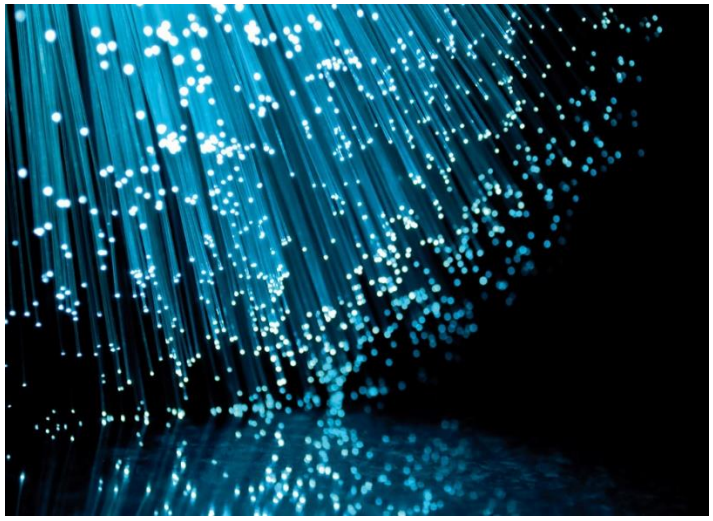
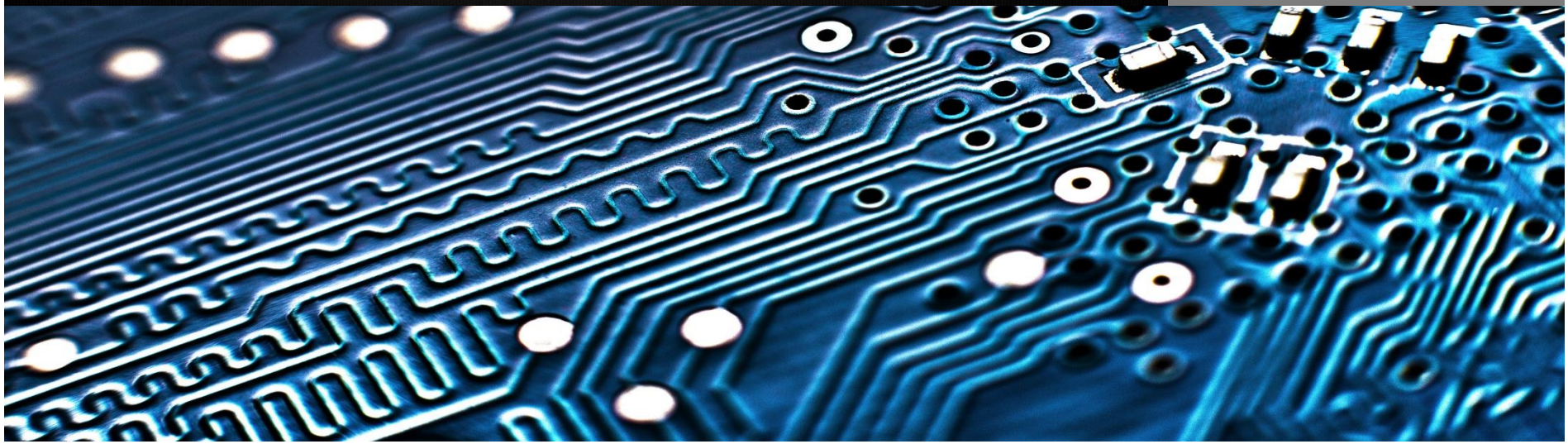


# Information Security Primer

Adeel Javaid, CITP, C)VA, C)IHE, CDSOE



# Importance of Cybersecurity

- The internet allows an attacker to work from anywhere on the planet.

- Risks caused by poor security knowledge and practice:
  - Identity Theft
  - Monetary Theft
  - Legal Ramifications (for yourself and your organization)
  - Sanctions or termination if policies are not followed

- According to the SANS Institute, the top vectors for vulnerabilities available to a cyber criminal are:
  - Web Browser
  - IM Clients
  - Web Applications
  - Excessive User Rights

# Cybersecurity is Safety

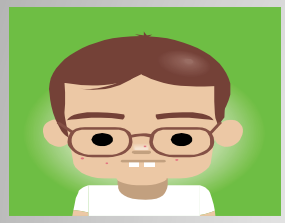
**Security:** We must protect our computers and data in the same way that we secure the doors to our homes.

