Secunia

Stay Secure

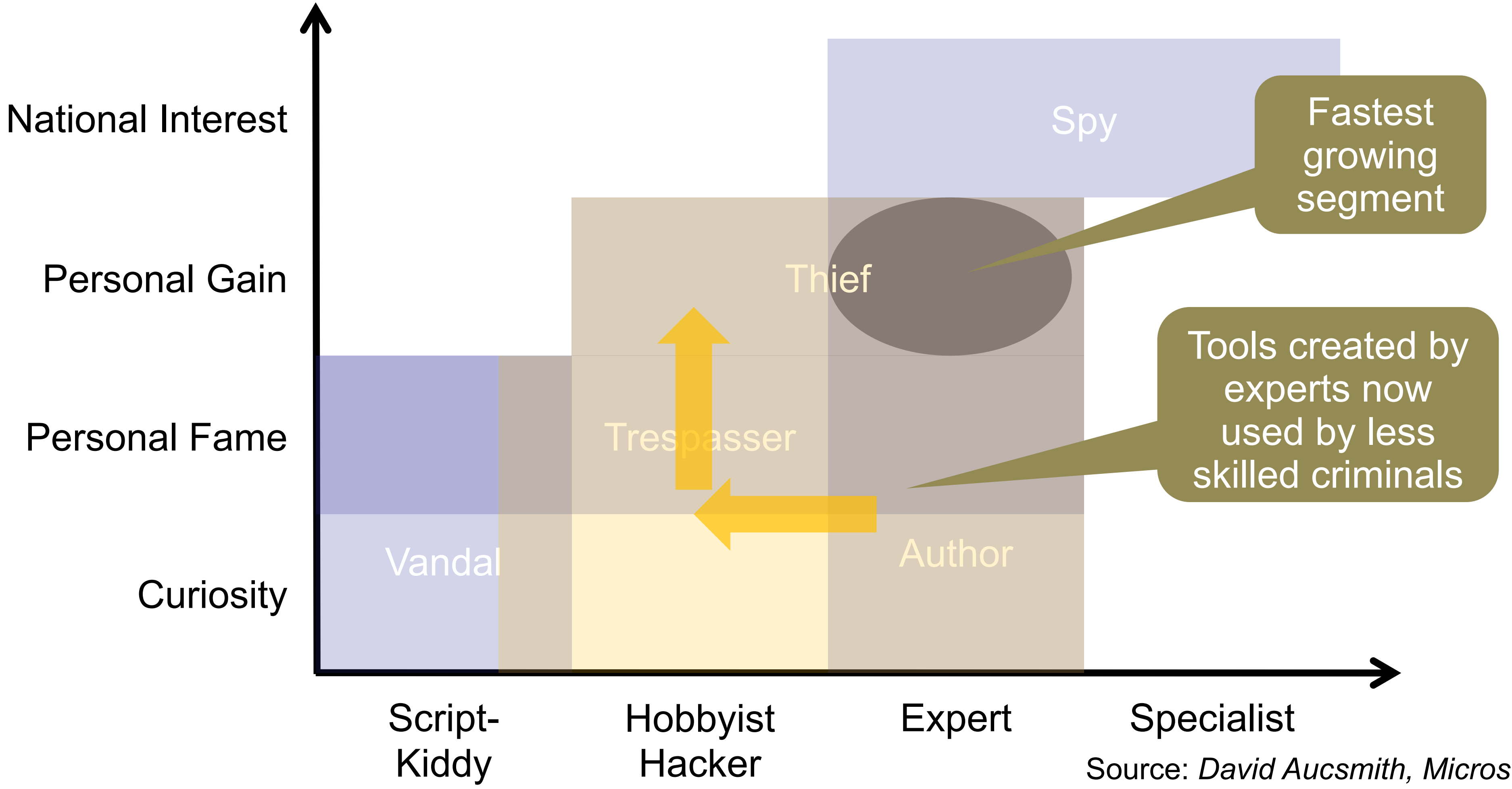
# The Fundamental Failures of End-Point Security

Stefan Frei
Research Analyst Director
sfrei@secunia.com

# Agenda

- The Changing Threat Environment
- Malware Tools & Services
- Why Cybercriminals Need No 0-Days
- Complexity of Patching
- Defense Strategies

# The Changing Threat Environment



Source: *David Aucsmith, Microsoft*

# Today's Cybercrime Landscape

- Cybercrime – it is all about profit (+ politics)
- Tools created by the experts are used by less skilled attackers
  - more and well armed opportunistic attackers
  - highly automated attacks
- Tools are readily available
  - in all shapes and colors or as Malware as a Service (MaaS)
- What is the potential of this model, what are the preferred targets?

