

# **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.



Presented by William M. Pottenger, Ph.D.



# 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

**Port Authority Police**  
 Samuel J. Plumeri, Director of Public Safety and Superintendent of Police

Volume 1 Number 5 **CompStat** All Commands  
 Report Covering the Week of 7/30/2007 through 8/05/2007

**Crime Complaints**

	Week to Date			28 day			Year to Date*		
	2007	2006	% Change	2007	2006	% Change	2007	2006	% Change
Murder	0	0	-	0	0	-	1	0	-
Rape	0	0	-	0	0	-	0	0	-
Robbery	1	4	-75.0%	8	8	0.0%	32	24	33.3%
Fel. Assault	4	1	300.0%	7	9	-22.2%	49	55	-10.9%
Burglary	2	0	-	4	2	100.0%	40	23	73.9%
Gr. Larceny	35	19	84.2%	97	72	34.7%	635	543	16.9%
G.L. Auto	2	1	100.0%	5	8	-16.7%	41	33	24.2%
<b>TOTAL</b>	<b>44</b>	<b>25</b>	<b>76.0%</b>	<b>121</b>	<b>97</b>	<b>24.7%</b>	<b>798</b>	<b>618</b>	<b>17.7%</b>

**Historical Perspective**  
 (Historical Perspective is a complete calendar year of data.)

	1997	2002	2004	2005	2006	% Chg '06 vs '05	% Chg '06 vs '04	% Chg '06 vs '03	% Chg '06 vs '02
Murder	0	0	1	1	0	-100.0%	-100.0%	-	-
Rape	1	0	1	0	0	-100.0%	-	-	-100.0%
Robbery	114	52	40	41	46	12.2%	-9.0%	-11.5%	-59.8%
Fel. Assault	215	123	141	84	84	0.0%	-40.4%	-31.7%	-60.9%
Burglary	103	36	61	49	31	-36.7%	-49.2%	-11.4%	-69.9%
Gr. Larceny	2423	993	1019	929	1006	8.3%	-1.3%	1.3%	-58.5%
G.L. Auto	209	50	81	75	64	-20.0%	-33.3%	0.0%	-74.0%
<b>TOTAL</b>	<b>3864</b>	<b>1253</b>	<b>1354</b>	<b>1179</b>	<b>1221</b>	<b>3.6%</b>	<b>-9.8%</b>	<b>-2.6%</b>	<b>-60.2%</b>

*The above CompStat figures are posted on Monday, one week after the closing date.*

CompStat figures are preliminary and subject to further analysis and revision. Crime statistics reflect New York State Penal Law definitions and/or Title 20, The NY Code of Criminal Justice and differ from the crime categories reported to the FBI Uniform Crime Reporting System. All degrees of rape are included in the rape category.

**Port Authority Police**  
 Samuel J. Plumeri, Director of Public Safety and Superintendent of Police

Volume 1 Number 5 **CompStat** WFC  
 Report Covering the Week of 7/30/2007 through 8/05/2007

**Targeted Crime Complaints**

	Week to Date			28 day			Year to Date*		
	2007	2006	% Change	2007	2006	% Change	2007	2006	% Change
Larceny	0	0	-	0	0	-	1	0	-
Tenant Larceny	0	0	-	0	0	-	0	0	-
Pickpocket	0	0	-	0	0	-	0	0	-
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>-</b>	<b>0</b>	<b>0</b>	<b>-</b>	<b>1</b>	<b>0</b>	<b>-</b>

**Historical Perspective**  
 (Historical Perspective is a complete calendar year of data.)

	1997	2002	2004	2005	2006	% Chg '06 vs '05	% Chg '06 vs '04	% Chg '06 vs '03	% Chg '06 vs '02
Larceny	335	3	9	1	0	-100.0%	-100.0%	-100.0%	-100.0%
Tenant Larceny	77	0	0	0	0	-	-	-	-100.0%
Pickpocket	23	0	0	0	0	-	-	-	-100.0%
<b>TOTAL</b>	<b>435</b>	<b>3</b>	<b>9</b>	<b>1</b>	<b>0</b>	<b>-100.0%</b>	<b>-100.0%</b>	<b>-100.0%</b>	<b>-100.0%</b>

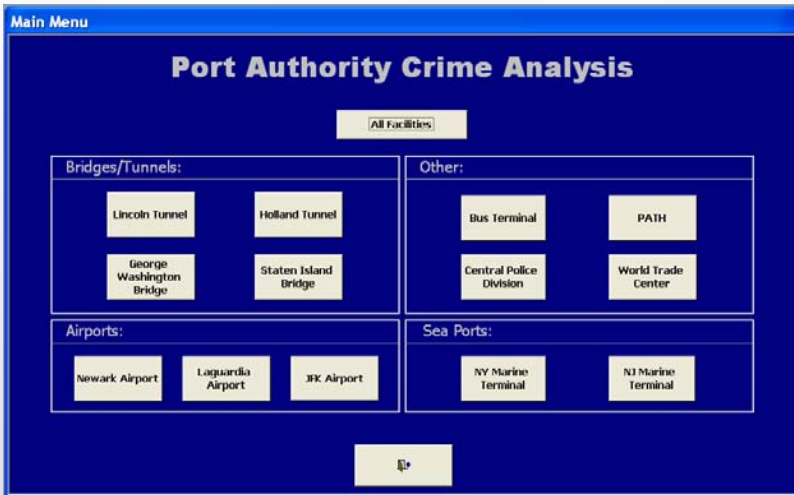
*The above CompStat figures are posted on Monday, one week after the closing date.*

CompStat figures are preliminary and subject to further analysis and revision. Crime statistics reflect New York State Penal Law definitions and/or Title 20, The NY Code of Criminal Justice and differ from the crime categories reported to the FBI Uniform Crime Reporting System. All degrees of rape are included in the rape category.

