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Cybersecurity and Operational Risk Initiative

Financial Research Advisory Committee Meeting
July 20, 2017

Overview

Cyber events and operational failures have become a major risk to financial stability

They can disrupt the entire financial system

- **A cyberattack on one institution can spread widely through contagion**
- **New technologies can bring about new vulnerabilities**
- **Recent hacks have shown the potential dangers**

The OFR has the ability to look across the financial system, map key financial networks, and identify structural weaknesses

Our Two-Pronged Research Agenda

First – Event and Policy Studies

- Analyze past operational and cyber events
- Evaluate policies and regulations
- Draw lessons from tabletop exercises and contribute to developing better tabletop exercises
- Forge relationships with industry participants

Second – Financial Mapping and Risk Analysis

- Map out different financial markets
- Identify connections within and across markets
- Analyze networks for key vulnerabilities
- Provide guidance on structuring defenses

Four Components of Mapping Project

Source

- Gather detailed and dynamic data to build maps of financial markets

Significance

- Identify critical entities and potential points of failure

Stability

- Analyze the resiliency of financial markets and the overall financial system

Shocks

- Study the impact of both random and targeted shocks

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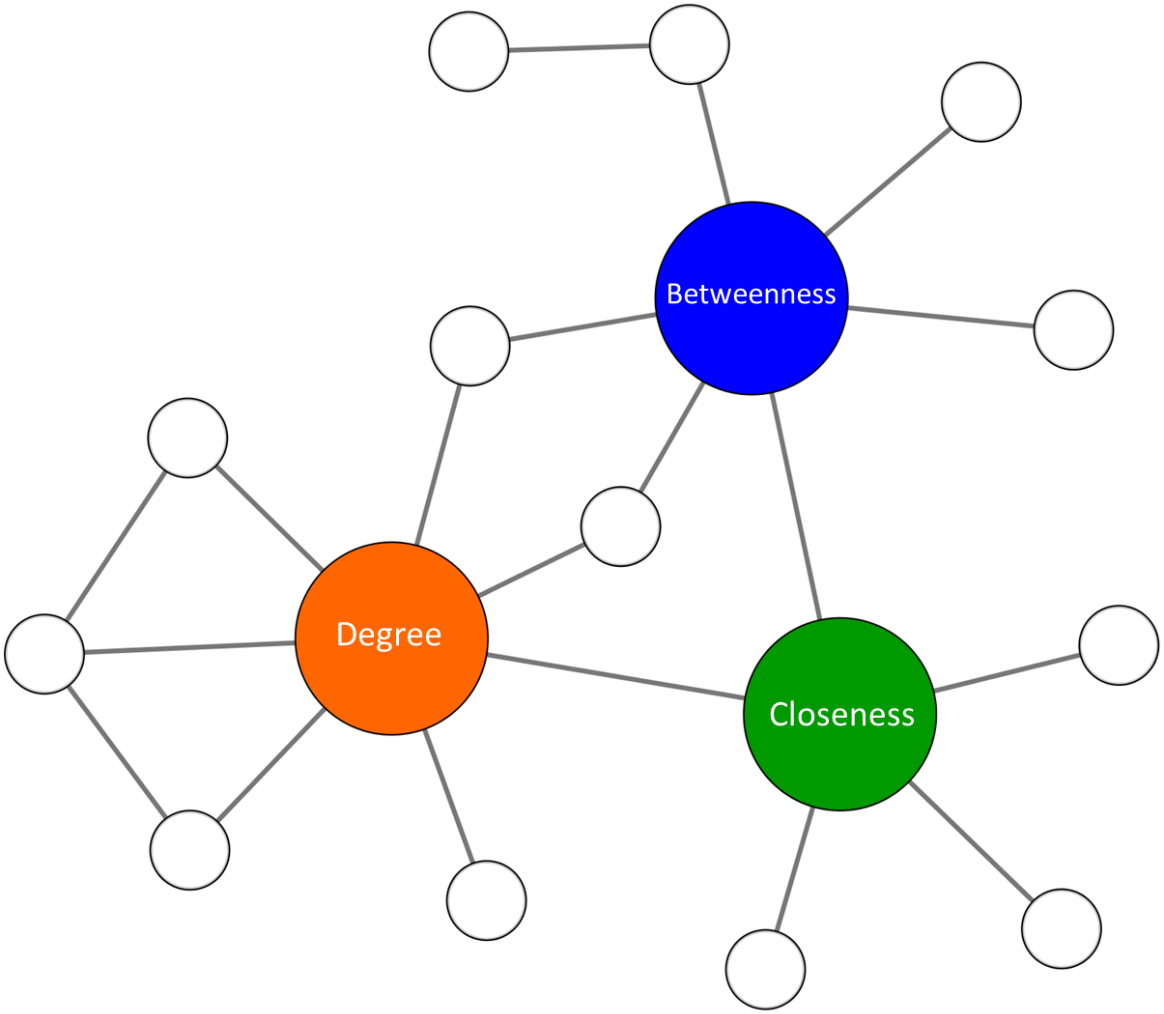
Mapping Project Details