# Malware Ecosystem

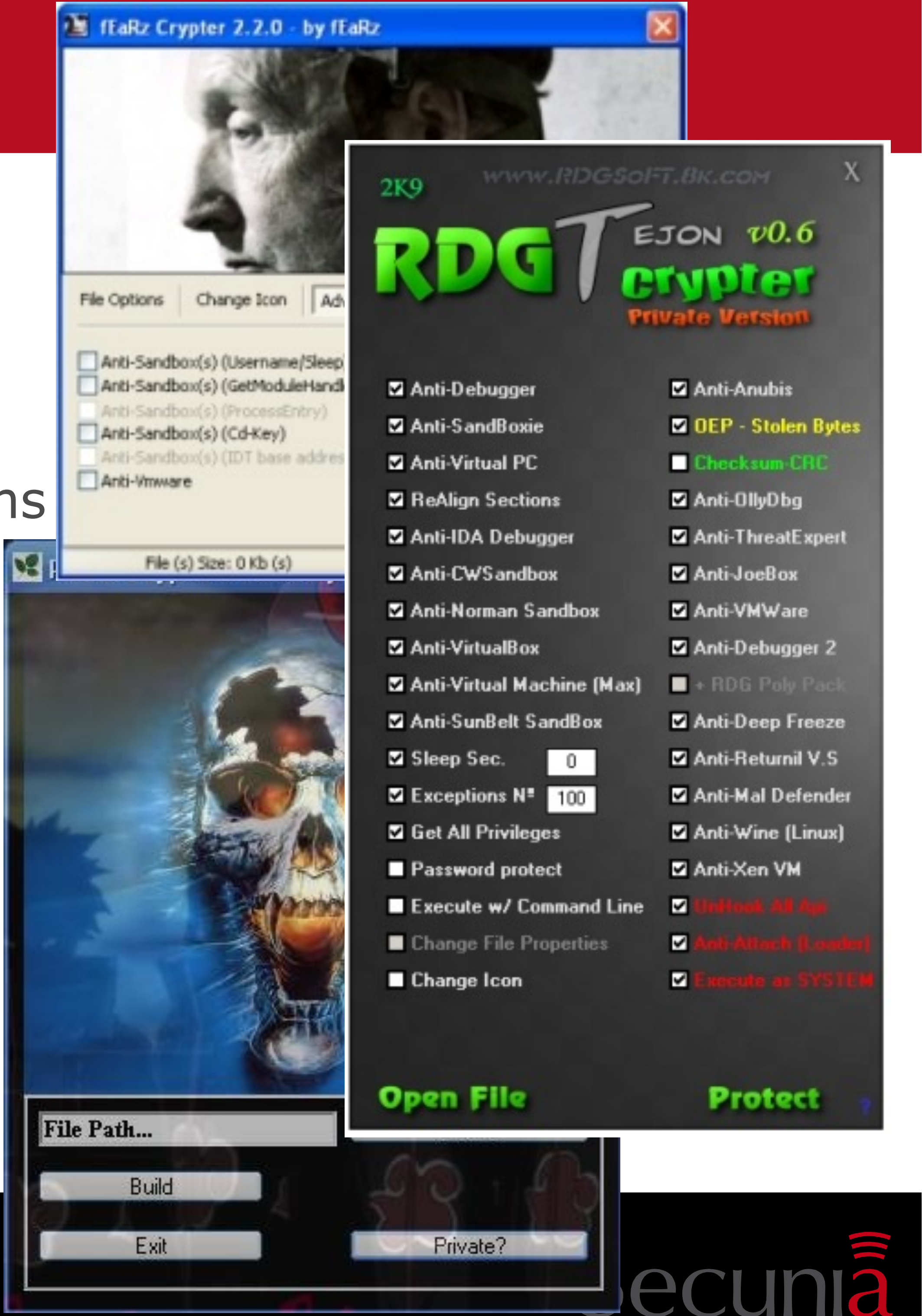
- Malware Creation
  - Cybercriminals use a broad spectrum of tools and techniques to create one-of-a-kind packages that easily bypass traditional antivirus technologies
- Cyber-criminal can selectively apply manipulation technologies to their creations that radically alter the fabric of malware
- Result: Stealthy Threats
  - that evade signature-based detection systems, static analysis tools, behavioral monitoring environments and sandbox technologies

# Serial Variants & Permutations

- Tactics
  - Multiple variants of a particular malware agent are created in advance of the attack
  - Each new variant is released at scheduled intervals to constantly remain ahead of antivirus protection updates
- Process
  - Automatically create 10’000 variants of your malware and release a first batch of 1,000 samples
  - As soon as the first batch is detected by antivirus, release the next 1,000 samples …
  - Result: antivirus is playing catch-up

# Tools of the Trade

- Cryptor
  - encrypt malware so that signature detection systems and static analysis processes are ineffectual
- Protector
  - add anti-debugging features that thwart security researchers and automated sandbox analysis technologies



☐ Anti-Sandbox(s) (Username/Sleep
☐ Anti-Sandbox(s) (GetModuleHandl
☐ Anti-Sandbox(s) (ProcessEntry)
☐ Anti-Sandbox(s) (Cd-Key)
☐ Anti-Sandbox(s) (IDT base addres
☐ Anti-Vmware

File (s) Size: 0 Kb (s)

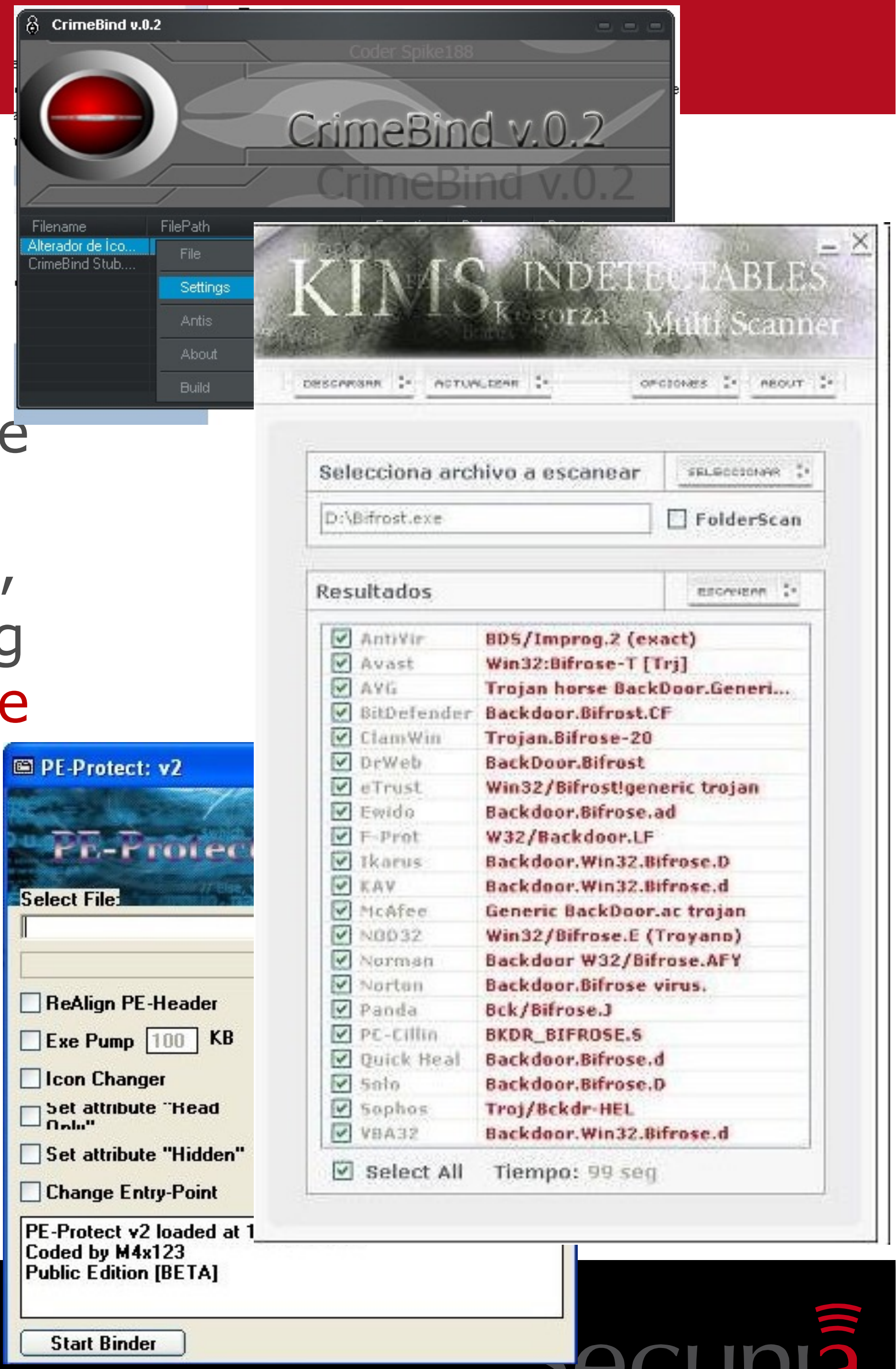
☑ Anti-Debugger
☑ Anti-SandBoxie
☑ Anti-Virtual PC
☑ ReAlign Sections
☑ Anti-IDA Debugger
☑ Anti-CWSandbox
☑ Anti-Norman Sandbox
☑ Anti-VirtualBox
☑ Anti-Virtual Machine (Max)
☑ Anti-SunBelt SandBox
☑ Sleep Sec. 0
☑ Exceptions Nº 100
☑ Get All Privileges
☐ Password protect
☐ Execute w/ Command Line
☐ Change File Properties
☐ Change Icon