**Safety:** We must behave in ways that protect us against risks and threats that come with technology.

# User Awareness

## Cyber-Criminals

**System Administrators**
Some scripts appear useful to manage networks…



**Cracker:**
Computer-savvy programmer creates attack software

Posts to

**Hacker Bulletin Board**
SQL Injection
Buffer overflow
Password Crackers
Password Dictionaries

Successful attacks!
Crazyman broke into …
CoolCat penetrated…

**Script Kiddies**:
Unsophisticated computer users who know how to execute programs

Downloads

Reports

Posts to

**Criminals:** Create & sell bots -> generate spam
Sell credit card numbers, etc…

Malware package earns $1K-2K
1 M Email addresses earn $8
10,000 PCs earn $1000

# Leading Threats

Viruses

Worms

Trojan Horses / Logic Bombs

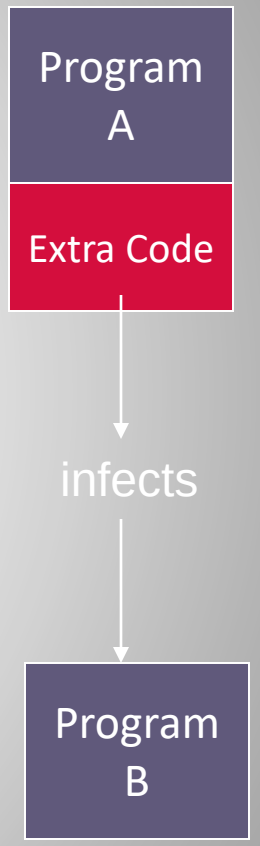
Social Engineering

Rootkits

Botnets / Zombies

# Viruses

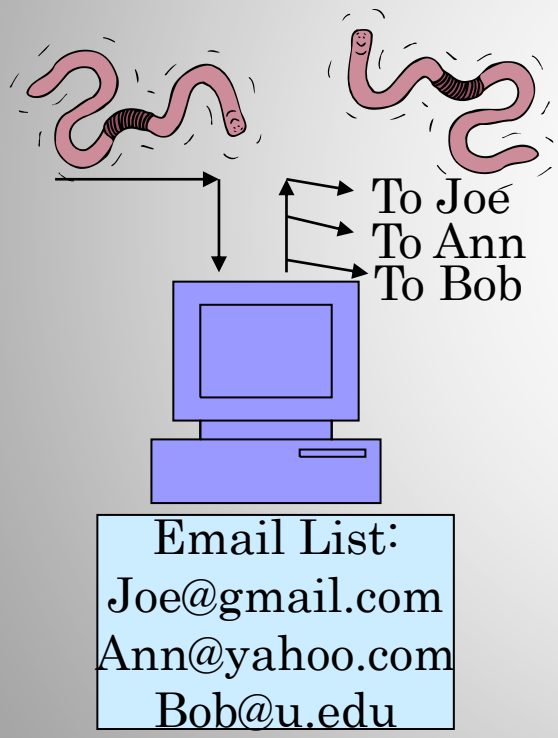
- A virus attaches itself to a program, file, or disk.
- When the program is executed, the virus activates and replicates itself.
- The virus may be benign or malignant but executes its payload at some point (often upon contact).
  - Viruses can cause computer crashes and loss of data.
- In order to recover or prevent virus attacks:
  - Avoid potentially unreliable websites/emails.
  - System Restore.
  - Re-install operating system.
  - Use and maintain anti-virus software.

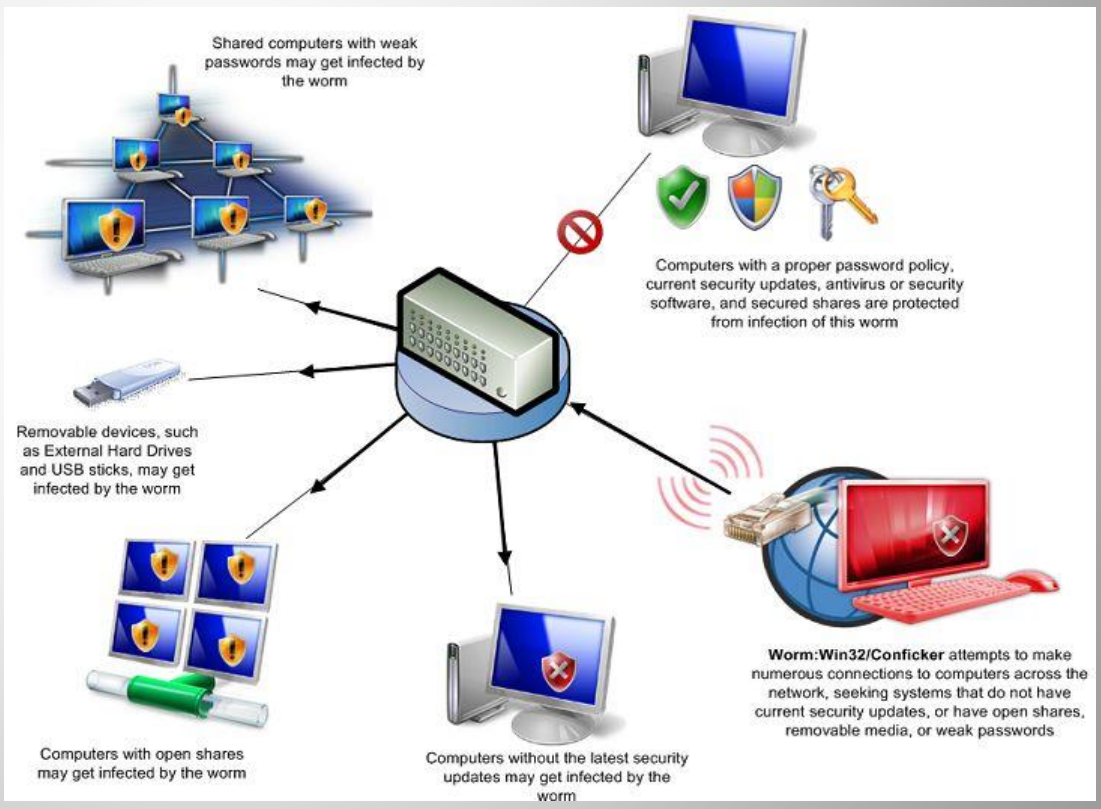


# Worms

Independent program that replicates itself and sends copies from computer to computer across network connections.

Upon arrival, the worm may be activated to replicate.



# Logic Bombs and Trojan Horses

Logic Bomb: Malware logic executes upon certain conditions. The program is often used for otherwise legitimate reasons.

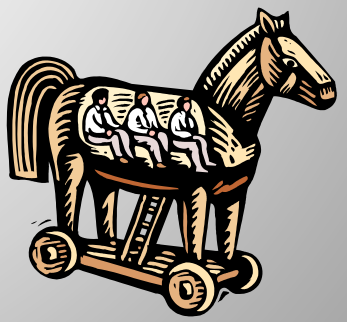
Examples:

Software which malfunctions if maintenance fee is not paid.

Employee triggers a database erase when he is fired.

Trojan Horse: Masquerades as a benign program while quietly destroying data or damaging your system.

Download a game: It may be fun but contains hidden code that gathers personal information without your knowledge.



# Social Engineering

Social engineering manipulates people into performing actions or divulging confidential information. Similar to a confidence trick or simple fraud, the term applies to the use of deception to gain information, commit fraud, or access computer systems.

