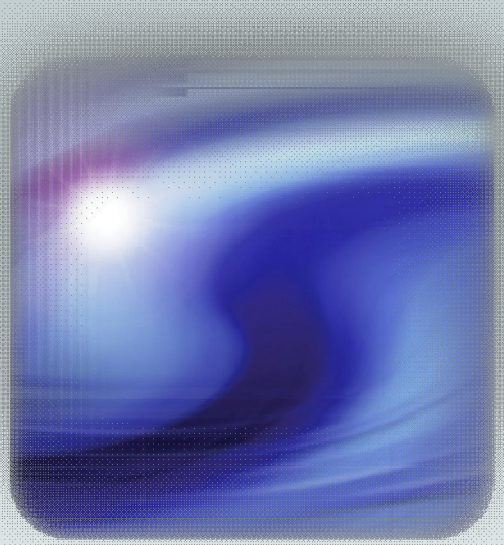


THE POWER TO KNOW.

Social Network Analysis

TDMF – May 5th, 2010

Dan McKenzie – Fraud Solutions Specialist

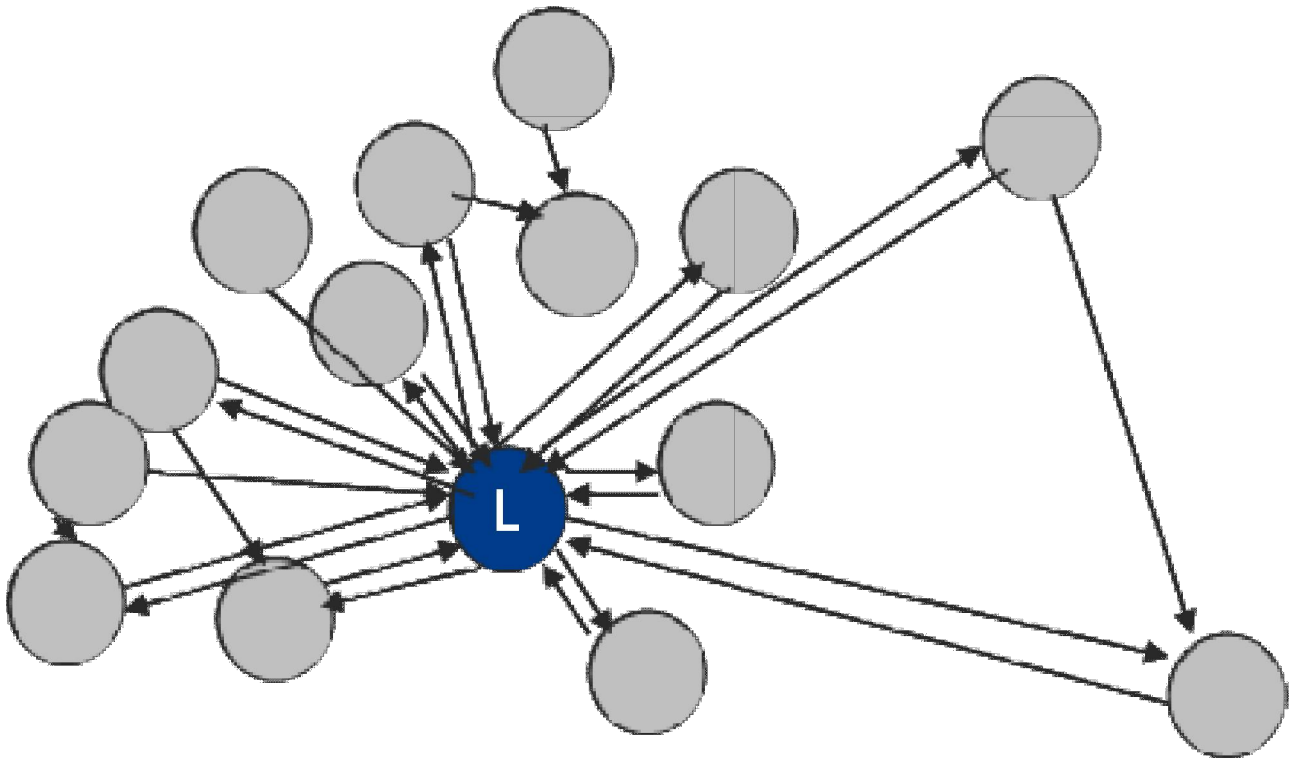
Facebook?

Matt Malczewski

What is *"Social Network Analysis"* ?

