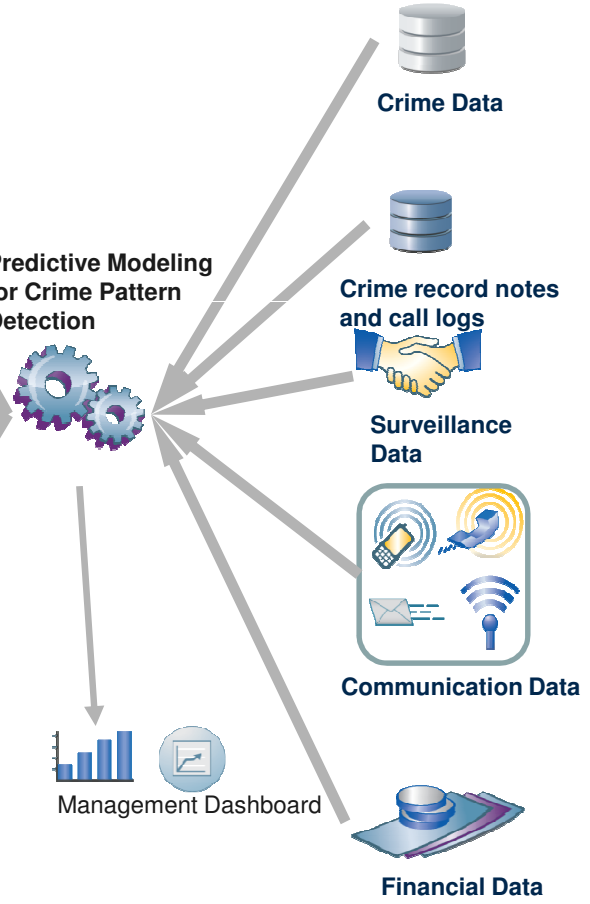

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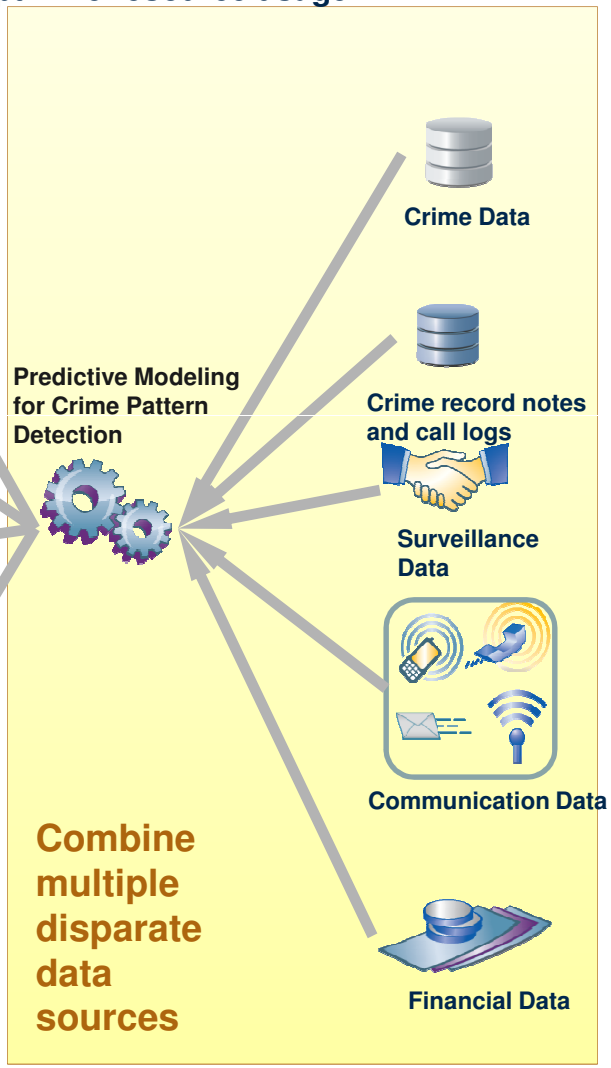

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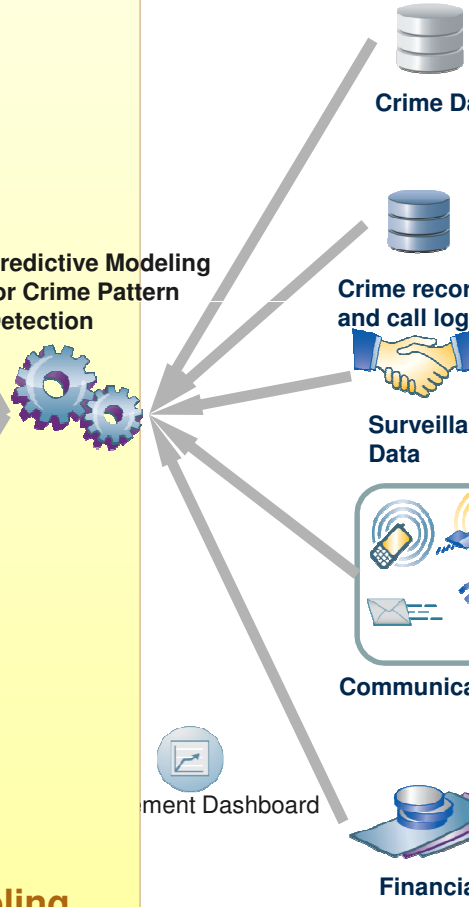

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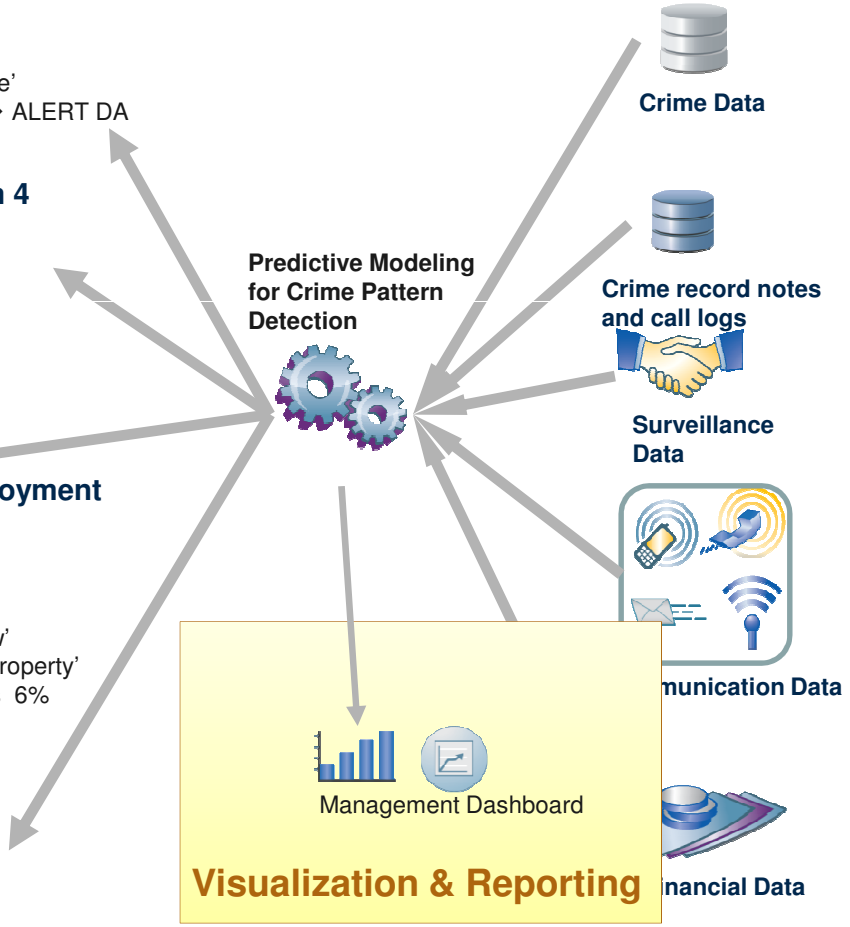

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Text Analytics

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Surveillance Data

Communication Data

Management Dashboard

Financial Data

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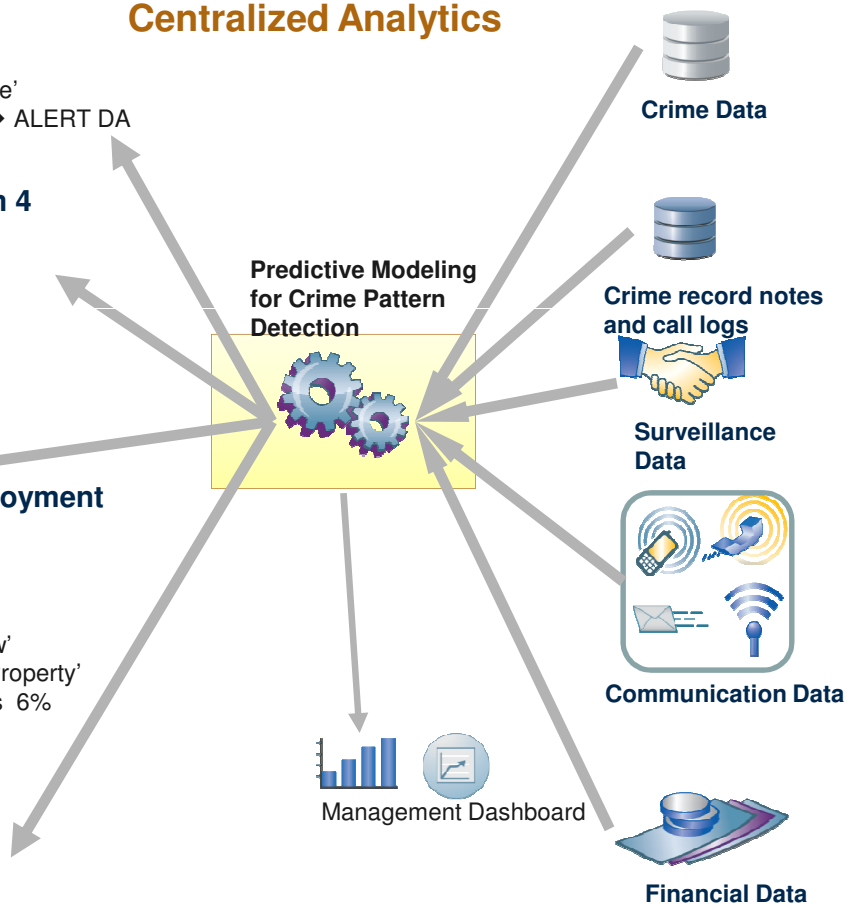

