CERT

Preventing Insider Sabotage: Lessons Learned From Actual Attacks

Dawn Cappelli

November 14, 2005
Agenda

What is CERT?
Are Insiders a Threat?
CERT/U.S. Secret Service (USSS) Insider Threat Study
Best practices
  ▪ Supporting Findings
  ▪ Case Examples
What’s Next
Questions/Discussion
What is CERT?

Center of Internet security expertise

Established in 1988 by the Department of Defense (DARPA) in 1988 on the heels of the Morris worm that created havoc on the ARPANET, the precursor to what is the Internet today

Located in the Software Engineering Institute (SEI)

- Federally Funded Research & Development Center (FFRDC)
- Operated by Carnegie Mellon University (Pittsburgh, Pennsylvania)
The CERT/CC gains a broad view of Internet security threats with data from many sources. CERT/CC analysts synthesize the data and publish timely, accurate information fast. Researchers develop long-term strategies to improve system security and survivability.

Security Information Flow

DoD
Private Sector Organizations
Federal and Civilian Agencies
Law Enforcement
CERT/CC Partners
International CSIRTs

Risk Assessments
Surveys

CERT® Coordination and Analysis Centers

Research and Development

Security Practices
Risk Management Strategies
Models and Assessment Methods
Survivable Systems Engineering Practices

Vulnerability Reports
State-of-the-Practice Data
Artifacts (or malicious code)

Security Incident Reports
Security Event Data
Threat Assessments

Threat Reports
Vulnerability Reports
Analysis Reports

CERT/CC Knowledgebase
Are Insiders a Threat?
e-Crime Watch

CSO, USSS & CERT/CC

819 respondents

Average number of e-crimes in 2004: 86

35% increase in e-crimes in 2004

68% at least one e-crime or intrusion

39% of the organizations experienced one or more insider attacks or intrusions

20% of all attacks by insiders (versus outsiders)
“We're all too paranoid, no point looking behind your back, we are already here.”

Posted by: Anonymous
“idiocy to say the least
having been a statistic myself
i see that fear and stupidity prevail
nothing is secure
trust no-one
ever”

Posted by: C0rpR4t3_H4C|<
USSS/CERT Insider Threat Study

Definition of insider

Purpose of the study

Study method

Reports
Study Definition of Insider

Current or former employees or contractors who

- intentionally exceeded or misused an authorized level of access to networks, systems or data in a manner that

- targeted a specific individual or affected the security of the organization’s data, systems and/or daily business operations
Study Purpose

Identify information that was known or potentially detectable prior to the incident.

Analyze physical, social and online behaviors of insiders.

Develop information to help private industry, government and law enforcement better understand, detect and prevent harmful insider activity.
Study Method

Incidents perpetrated by insiders in critical infrastructure sectors.

Initial incidents occurred between 1996 and 2002.

Reported publicly or investigated by the Secret Service.

Reviewed primary source material (investigative reports, court documents) and conducted supplemental interviews.
USSS/CERT Insider Threat Study

Definition of insider

Purpose of the study

Study method

Reports

![Bar chart showing cases of sabotage, fraud, and information theft in Banking & Finance and Cross Sector.]
Insider Sabotage

Who were they?

Why did they do it?

What were the consequences?

Best practices

- Supporting Findings
- Case Examples
Who Were the Insiders?

- Male
- 17-60 years old
- About half married
- Variety of racial & ethnic backgrounds

![Pie chart showing 57% disgruntled and 43% not disgruntled]
Primary Motive

<table>
<thead>
<tr>
<th>Motive</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>84%</td>
</tr>
<tr>
<td>Revenge</td>
<td>92%</td>
</tr>
<tr>
<td>Response to negative event</td>
<td></td>
</tr>
</tbody>
</table>
Consequences to Targeted Organizations

Financial Loss

Harm to Individuals

- Experienced financial loss: 19%
- No financial loss: 81%
Consequences to Targeted Organizations

Financial Loss

Harm to Individuals

- 65% No individual harm
- 35% Harmed an individual

[Diagram showing the breakdown of harm to individuals]
Best Practices
Background checks

Conduct background checks & consider results carefully.

- No previous arrest(s): 70%
- Previous arrest(s): 30%
Security Awareness Training

_Institute periodic employee security awareness training for all employees._
Separation of Duties

Enforce separation of duties and least privilege.

- Only detected by security staff: 29%
- Detected by non-security personnel: 71%
Implement strict password and account management policies and practices.
Monitoring

Log, monitor, and audit employee online actions.

No system failure or irregularity

94%

Detected due to system failure or irregularity

6%
System Administrators

Use additional controls for system administrators and privileged users.

![Pie chart showing 86% for Technical position and 14% for Non-technical position]
Malicious Code

Actively defend against malicious code.

- Not technically sophisticated: 61%
- Technically sophisticated: 39%
Remote Access

Use layered defense against remote attacks.

- Remote access not used: 36%
- Used remote access: 64%
Suspicous Behavior

Monitor and respond to suspicious or disruptive behavior.

No concerning behavior: 20%
Concerning behavior: 80%
Access Following Termination

Deactivate access following termination.

- Current employees: 41%
- Former employees: 59%
Investigation

Collect and save data for use in investigations.

- System logs used for investigation: 70%
- System logs not used for investigation: 30%
Implement secure backup and recovery processes.

- No impact on business operations: 25%
- Impacted business operations: 75%
Formal Documentation

Clearly document insider threat controls.

“Most ITs I know, even the entry-level guys, install root kits as a first order of business when they join a company. They do it as a reflex, not because they have malicious intent or plan to hack the company, but to give themselves convenient access so they can work from home or school.”

Posted by: Ben
Summary of Best Practices

Conduct background checks & consider results carefully.

Institute periodic employee security awareness training for all employees.

Enforce separation of duties and least privilege.

Implement strict password and account management policies and practices.

Log, monitor, and audit employee online actions.

Use additional controls for system administrators and privileged users.

Actively defend against malicious code.

Use layered defense against remote attacks.

Monitor and respond to suspicious or disruptive behavior.

Deactivate access following termination.

Collect and save data for use in investigations.

Implement secure backup and recovery processes.

Clearly document insider threat controls.
What’s Next

In progress:

- Additional “sector reports”
  - IT sector
  - Government sector
- Training – U.S. Secret Service Electronic Crimes Task Force meetings
- System Dynamics Modeling

Planned:

- Insider Threat Phase 2
System Dynamics Modeling

Model interaction over time between

• organizational culture
• organization’s mission
• policies & procedures
• technology
• behavioral psychology
Management Education on Risk of Insider Threat

Management Simulator for insider threat problem

Decision support system for management

Evaluate relative insider threat risk
Insider Threat Phase 2

Collaborate with government and industry partners

Diagram:
- Insider
  - Steal money
  - Steal trade secrets
  - Sabotage systems
“I worked at a medium-sized software company, and had root access to their main servers. Purely as an intellectual exercise, I thought about how I could most maliciously use that access. This is what I came up with:

Step 1: Hack the backup system: all backups are secretly encrypted as they are made, and decrypted when read back (so that checks of the backups shows nothing.)

Step 2: Wait a year or more.

Step 3: Wipe all the disks on the servers - including the hacked backup encryption/decryption software.

Step 4: Send extortion demand for the encryption key to the backups. Unless they pay, they've lost years of work.

Of course, I didn't actually try it, so I don't know if it would work...”

Posted by: Filias Cupio
Questions/Discussion