EXTREME CYBER SCENARIO PLANNING & ATTACK TREE ANALYSIS

Ian Green
Manager, Cybercrime & Intelligence
Commonwealth Bank of Australia

Session ID: GRC-T17
Session Classification: ADVANCED
WHY?
“What keeps you up at night?”
“What keeps you up at night?”

Lockheed Martin’s Security Networks Were Hacked

Lockheed Martin, one of the world’s largest defense contractors, was hit hard by hackers this week who used falsified SecurID electronic tokens to gain access. The breach threatens the security of vital data on present and future military technology.

Which, you know, sucks for us and our allies in the UK.

MAY 28, 2011 11:00 AM
Extreme events are costly

Global Payments Inc.

10% or $400m wiped off market cap
How prepared are you?

General Keith Alexander
Director, National Security Agency
Commander, United States Cyber Command

http://www.youtube.com/watch?v=rtvi_RiFzOc&feature=plcp
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Cyber Resilience

- mean time to failure
- mean time to recovery

“Can only be achieved by adopting a holistic approach of the management of cyber risk”

“While failures are unavoidable, cyber resilience prevents systems from completely collapsing”
HOW?
Threat Actor Analysis

For each scenario

Threat Actor Analysis → Scenario Selection

Aim: Identify actors who pose a significant threat to the organisation
## Threat Agent Library – Intel

<table>
<thead>
<tr>
<th>Intent</th>
<th>NON-HOSTILE</th>
<th>HOSTILE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Employee</td>
<td>Anarchist</td>
</tr>
<tr>
<td>Access</td>
<td>Reckless</td>
<td>Civil Activist</td>
</tr>
<tr>
<td></td>
<td>Untrained</td>
<td>Info Partner</td>
</tr>
</tbody>
</table>

Agent Attributes - Intel

**WHO**
- **Intent**: Non-hostile, Hostile
- **Access**: Internal, External
- **Skill Level**: None, Minimal, Operational, Adept
- **Resources**: Individual, Club, Contest, Team, Organisation, Government
- **Limits**: Code of conduct, Legal, Extra-legal (minor), Extra-legal (major)

**HOW**
- **Visibility**: Overt, Covert, Clandestine, Don’t Care
- **Objective**: Copy, Destroy, Injure, Take, Don’t Care
- **Outcome**: Acquisition / Theft, Business Advantage, Damage, Embarrassment, Technical Advantage
Agent Attributes - Intel

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Consolidated Threat Actors

- Corrupt Government Official
- Government Cyber Warrior
- Government Spy
- Civil Activist
- Radical Activist
- Mobster
- Terrorist
- Competitor
- Internal Spy

- Nation State
- Hacktivist
- Organised Crime
- Terrorists
- Trusted Insider

RSA Conference 2013

Commonwealth Bank
Threat Actor Analysis

- Organised Crime
- Hacktivist Group
- Nation State
- Terrorist

RSA CONFERENCE 2013
Threat Actor Analysis

Organised Crime

Nation State

Trusted Insider

Hacktivist Group

Terrorist

Hacktivist Group

Intent: Hostile
Access: External
Skill Level: Adept
Resources: Organisation
Limits: Extra-legal (major)
Visibility: Overt
Objective: Copy, Injure
Outcome: Damage, Embarrassment
Threat Actor Analysis

Organised Crime
- Intent: Hostile
- Access: External
- Skill Level: Adept
- Resources: Organisation
- Limits: Extra-legal (major)
- Visibility: Covert
- Objective: Take
- Outcome: Acquisition / Theft
Threat Actor Analysis

- **Terrorist**
- **Trusted Insider**
- **Nation State**
- **Hacktivist Group**
- **Organised Crime**

**Nation State**

- **Intent:** Hostile
- **Access:** External
- **Skill Level:** Adept
- **Resources:** Government
- **Limits:** Extra-legal (major)
- **Visibility:** Clandestine
- **Objective:** Copy
- **Outcome:** Technical Advantage
Threat Actor Analysis