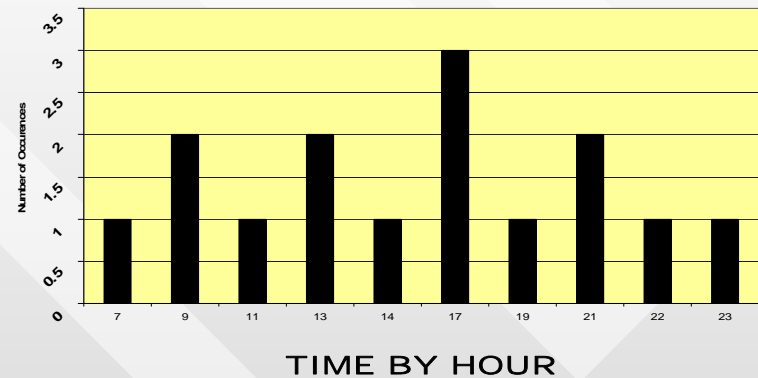


# Phase 1: Crime Analysis Software

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

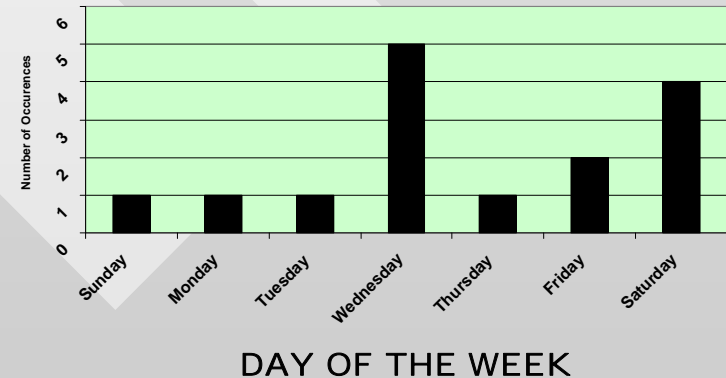


PABT Robbery by Hour (1/01/07 -7/24/07 YTD)



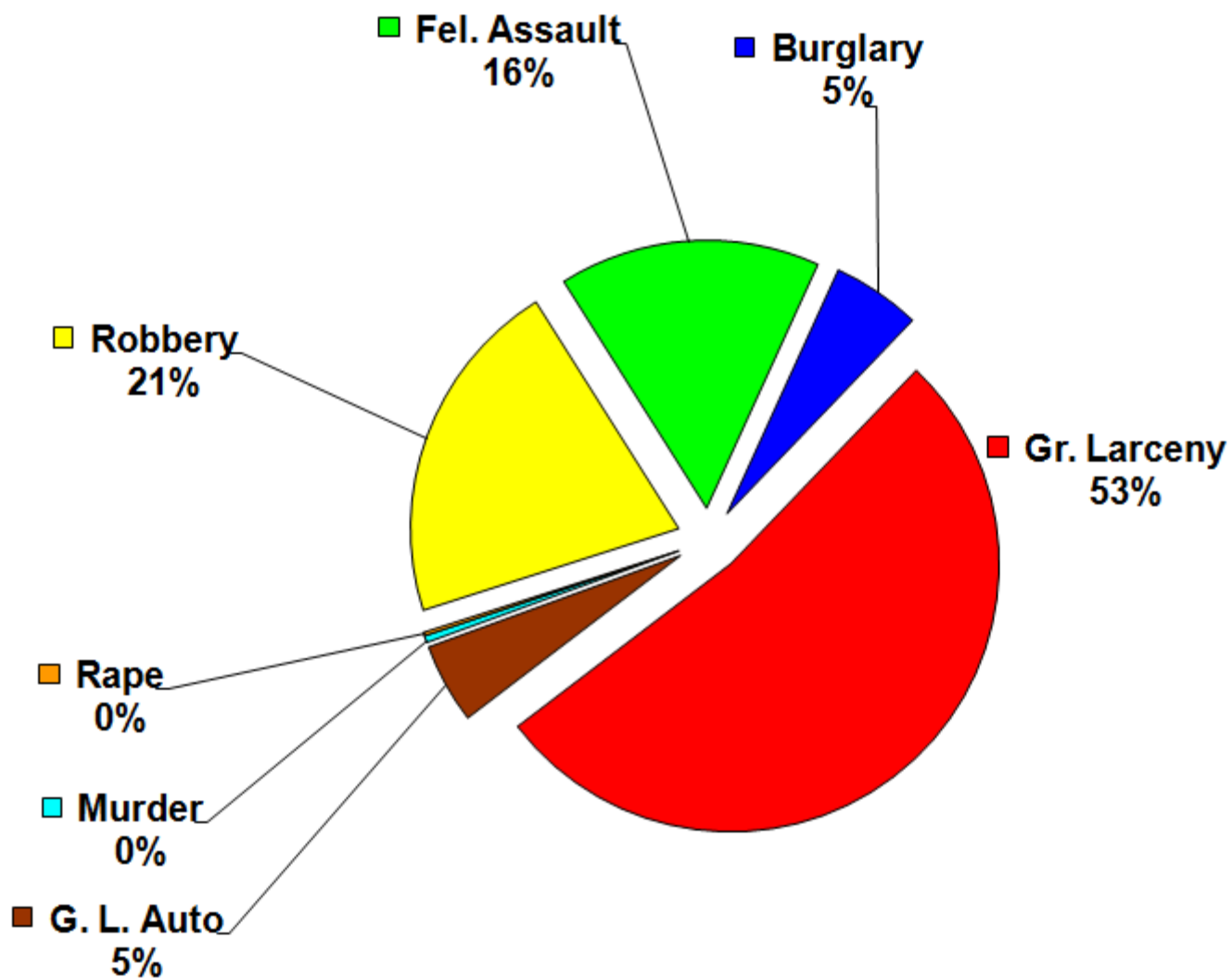
CRIME	2000	2001	2002	2003	2004	2005	2006	2007	Grand Total
Robbery	7	11	9	9	11	3	8	13	70
Assault	4	6	1	2	7	1	3	2	26
ASSAULT DANGEROUS WEAPON									
ASSAULT HANDGUN		1	2						3
ASSAULT KNIFE / CUTTING INSTRUMENT	2	1					1		5
ASSAULT PO - HOSPITAL				1	5				7
ASSAULT PO - INJURY	3	4	2	4	2	3	3	3	24
ASSAULT PO - NO INJURY	1	2		2	1				7
ASSAULT STRONGARM	16	15	11	16	16	6	2	2	84
Total	26	29	16	25	31	10	10	9	156
Larceny	111	115	108	62	141	105	72	79	793
Luggage Theft	41	32	23	9	35	19	13	20	191
Pickpocket	21	13	13	7	14	7	7	6	88
Burglary 2	2	5				1	7	6	22
Grand Total	208	205	168	112	233	144	117	133	1320