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A Break-in into a shop is reported
The perpetrators entered by breaking a window probably between 3am and 5am. Crime was discovered at 6 pm next day

Does it make sense to send out a CSI team?

Is it likely that they'll find useful evidence?

An organized crime unit wants to bust a drugs ring
The detectives are interested in identifying the central players within a narcotics network

Who are the key persons?

Who are the leaders?

Aspiring Repeat Offender profile
…
If male
And age 14-16
And crime ='car break in'
And motive ='peer pressure'
Then repeat risk is HIGH → ALERT DA
…

Crime profile → Team 4
Cluster 'Bogus Official'
- Burglary,
- Visit by city official,
- Entry 'Back door',
- Victim "Elderly'

CS profile → No Deployment
…
If Break In
And Night
And report>12hrs
And entry ='broken window'
And object='Commercial Property'
Then probability evidence is 6%
…

Efficient Execution

Key Players
Focus on:
- Keith Patterson
- Colin Wiertz
- Markus Haffey

Predictive Modeling for Crime Pattern Detection

Crime Data

Crime record notes and call logs

Surveillance Data

Communication Data

Management Dashboard

Financial Data

Business Objectives

PD uses predictive analytics to profile crimes & criminals to improve solved crime rates and optimize resource usage

Johnny is arrested for breaking into a car
He is 15 years old and confesses that he wanted to belong to a group of friends

Will he become a repeat offender?

If YES: advise DA and later parole officer?

Aspiring Repeat Offender profile
…
If male
And age 14-16
And crime ='car break in'
And motive ='peer pressure'
Then repeat risk is HIGH → ALERT DA
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The detectives are interested in identifying the central players within a narcotics network

Who are the key persons?

Who are the leaders?

Key Players
Focus on:
- Keith Patterson
- Colin Wiertz
- Markus Haffey

Prevention

Predictive Modeling for Crime Pattern Detection

Crime Data

Crime record notes and call logs

Surveillance Data

Communication Data

Management Dashboard

Financial Data

Business Functions

PD uses predictive analytics to profile crimes & criminals to improve solved crime rates and optimize resource usage

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- Victim "Elderly'

CS profile → No Deployment

…
If Break In
And Night
And report>12hrs
And entry ='broken window'
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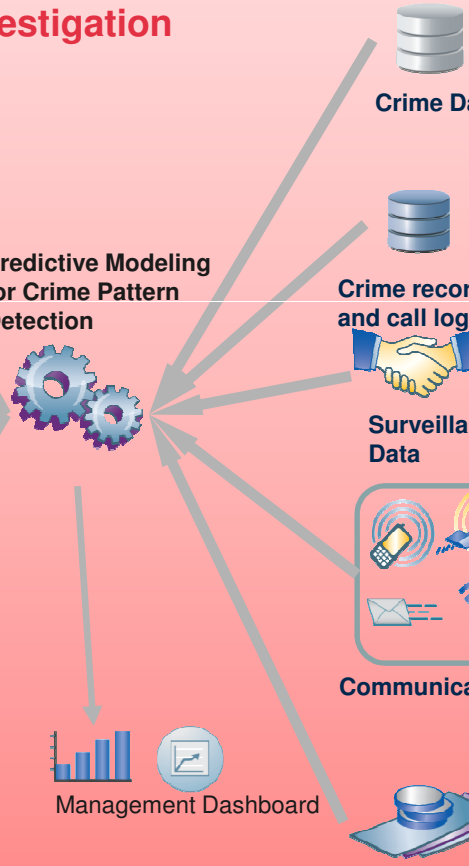
Then probability evidence is 6%
…

Key Players

Focus on:
- Keith Patterson
- Colin Wiertz
- Markus Haffey

Investigation

Predictive Modeling for Crime Pattern Detection



Business Functions

PD uses predictive analytics to profile crimes & criminals to improve solved crime rates and optimize resource usage

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Predictive Modeling for Crime Pattern Detection

CS profile → No Deployment
…
If Break In
And Night
And report>12hrs
And entry ='broken window'
And object='Commercial Property'
Then probability evidence is 6%

Resource Planning

…

Key Players
Focus on:
• Keith Patterson
• Colin Wiertz
• Markus Haffey

Management Dashboard

Crime Data

Crime record notes and call logs

Surveillance Data

Communication Data

Financial Data

PD uses predictive analytics to profile crimes & criminals to improve solved crime rates and optimize resource usage

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Case Management

Crime profile → Team 4
Cluster 'Bogus Official'
- Burglary,
- Visit by city official,
- Entry 'Back door',
- Victim "Elderly'

CS profile → No Deployment
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And Night
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And entry ='broken window'
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…

Key Players
Focus on:
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- Colin Wiertz
- Markus Haffey

Predictive Modeling for Crime Pattern Detection

Crime Data

Crime record notes and call logs

Surveillance Data

Communication Data

Management Dashboard

Financial Data

Business Functions

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- Entry 'Back door',
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Predictive Modeling for Crime Pattern Detection