- Hacktivist Group
  - Intent: Hostile
  - Access: External
  - Skill Level: Adept
  - Resources: Organisation
  - Limits: Extra-legal (major)
  - Visibility: Covert
  - Objective: Destroy
  - Outcome: Damage

- Organised Crime

- Trusted Insider

- Nation State

- Terrorist

RSA Conference 2013
Impact Analysis

Aim: Determine what your organisation really cares about protecting
# Business Impact Matrix

<table>
<thead>
<tr>
<th>Impact</th>
<th>Financial</th>
<th>Customer Service &amp; Operations</th>
<th>Reputation / Brand</th>
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<th>People</th>
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<tr>
<td>5</td>
<td>&gt;$500m</td>
<td>Significant loss of customers due to extensive interruption to service capability</td>
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<tr>
<td>4</td>
<td>$200m-$500m</td>
<td>...</td>
<td>...</td>
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<td>...</td>
<td>...</td>
</tr>
<tr>
<td>3</td>
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<td>...</td>
<td>...</td>
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</tr>
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Values at Risk

- Health and safety of employees
- Customer funds and stocks
- Customer data (private information)
- Customer data (intellectual property)
- Corporate data (sensitive information)
- Corporate data (intellectual property)
- Availability of banking channels (Internet facing)
- Availability of banking channels (back end)
Aim: Select scenarios that could have a catastrophic impact on the organisation
## Scenario Selection

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<tr>
<td>Business Advantage</td>
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<td>Injure</td>
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**Organised Crime**

**Intent:** Hostile  
**Access:** External  
**Skill Level:** Adept  
**Resources:** Organisation  
**Limits:** Extra-legal (major)  
**Visibility:** Covert  
**Objective:** Take  
**Outcome:** Acquisition / Theft

**Scenario:** Organised crime gang steals customer funds causing significant financial loss.
Scenario Selection

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**Scenario**: Socio-political group performs prolonged denial-of-service attack causing sustained outages.
## Is it “Extreme”?

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### Scenarios on Risk Matrix

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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>L</td>
<td>M</td>
<td>M</td>
<td>H</td>
<td>VH</td>
</tr>
<tr>
<td>4</td>
<td>L</td>
<td>L</td>
<td>M</td>
<td>H</td>
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Impact

1 | 2 | 3 | 4 | 5
### Scenario Selection

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<thead>
<tr>
<th>Organised Crime</th>
<th>Hacktivist Group</th>
<th>Nation State</th>
<th>Terrorist</th>
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</thead>
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<tr>
<td><strong>Financial Gain</strong></td>
<td>1. Large scale targeting of bank customers using malware to steal funds.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. High value fraud conducted against backend payment system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Theft / Exposure</strong></td>
<td>4. Exfiltrate and disclose large sets of corporate data to embarrass or discredit the bank.</td>
<td>6. Exfiltrate corporate intellectual property for strategic, commercial or political gain.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Compromise bank IT systems and exfiltrate large sets of customer data.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sabotage / Operations Impact</strong></td>
<td>3. Targeted, prolonged DDoS against multiple Internet facing systems.</td>
<td></td>
<td>7. Destructive cyber-attack against multiple bank data centres.</td>
</tr>
</tbody>
</table>
Aim: Develop detailed attack trees for each extreme scenario
Attack Tree Analysis

Steal Car

Unlock Door
- Smash Window
- Pick lock

Start Engine
- Hot wire
- Screwdriver in ignition
Attack Tree Analysis

“How”?