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



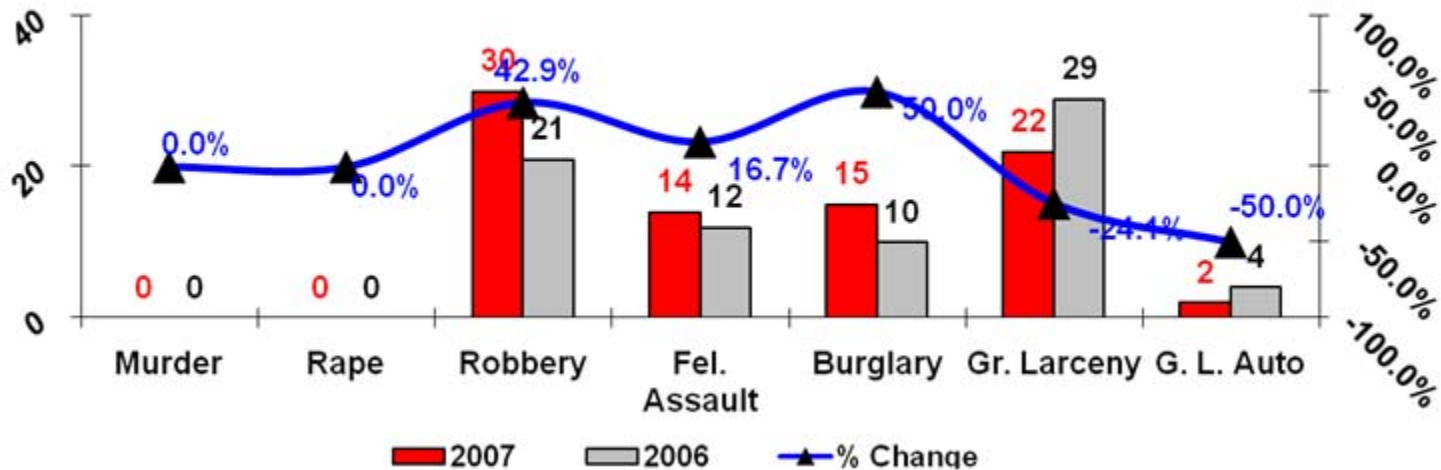
# OVERALL MAJOR CRIME ACTIVITY BY PERCENTAGE

