Intelligence Led Policing: Enhancing Force Deployment in Law Enforcement and Counter-Terrorism Using Data & Visual Analytics

Joint Project of DHS, the Port Authority of NY and NJ, PNNL, Rutgers University DIMACS, UMD START and Intuidex, Inc.

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Project Overview

• **CompStat NG™ System Goal**
  • Marry law enforcement and counter-terrorism initiatives to aid in force deployment
    • Data collection
    • Data analysis
    • Force deployment

• **CompStat NG™ System Components**
  • Enterprise Architecture (PNNL SRS)
  • Online data collection / entry
  • Data Warehouse
  • On Demand Analysis and Reporting Tools
    • Reports, Charts & Graphs
    • Visual / Data Analytics
System Pilot at the Port Authority Bus Terminal (PABT)

- Phase 0
  - CompStat NG™ operational in semi-automatic mode
- Phase 1
  - CompStat NG™ operational in automatic mode for PABT Pilot
- Phase 2
  - Online data collection / entry and Data Warehouse operational for PABT Pilot
- Phase 3
  - SRS (Scalable Reasoning System) operational for PABT Pilot
  - Visual / data analytics operational in SRS for PABT Pilot
Phase 0: Overview of Tasks Completed

- Data captured from several data sources
  - VAX/VMS Oracle database
  - Local statistics at commands
  - Other facility-wide databases
- Aided in development of Excel-based crime analysis software
- Generated the first PA CompStat NG™ reports
Phase 1: Overview

- Purchase and configure server hardware for data warehouse
- Set up Sequel server and create a database connected to PA / PABT data sources used in CompStat NG™
- Develop web forms for online data collection / entry
- Develop / enhance crime analysis and reporting system
- Document the system and train staff
Phase 1: Online Data Entry

• Copy historical data to the Sequel server and route daily updates to the Sequel database from
  • VAX/VMS CAD / RMS
  • PeopleSoft Payroll System
  • Sick / IOD database

• Develop web data entry forms for use at each facility for online data collection / entry of incident reports on the SQL server

• Develop web forms to store other local information such as
  • Criminal investigations data
  • Summons activity
  • Community Policing Initiatives
Phase 1: Crime Analysis System and Training

- Provide automatic CompStat NG™ Recap Reports
  - Generated on demand from Access/Sequel DBs
- Build on existing CompStat NG™ graphs and charts
  - Link existing chart-generation tools to Access/Sequel DBs
- Provide usage and training documentation; provide training sessions to PANYNJ staff on usage and administration of Crime Analysis System
Phase 1: Recap Reports on Demand

- CompStat NG™ Recap for each facility and job wide
- Includes statistics for seven major crimes, targeted crimes, and/or quality of life issues
Phase 1: Crime Analysis Software

Sorts crime statistics by date, location, time of day, and day of week

PABT Robbery by Hour (1/01/07 - 7/24/07 YTD)

PABT Robbery by Day (1/01/07 - 7/24/07 YTD)
PA BUS TERMINAL - 7 MAJOR CRIMES
2006 vs. 2007

PA BUS TERMINAL - 7 MAJOR CRIMES
1997 vs. 2006

CRIME DOWN BY -44.5%

Murder Rape Robbery Fel. Assault Burglary Gr. Larceny G. L. Auto
0 0 0 0 0 0 0

0 0 21 14 15 22 29 2 4

0.0% 0.0% 32.9% 16.7% 50.0% 24.1% -50.0%

2007 2006 % Change

0 0 20 33 12 50 4 2

0 0 0% 0% -13% -27% -50% -60%

TOTAL 1997 TOTAL 2006 % Chg ’06 vs ’97
Phase 2: Data Warehouse

- Incorporate information and support real-time updating from:
  - Global Terrorism Database @ START
  - CompStat NG™ Access/Sequel DBs
  - Other potential data sources:
    - Weather data: daily/hourly reports from weather stations of the three major airports
    - Traffic data: from PA traffic engineering
- Integrate the multiple sources of information
- Integrate information extraction capability from police incident data and GTD
Phase 2: Information Extraction From Unstructured Data

New and Existing Entity/doc

- 30 rich documents from 120
- 30 random documents from 120
- 30 random documents from 1000

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Phase 2: Information Extraction From Unstructured Data

Contribution of each entity type on existing/new entities

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NE: New Entity/doc
EE: Existing Entity/doc
Phase 3: Visual Analytics

- Overarching goal is to *reduce relative risk*
- Specify visualization tools and potential integration
  - PNNL In-Spire
  - PNNL Scalable Reasoning System (SRS)
- Deploy Assessment Wall
- Verify appropriate security, functionality, and connectivity with the data warehouse
- Provide usage and training documentation; provide training sessions to PANYNJ staff on usage and administration of visual analytics system
IN-SPIRE: Advanced Text Analysis Platform

- Cluster and Thematic views
- Evidence Evaluation
- Triage Networks
- Visual analysis for multiple languages
- Multi-Viewpoint Support
- Affect and Emotion Measures
- Correlation Analysis
- Streaming Data

http://in-aspire.pnl.gov
The Assessment Wall

Developed an interactive information visualization system that provides an up-to-date overview and helps users intuitively find documents of interest on a large touch display.

- A walk-up usable interface that provide anyone instant analytical capability.
- Designed for team collaboration and discussion of analytical tasks.
- Simple interface design to provide rapid analytical results is ideal for command room style utility.

Partnership Funding
**AIM**

Develop a thin-client platform for integrating diverse visual analytic applications in an approachable interface for knowledge discovery.
IMPACTS

- Users can easily discover topical, temporal, and geographic patterns in their data.
- Customers can easily integrate visualization into their existing web portals.
- Real-time information sharing builds situation awareness.
Scalable Reasoning System
Conclusion

CompStat NG™ Supports

- **CompStat Crime Analysis**
  - Charts, graphs and reports for managing force deployment in counter-terrorism and the fight against crime

- **Data Warehouse**
  - Leverage underutilized everyday data through automatic information gathering /extraction and intelligence generation
  - Discover trends that aid in counter-terrorism and crime prevention efforts
  - Support suspect identification

- **Visual / Data Analytics**
  - Mine valuable links between people, places and things
  - Enable command staff to quickly visualize crime and other trends

**Executive Director Tony Shorris’ Goal:** A “national model” for counter-terrorism and crime prevention and analysis!