

# Crime Capture, Spatial Analysis and Probability Modeling in Policing

- **Introductions**

- Chris Overall (DMPS - Crime Mapping Analysis Project)
- Gregory Day (GIMS - Professional Services)



# Crime Capture, Spatial Analysis and Probability Modeling in Policing

- **Purpose/Process**

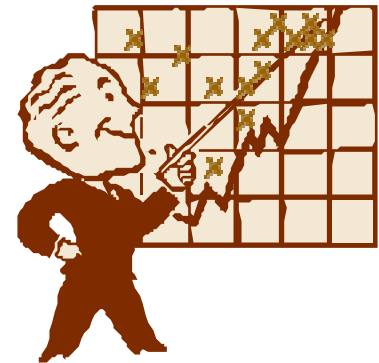
- Pilot the implementation of ArcView GIS and Mapping of Crime in a practical Policing Environment
- Develop Data Flow Processes
  - Acquisition
  - Input
  - Analysis
  - Product
- Establish a Spatial Baseline of crime locations within the project areas
- Explore the higher end of Spatial Analysis and Probability Modeling, as an all round Decision Support Tool in Policing



# Crime Capture, Spatial Analysis and Probability Modeling in Policing

## • Background and Historic Perspective

- DMPS established Crime Mapping Analysis Project 2003
- Making use of City's IT and GIS Infrastructure
  - Cadastre and Valuation Roll
  - Orthophotography
  - Road Centrelines
  - Address Points
  - Buildings and Businesses
- Identified Three Project Areas within the City
  - Point
  - CBD
  - Cato Manor



# Crime Capture, Spatial Analysis and Probability Modeling in Policing

- **Background and Historic Perspective**

- **Developed Database Design**

- **Basic Requirements based on data provision**
    - **Utilizes a One-to-Many relationship between Location and Incident (example: block of flats)**
    - **Compatible storage format for a number of Crime Analysis and Probability Predictive software (CASE (US), Rigel (Canada) and Recap SDE (US))**

- **Semi-Automated Capture with ArcView GIS and Avenue scripting**



# Crime Capture, Spatial Analysis and Probability Modeling in Policing

- Background and Historic Perspective

XY Capture Position | Durban Metro Police

Select Crime Type

Person

Property

Traffic

Miscellaneous

Date (YYYYMMDD)  Use today's date  Use stored date

20070412

Time Hour Minute

04 : 16

Enter Coordinates of Crime Position

Lat/Long (DMS)  Lat/Long (DD)  X/Y (Lo 31/84)

e.g. Lat (D): 29 (M): 32 (S): 53.2356

Long (D): 31 (M): 14 (S): 42.1689

Lat (D): 29 (M): 32 (S): 53.2356 NB: This is the value South of the Equator

Long (D): 31 (M): 14 (S): 42.1688 NB: This is the value East of Greenwich

Crime Description

Peace Order

Police Station

Mayville

Case / OB

23 / 04 / 07

Number of Arrests

2

Description of Position

Opposite Johnny Foxes, Florida Road

Comments

Suspect seen fleeing in Silver BMW fleeing towards Acutt Avenue. Known accomplice