What Node Is Most Significant? Centrality Metrics



Network Defense Models

Two Agents – Designer and Adversary

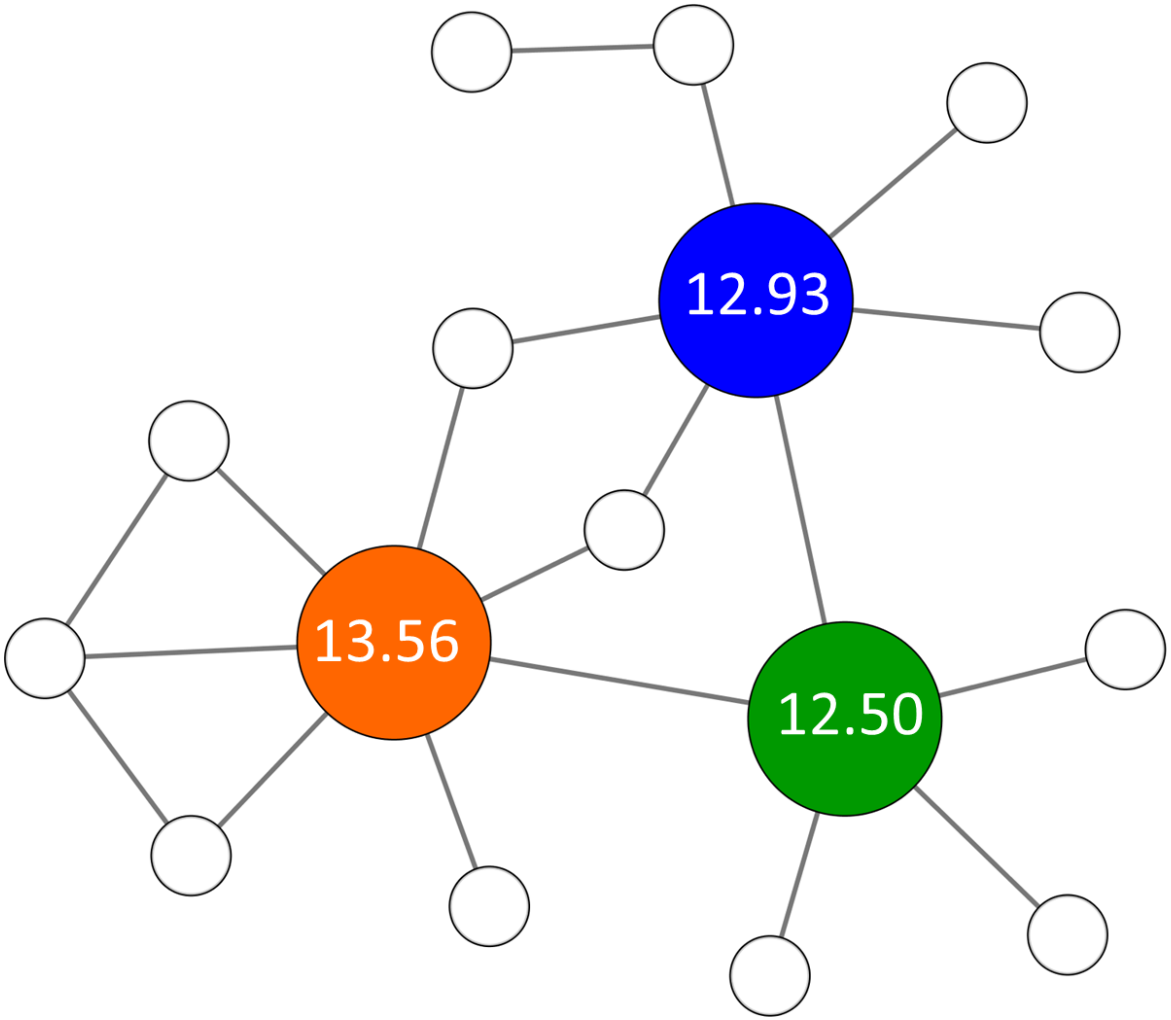
- Designer assembles network defense by selecting network links, establishing node defenses, or both
- Adversary attacks certain nodes, either at random or strategically