☑ Anti-Anubis
☑ OEP - Stolen Bytes
☐ Checksum-CRC
☑ Anti-OllyDbg
☑ Anti-ThreatExpert
☑ Anti-JoeBox
☑ Anti-VMWare
☑ Anti-Debugger 2
☐ + RDG Poly Pack
☑ Anti-Deep Freeze
☑ Anti-Returnil V.S
☑ Anti-Mal Defender
☑ Anti-Wine (Linux)
☑ Anti-Xen VM
☑ UnHook All Api
☑ Anti-Attach (Loader)
☑ Execute as SYSTEM

# Tools of the Trade

- Binder
  - “embed” malware and trojanize other software packages
  - aiding propagation of malware, tricking victims into executing something that looks legitimate

- Quality Assurance
  - Malware is passed through multiple antivirus products to verify it will not be detected prior to their criminal deployment



Selecciona archivo a escanear

D:\Bifrost.exe ☐ FolderScan

Resultados

| | |
|---|---|
| ☑ AntiVir | BDS/Improg.2 (exact) |
| ☑ Avast | Win32:Bifrose-T [Trj] |
| ☑ AVG | Trojan horse BackDoor.Generi... |
| ☑ BitDefender | Backdoor.Bifrost.CF |
| ☑ ClamWin | Trojan.Bifrose-20 |
| ☑ DrWeb | BackDoor.Bifrost |
| ☑ eTrust | Win32/Bifrost!generic trojan |
| ☑ Ewido | Backdoor.Bifrose.ad |
| ☑ F-Prot | W32/Backdoor.LF |
| ☑ Ikarus | Backdoor.Win32.Bifrose.D |
| ☑ KAV | Backdoor.Win32.Bifrose.d |
| ☑ McAfee | Generic BackDoor.ac trojan |
| ☑ NOD32 | Win32/Bifrose.E (Troyano) |
| ☑ Norman | Backdoor W32/Bifrose.AFY |
| ☑ Norton | Backdoor.Bifrose virus. |
| ☑ Panda | Bck/Bifrose.J |
| ☑ PC-Cillin | BKDR_BIFROSE.S |
| ☑ Quick Heal | Backdoor.Bifrose.d |
| ☑ Solo | Backdoor.Bifrose.D |
| ☑ Sophos | Troj/Bckdr-HEL |
| ☑ VBA32 | Backdoor.Win32.Bifrose.d |

☑ Select All Tiempo: 99 seg

Select File:

☐ ReAlign PE-Header

☐ Exe Pump 100 KB

☐ Icon Changer

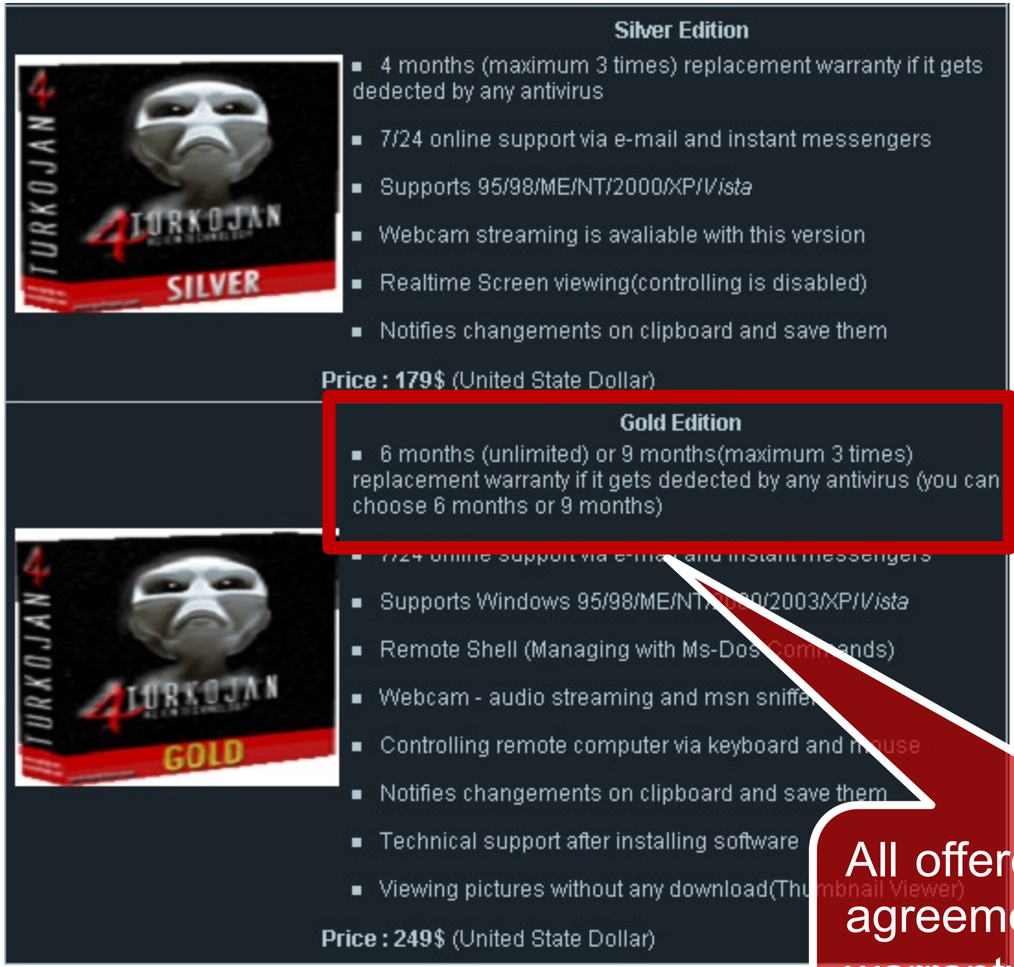
☐ Set attribute "Read Only"