Key Players
Focus on:
• Keith Patterson
• Colin Wiertz
• Markus Haffey

Intelligence Gathering

Crime Data

Crime record notes and call logs

Surveillance Data

Communication Data

ment Dashboard

Financial Data

Analytical Process

Crime Data

Crime record notes and call logs

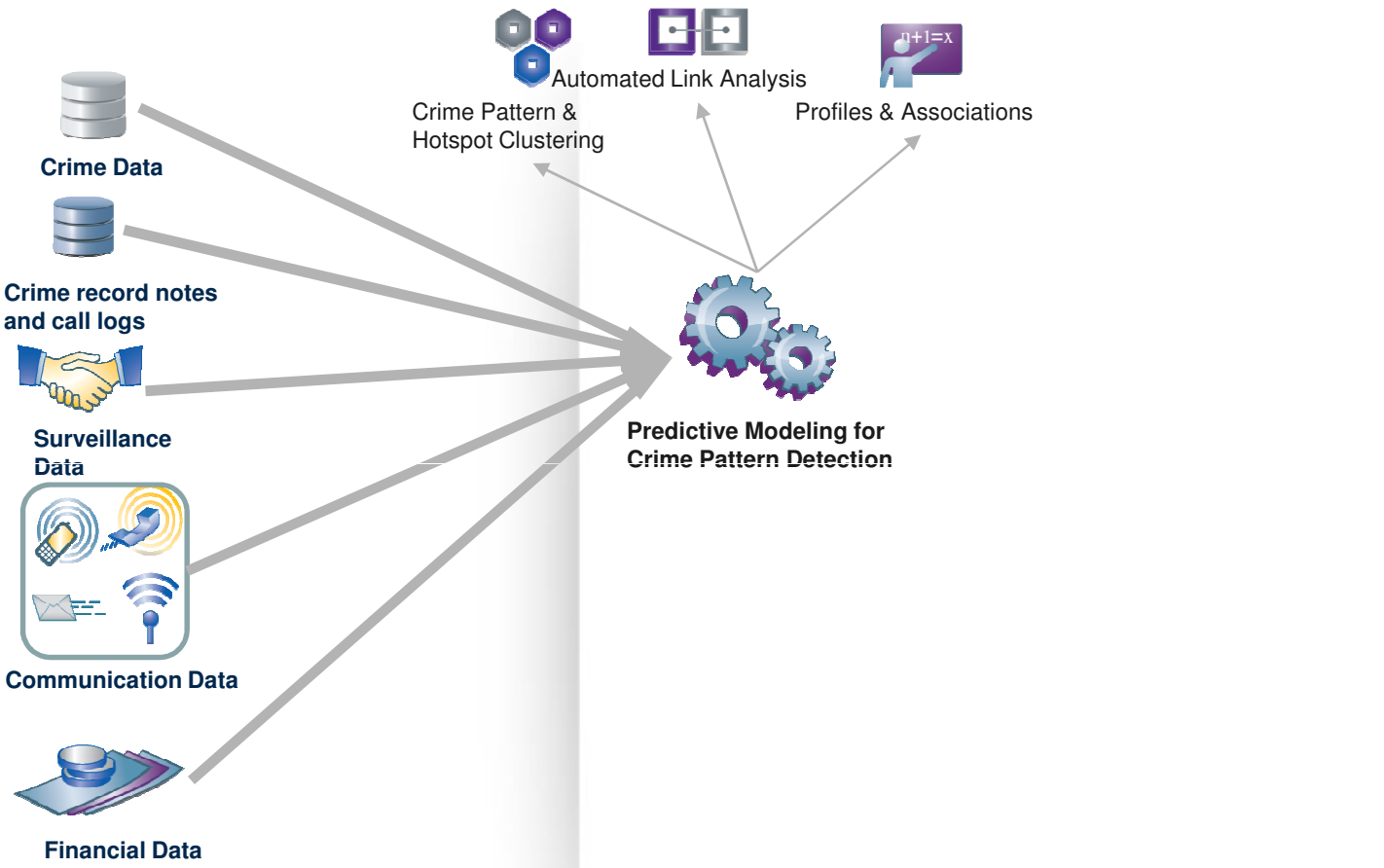
Surveillance Data

Communication Data

Financial Data

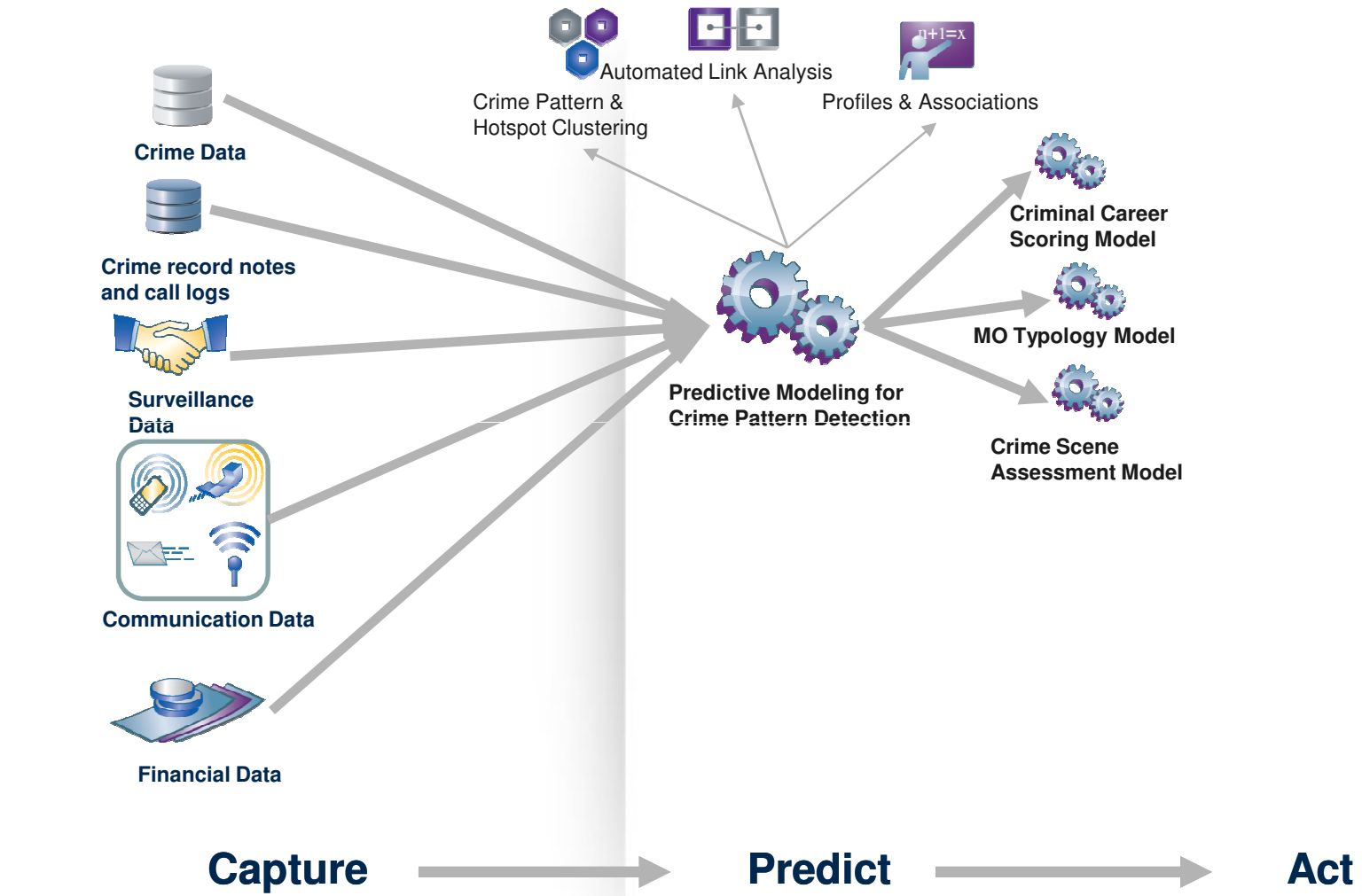
Capture → **Predict** → **Act**

Analytical Process

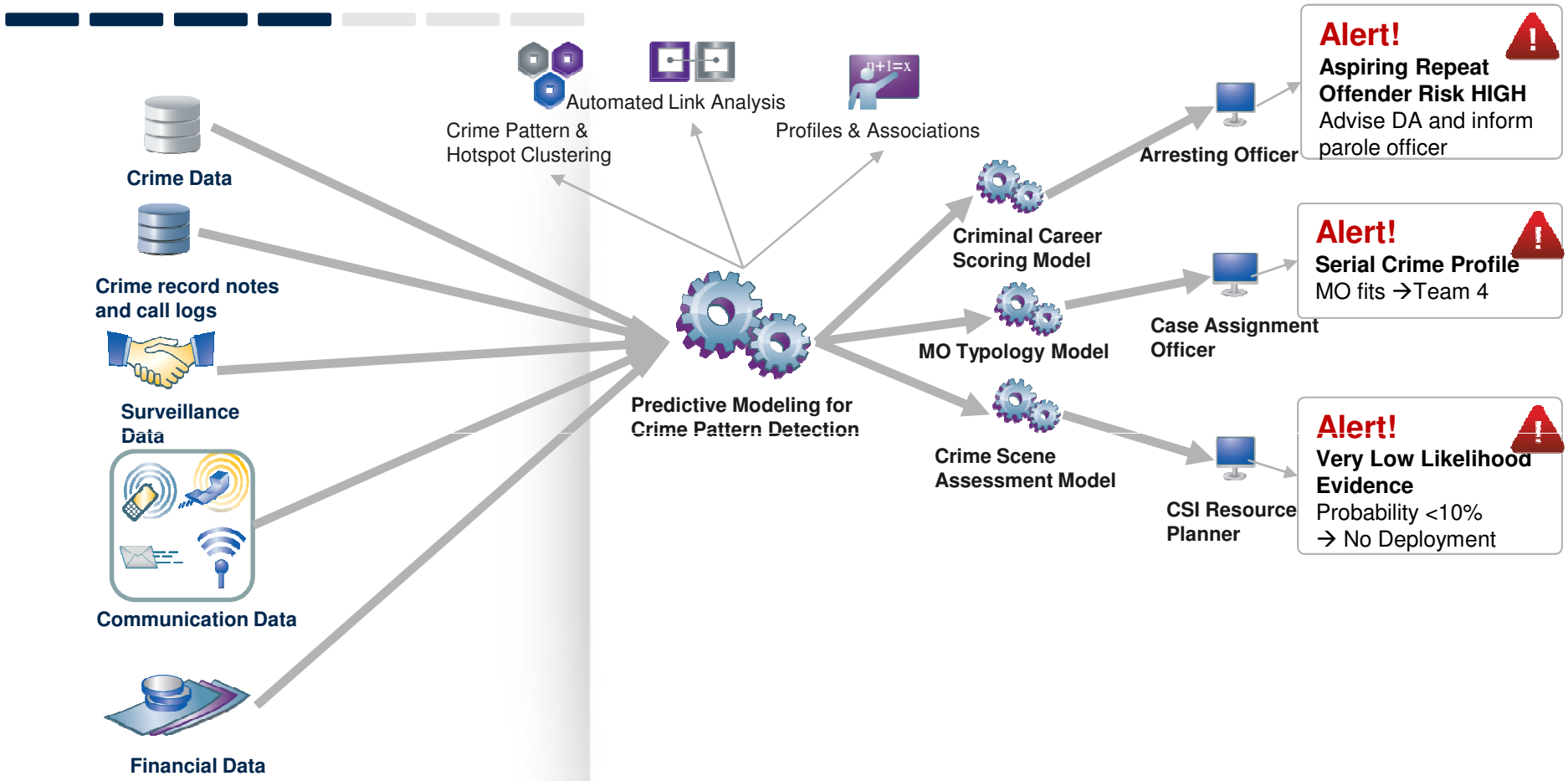


Capture → **Predict** → **Act**

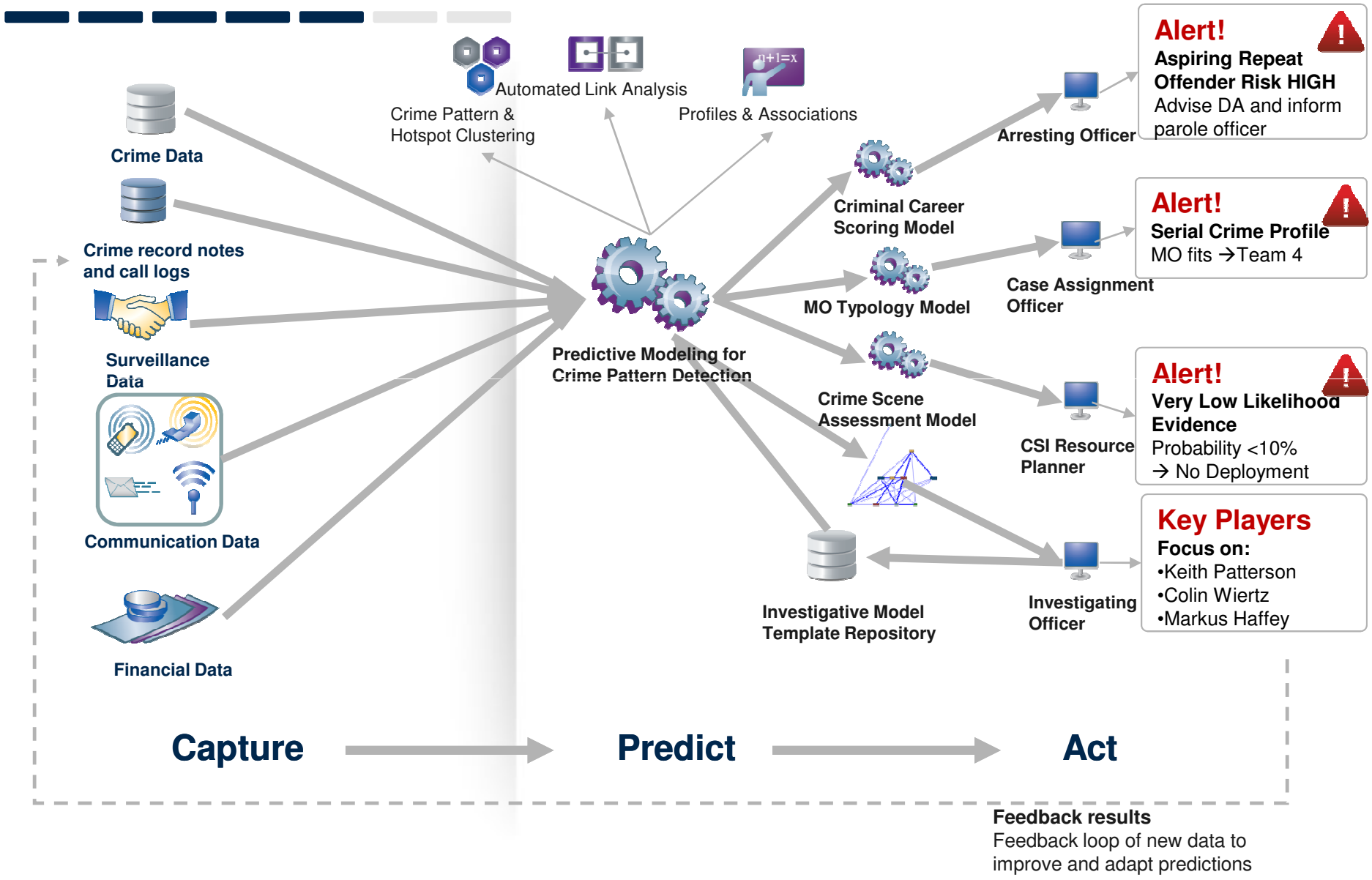
Analytical Process



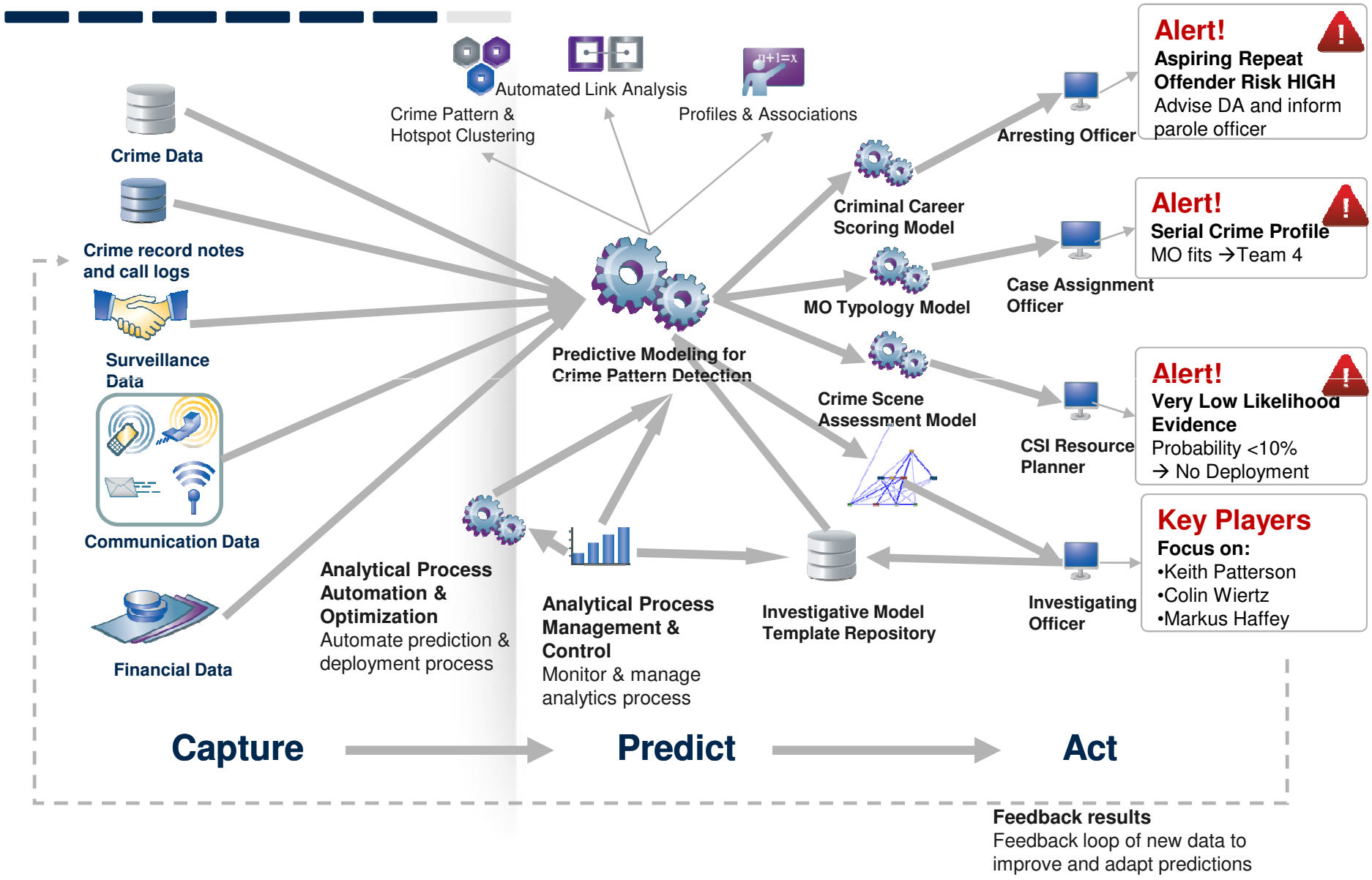
Analytical Process

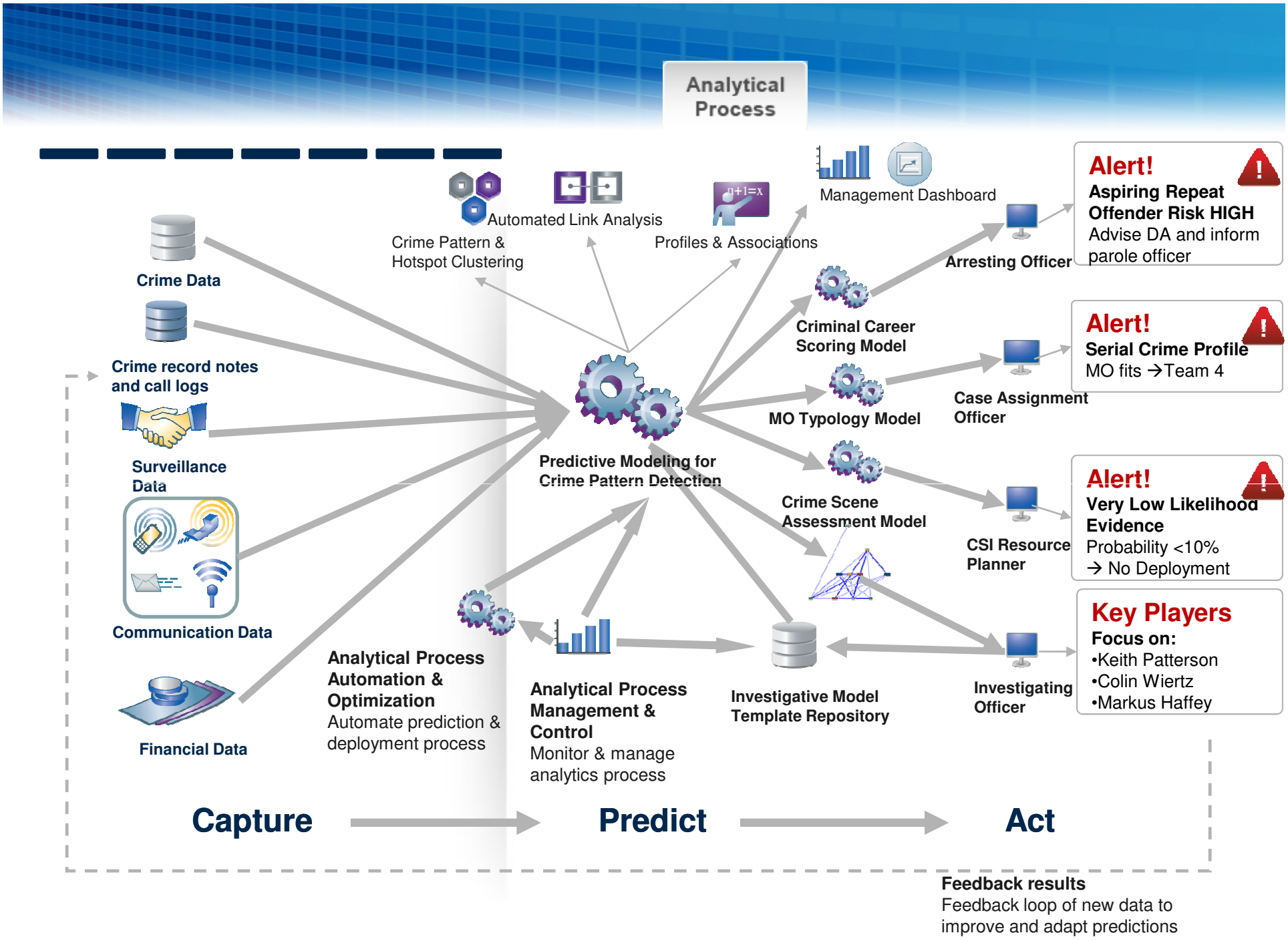


Analytical Process



Analytical Process




Analytical Process
Crime Data
Crime record notes and call logs
Surveillance Data
Communication Data
Financial Data
Automated Link Analysis
Crime Pattern & Hotspot Clustering
Profiles & Associations
Management Dashboard
Predictive Modeling for Crime Pattern Detection
Criminal Career Scoring Model
MO Typology Model
Crime Scene Assessment Model
Arresting Officer
Case Assignment Officer
CSI Resource Planner
Investigating Officer
Alert!
Aspiring Repeat Offender Risk HIGH
Advise DA and inform parole officer
Alert!
Serial Crime Profile
MO fits →Team 4
Alert!
Very Low Likelihood Evidence
Probability <10%
→ No Deployment
Key Players
Focus on:
•Keith Patterson
•Colin Wiertz
•Markus Haffey
Analytical Process Automation & Optimization
Automate prediction & deployment process