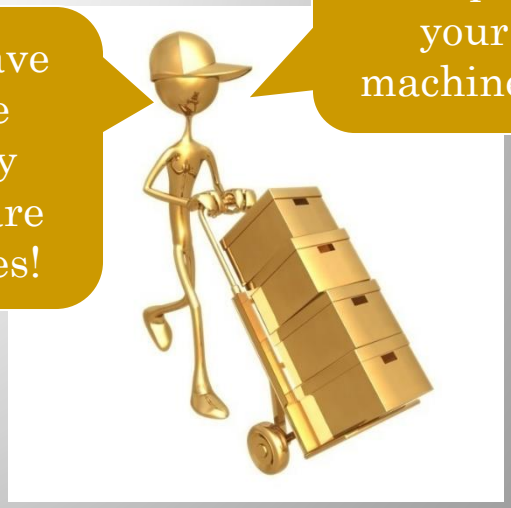
**Email:**
ABC Bank has noticed a problem with your account…

**Phone Call:**
This is John, the System Administrator. What is your password?

**In Person:**
What ethnicity are you? Your mother's maiden name?

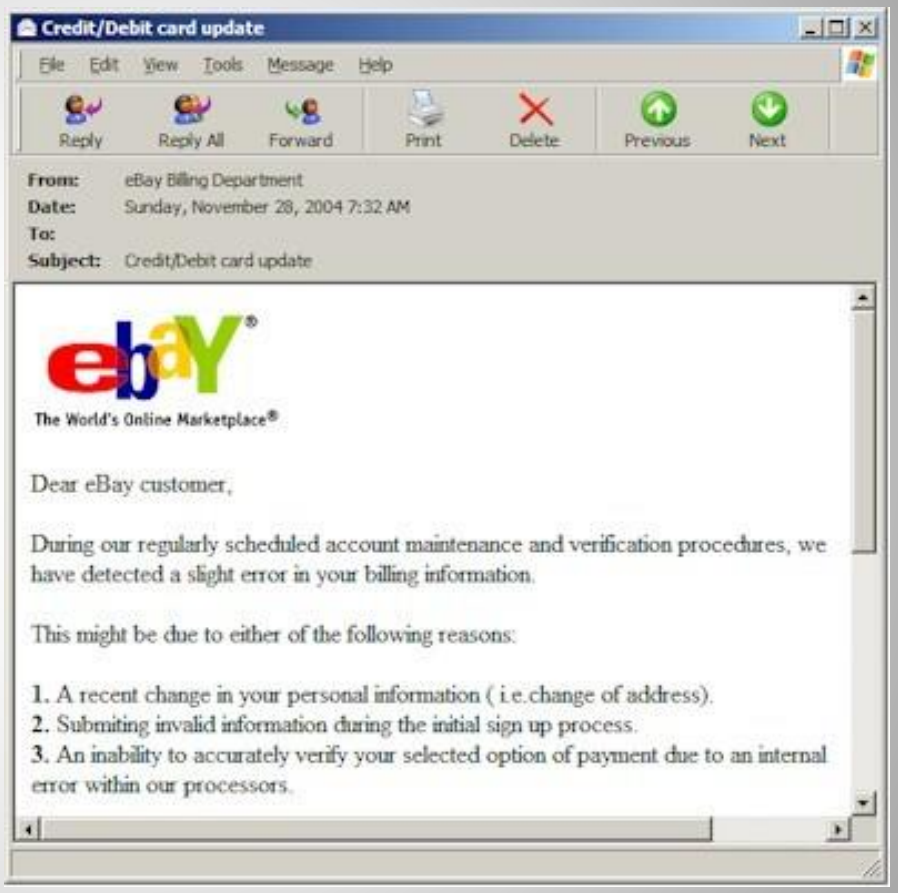
I have come to repair your machine…

and have some lovely software patches!

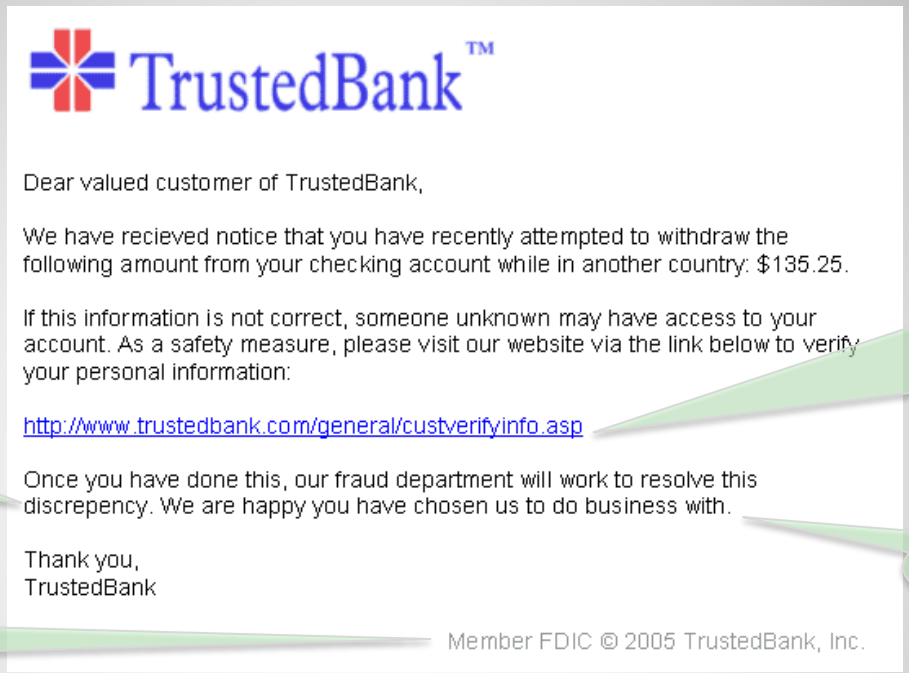


# Phishing: Counterfeit Email

Phishing: A seemingly trustworthy entity asks for sensitive information such as SSN, credit card numbers, login IDs or passwords via e-mail.



# Pharming: Counterfeit Web Pages




Misspelled

Wiping over, but not clicking the link may reveal a different address.

With whom?