☐ Set attribute "Hidden"

☐ Change Entry-Point

PE-Protect v2 loaded at 1
Coded by M4x123
Public Edition [BETA]

# Malware Ecosystem & Services



**Silver Edition**

- 4 months (maximum 3 times) replacement warranty if it gets dedected by any antivirus
- 7/24 online support via e-mail and instant messengers
- Supports 95/98/ME/NT/2000/XP/Vista
- Webcam streaming is avaliable with this version
- Realtime Screen viewing(controlling is disabled)
- Notifies changements on clipboard and save them

**Price : 179$** (United State Dollar)

**Gold Edition**

- 6 months (unlimited) or 9 months(maximum 3 times) replacement warranty if it gets dedected by any antivirus (you can choose 6 months or 9 months)
- 7/24 online support via e-mail and instant messengers
- Supports Windows 95/98/ME/NT/2000/2003/XP/Vista
- Remote Shell (Managing with Ms-Dos Commands)
- Webcam - audio streaming and msn sniffer
- Controlling remote computer via keyboard and mouse
- Notifies changements on clipboard and save them
- Technical support after installing software
- Viewing pictures without any download(Thumbnail Viewer)

**Price : 249$** (United State Dollar)

All offered with a service level agreement and replacement warranty if the creation is detected by any antivirus

- Malware automatically cycles through a large number of exploits until one succeeds to compromise the target
- Systematic and automated exploitation of victims at large scale
- The tools are readily available, no expertise needed

# I am not a target

- The “I have nothing to hide” argument:
  - fails short as automated tools do not differentiate
- There is nothing valuable to steal in my infrastructure
  - Well, criminals have plenty of uses for your bandwidth and CPU:
  - hosting malicious content
  - using you as an infection point to spread malware
  - anonymization proxy to hide their activity
  - breaking passwords using your CPU
  - …

Everyone is a valuable target for cybercriminals

#Hosts x #Vulnerabilities

=

Opportunity

#Hosts x #Vulnerabilities

=

Opportunity

# World Internet Usage

**1,966 Million**

estimated Internet users on June 30, 2010

**448%** growth of Internet population from 2000 to 2010 did not go unnoticed by cybercriminals

Source: *Internet World Stats*
*http://www.internetworldstats.com*

# 1,966 Million potential Targets …

- Business as well as personal end-point PCs are increasingly targeted
- End-point PCs is where the most valuable data is found the least protected
- Eventually, end-point PCs have access to all data needed to conduct their business

# Some Real Life Stats
# Botnet Infections in Enterprises

- Up to 9 percent of the end-point PCs in enterprises are found infected
- Of all enterprises looked at, 100 percent had bot infections

- Best of breed antivirus, perimeter protection, and IDS/IPS do not provide 100% detection

Source: Darkreading http://bit.ly/EntBot

#Hosts x #Vulnerabilities

=

Opportunity

# What does a typical End-point PC look like?

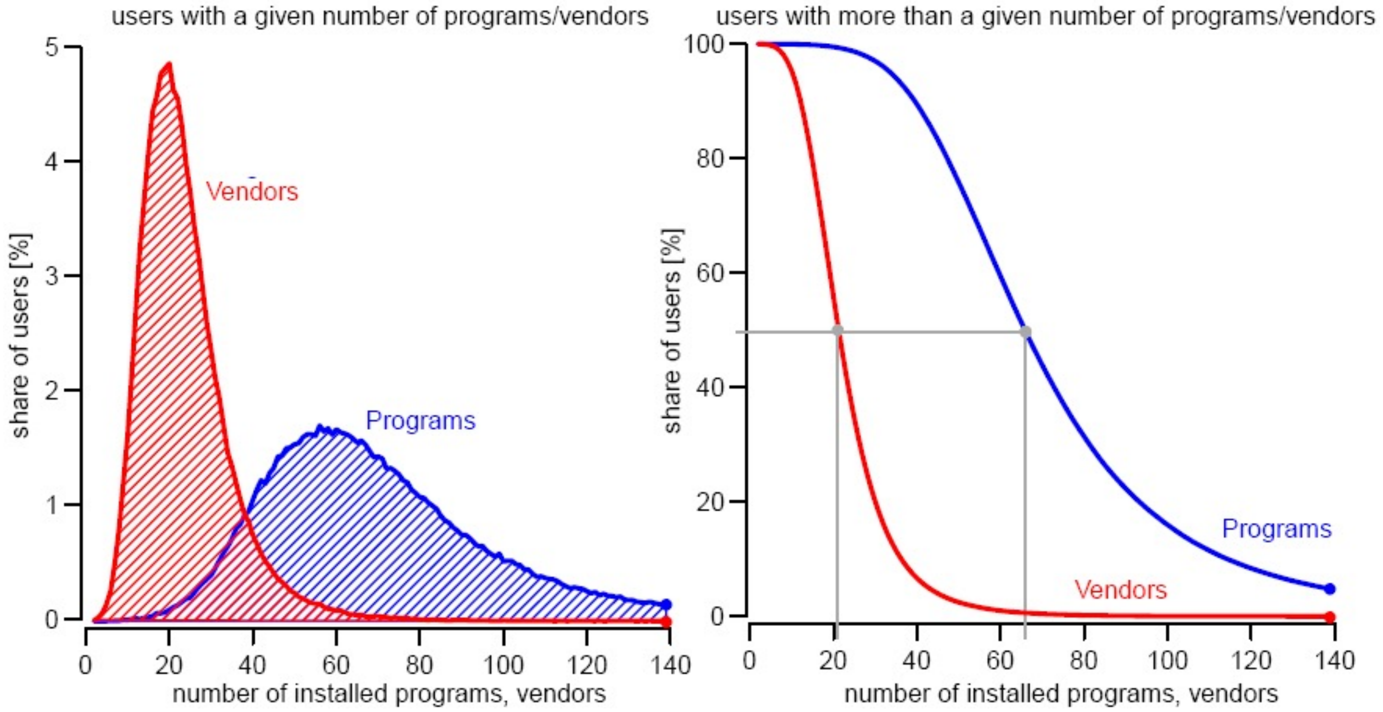
- Highly dynamic environment
- Unpredictable usage patterns by users
- Numerous programs and plug-in technologies
- How many programs do you think you have installed on your typical Windows machine?
- How many different update mechanisms do you need to keep this PC up-to-date?