Process Cancel

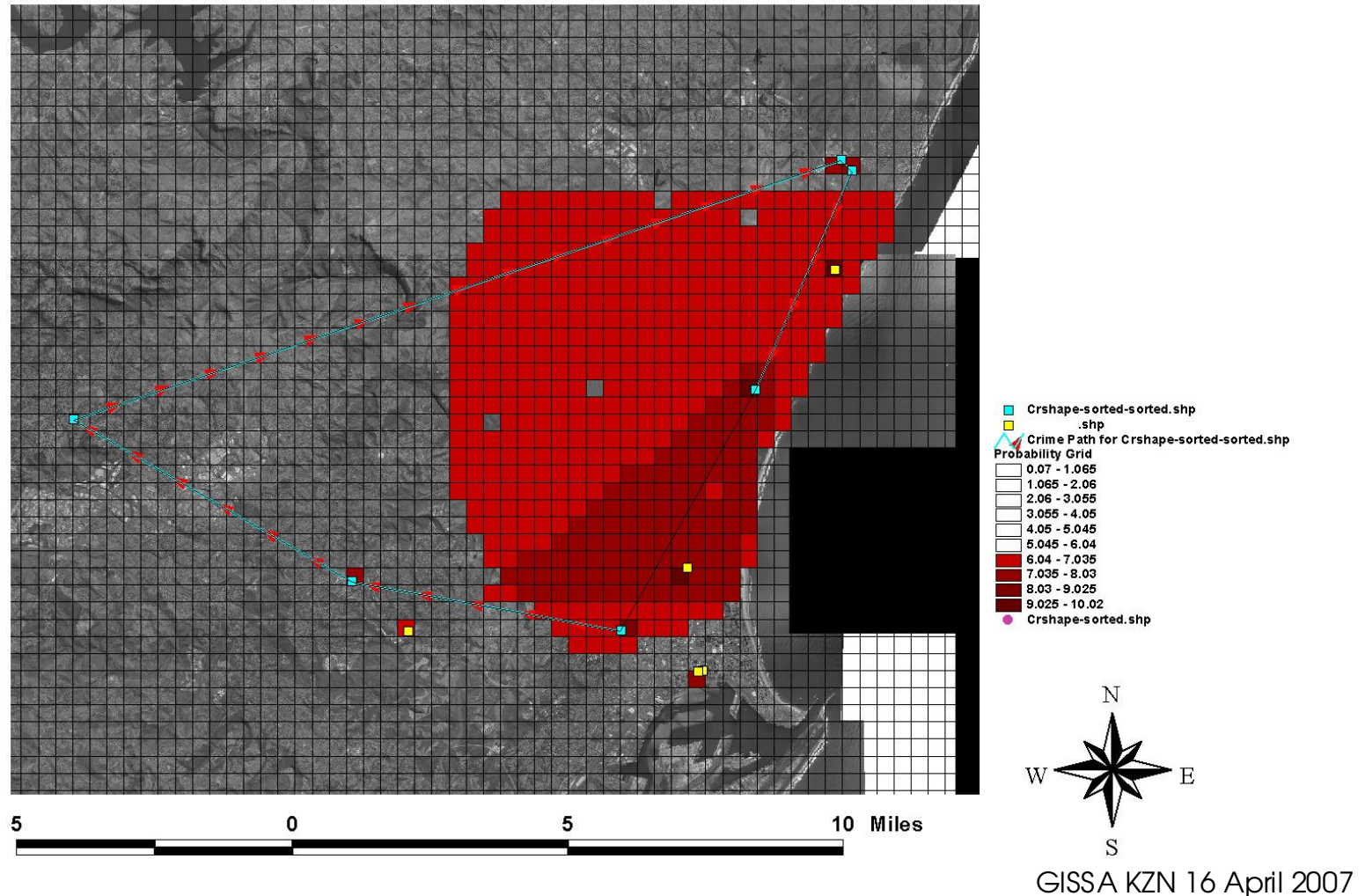


**Faux Data**



# Crime Capture, Spatial Analysis and Probability Modeling in Policing

The Hammer Gang  
October 2003-January 2004



# Crime Capture, Spatial Analysis and Probability Modeling in Policing

- **Geographic Profiling**

- Useful in serial crimes when the offender is unknown
- Most often used in crimes of violence
- Focuses investigative efforts on the probable location of the suspect within an area defined by a geo-profile
- Has the potential to reduce investigative time and effort
- Compliments normal investigative techniques