Copyright date is old

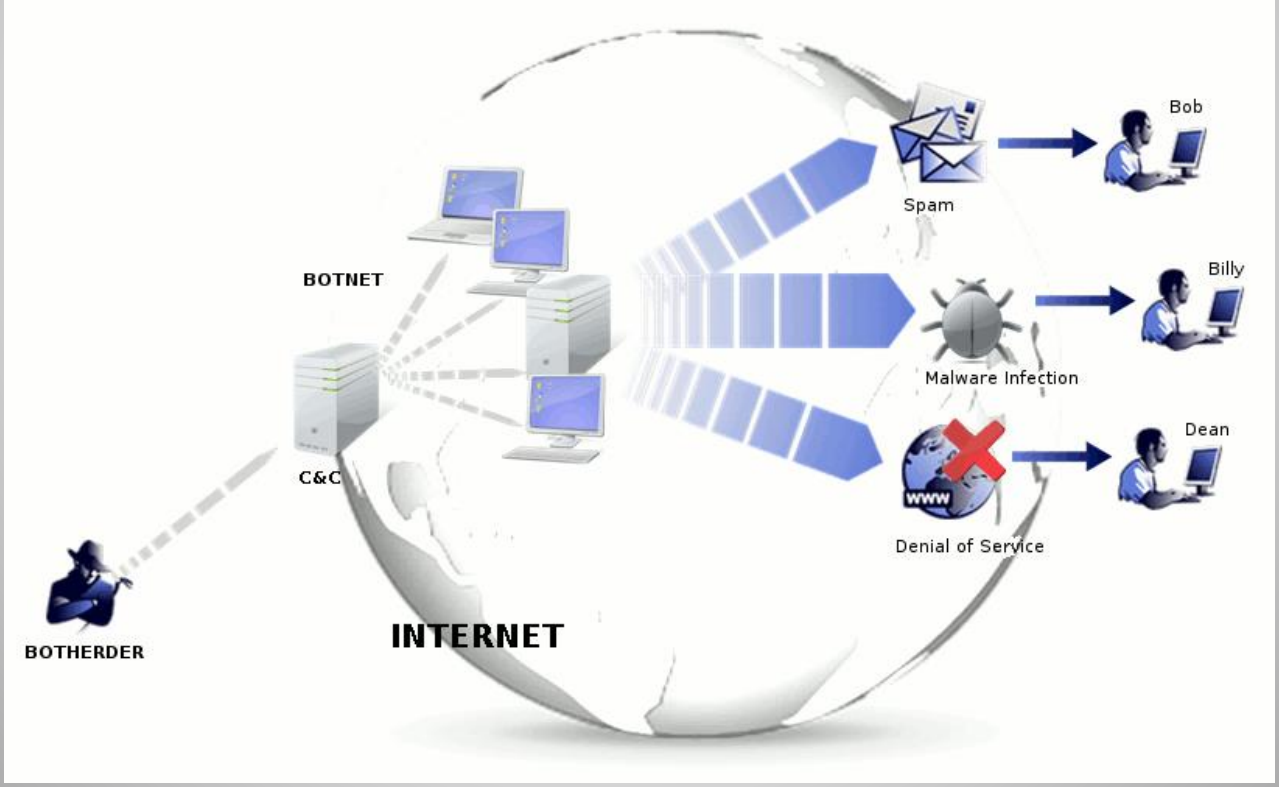
The link provided in the e-mail leads to a counterfeit webpage which collects important information and submits it to the owner.

The counterfeit web page looks like the real thing

Extracts account information

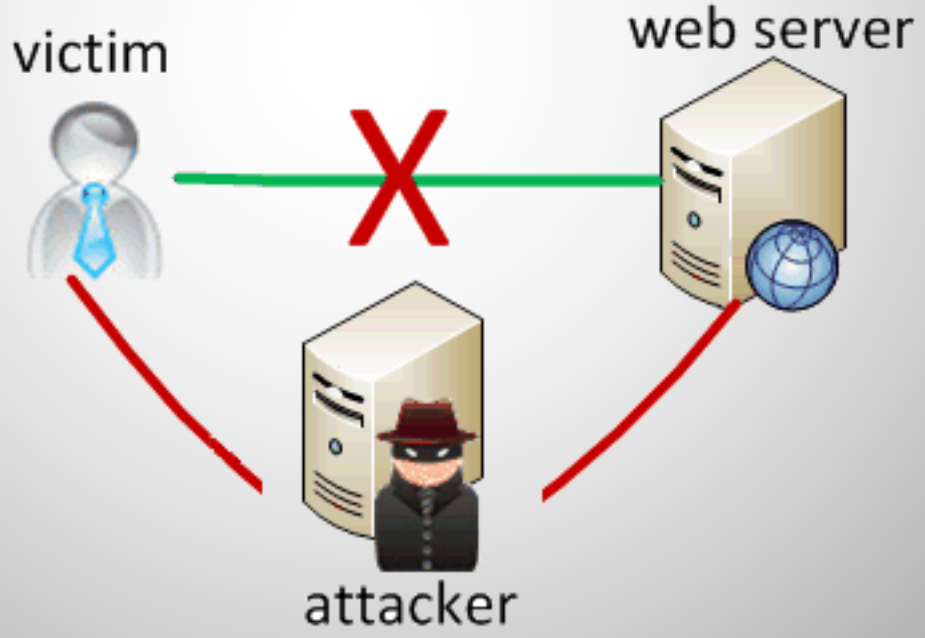
# Botnet

- A botnet is a number of compromised computers used to create and send spam or viruses or flood a network with messages as a denial of service attack.
- The compromised computers are called zombies.



# Man In The Middle Attack

An attacker pretends to be your final destination on the network. When a person tries to connect to a specific destination, an attacker can mislead him to a different service and pretend to be that network access point or server.



# Rootkit

- Upon penetrating a computer, a hacker may install a collection of programs, called a rootkit.
- May enable:
  - Easy access for the hacker (and others)into the enterprise
  - Keystroke logger
- Eliminates evidence of break-in.
- Modifies the operating system.