# A typical end-point PC software portfolio

- Secunia Personal Software Inspector (PSI)
  - A lightweight scanner for Windows PCs to identify insecure programs and plug-ins
  - Secunia PSI is free for home use
  - Insight from data of more than 3 Mio end-point PCs
- A program version is considered insecure if
  - .. available patches are not installed
  - .. the product is end-of-life

What have users typically installed on their end-point PC?

# 50% of the users have more than 66 programs from more than 22 vendors installed



- The Top-50 software portfolio contains the 50 most prevalent programs to  represent a typical end-point PC
    - each program in the Top-50 portfolio has at least a 24% user-share, eight programs from three vendors have more than a 80% user-share

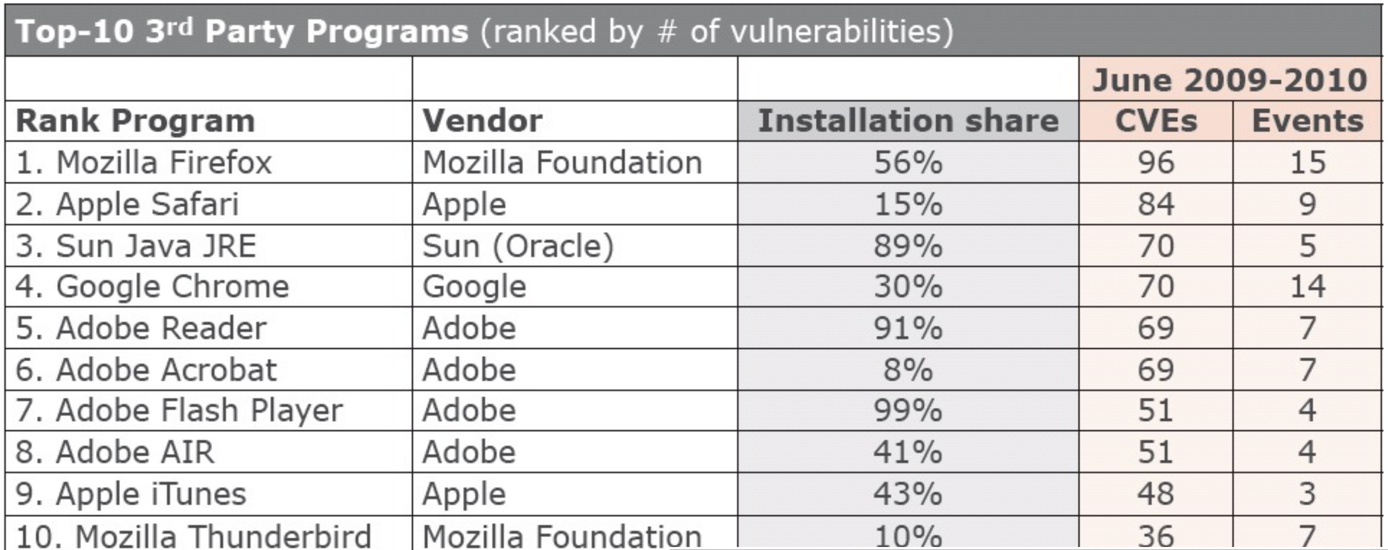
24
Microsoft

26
Third Party

14
Vendors

- The Top-50 portfolio consists of  26 Microsoft and 24 third party (non-Microsoft) programs from 14 different vendors

# Top-10 by vulnerabilities

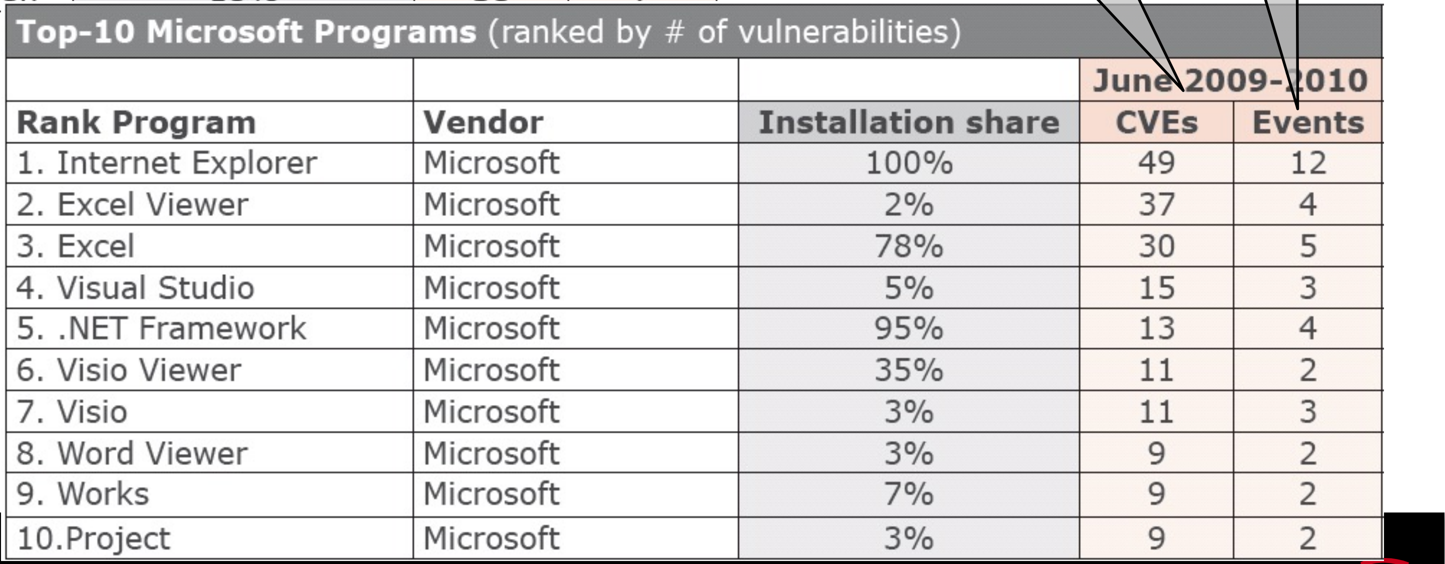


**Top-10 3rd Party Programs** (ranked by # of vulnerabilities)

| | | | June 2009-2010 | |
|---|---|---|---|---|
| **Rank Program** | **Vendor** | **Installation share** | **CVEs** | **Events** |
| 1. Mozilla Firefox | Mozilla Foundation | 56% | 96 | 15 |
| 2. Apple Safari | Apple | 15% | 84 | 9 |
| 3. Sun Java JRE | Sun (Oracle) | 89% | 70 | 5 |
| 4. Google Chrome | Google | 30% | 70 | 14 |
| 5. Adobe Reader | Adobe | 91% | 69 | 7 |
| 6. Adobe Acrobat | Adobe | 8% | 69 | 7 |
| 7. Adobe Flash Player | Adobe | 99% | 51 | 4 |
| 8. Adobe AIR | Adobe | 41% | 51 | 4 |
| 9. Apple iTunes | Apple | 43% | 48 | 3 |
| 10. Mozilla Thunderbird | Mozilla Foundation | 10% | 36 | 7 |