## ALL COMMANDS



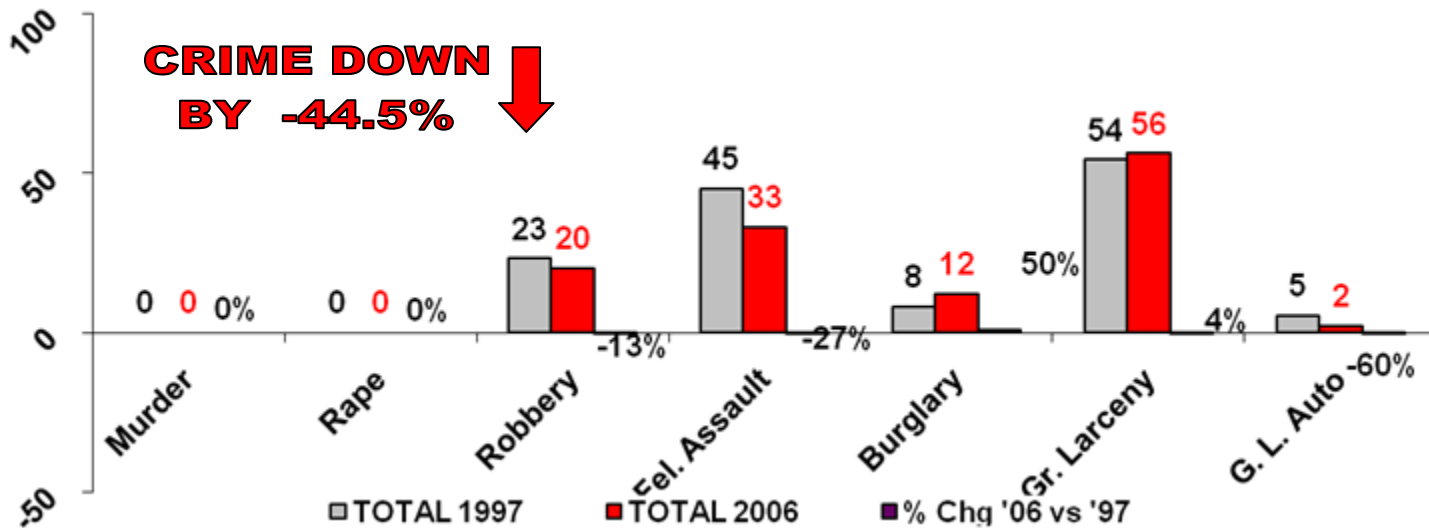
## PA BUS TERMINAL - 7 MAJOR CRIMES

2006 vs. 2007

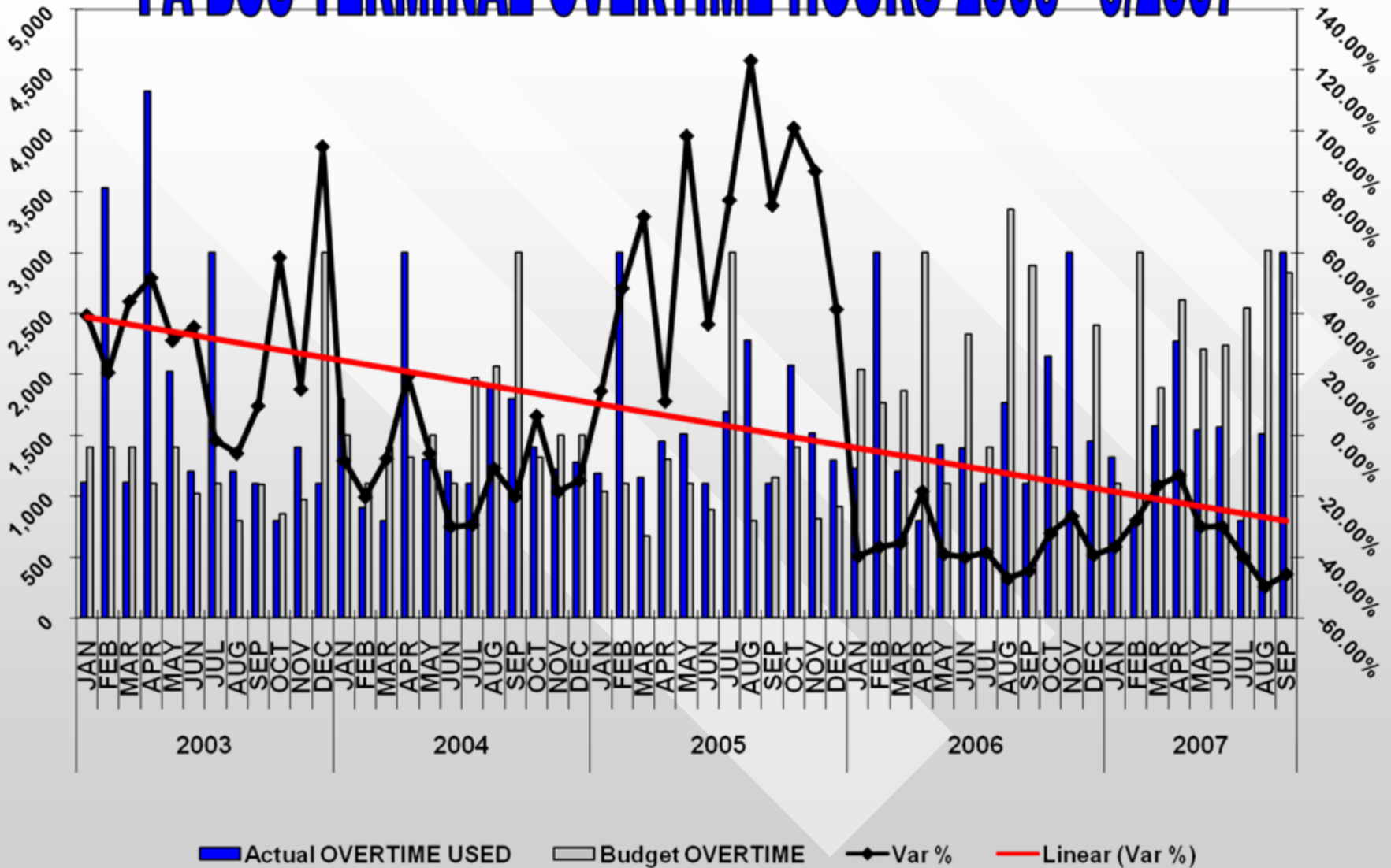


## PA BUS TERMINAL - 7 MAJOR CRIMES

1997 vs. 2006

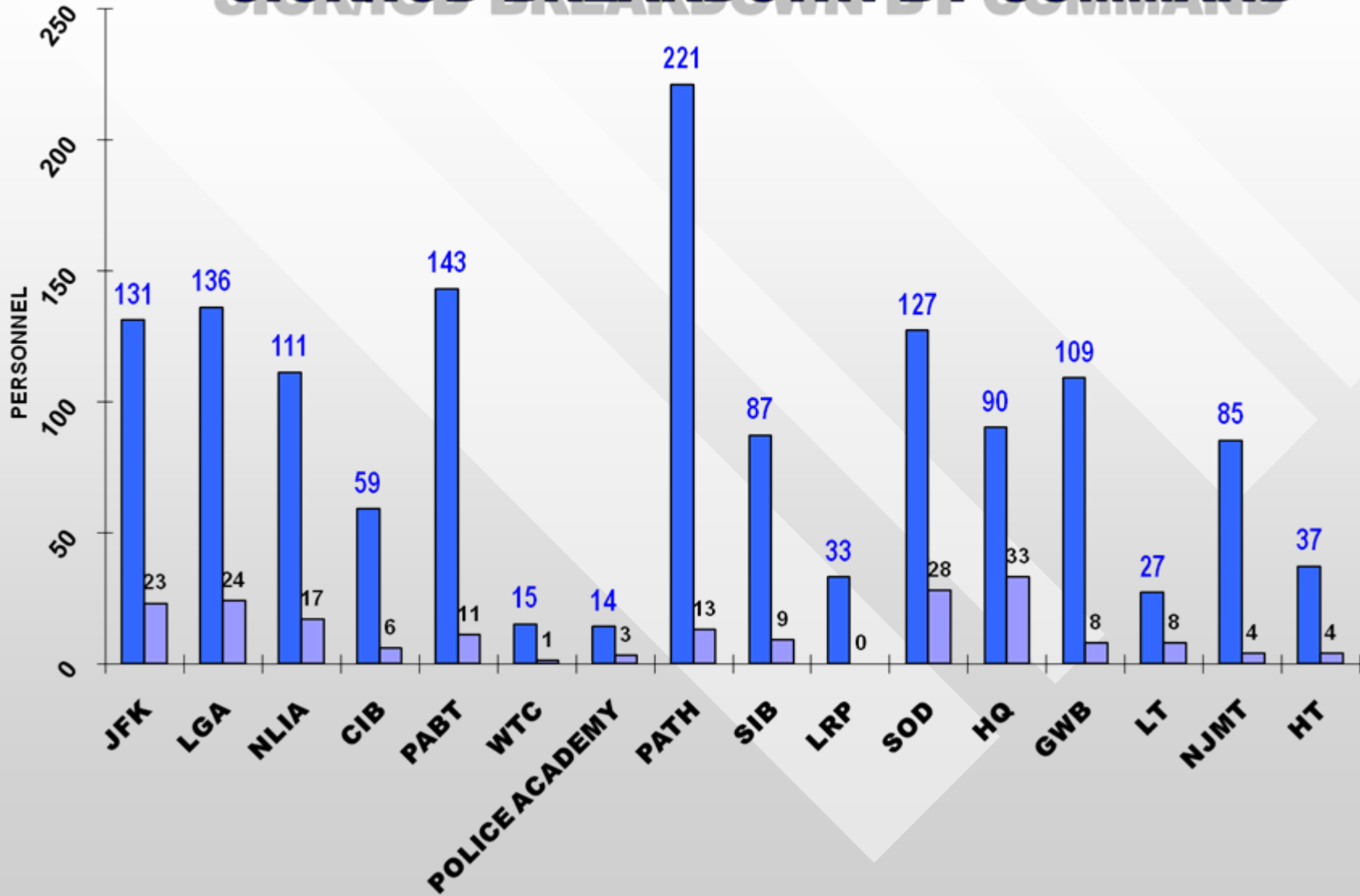


# PA BUS TERMINAL OVERTIME HOURS 2003 - 9/2007





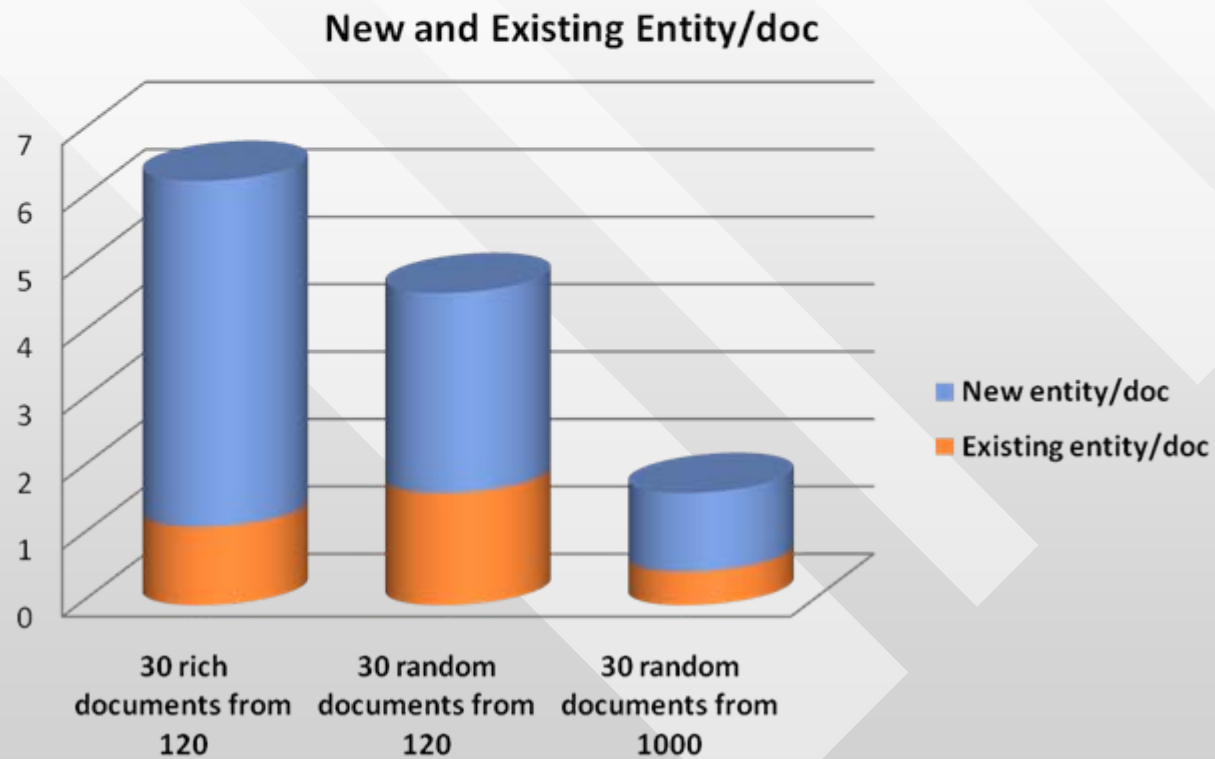
# ABSENCE CONTROL UNIT SICK/IOD BREAKDOWN BY COMMAND



# Phase 2: Data Warehouse

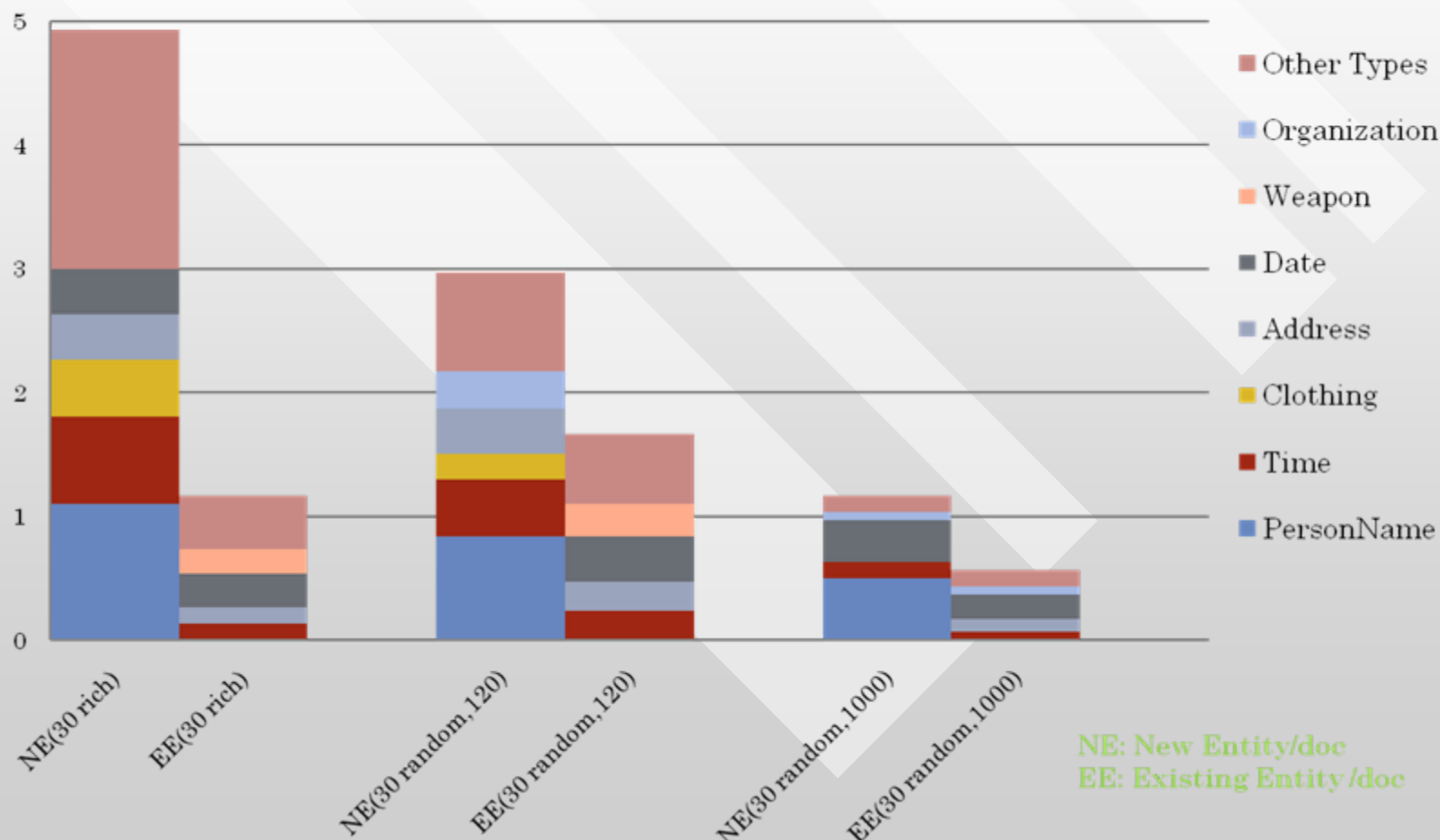
- Incorporate information and support real-time updating from
  - Global Terrorism Database @ START
  - CompStat NG™ Access/Sequel DBs
  - Other potential data sources
    - Weather data: daily/hourly reports from weather stations of the three major airports
    - Traffic data: from PA traffic engineering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

# Phase 2: Information Extraction From Unstructured Data



# Phase 2: Information Extraction From Unstructured Data

Contribution of each entity type on existing/new entities



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





# 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.



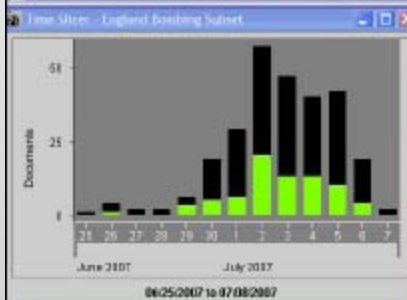
Partnership Funding



# The Assessment Wall



Visualizing 270 documents. Touch screen to explore.