# Password Cracking

## Dictionary Attack and Brute Force

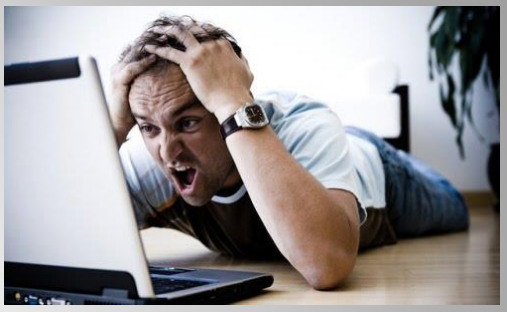
| Pattern | Calculation | Result | Time to Guess ($2.6 \times 10^{18}$ tries/month) |
|---|---|---|---|
| Personal Info: interests, relatives | | 20 | Manual 5 minutes |
| Social Engineering | | 1 | Manual 2 minutes |
| American Dictionary | | 80,000 | < 1 second |
| 4 chars: lower case alpha | $26^4$ | $5 \times 10^5$ | |
| 8 chars: lower case alpha | $26^8$ | $2 \times 10^{11}$ | |
| 8 chars: alpha | $52^8$ | $5 \times 10^{13}$ | |
| 8 chars: alphanumeric | $62^8$ | $2 \times 10^{14}$ | 3.4 min. |
| 8 chars alphanumeric +10 | $72^8$ | $7 \times 10^{14}$ | 12 min. |
| 8 chars: all keyboard | $95^8$ | $7 \times 10^{15}$ | 2 hours |
| 12 chars: alphanumeric | $62^{12}$ | $3 \times 10^{21}$ | 96 years |
| 12 chars: alphanumeric + 10 | $72^{12}$ | $2 \times 10^{22}$ | 500 years |
| 12 chars: all keyboard | $95^{12}$ | $5 \times 10^{23}$ | |
| 16 chars: alphanumeric | $62^{16}$ | $5 \times 10^{28}$ | |

# Georgia Data Breach Notification Law

O.C.G.A. §§10-1-910, -911, -912

- An unauthorized acquisition of electronic data that compromises the security, confidentiality or integrity of "personal information."
- Personal Information
  - Social Security Number.
  - Driver's license or state ID number.
  - Information permitting access to personal accounts.
  - Account passwords or PIN numbers or access codes.
  - Any of the above in connection with a person's name if the information is sufficient to perform identity theft against the individual.

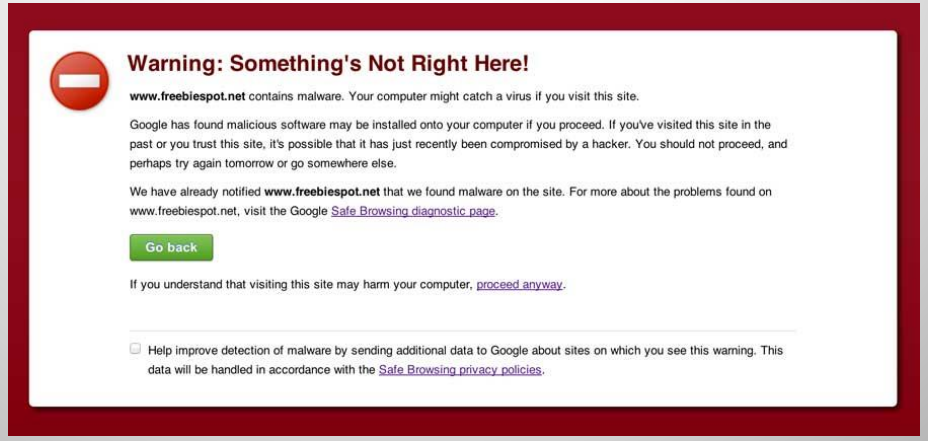
# Identifying Security Compromises



- Symptoms:
  - Antivirus software detects a problem.
  - Disk space disappears unexpectedly.
  - Pop-ups suddenly appear, sometimes selling security software.
  - Files or transactions appear that should not be there.
  - The computer slows down to a crawl.
  - Unusual messages, sounds, or displays on your monitor.
  - Stolen laptop: 1 stolen every 53 seconds; 97% never recovered.
  - The mouse pointer moves by itself.
  - The computer spontaneously shuts down or reboots.
  - Often unrecognized or ignored problems.