Steal Car

Unlock Door
Smash Window
Pick lock

Start Engine
Hot wire
Screwdriver in ignition

AND
Attack Tree Analysis

Steal Car

- Unlock Door
  - Smash Window
  - Pick lock

- Start Engine
  - Hot wire
  - Screwdriver in ignition

“And then”?
Attack Tree Demonstration

Demonstration of attack trees (Prezi)
Controls Assessment

For each scenario

Threat Actor Analysis → Scenario Selection → Attack Tree Development → Remediation

Impact Analysis → Scenario Selection

Aim: Map controls to attack trees and assess effectiveness
Industry Standard Control Sets

- Provides a consistent set of controls for assessment and comparison
- May not be relevant to a particular scenario
- May not be pitched at the right level to be useful

Options available:

- DSD Top 35 Mitigation Strategies
- NIST Special Publication 800-53
- SANS 20 Critical Controls for Effective Cyber Defense
Hybrid Control Set

- Application Whitelisting
- Data Encryption
- Physical Security Controls
- Third Party Governance
- Data Loss Prevention
- Penetration Testing
- Layer 7 DDoS Prevention
- Network Segmentation
- MiTB Detection
## Controls Assessment

- **Type of control:**
  - Predict
  - Prevent
  - Detect
  - Respond

- **Status of control:**
  - Control has not been implemented
  - Control has known gaps
  - Control operating effectively

- **Potential to mitigate:**
  - 25%
  - 50%
  - 75%
  - 100%

- **Cost of control:**
  - Low cost
  - Moderate cost
  - High cost
Control Mapping

Steal Car

AND

Unlock Door

Smash Window

Pick lock

Start Engine

Hot wire

Screwdriver in ignition

$ 75%

Prevent

Bullet proof glass

Sidewinder Lock

$ 75%

Engine Immobiliser

Car Alarm

Detect

$ 75%
Attack Tree Demonstration

Demonstration of attack trees (Prezi)
Aim: Use controls assessment to plan remediation projects which address control gaps
Response Planning

For each scenario

- Threat Actor Analysis
- Impact Analysis
- Scenario Selection
- Attack Tree Development
- Controls Assessment
- Remediation
- Response Planning
- Exercise

Aim: Create or enhance existing response plans to cater for extreme scenarios
Incident Response Framework

- **IRP**: Incident Response Plan
- **IRSOP**: Incident Response Standard Operating Procedure
- **IRG**: Incident Response Guidelines
Incident Response Standard Operating Procedures

- Denial of Service
- Compromised Information
- Compromised Asset
- Unlawful Activity
- Probing
- Malware
IR Considerations

► Will your incident response plans hold up to extreme scenarios?
► What outside resources will you lean on for assistance in an extreme scenario?
► Have you documented and shared all your contacts into government, law enforcement, service providers?
► Have you discussed & planned your response with external stakeholders? Do you know what you will expect from each other if such a scenario occurs?
► Have you practiced your incident response?
Exercise

For each scenario

Threat Actor Analysis

Scenario Selection

Attack Tree Development

Impact Analysis

Response Planning

Remediation

Exercise

Aim: Test control strength, response plan and overall preparedness
Example: “BYO Botnet”

- HTTP “large resource” request
- HTTPS “large resource” request
- HTTPS “slow” POST attack
- HTTPS search query attack
- SSL Exhaustion
- DNS Query attack
- TCP SYN flood
- IP Fragmentation Attack
- ICMP flood
Cyber Risk Management Maturity Model

Stage 1: Unaware
Stage 2: Fragmented
Stage 3: Top Down
Stage 4: Pervasive
Stage 5: Networked

The organisation’s leadership takes ownership of cyber risk management… they understand the organisation’s vulnerabilities and controls.

The organisation is highly connected to their peers and partners, sharing information and jointly mitigating cyber risk.

Source: World Economic Forum
Join “Extreme Cyber Scenario Planning” on LinkedIn
Information shared using the traffic light protocol:

http://www.us-cert.gov/tlp/

- **Private**
  - Full attack trees with control mapping and effectiveness

- **Restricted** Commitment to contribute to knowledge base

  - Full attack trees without control effectiveness

- **Vetted**
  - Verified members of IT security community

  - Generic attack trees
    - Control taxonomy
    - Threat actor library

- **Public**
  - Methodology only
Questions?

► LinkedIn Group “Extreme Cyber Scenario Planning”
► @pragmaticsec
► cybercrime@cba.com.au