Analytical Process Management & Control
Monitor & manage analytics process
Investigative Model Template Repository
Capture
Predict
Act
Feedback results
Feedback loop of new data to improve and adapt predictions

Before Predictive Analytics

Ad hoc, limited data usage, coincidence driven

Johnny is arrested for breaking into a car

He is 15 years old and confesses that he wanted to belong to a group of friends

Will he become a repeat offender?

If YES: advise DA and later parole officer?

Entered in system. Recognized as Repeat Offender after n[th] arrest

A citizen reports a burglary

Reports that her house was burglarized while she was talking to a representative from the city council

Does this crime resemble others? Is it serial?

Do we have a team working on similar crimes that we can assign it to?

Entered in system and assigned based on case load and shift. Similarities with other crimes discovered by coincidence.

A Break-in into a shop is reported

The perpetrators entered by breaking a window probably between 3am and 5am. Crime was discovered at 6 pm next day

Does it make sense to send out a CSI team?

Is it likely that they'll find useful evidence?

Entered in system and assigned based on case load, shift, crime type and subjective judgment about availability of evidence.

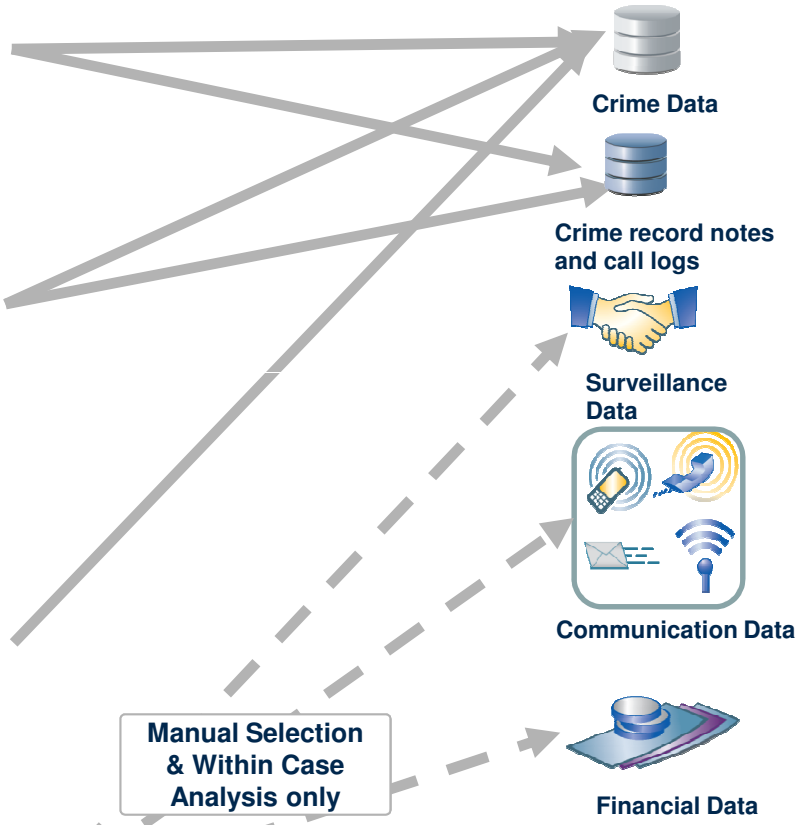
An organized crime unit wants to bust a drugs ring

The detectives are interested in identifying the central players within a narcotics network

Who are the key persons?