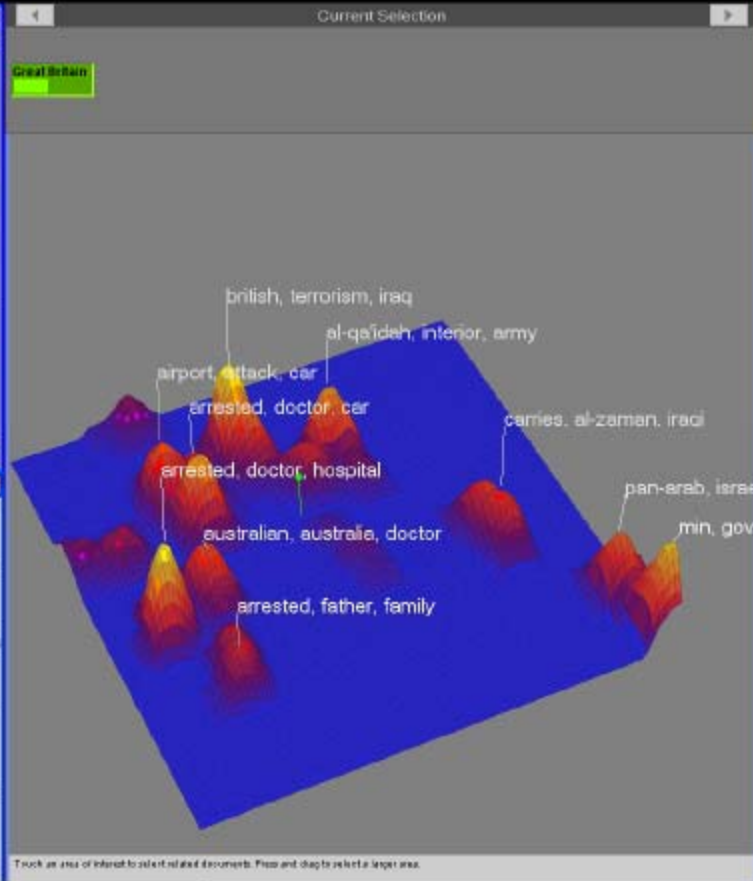
Document Viewer: 75 selected

Title	Date
UK: Expert Says Scots Must Face Fact Country on Frontline	Jul 2, 2007
UK Security Adviser: Incompetence Prevented Tragedy on Sea	Jul 2, 2007
UK: 38 Racially Motivated Attacks Reported to Strathclyde	Jul 5, 2007
N Ireland Secretary Warns Protesters on Same Security Level	Jul 2, 2007
Scotland's First Minister Opposes Detaining Terror Suspect	Jul 2, 2007
Northern Ireland Editorial Urges Tolerance of Muslims, Sec	Jul 2, 2007
N Ireland: Belfast Airport Step Up Security After UK Attack	Jul 2, 2007
UK introduces Extra Security Measures at Glasgow Airport	Jun 20, 2007

AFP: Australia To Hold Doctor Allegedly Connected to UK Bomb Plot for Extra 48 Hours JPR20070704960049 Hong Kong AFP in English 0622 GMT 04 Jul 07 DRAISBANE, Australia, July 4, 2007 (AFP) - Australia on Wednesday said police will hold an Indian doctor allegedly connected to a British bomb plot for an extra 48 hours as a Sudanese yard detective ties in to question him.

Prime Minister John Howard said a magistrate had given police an extra 48 hours starting late Tuesday to quiz Mohammed Haneef, arrested at Brisbane airport Monday as he tried to leave the country on a one-way ticket.

Howard said a chief inspector from Britain's Metropolitan Police was en route







# The Assessment Wall



Visualizing 270 documents. Touch screen to explore.

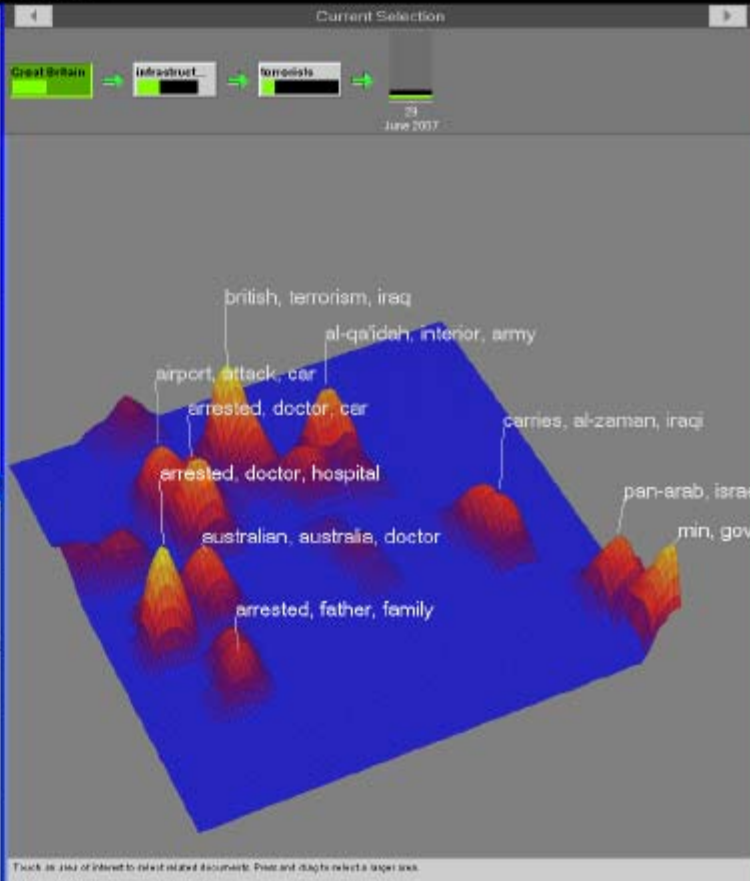


Title	Date
UK Security Source Says UK Car Bomb Plot Carried Out With Bin Laden's Blessing	Jun 29, 2007
UK Source Says MIA, MIA Investigating Iraq Al-Qaida's Plot	Jun 29, 2007

UK Security Source Says UK Car Bomb Plot Carried Out 'With Bin Laden's Blessing' EUP20070706031002 London The Times (Internet Version-WWW) in English 29 Jun 07 [Report by Deborah Haynes in Baghdad, Jeremy Page in Delhi and Martin Fletcher: "Bombing Plots 'Were Carried Out With Bin Laden's Blessing'"]

The London and Glasgow bomb plots were carried out with the approval of Osama Bin Laden, the Al-Qa'ida leader, a top foreign intelligence source said last night.