Definition:

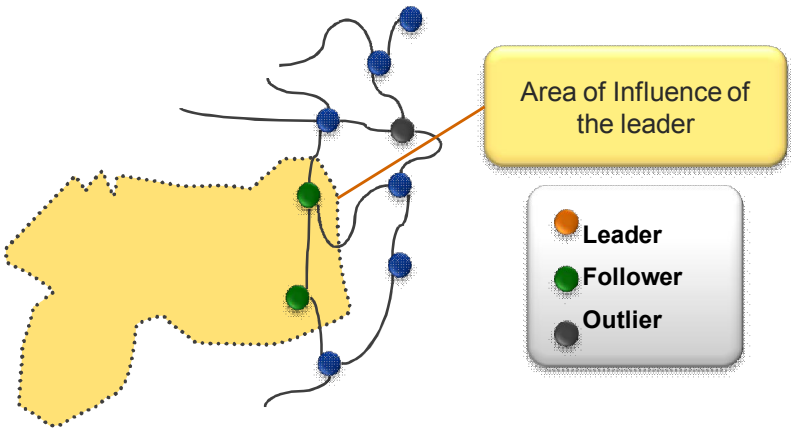
The practice of linking individuals and measuring the strength of their relationships.



Explanation:

- Social Network Analysis is the study of the social structure made of nodes (which are generally individuals or organizations) that are tied by one or more specific types of interdependency, such as values, visions, ideas, financial exchange, friendship, kinship, dislike, conflict or trade.

- Social Network Analysis views social relationships in terms of nodes and ties. Nodes are the individual actors within the networks, and ties are the relationships between these actors.



SAS® Social Network Analysis

SAS® Social Network Analysis improves customer retention, cross-sell / up-sell, & acquisition by enabling marketers to:

- Identify social communities based on behavioral relationships between customers
- Measure and segment customers based on social influence *(e.g. "leaders", "followers", "marginals" and "outliers")*
- Target customers based on community status and behavioral changes within communities *(e.g. when a community "leader" changes, target his/her "followers")*

Where to use Social Network Analysis in Marketing

1. **Segmentation**

2. **Retention**
   - Churn / attrition prevention

3. **Cross-sell & up-sell**
   - Viral product adoption

4. **Acquisition**

Example – Cross-sell "Leaders" for "viral" Effect

Capability:

•Identify "Leaders" & better understand new product adoption

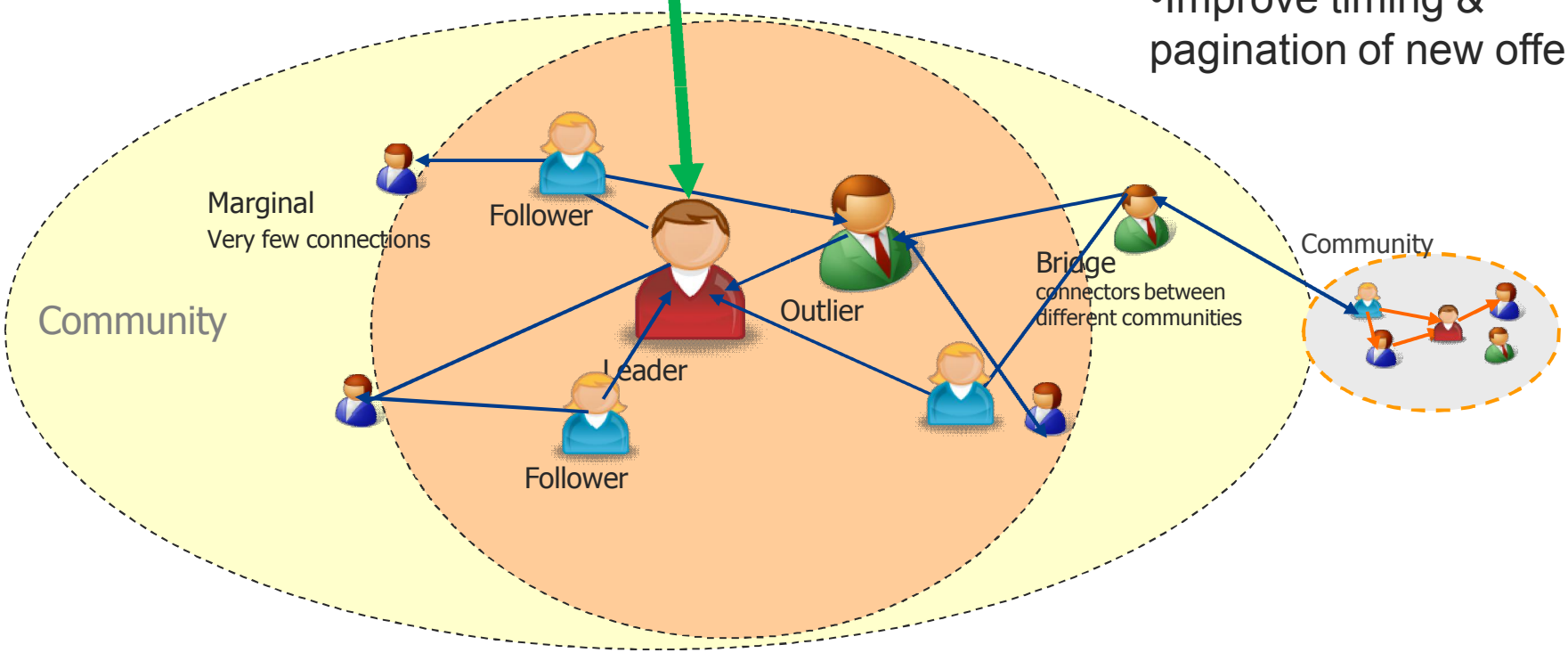
Marketing Action:

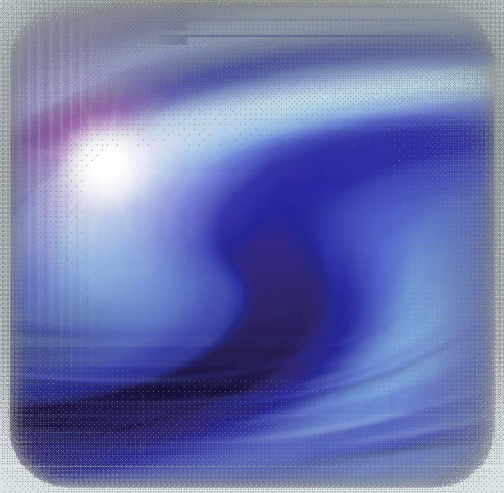
•Target cross / up-sell strategies to "Leaders" 1st – leveraging "viral" adoption

Benefit:

•Extend the impact of marketing spend

•Improve timing & pagination of new offers





SNA and Fraud Detection

THE POWER TO KNOW.

"Canada is a wonderful safe environment to commit fraud as there are no real deterrents and very few repercussions"

- Craig Hannaford

Executive Consultant
Fraud Squad TV
Ex- RCMP

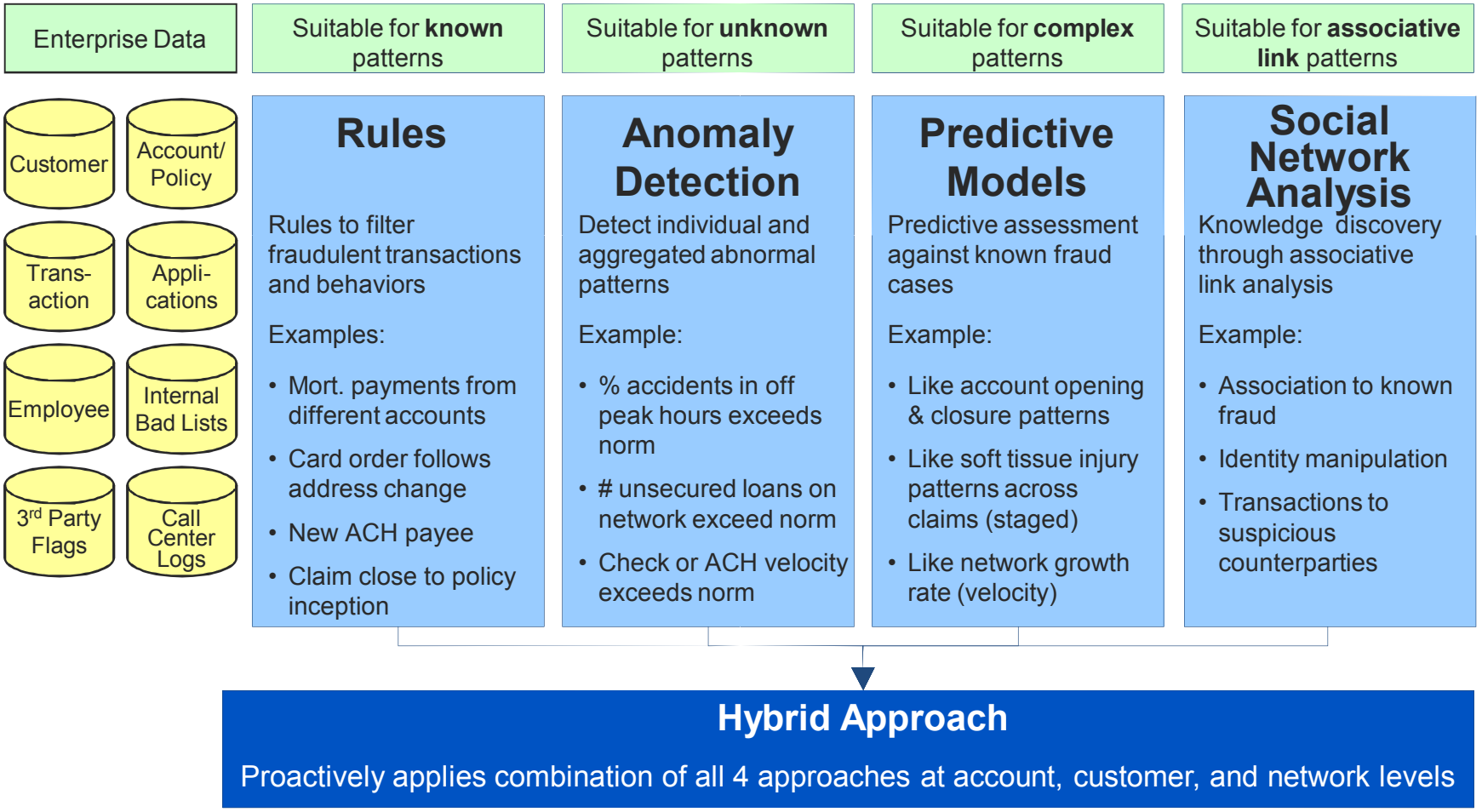
Starting with the SAS Financial Crimes Framework