**Events**
Approx. number of administrative events to keep program secure in 12 months

**CVEs**
Number of vulnerabilities in 12 months

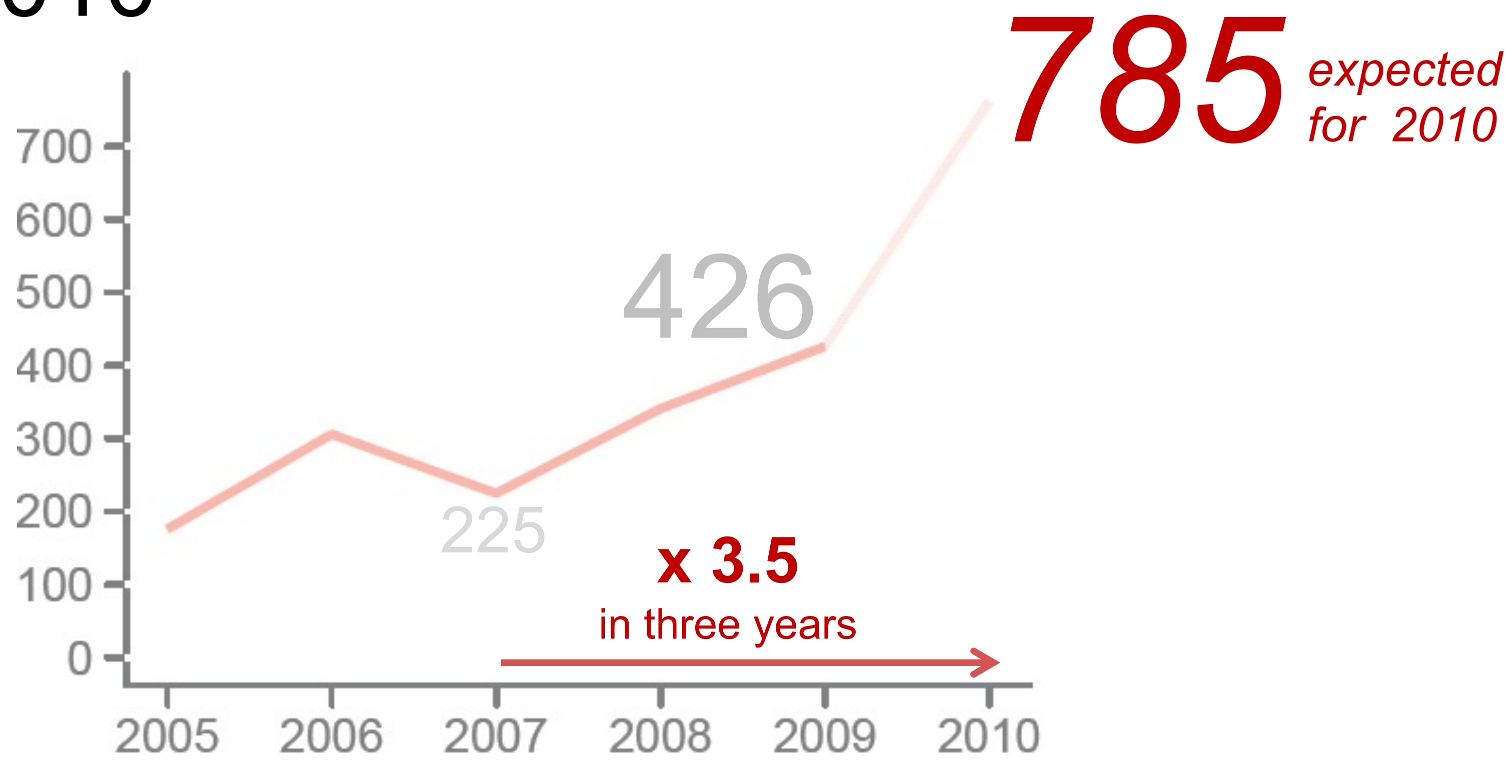


**Top-10 Microsoft Programs** (ranked by # of vulnerabilities)

| | | | June 2009-2010 | |
|---|---|---|---|---|
| **Rank Program** | **Vendor** | **Installation share** | **CVEs** | **Events** |
| 1. Internet Explorer | Microsoft | 100% | 49 | 12 |
| 2. Excel Viewer | Microsoft | 2% | 37 | 4 |
| 3. Excel | Microsoft | 78% | 30 | 5 |
| 4. Visual Studio | Microsoft | 5% | 15 | 3 |
| 5. .NET Framework | Microsoft | 95% | 13 | 4 |
| 6. Visio Viewer | Microsoft | 35% | 11 | 2 |
| 7. Visio | Microsoft | 3% | 11 | 3 |
| 8. Word Viewer | Microsoft | 3% | 9 | 2 |
| 9. Works | Microsoft | 7% | 9 | 2 |
| 10.Project | Microsoft | 3% | 9 | 2 |

Source: Secunia Half Year Report 2010

# Vulnerabilities affecting a typical end point increased 3.5 times to 785 per year from 2007 to 2010



# A relevant Trend ..

more than

50 percent of these vulnerabilities

are rated as highly or extremely critical

.. providing system access to
the victims of exploitation

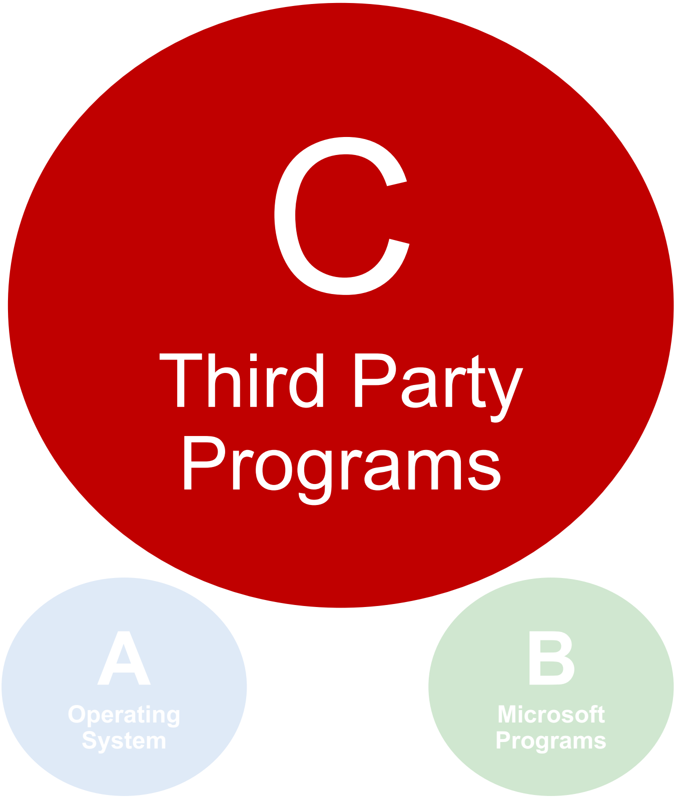
# What are the major contributors of this increasing trend?