Who are the leaders?

Ad hoc query on known cases to manually detect relations and map those again manually in case management or crime analyst system..



PD uses predictive analytics to profile crimes & criminals to improve solved crime rates and optimize resource usage

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Crime profile → Team 4
Cluster 'Bogus Official'
- Burglary,
- Visit by city official,
- Entry 'Back door',
- Victim "Elderly'

Predictive Modeling for Crime Pattern Detection

Crime Data

Financial Data

Step 1:

Create Crime Profiles for assignment and for matching unsolved (cold) cases to known offenders for Top 3 Types of Crime

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Predictive Modeling for Crime Pattern Detection

Crime Data

Crime record notes and call logs

CS profile → No Deployment
…
If Break In
And Night
And report>12hrs
And entry ='broken window'
And object='Commercial Property'
Then probability evidence is 6%
…

Step 2:

Create Criminal Profiles and Crime Scene Profiles for suspects and CSI resource assignment. Add Crime Profiles for additional Types of Crime

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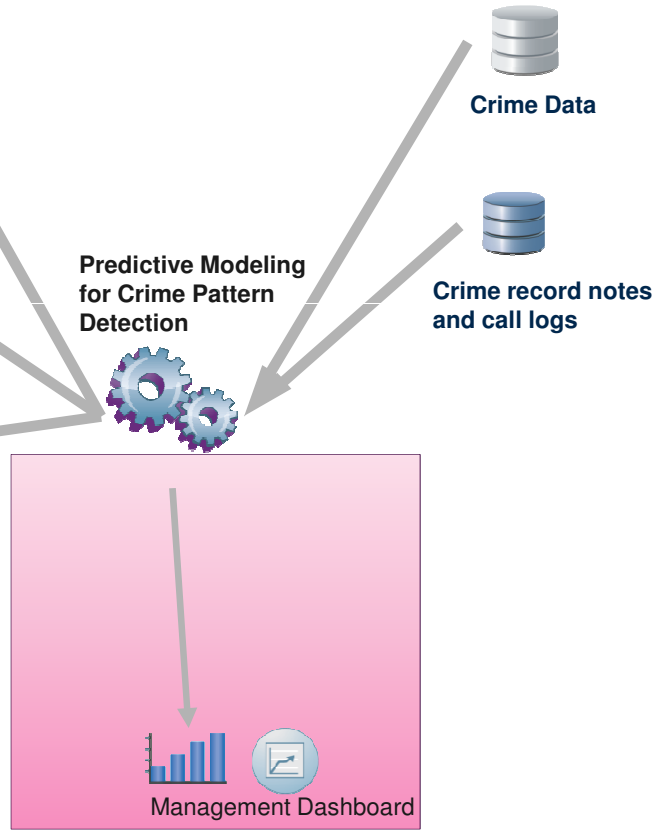

Step 3:
Implement Management Dashboard for strategic and tactical decision making

PD uses predictive analytics to profile crimes & criminals to improve solved crime rates and optimize resource usage

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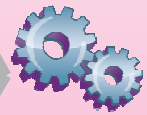
Crime profile → Team 4