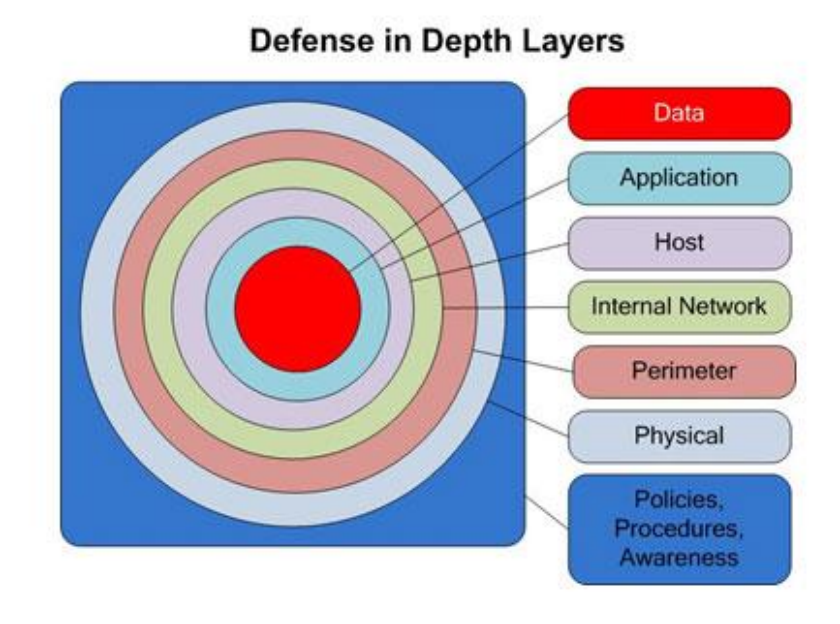
# Malware detection

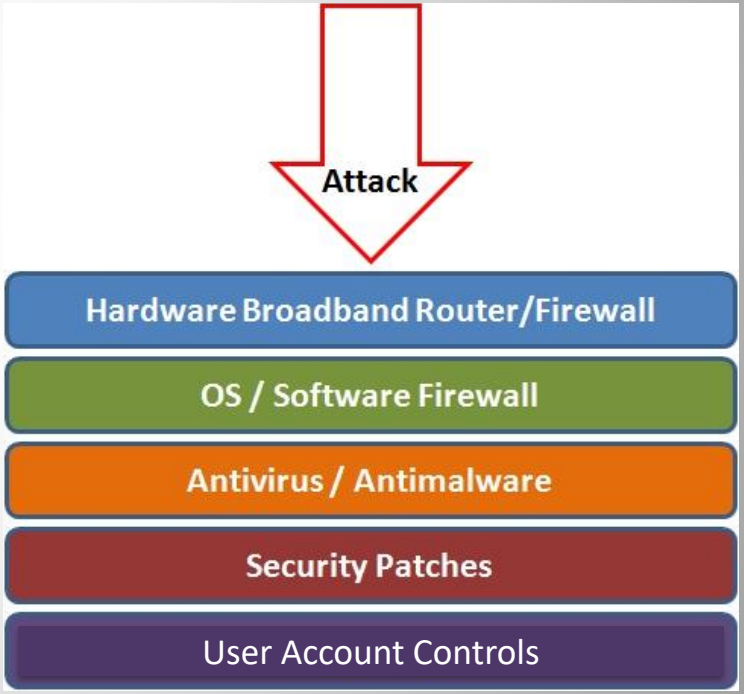
- Spyware symptoms:
  - Changes to your browser homepage/start page.
  - Ending up on a strange site when conducting a search.
  - System-based firewall is turned off automatically.
  - Lots of network activity while not particularly active.
  - Excessive pop-up windows.
  - New icons, programs, favorites which you did not add.
  - Frequent firewall alerts about unknown programs when trying to access the Internet.
  - Poor system performance.



# Best Practices to avoid these threats

**Defense in depth** uses multiple layers of defense to address technical, personnel and operational issues.



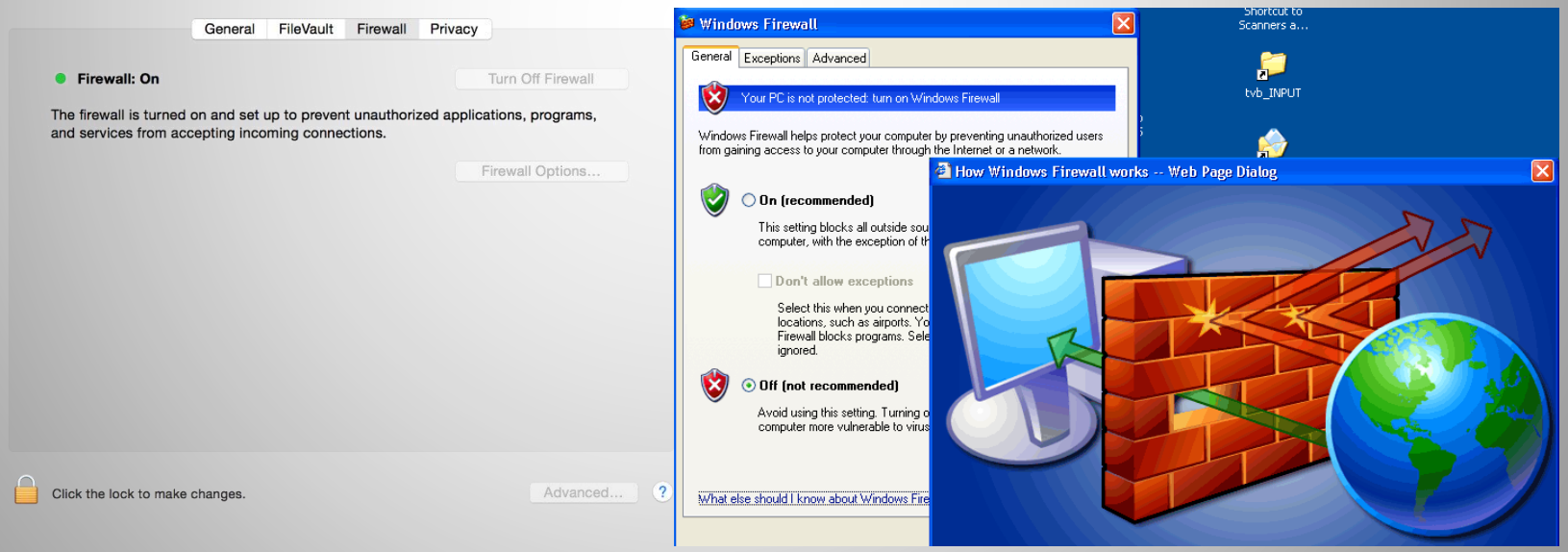



# Anti-virus and Anti-spyware Software

- Anti-virus software detects certain types of malware and can destroy it before any damage is done.
- Install and maintain anti-virus and anti-spyware software.
- Be sure to keep anti-virus software updated.
- Many free and commercial options exist.
- Contact your Technology Support Professional for assistance.

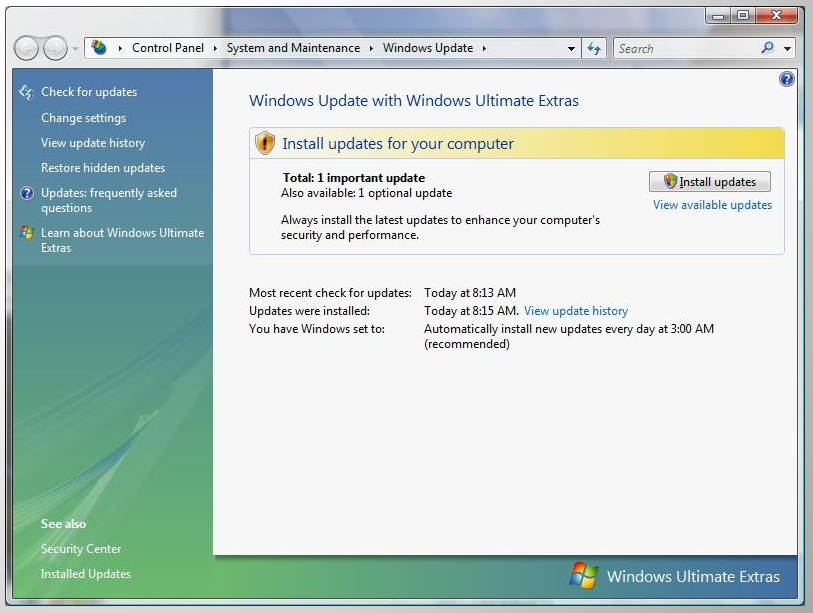
# Host-based Firewalls

- A firewall acts as a barrier between your computer/private network and the internet. Hackers may use the internet to find, use, and install applications on your computer. A firewall prevents many hacker connections to your computer.
- Firewalls filter network packets that enter or leave your computer



# Protect your Operating System

- Microsoft regularly issues patches or updates to solve security problems in their software. If these are not applied, it leaves your computer vulnerable to hackers.
- The Windows Update feature built into Windows can be set up to automatically download and install updates.
- Avoid logging in as administrator
- Apple provides regular updates to its operating system and software applications.
- Apply Apple updates using the App Store application.