Successfully attacked nodes are eliminated

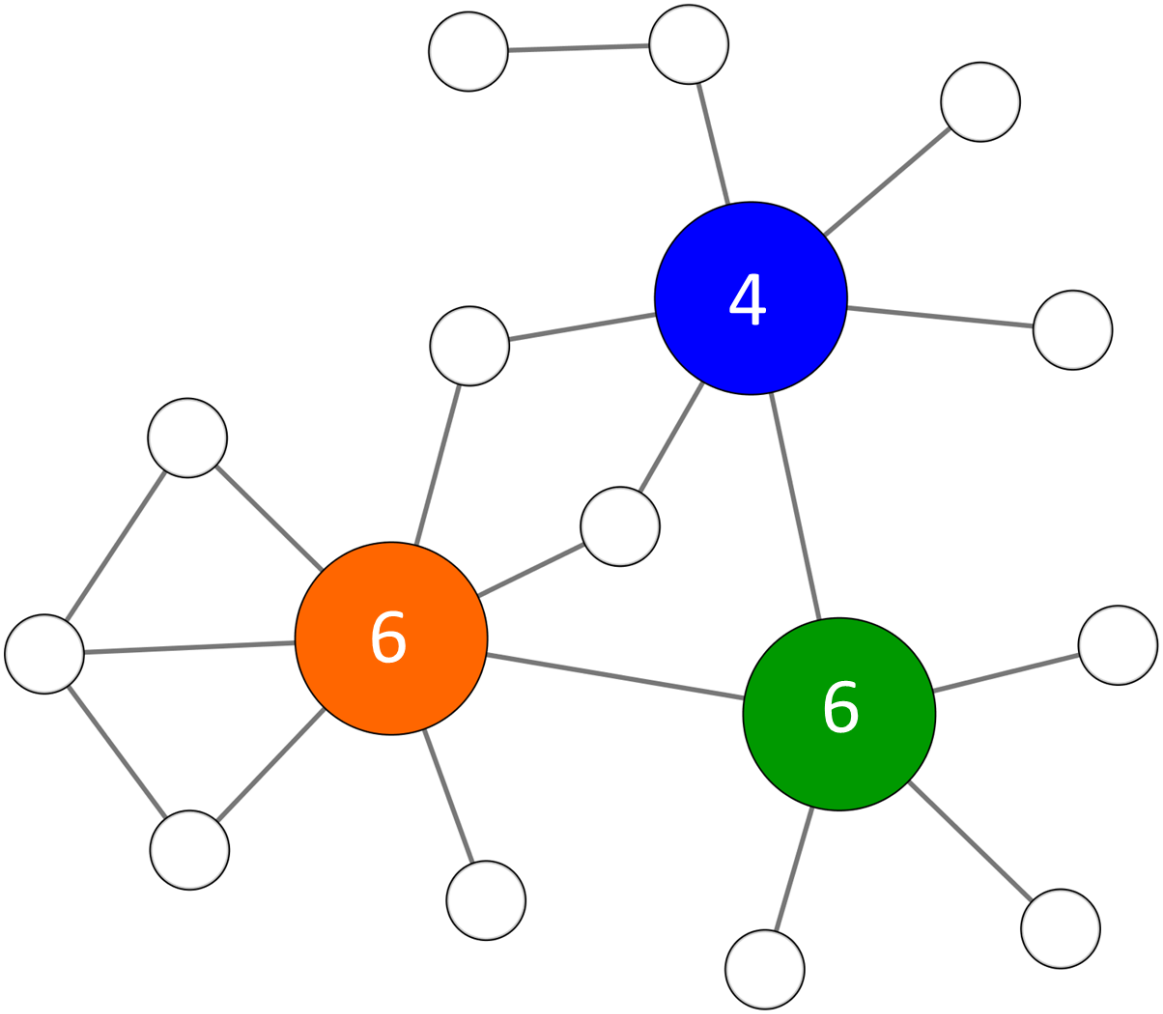
- The attacked node and all its links are removed
- With contagion, further attacks are propagated on neighbors