Crime Data

Predictive Modeling for Crime Pattern Detection



Surveillance Data

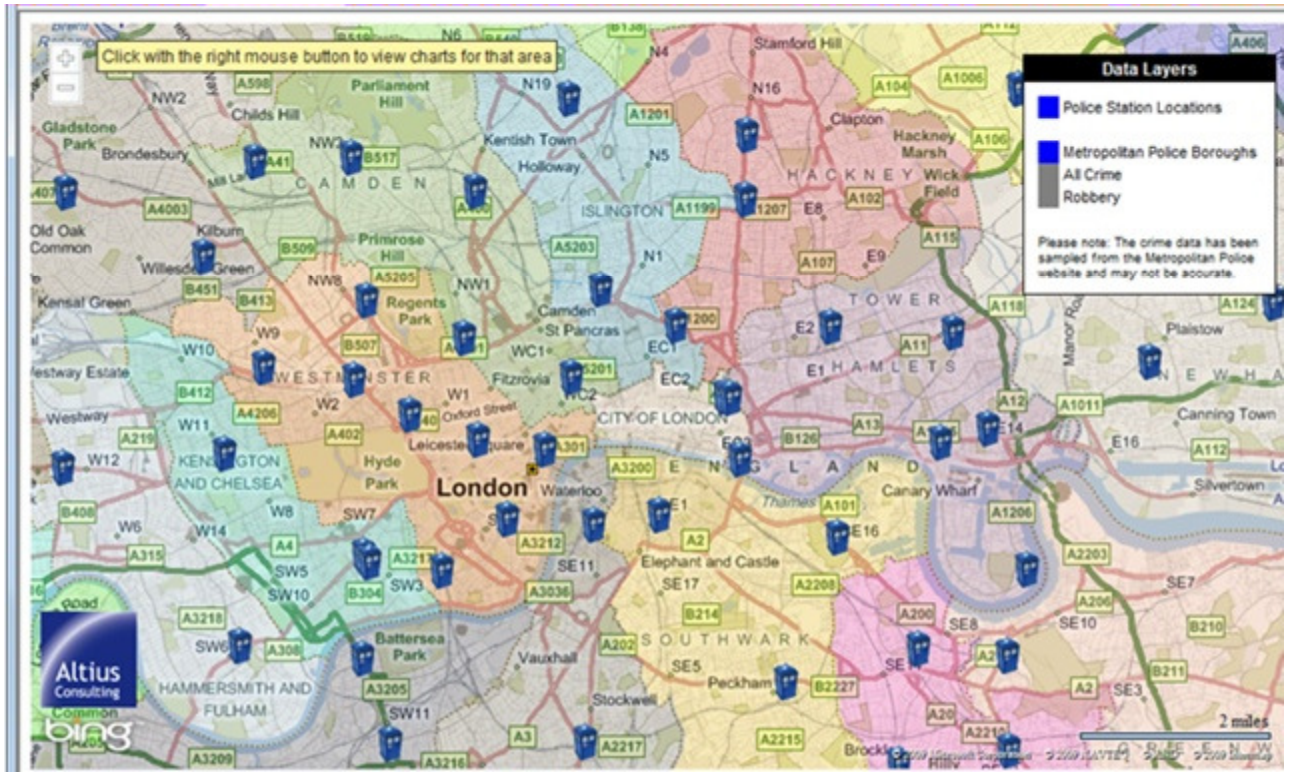
Communication Data

Key Players
Focus on:
- Keith Patterson
- Colin Wiertz
- Markus Haffey

Step 4:
Add Additional data sources and create templates for case-by-case analysis

Financial Data

Decisioning



BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander
Actively manages force deployment decisions.
Traditionally reactive, but now proactive in making next day decisions for every dispatch area

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Deploys the right number of officers at the right place and the right time

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Patrol Officer
Traditionally used experience / instinct. Now, at the start of shift , based on input from the commander and likelihood of crime, examines his deployment area to better understand patrol routes

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Patrol Officer

Notices change in weather conditions

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Patrol Officer

Notices change in weather conditions

Enters updated factors in the system, including current patrol activity, to generate real-time predictions of crime in areas of interest

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Patrol Officer

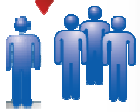
Notices change in weather conditions

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A



Reallocation

Patrol Officer

Notices change in weather conditions

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Reallocation

Patrol Officer

Notices change in weather conditions

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Historical crime incidents
(RMS, CAD)

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Reallocation

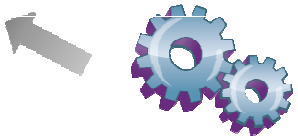
Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Risk Assessment

If Day=Saturday
And EntertainmentEvent
And DayAfterPayday
And DispatchZone=004
Then V_Crime=Yes (65, 0.98)



Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Reallocation

Patrol Officer

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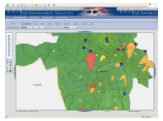
The agency uses predictive analytics to proactively deploy police forces and prevent crime

Operational Alert



Planning

Risk Assessment

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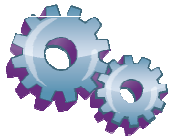


Likelihood of Crime

Enabling factors
(Weather, Police presence, …)

Historical crime incidents
(RMS, CAD)

Triggers
(City events, Paydays, Time, Holiday…)

BUSINESS SCENARIO: DECISIONING - FORCE DEPLOYMENT

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

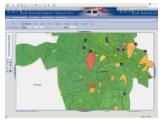
Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Operational Alert



Planning

Risk Assessment
If Day=Saturday
And EntertainmentEvent
And DayAfterPayday
And DispatchZone=004
Then V_Crime=Yes (65, 0.98)

Risk Assessment: area 008
If Condition=Rain
And Temp>=60
And PatrolActivityPS=High
Then V_Crime=No (0.92)

Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

Home

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Operational Alert

Planning

Risk Assessment
If Day=Saturday
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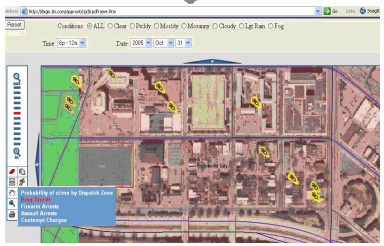

Interactive Decisioning

Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

Capabilities

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

Reallocation

Patrol Officer

Notices change in weather conditions

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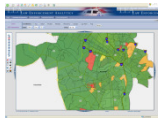
Operational Alert



Planning

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

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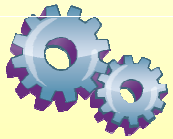
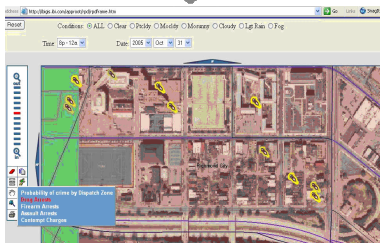


Likelihood of Crime

Predictive Modeling



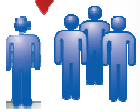
Interactive Decisioning

Capabilities

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A



Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Deployment into Operational Processes

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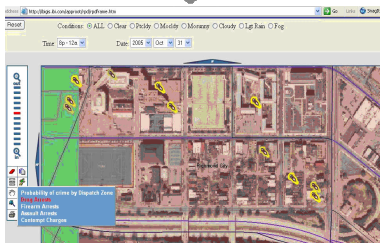
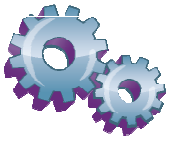


Interactive Decisioning



Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

Capabilities

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

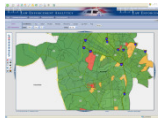
Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Operational Alert



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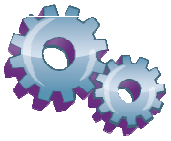

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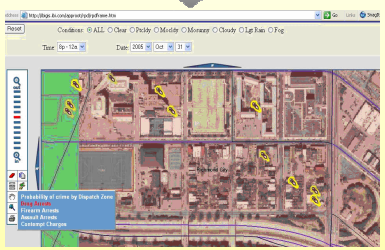


Interactive Decisioning

Real-time Risk Analysis

Business Objectives

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

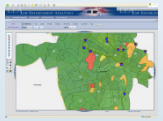
Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Operational Alert



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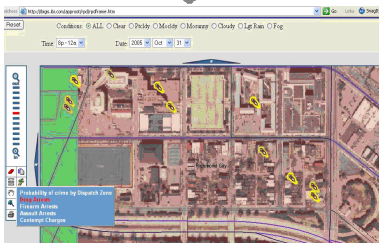
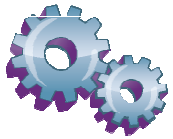


Interactive Decisioning

Effective & Efficient Force Deployment



Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

Business Objectives

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

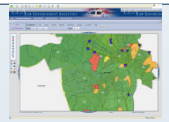
Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Operational Alert



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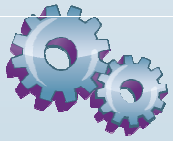

Likelihood of Crime

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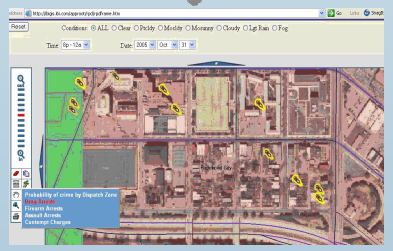


Interactive Decisioning

Reduction in crime = Public Safety

Business Functions

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

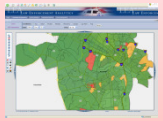
Reallocation

Patrol Officer

Notices change in weather conditions

"Operational Planning"