# Use Strong Passwords

Make passwords easy to remember but hard to guess

- nOps standards:
- Be at least ten characters in length
- Must contain characters from at least two of the following four types of characters:
  - English upper case (A-Z)
  - English lower case (a-z)
  - Numbers (0-9)
  - Non-alphanumeric special characters ($, !, %, ^, …)
- Must not contain the user's name or part of the user's name
- Must not contain easily accessible or guessable personal information about the user or user's family, such as birthdays, children's names, addresses, etc.

# Creating Strong Passwords

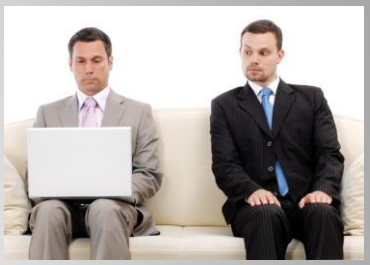
- A familiar quote can be a good start:

"LOVE IS A SMOKE MADE WITH THE FUME OF SIGHS"
*William Shakespeare*

- Using the organization standard as a guide, choose the first character of each word:
  - LIASMWTFOS
- Now add complexity the standard requires:
  - `L1A$mwTF0S` (10 characters, 2 numerals, 1 symbol, mixed English case: password satisfies all 4 types).
- Or be more creative!

# Password Guidelines

- Never use admin, root, administrator, or a default account or password for administrative access.
- A good password is:
  - Private: Used by only one person.
  - Secret: It is not stored in clear text anywhere, including on Post-It® notes!
  - Easily Remembered: No need to write it down.
  - Contains the complexity required by your organization.
  - Not easy to guess by a person or a program in a reasonable time, such as several weeks.
  - Changed regularly: Follow organization standards.
- Avoid shoulder surfers and enter your credentials carefully! If a password is entered in the username field, those attempts usually appear in system logs.

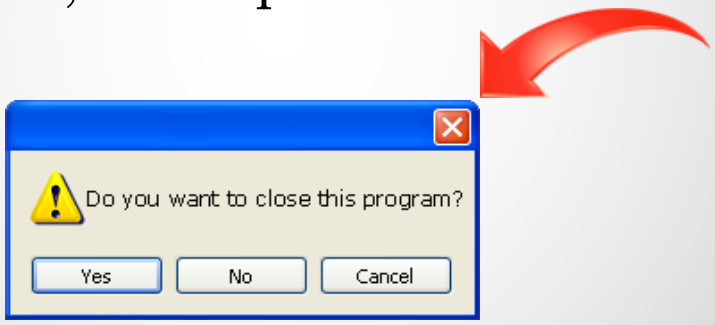


# Avoid Social Engineering and Malicious Software

- Do not open email attachments unless you are expecting the email with the attachment and you trust the sender.
- Do not click on links in emails unless you are absolutely sure of their validity.
- Only visit and/or download software from web pages you trust.

# Avoid Stupid Hacker Tricks

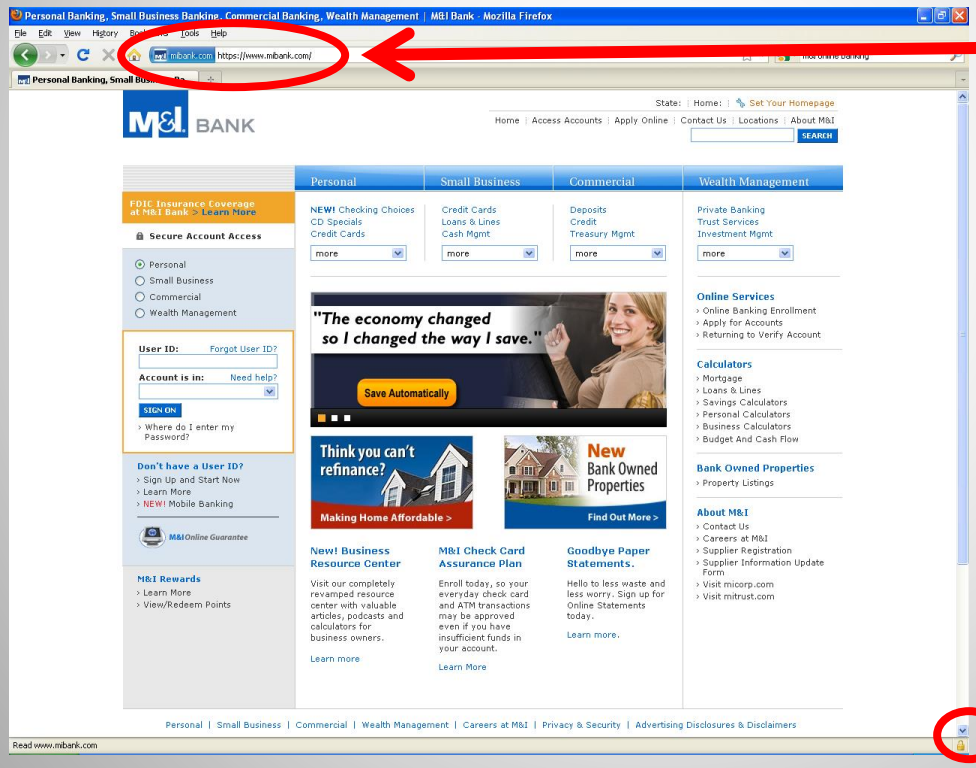
- Be sure to have a good firewall or pop-up blocker installed.
- Pop-up blockers do not always block ALL pop-ups so always close a pop-up window using the 'X' in the upper corner.
- Never click "yes," "accept" or even "cancel."




- Infected USB drives are often left unattended by hackers in public places.

