Il processo SDL in Microsoft: problematiche, vantaggi e risultati

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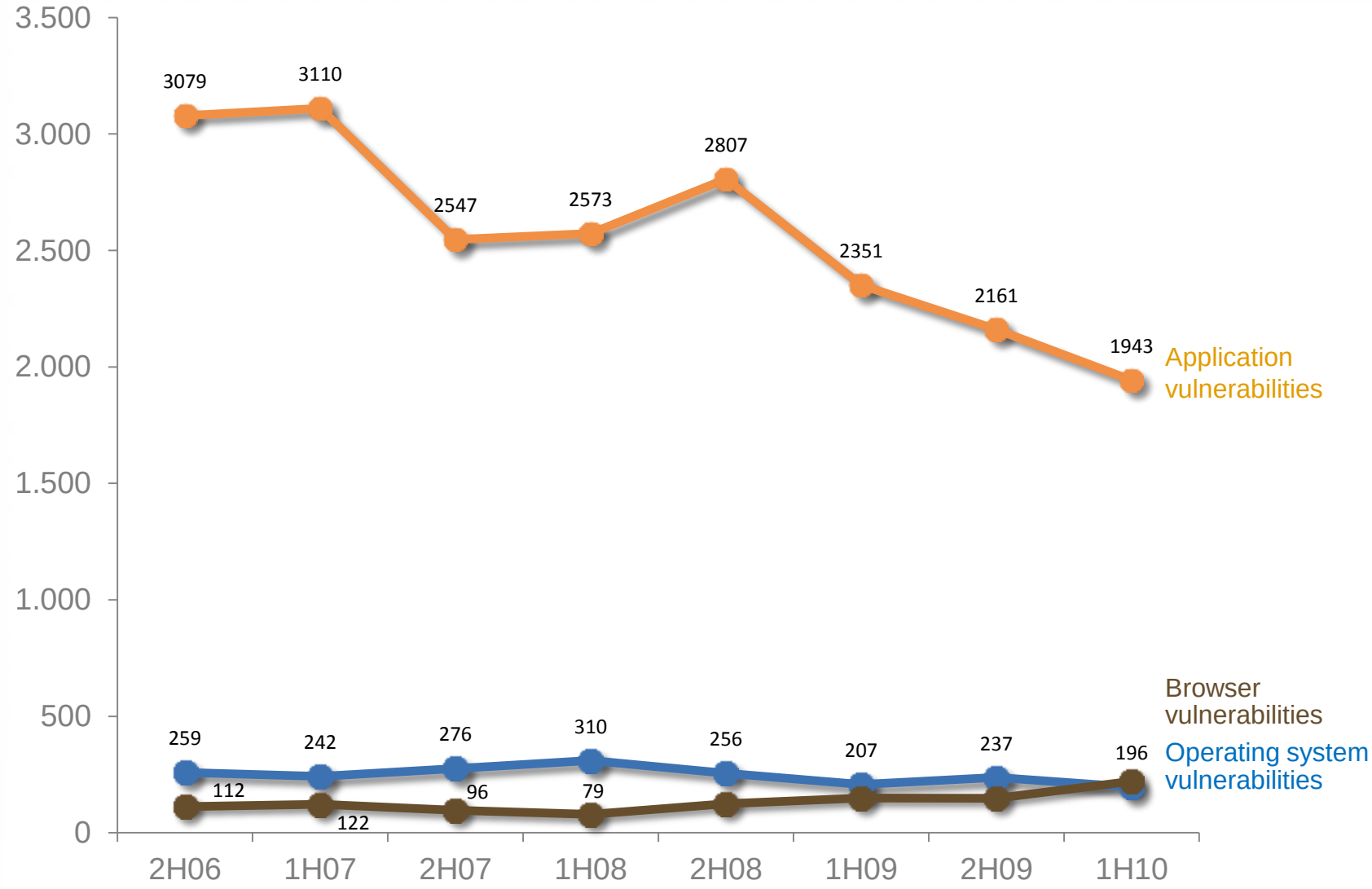
Software Vulnerability Disclosures

Operating system, Browser and Application Disclosures



Microsoft Security Intelligence Report v9 (1H10): **www.microsoft.com/sir**

How We Got Here

- Through 1980s, security was about insiders
  - Studies and experiments demonstrated potential for attacks on software
  - No real examples
  - “Nobody would ever…”
- Computer security treated as a theoretical problem
  - Prove it’s secure and you’re done forever
  - Market proved unsympathetic (or absent) – projects canceled, no real products

How We Got Here

- PC and Internet changed the rules
  - Viruses, information sharing, “outside” and “inside” indistinguishable
  - Vulnerability research for reputation
- Vulnerability research led to security response process
  - Fix the problems when they’re found
- “Secure Windows Initiative” to make software secure
  - Assigned three program managers to review Windows
  - Evolved to training and “bug bashes”

How We Got Here

- Thought we'd done "better" with XP, and then…
  - Code Red
  - Nimda
  - UPNP

From: Bill Gates
Sent: Thursday, 18, 2002
Subject: Trustworthy Computing

As I've talked with customers over the last year - from individual consumers to big enterprise customers - it's clear that everyone recognizes that computers play an increasingly important and useful role in our lives. At the same time, many of the people I talk to are concerned about the security of the technologies they depend on…