Increasing Fraud - The Business Problem

- Fraudsters
  - Far more sophisticated – organized, patient, share rules
  - Engage insiders to understand detection environment
  - High velocity of attacks – disappear after 2-3 transactions
  - Hit multiple channels and industries at the same time
  - Continuously evolve fraud strategies
- Current Fraud Systems
  - Silo'd by line of business – No sharing of data
  - Act on transaction or customer
  - Rules and predictive models have limitations
  - No real proactive steps taken to combat cross channel fraud
  - Evidence insufficient to act upon

SAS Fraud Analytics

Using a Hybrid Approach for Fraud Detection



Why the Hybrid Approach?

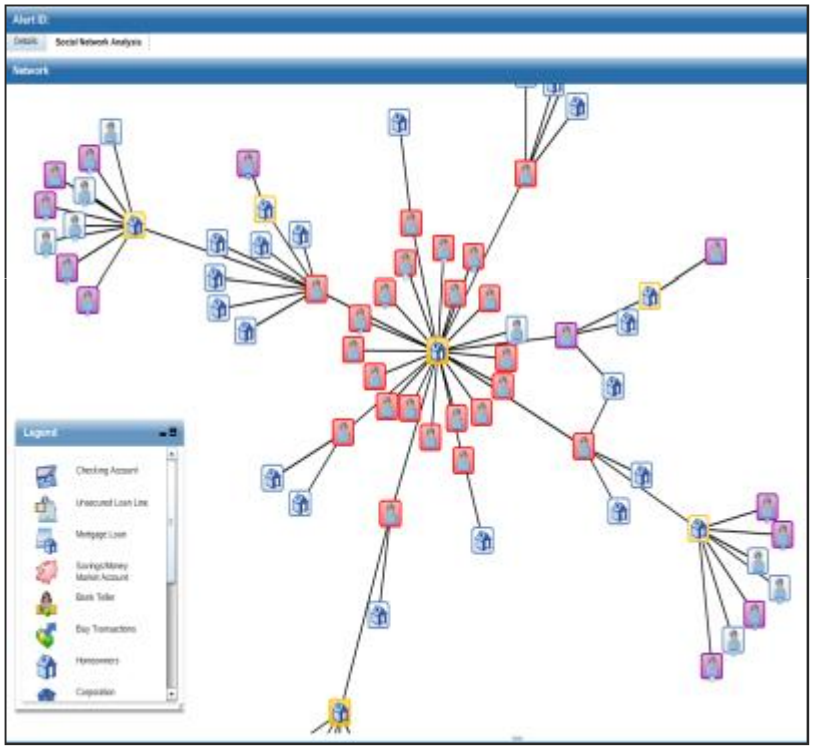
Provides the ability to apply Rules, Predictive Models, and Anomaly Detection on linked data

- More fraud/actionable cases identified
  - Including both previously undetected networks and extensions to already identified cases
- Reduction in false positive rates
  - Hybrid approach with SNA reduces false positives by up to 10+ times over traditional rules-based approaches
- Improved analyst / investigation efficiency
  - Each referral takes 1/2 – 1/3 the time to investigate using SAS' fraud network visualization on aggregated data
- Significant increase in ROI per analyst / investigator