Operational Alert



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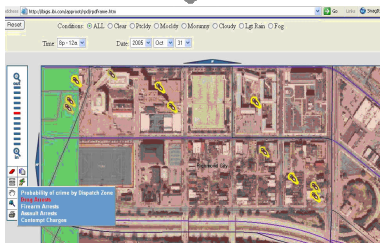


Interactive Decisioning

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

Business Functions

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

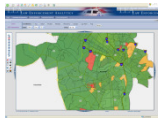
Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Operational Alert



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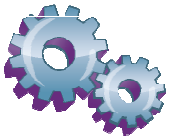

Likelihood of Crime

Triggers (City events, Paydays, Time, Holiday…)

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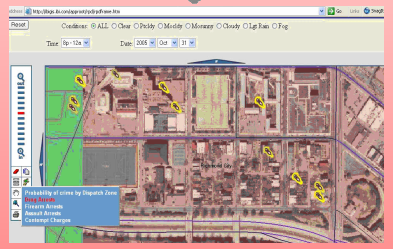


Interactive Decisioning

"Policing"

Business Functions

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

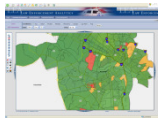
Reallocation

Patrol Officer

Notices change in weather conditions

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Operational Alert



Planning

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Historical crime incidents (RMS, CAD)

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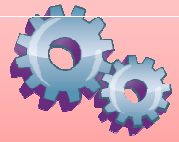
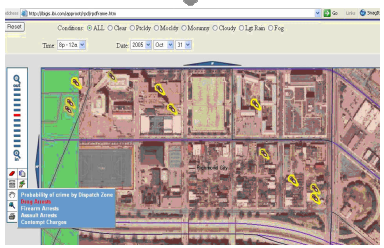


Likelihood of Crime

"Crime Analysis Unit"



Interactive Decisioning

Analytical Process

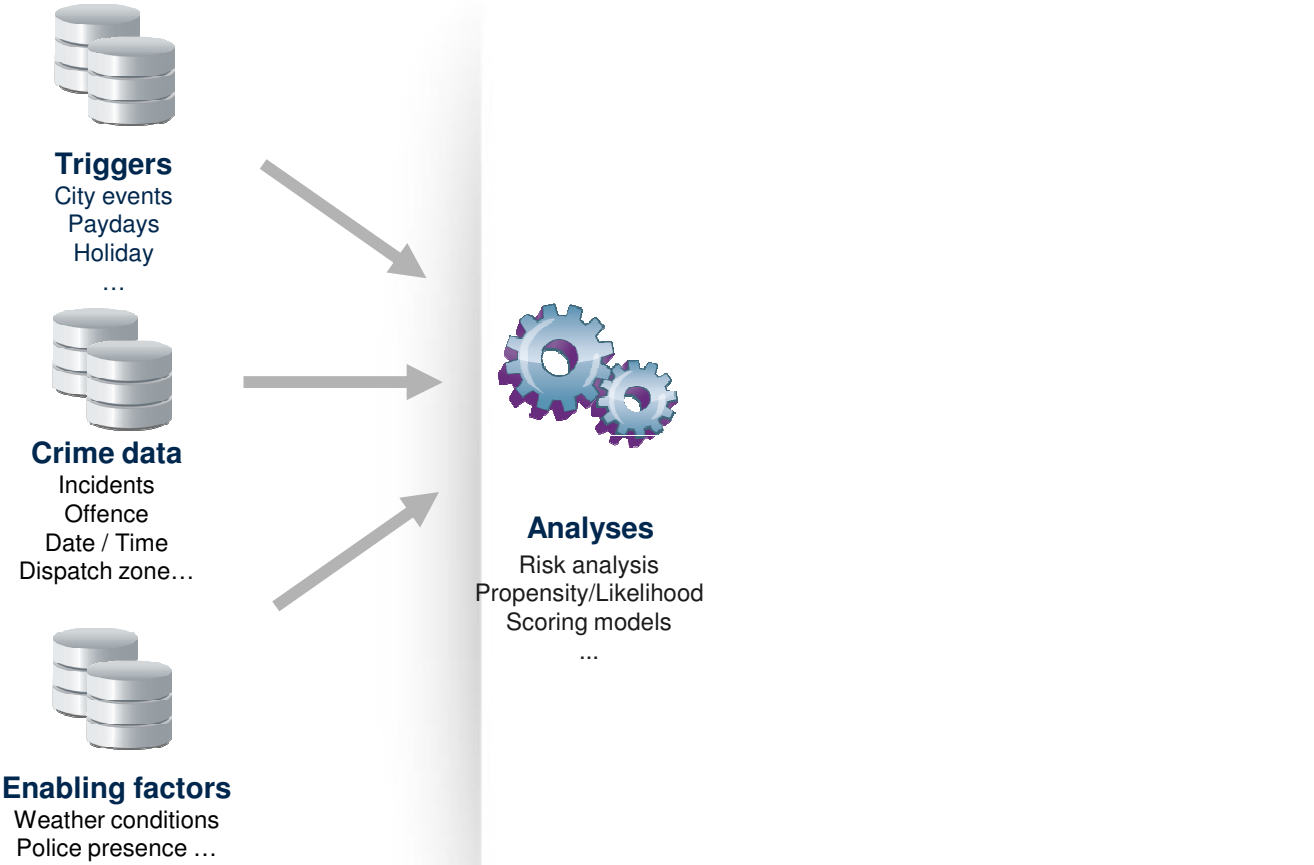
Triggers
City events
Paydays
Holiday
…

Crime data
Incidents
Offence
Date / Time
Dispatch zone…

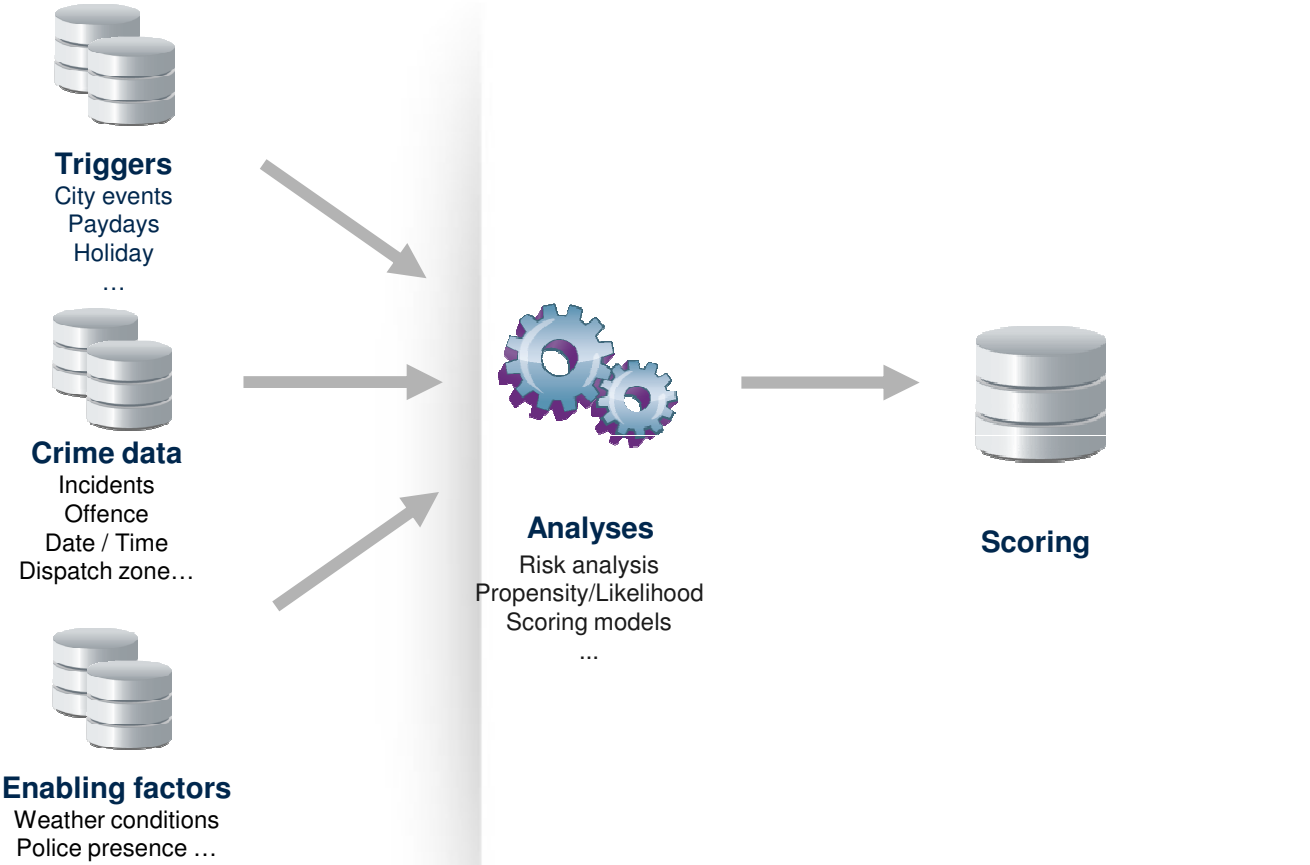
Enabling factors
Weather conditions
Police presence …

Capture → **Predict** → **Act**

Analytical Process



Analytical Process



Analytical Process

Triggers
City events
Paydays
Holiday
…

Crime data
Incidents
Offence
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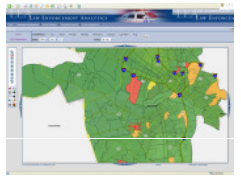
Enabling factors
Weather conditions
Police presence …

Analyses
Risk analysis
Propensity/Likelihood
Scoring models
...