A
Operating System

B
Microsoft Programs

C
Third party Programs

# Third party programs are found to be almost exclusively responsible for this trend



C

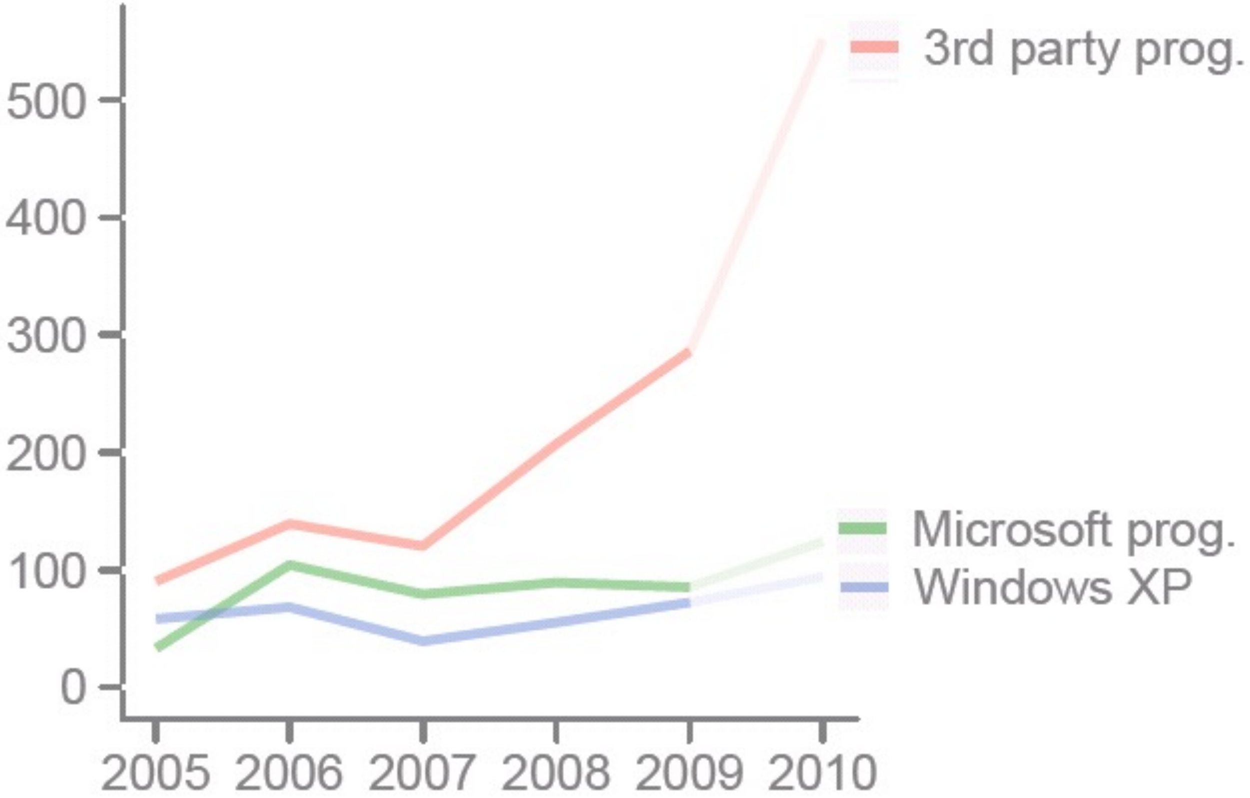
Third Party Programs

A

Operating System

B

Microsoft Programs



# Updating the typical end-point PC

- To keep a PC with the Top-50 portfolio fully patched, the user has to manage a total of 14 different update mechanisms:

- One update mechanism …
  - to patch the OS and the 26 Microsoft programs
  - to cover 35% of vulnerabilities

- Another 13 different update mechanisms …
  - to patch the remaining 24 third party programs
  - to cover 65% of vulnerabilities

Do you manually update antivirus signatures?

Do you manually run backups?

How do you enumerate and patch 3rd party programs?

# Current State

- User's and businesses alike still perceive the operating system and Microsoft products to be the primary attack vector, largely ignoring third party programs
- The frequency and complexity of managing a large number of different update mechanisms will almost certainly lead to incomplete patch levels at large

Cybercriminals do not need precious 0-day vulnerabilities

Cybercriminals do not need Microsoft vulnerabilities

#Hosts x #Vulnerabilities
x {Complexity to stay secure}
=
Opportunity

Cybercriminals act based on the harsh reality, which is that numerous unpatched programs are present at any time.

They don’t need to conceptualize on how a perfectly patched world is supposed to look like.

# From a Cybercriminals perspective

- Targeting third party programs proves to be a rewarding path, and will remain so for an extended period of time.

- In the Top-50 portfolio in 2009
  - Third party programs had 286 vulnerabilities,
  - 3.5x more than the Microsoft programs

- In the Top-50 portfolio in 2010 (first half year)
  - Third party programs had 275 vulnerabilities,
  - 4.4x more than the Microsoft programs

- Only one exploitable vulnerability is needed to compromise an end-point PC.