Models give insight on overall network stability, which nodes are most important to protect, and the impact of different types of attacks

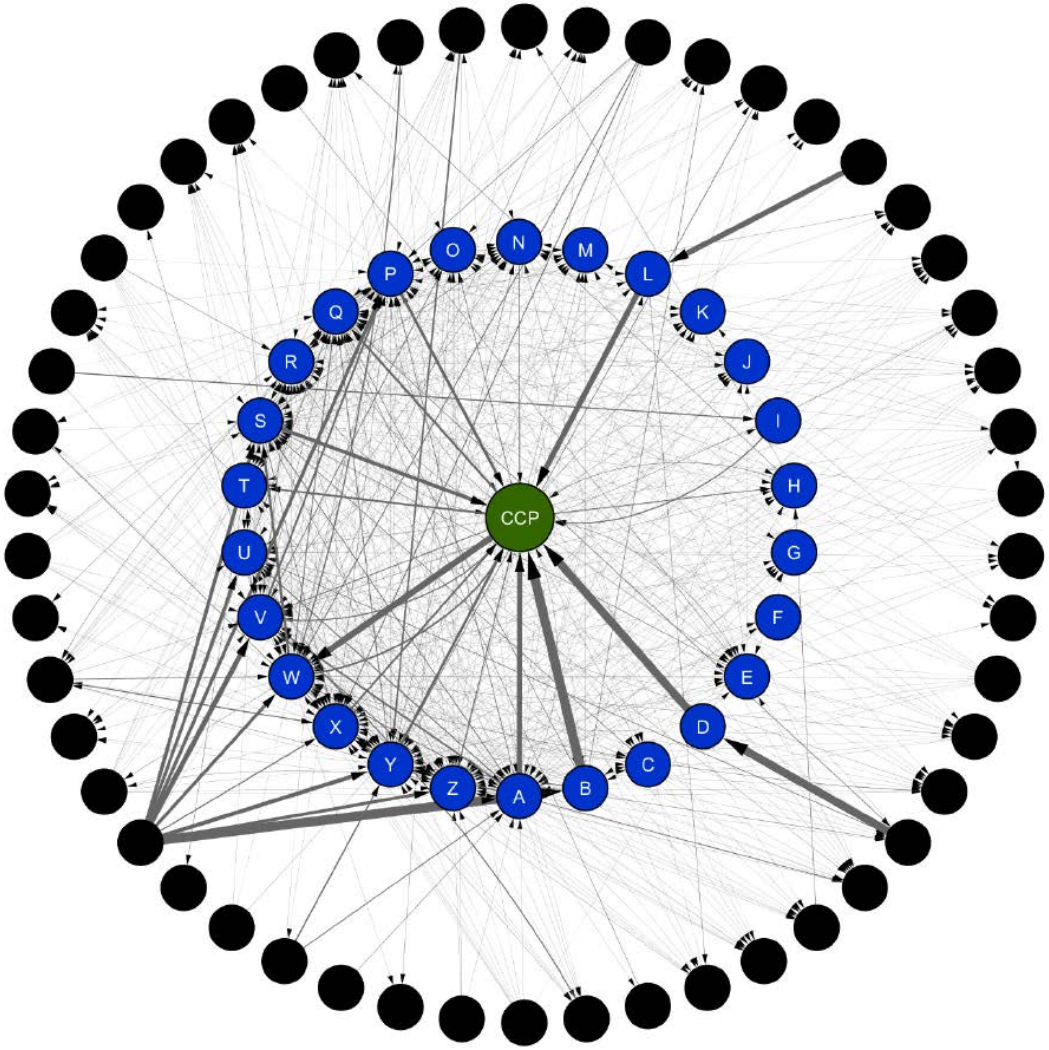
Network Defense Against a Random Shock



Network Defense Against a Targeted Shock



Importance of Detailed Data: The CDS Network



Questions for Discussion

1. Which financial markets are the most urgent to analyze for operational or cyber risks?

2. What research approaches and models are important for investigating operational and cybersecurity risks?

3. What statistics and metrics are the most important for monitoring and analyzing operational and cybersecurity risks?