# Secure Business Transactions

- **Always use secure browser to do online activities.**
- **Frequently delete temp files, cookies, history, saved passwords etc.**




https://

Symbol indicating enhanced security

# Backup Important Information

- No security measure is 100% reliable.
- Even the best hardware fails.
- What information is important to you?
- Is your backup:

Recent?

Off-site & Secure?

Process Documented?

Encrypted?

Tested?

# Cyber Incident Reporting

If you suspect a cybersecurity incident, notify your organization's help desk or the nOps help desk immediately. Be prepared to supply the details you know and contact information.

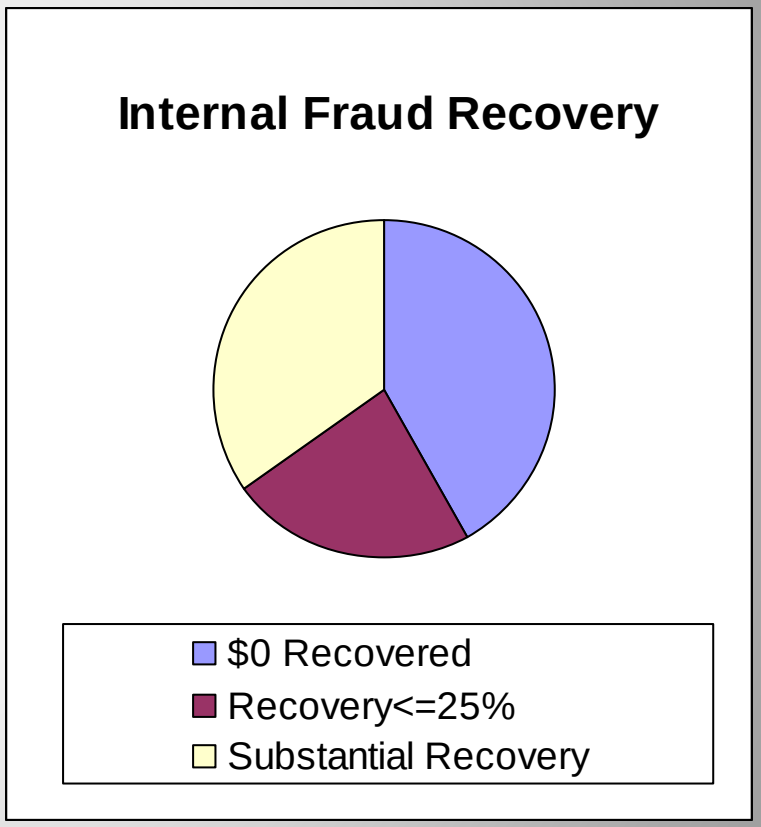
1. Do not attempt to investigate or remediate the incident on your own.
2. Inform other users of the system and instruct them to stop work immediately.
3. Unless instructed, do not power down the machine.
4. Unless instructed, do not remove the system from the network.

The cybersecurity incident response team will contact you as soon as possible to gather additional information.

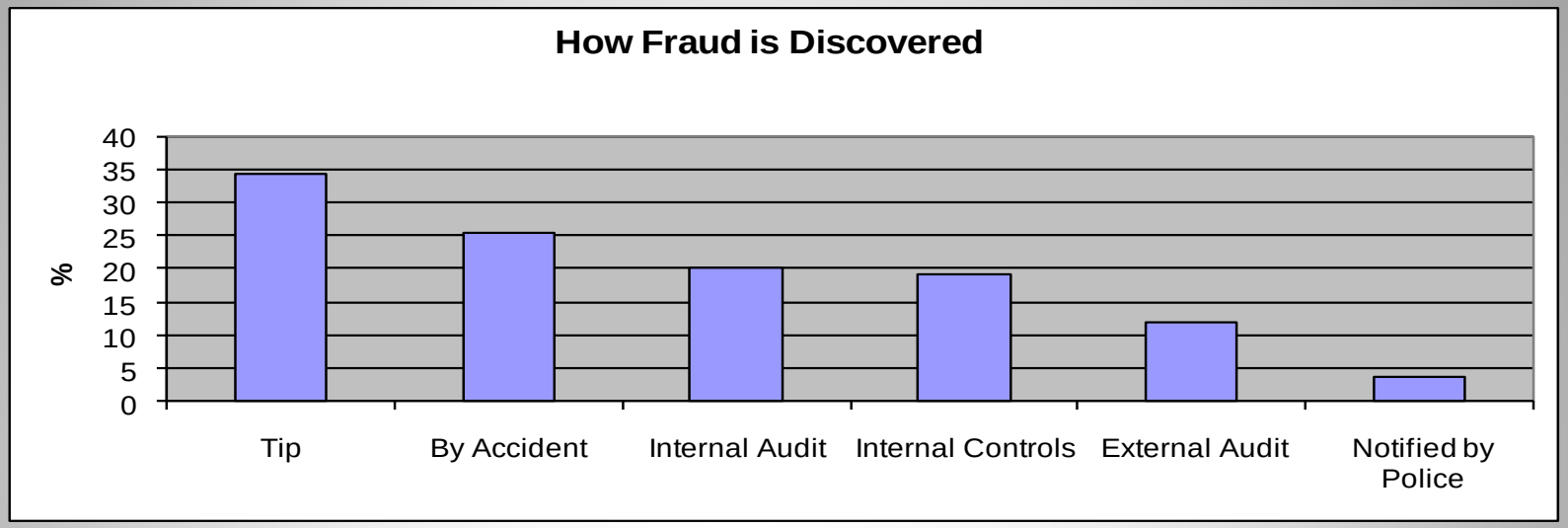
Each nOps department is required to have a specific plan to handle cybersecurity incidents. Refer to local policies, standards and guidelines for specific information.

# Fraud

- Organizations lose 5-6% of revenue annually due to internal fraud = $652 Billion in U.S. (2006)
- Average scheme lasts 18 months, costs $159,000
- 25% costs exceed $1M
- Smaller companies suffer greater average dollar losses than large companies



# Fraud Discovery




Tips are the most common way fraud is discovered.
Tips come from:

- Employee/Coworkers 64%,
- Anonymous 18%,
- Customer 11%,
- Vendor 7%

# Thank You