# Updating the typical end-point PC

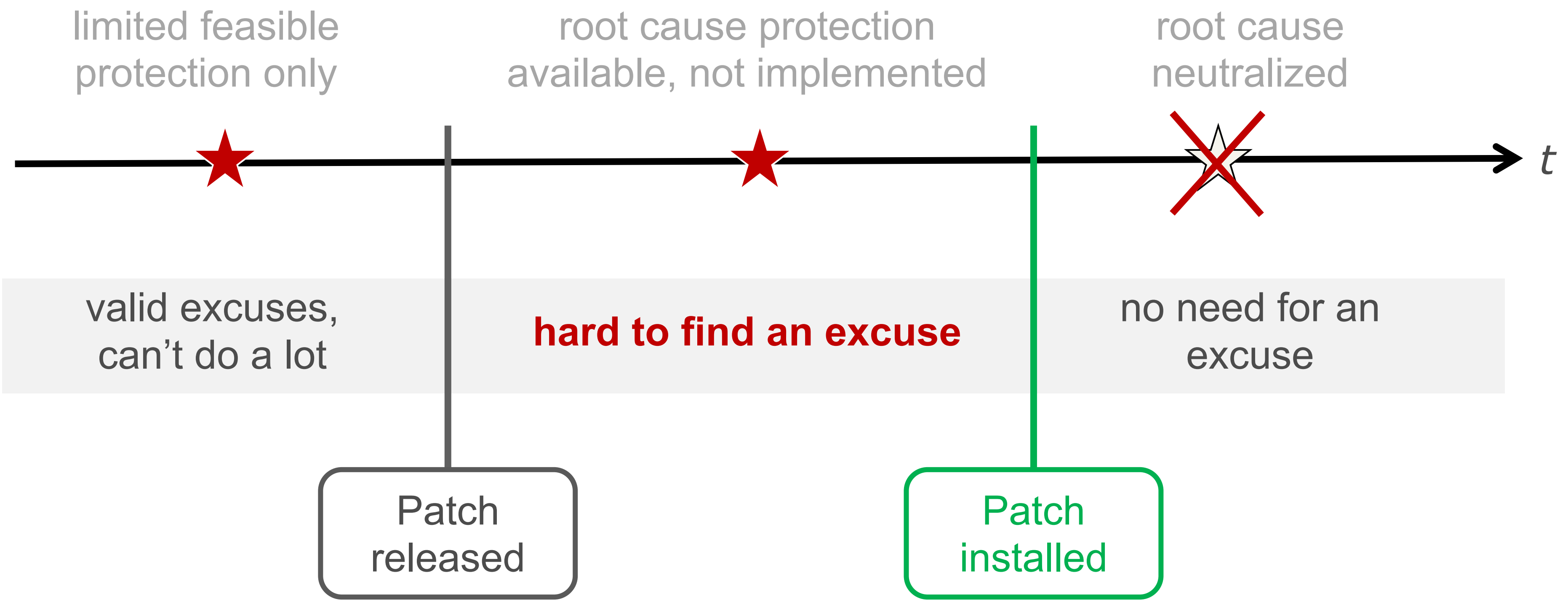
- **How to manage 150 patches for 50 programs of 14 different vendors per year?**

- Any manual approach is doomed to fail and will leave many programs unpatched for extended periods
  - Easy prey for cybercriminals

- Process Requirements
  - automatically identify all third party programs
  - verify the patch level of the programs found
  - report missing patches or insecure installations
  - install the missing patches

# Responsibility

- It is entirely your fault if you get infected after a patch is available

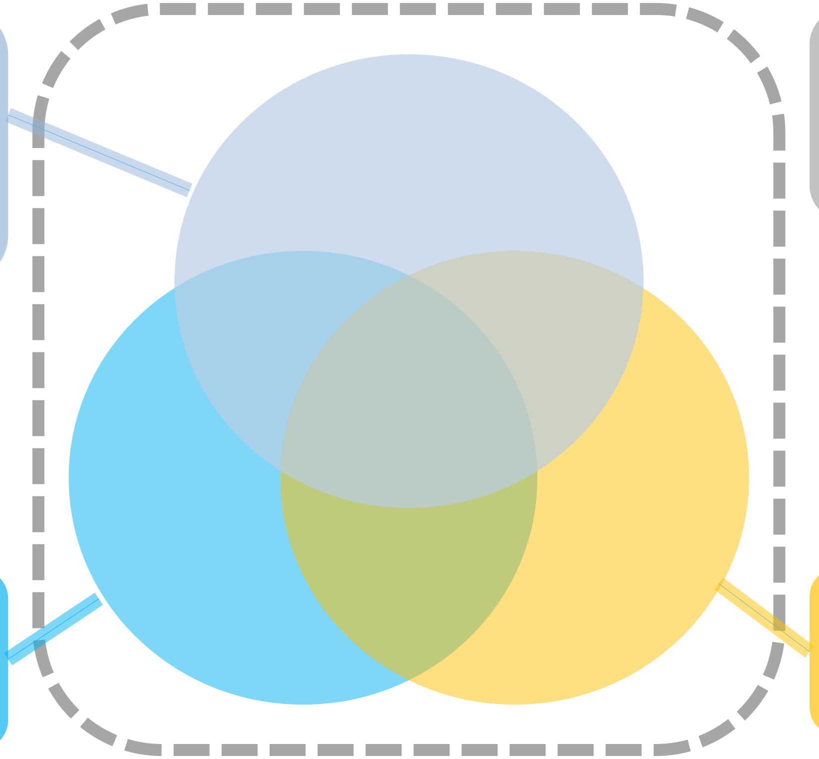

limited feasible protection only
root cause protection available, not implemented
root cause neutralized
t
valid excuses, can't do a lot
hard to find an excuse
no need for an excuse
Patch released
Patch installed

A patch provides
better protection
than thousands of signatures

it eliminates the
root cause

# Multi Layer Defense

- there is no single silver bullet technology
- systematically know where you are vulnerable
- control the remediation process



Controlled and timely patching **of all programs,** including **third party** programs

Vulnerability assessment and remediation management

Antivirus
- on host and perimeter

Perimeter protection
- firewalls, proxies, IPS

# Conclusion

- User's and businesses alike still perceive the operating system and Microsoft products to be the primary attack vector, largely ignoring third party programs
  - locking the front door while the backdoor remains widely open

- Patching is still seen as secondary measure compared to anti-virus and perimeter protection

- Controlled identification and timely patching of all programs, incl. third party programs, is needed

# Personal Software Inspector PSI 2.0 Beta

- Free auto-update for third party programs
- Automatically updates a growing number of frequently used 3rd party programs
  - (i.e. Adobe Reader, Flash Player, Firefox, Java, Skype, ..)
- Choose "one click" or silent update mode
- First results: PSI 2.0 patches many programs that come with their own update mechanism!
- Secunia PSI 2.0 uses the same framework and engine which is used in our robust commercial solution, the Corporate Software Inspector (CSI)

Stay Secure!

# Supporting Material

- Secunia 2010 half year report
  on the threat of 3rd party programs
  http://secunia.com/gfx/pdf/Secunia_Half_Year_Report_2010.pdf

- RSA Paper "Security Exposure of Software Portfolios"
  http://secunia.com/gfx/pdf/Secunia_RSA_Software_Portfolio_Security_Exposure.pdf

- Secunia Personal Software Inspector (PSI)
  free for personal use: http://secunia.com/psi

- Secunia Corporate Software Inspector (CSI)
  http://secunia.com/vulnerability_scanning/corporate