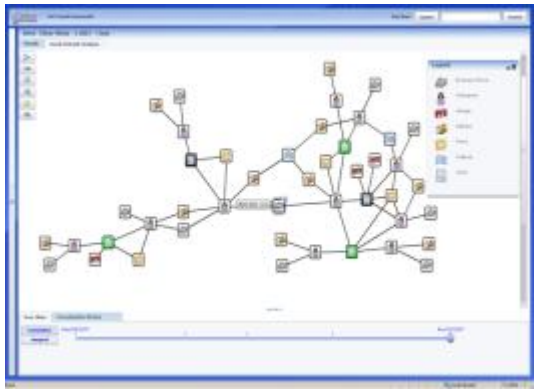
Analytic Engine

SAS Social Network Analysis

- Network scoring
  - Rule and analytic-based
- Analytic measures of association help users know where to look in network
  - Net-CHAID for local area of interest (node) in the network
  - Density, Beta-Index (network)
  - Risk ranking with hypergeometric distribution, degree, closeness, betweenness, eigenvector, clustering coefficients (node)
- Modularity (sub-network)



Case Study – Workers Compensation Insurer



Highlights

- Advanced analytics drove 38% better results than competition
  - 40% lift on claim referrals
  - 27% lift on network referrals
- Incremental estimated save of $10.8M annually (for same # of annual investigations)
- 61% lift over current process
- 47% correct hit rate on claims
- 67% correct hit rate on networks
- 100% of WC and GL claims processed (~$16B claims)

Business Problem

A large US commercial insurer was incurring significant fraud losses across their lines of business. The insurer **engaged 3 vendors in a competitive pilot** to determine the solution that would provide the most lift over their current rules and models and enhance effectiveness of the triage and fraud investigation teams.

SAS Approach

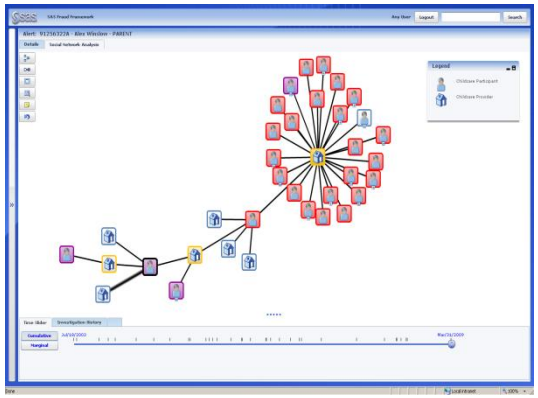
SAS subjected **4 years of historical data** to the predictive capabilities of the SAS Fraud Framework. Client investigators evaluated the solution results during a **3 week validation** period to identify incremental fraud detection at the claim and network levels, reduction in false positives, and enhancements to investigative efficiency.

Results

The key client decisioning factors for vendor selection include:

- **Incremental Detection: $10.9M annually** (for same number of investigations)
- **ADVANCED ANALYTICS**, allowing the appropriate **prioritization of investigator time** and **extraction of maximum value**. Using SAS advanced analytics, SAS performed **38% better** than all other vendors.
- **OPEN ARCHITECTURE**, allowing client to become self sufficient vs. other black box + services based approaches (self sufficiency can **result in significant annual savings on services costs.**).

Case Study – County Department of Social Services



Business Problem

The Department of Social Services of a large US County was being hit by fraud, waste, and abuse across their **public assistance programs**. The County engaged SAS to pilot the **SAS Fraud Framework** to determine if the data analytics and visualization solution could assist in **proactively detecting both opportunistic and organized fraud** across providers and participants in the Childcare program.

SAS Approach

SAS subjected **6 years of historical data** to the predictive capabilities of the SAS Fraud Framework. Client investigators evaluated the solution results during a **3 week validation** period against 4 main categories: **Ease of analyst use**, **investigative efficiency**, **earlier fraud detection**, and **incremental fraud detection.**

Results

The pilot resulted in a business case and deployment roadmap for full implementation:

- **Investigative Efficiency: $3.0M** (saved across 40 investigators)
- **Earlier Detection: $1.6M** annually
- **Incremental Detection: $26.5M** annually

Highlights

- 32 times increase in # fraud rings detected annually
- Incremental estimated save of $31.1M annually
- 83% correct hit rate on provider fraud
- 40% correct hit rate on participant fraud
- 6 years of historical data from 5 data source systems