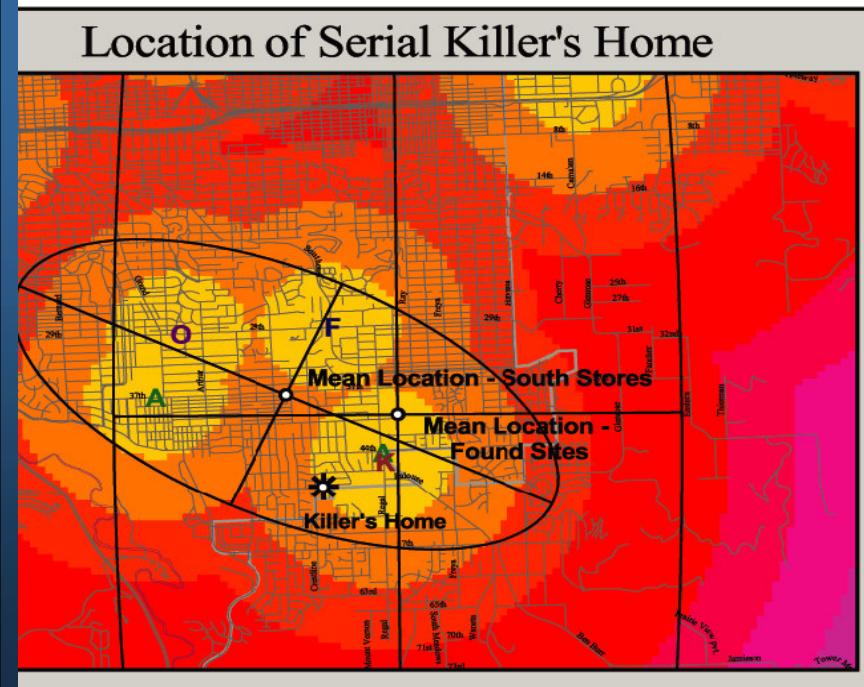
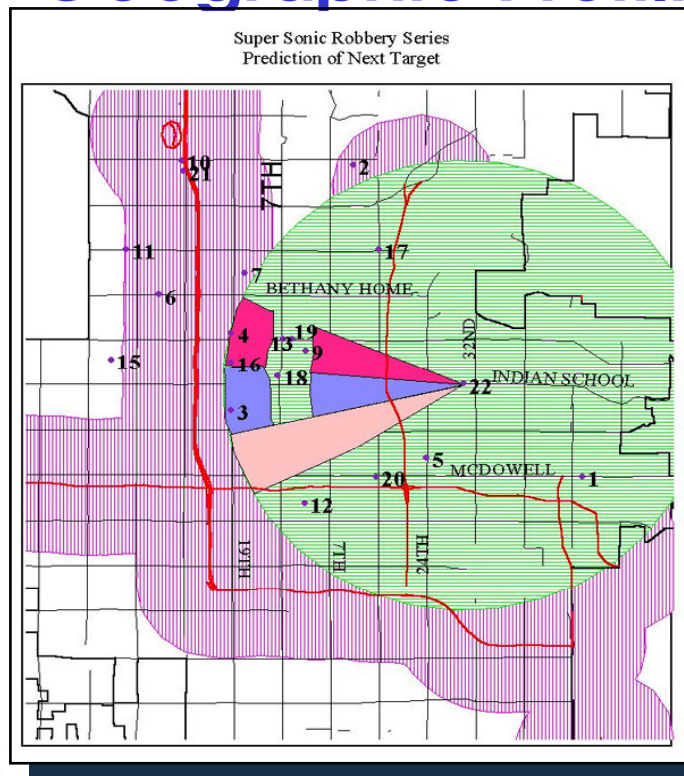


**Lew Nelson**  
**Industry Solutions Department Manager**  
**and Law Enforcement Solutions Manager**  
**ESRI Business Partner Conference 2006**

GISSA KZN 16 April 2007

# Crime Capture, Spatial Analysis and Probability Modeling in Policing

- **Geographic Profiling**



Low Nelson

Industry Solutions Department Manager  
and Law Enforcement Solutions Manager  
ESRI Business Partner Conference 2006





# Crime Capture, Spatial Analysis and Probability Modeling in Policing

- **Spatial Analysis and Probability Modeling**

- Low End - ESRI Crime Analysis Extension and Recap SDE

- Density Analysis to generate Hotspots
- Filtering of Data
- Time Window

- High End – CASE and Rigel

- Offender Path (movement of offender from existing targets to potential targets)
- Probability Grid (prioritization of potential targets i.t.o. Environmental Criminology Principles)
- Location of Offender Home Base through Geographic Profiling



# Crime Capture, Spatial Analysis and Probability Modeling in Policing

- **Post-hoc Analysis on Crime Series**

- CASE and Rigel

- Removal of last offence in series to test probability models in prediction of the next offence

- Serial Sexual Offender Series

- Serial Armed Robbery Series

- Analysis for Law Enforcement – Meritus Solutions Canada

- UCL Jill Dando Institute for Crime Science

- National Institute of Justice

- Geographic Profiling, ECRI Canada

- Crime Intelligence Analysis, Anacapa Sciences



- Use of technology within existing series

# Crime Capture, Spatial Analysis and Probability Modeling in Policing

- Questions

