Use of Network and Mapping Software for Fraud Analysis

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“Crime Analysis” Defined

The creation of an interpretation about a criminal activity after detailed examination and assessment of the constituent elements.

The processing of crime-related data using a series of steps for the purpose of creating an interpretation that increases the client’s level of understanding of the phenomenon in a way that the client can make decisions that are within the client’s responsibilities.

“I know what intelligence is when I see it.” (attributed to Henry Kissinger)
Crime Analysis as a “Puzzle”

Accurate picture unknown at start

Many pieces involved, both relevant and irrelevant

Some pieces missing

A deadline for completion

Evaluation of each piece required

Loose fit between pieces
Types of Crime Analysis

- Descriptive vs. Predictive
- Crime vs. Criminal Intelligence
- Tactical vs. Strategic
CRIME ANALYSIS CYCLE

Direction

Planning

Collection

Evaluation

Report Preparation

Dissemination

Analysis

Assessment

Processing

Collation

Evaluation
Inductive Reasoning

- Process of using facts to come up with a general statement

- Premises and Inferences are evaluated on basis of probability

- An inference can be a hypothesis, conclusion, or prediction
Cognitive Biases

“Major intelligence failures are usually caused by failures of analysis, not failures of collection. Relevant information is discounted, misinterpreted, ignored, rejected, or overlooked because it fails to fit prevailing mental model or mindset.”

(Source: Richards J. Heuer, Jr. The Philosophy of Analysis)
Available Analytical Software Tools

• Software tools depicted in the entertainment industry

• Software tools available law enforcement analysts
Benefits of using Analytic Software

- Reduction in staffing costs / time requirements
- Increased accuracy / reliability of results
- Enhanced pattern and gap identification
- Enhanced effectiveness in communicating analytical findings
Cases Discussed in Lecture

• Credit Card Fraud

• Identity Theft

• Mass Marketing Fraud

• Breach of Trust
4 Analysis Tasks

1. Profiling with Pivot Tables
   - MS Excel

2. Event Flow Analysis
   - i2 Analyst Notebook

3. Link Association and Social Network Analysis
   - i2 Analyst Notebook

4. Crime Mapping
   1. Google Maps
   2. ESRI ArcView
1. Profiling with Pivot Tables

Task: Identify associations, personal schedule and movement between locations of cell phone user using cell phone information

Crime: Credit Card Fraud

Information: Cell Phone Records

Software: Pivot Table (MS Excel)
Demonstrations

1. Creation of a pivot table

2. Using a pivot table to profile the cell phone user committing a credit card fraud
2. Event Flow Analysis

Value

- Personal schedule identification
- Information gap identification
- Conspiracy identification
- Investigation timeline
- Illustrate method of operation
Task: Breach of Trust Conspiracy

Task: Identify examples of conspiracy between suspects

Crime: Breach of trust

Information: Cell Phone Records

Software: MS Excel and i2 Analyst Notebook

Demonstration: Importing and Analysis
Task: Passed Counterfeit Bills

Task: Identify common patterns of passed counterfeit bills

Information: Excel records of seized counterfeit records

Software: MS Excel and i2 Analyst Notebook

Demonstration: Importing and Analysis
Task: Timelines of Several Phones

Task: Illustrate the purpose of various phones

Crime: Credit Card Fraud

Information: Cell phone records

Software: MS Excel and i2 Analyst Notebook

Demonstration: Importing and Analysis
3. Link Association and Social Network Analysis

Analytical Value

• Identification of contacts
• Illustration of individual’s value to organizational
**Link Association vs Social Network Analysis**

**Link Association**
- Non-persons can be an entity on the chart
- Subjective repeatability is not guaranteed

**Social Network Analysis**
- Only persons are nodes
- Objective and repeatable
- 4 Dimensions of Power
  - Degree
  - Betweenness
  - Closeness
  - Eigenvector
Task: Link Association Chart of Bribery

- Information: Cell phone records
- Software: MS Excel and i2 Analyst Notebook
- Demonstrations: Importing and Analysis
Task: Link Association of Personal Communications Network

Crime: Credit card fraud

Information: Cell phone records

Software: MS Excel and i2 Analyst Notebook

Demonstrations: Importing and Analysis
Task: Link Association of Identity Theft Aliases

Information: Various police reports and exhibits

Software: i2 Analyst Notebook

Demonstration: Analysis of Link Association Chart
Task: Social Network Analysis of Mass Marketing Problem

Information: Various complaints and police information

Software: i2 Analyst Notebook

Demonstration: Importation and Analysis
4. Crime Mapping

Value

• Identify probably location of suspect or victim
• Track suspect movement
• Identify “hot spots” of criminal activity

Import Issue

• XY Coordinates
• Geo-coding
Software: Google Earth

Attributes

• Free
• Import function
• Slider bar

Demonstration

• Map Creation
Software: ArcView (ESRI)

Attributes
• Comprehensive mapping program
• Import function
• Online resources

Demonstration
• Map Creation
Mapping Communications

Cell Dump Analysis
• Identify common numbers between locations

Co-location Analysis
• Identify 2 or more phones carried and used by one person (one clean, one operational)

• Identify when two phones used in close temporal and spatial proximity
Mapping Communications

Cell Site Location Analysis

- Identify approximate geographical area of phone/data device when in use
- Confirm / Contradict alibis
- Verify participation in activities
- Placement of individuals at locations
Task: Map Cell Tower Usage

Crime: Counterfeit Credit Card

Information: Cell phone records

Software: MS Excel, i2 Analyst Notebook, Google Earth and ArcView

Demonstrations: Importation and Analysis
Task: Hotspots of Counterfeit Money Passing

Information: Various police records

Software: MS Excel and ArcView

Demonstration: Importation and Analysis
Task: Hotspots of Mass Marketing Frauds

Information: Police information

Software: Database, i2 Analyst Notebook, ArcView

Demonstration: Importation and Analysis
Questions or Comments
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