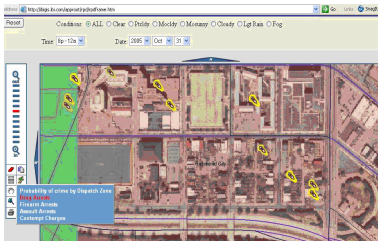
Scoring



Operational Planning Process

Capture → **Predict** → **Act**

Analytical Process



Decisioning

Interactive Scoring

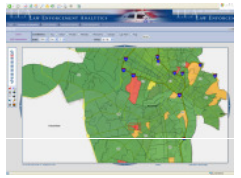
Triggers
City events
Paydays
Holiday
…

Crime data
Incidents
Offence
Date / Time
Dispatch zone…

Enabling factors
Weather conditions
Police presence …

Analyses
Risk analysis
Propensity/Likelihood
Scoring models
...

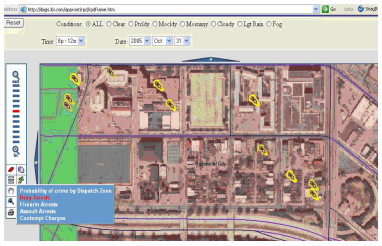
Scoring



Operational Planning Process

Capture → **Predict** → **Act**

Analytical Process



Triggers
City events
Paydays
Holiday
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Crime data
Incidents
Offence
Date / Time
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Weather conditions
Police presence …

Interactive Scoring

Decisioning

Analyses
Risk analysis
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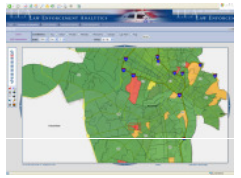
...

Scoring



Operational Planning Process

Feedback

Capture → **Predict** → **Act**

Data

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Shift Commander

Understands geographically where events are likely to happen

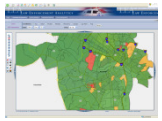
Crash in Zone 123A

Reallocation

Patrol Officer

Notices change in weather conditions

Operational Alert



Planning

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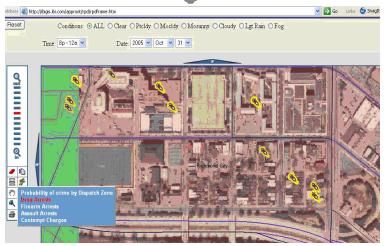

Interactive Decisioning

"Crime Characteristics"

Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

Data

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

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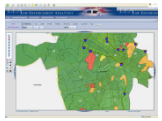

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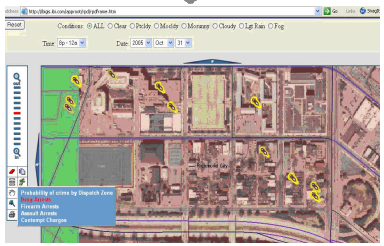

Interactive Decisioning

Likelihood of Crime

"Conditions"

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

Data

The agency uses predictive analytics to proactively deploy police forces and prevent crime

Shift Commander

Understands geographically where events are likely to happen

Crash in Zone 123A

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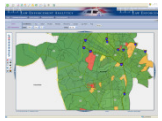


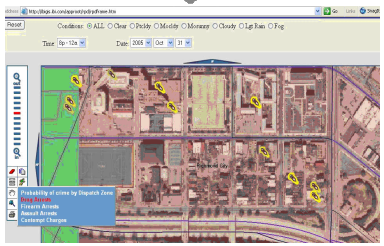
Planning

Risk Assessment

If Day=Saturday
And EntertainmentEvent
And DayAfterPayday
And DispatchZone=004
Then V_Crime=Yes (65, 0.98)

Risk Assessment: area 008

If Condition=Rain
And Temp>=60
And PatrolActivityPS=High
Then V_Crime=No (0.92)



Interactive Decisioning

"Triggers"

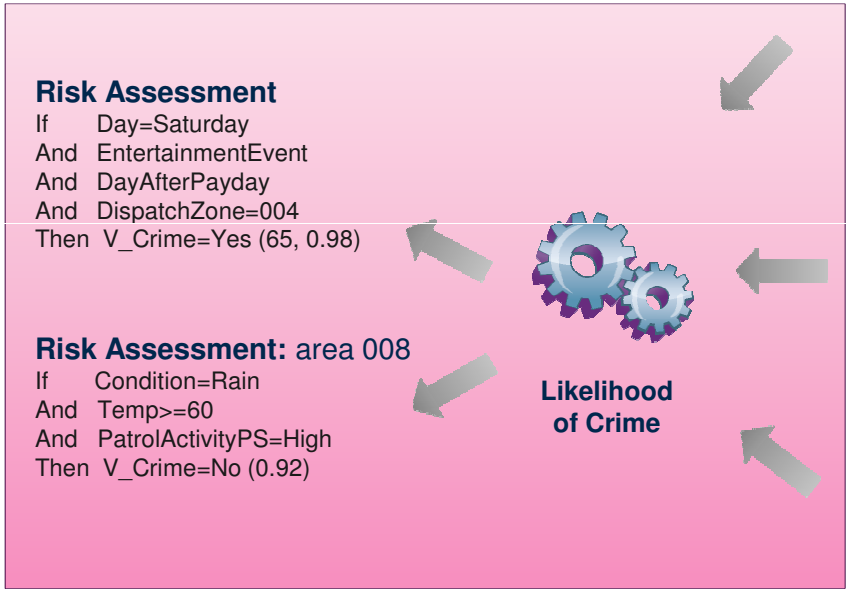
Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

Step 1:
Implement a data repository to store circumstances such as weather, city events, and local holidays that characterize crime.



Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

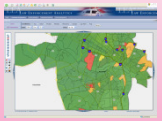
Triggers (City events, Paydays, Time, Holiday…)

Step 2:
Model crime data to discover the exact circumstances characterizing the occurrence of crime – in order to predict future similar crimes.

Shift Commander

Understands geographically where events are likely to happen

Operational Alert



Planning

Step 3:
Apply crime prediction models using current data to plan next day activity and officer deployment.

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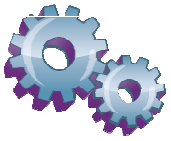

Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

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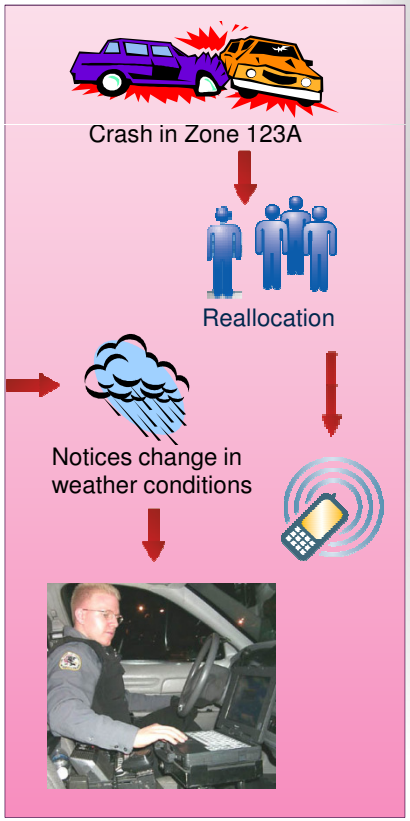
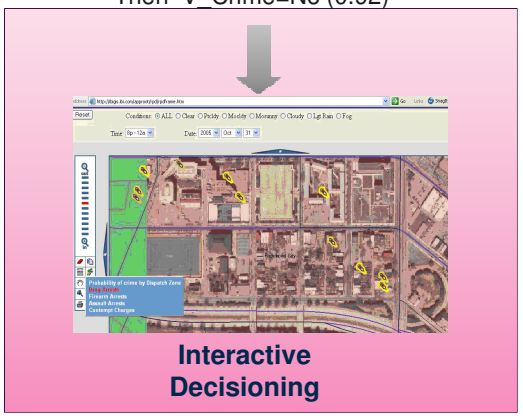
Step 4:
Configure the agency's GIS application to display crime predictions and allow patrol officer interactions for up to the minute updates.

Patrol Officer





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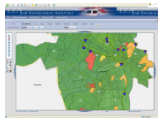

Planning

Likelihood of Crime

Enabling factors (Weather, Police presence, …)

Historical crime incidents (RMS, CAD)

Triggers (City events, Paydays, Time, Holiday…)

Future Possibilities

- Tactical analysis
  - Use predictive analytics for post crime analysis and criminal investigations to gain insight into unsolved crimes.
- Apply predictive analytics in Human Capital Management
  - Recruit officers with right competencies and retain the most valuable officers
- Actively Involve Citizen Feedback
- Tackle Other Security Threats
  - Cyber Crime
  - Internal/External Terrorist Threats
  - Traffic Safety

Summary

- Police Departments doing more with less
  - Budget constraints
- Data is Increasingly Open and Accessible
- Predictive Analytics Turns Data into Insight
- Multiple Applications
  - Profiling
  - Proactive Resource Allocation
- ROI is Significant
  - Richmond Police

Questions?

THANK YOU!