"It was an established fact from Day 1 that Al-Qa'ida was behind this and it was planned by its followers in Great Britain with Bin Laden's blessing" the



## AIM

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





# Scalable Reasoning System



## 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.





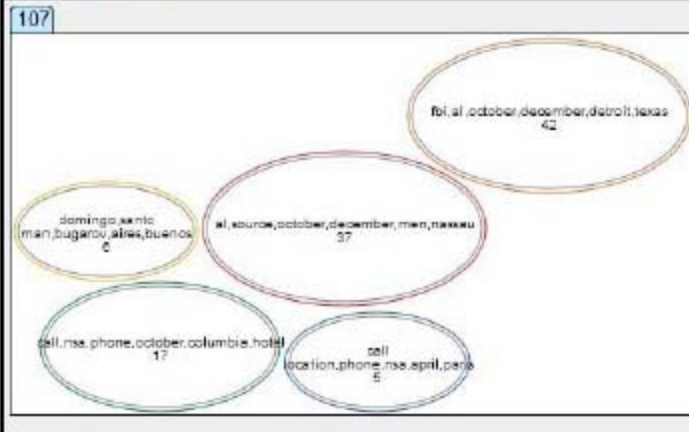
### Queries

atlanticstorm  
 Case: Atlantic Storm  
 Last run: Fri, 14 Sep 2007 16:32:23 GMT  
 107 Docs  
[Rerun](#)

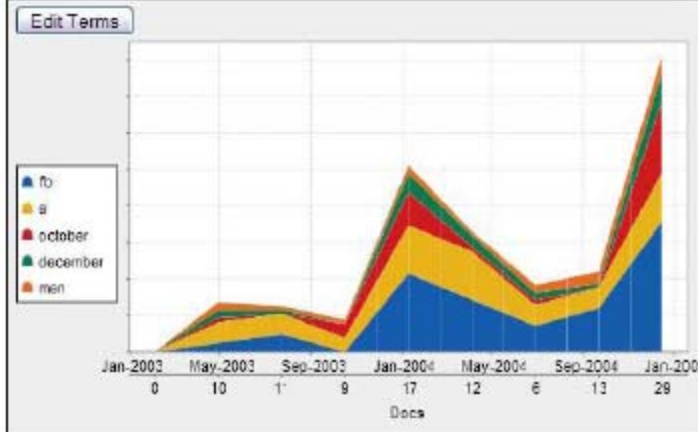
atlanticstorm  
 Case: Atlantic Storm  
 Last run: Fri, 14 Sep 2007 16:37:28 GMT  
 110 Docs  
[Rerun](#)

[New Query](#)

### Topic Clusters



### Themes



### Documents

- 51. [atlanticstorm/FBI 14.txt](#)  
 AjaxServlet?action=g...y&art=14746  
 02/07/2004 00:00:00
- 52. [atlanticstorm/FBI 15.txt](#)  
 AjaxServlet?action=g...y&art=14747  
 02/13/2004 00:00:00
- 53. [atlanticstorm/FBI 16.txt](#)  
 AjaxServlet?action=g...y&art=14748  
 02/14/2004 00:00:00
- 54. [atlanticstorm/FBI 17.txt](#)  
 AjaxServlet?action=g...y&art=14749  
 02/16/2004 00:00:00
- 55. [atlanticstorm/FBI 18.txt](#)  
 AjaxServlet?action=g...y&art=14750  
 03/06/2004 00:00:00
- 56. [atlanticstorm/FBI 19.txt](#)  
 AjaxServlet?action=g...y&art=14751  
 03/15/2004 00:00:00
- 57. [atlanticstorm/FBI 2.txt](#)

### Locations







# Scalable Reasoning System



Workspace

Save

Workspaces:

- New workspace for
- New workspace

Open

Reasoning artifacts

Search

atlanticstorm

Search

Case: Atlantic Storm

Message2Mobile

Destination: Demo Tree

Priority: 1

Send

Products

Import

URL

http://

New

Find:  Next Previous Highlight all Match case

Done

9 Errors

QUERY: atlanticstorm

contents visualization reasoning search

107 items. Harvesting...

```
graph TD;
    A["1712 Ferry Ave., Camden, NJ  
26"] --- B["Hamif  
7"];
    A --- C["Bahamas  
14"];
    A --- D["Detroit  
12"];
    A --- E["Cuba  
17"];
    A --- F["Ontario  
8"];
    B --- C;
    B --- D;
    B --- E;
    B --- F;
    C --- D;
    C --- E;
    C --- F;
    D --- E;
    D --- F;
    E --- F;
    G["Moscow  
9"] --- C;
    G --- D;
    G --- E;
    G --- F;
    H["Safrygin  
5"] --- C;
    H --- D;
    H --- E;
    H --- F;
    I["Bagarov  
6"] --- C;
    I --- D;
    I --- E;
    I --- F;
```

Watch Lists

Tree PT17203 collapse

- Note (text) Thu, 23/Aug/2007 13:26
- Photo - Suspicious bag (image) Thu, 23/Aug/2007 13:25
- Note (text) Thu, 23/Aug/2007 11:52
- Photo - Suspicious bag (image) Thu, 23/Aug/2007 11:52
- Note (text) Wed, 22/Aug/2007 13:57

QUERY: atlanticstorm

contents visualization reasoning search

107 items. Harvest complete.

addresses in Canada, the USA, and in Nassau in the Bahamas. The addresses are: 721 St. Clare St., Montreal; 455 11th Street, Miami Beach, FL; 1712 Ferry Ave., Camden, NJ, and 11 Apple St. in Nassau, The Bahamas.

- 58. atlanticstorm/FBI 21.txt /AjaxServlet?action...y&art=14753 [show]
- 59. atlanticstorm/FBI 22.txt /AjaxServlet?action...y&art=14754 [show]

# 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!**