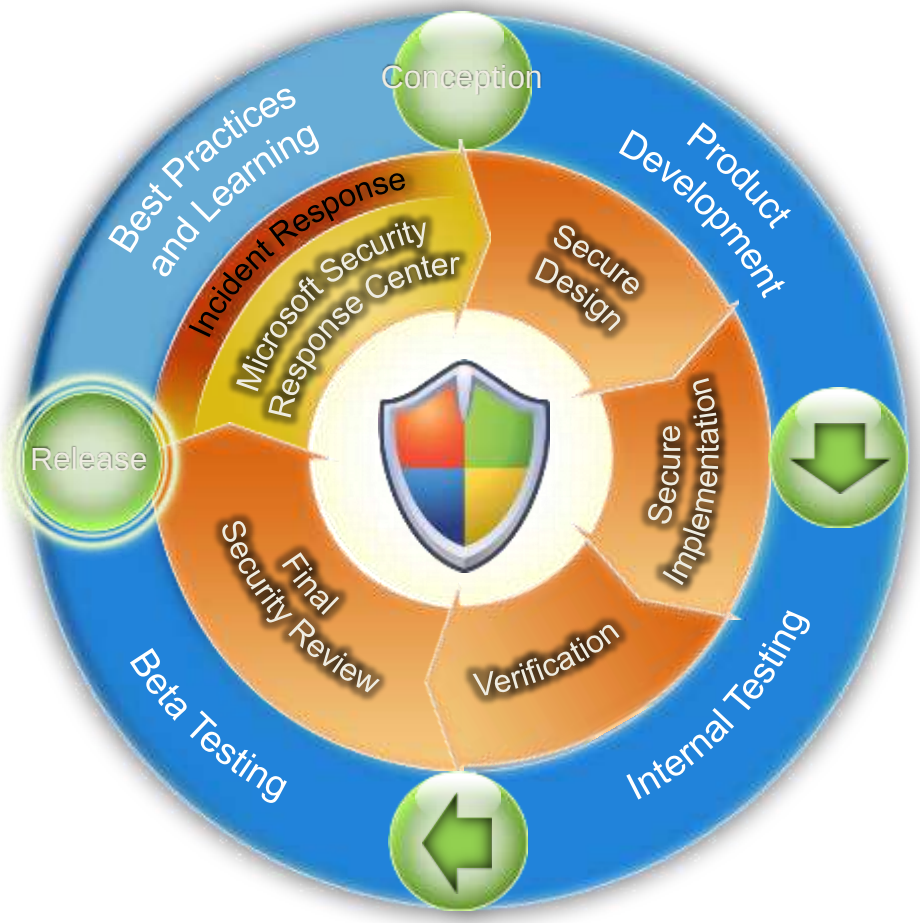
How We Got Here: The Security Push Era

- Security push
  - Team-wide stand-downs and training
  - Threat model, review code, run tools, conduct tests, modify defaults
  - (Relatively) quick way to significant improvement
  - Immature and ad hoc processes
- "Security science"
  - Identify and remove new classes of vulnerabilities
- Security "audit"
  - Independent review – what did the push miss?

Selling the Process

- Security pushes were an “obviously” necessary response…
- Security pushes achieved rapid improvements (some dramatic) but…
- Leverage comes from early (design time) focus on security
- Ongoing attacks demonstrated continued need
- Executive buy-in surprisingly easy in retrospect
  - Everyone understood what bad things could happen
  - Security pushes had accomplished enough to allow us to claim we could do this

The Microsoft SDL



Goals

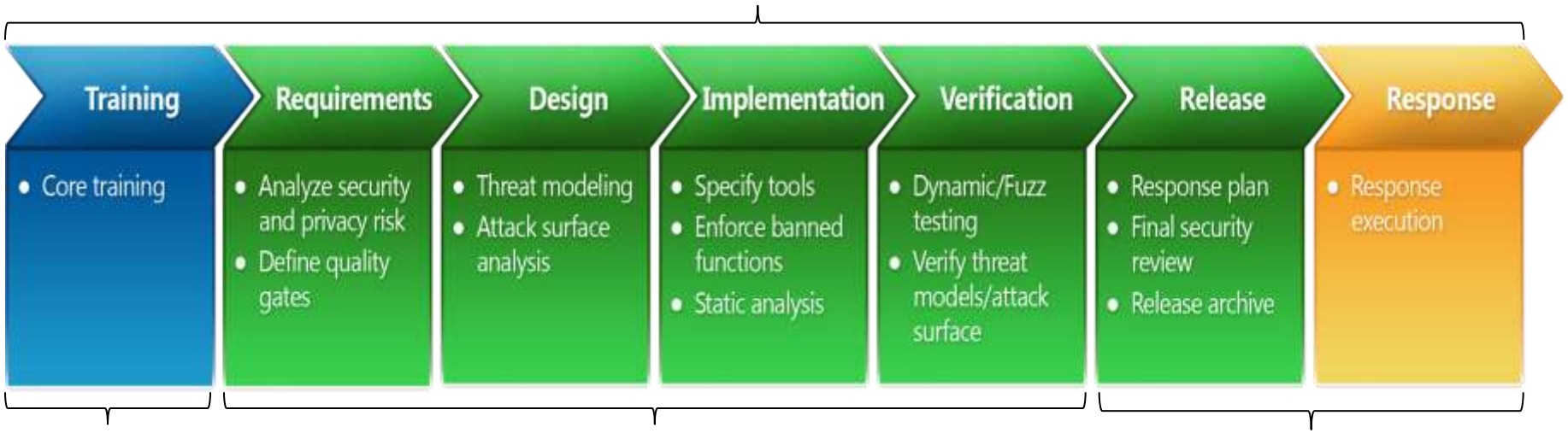
Protect Microsoft customers by

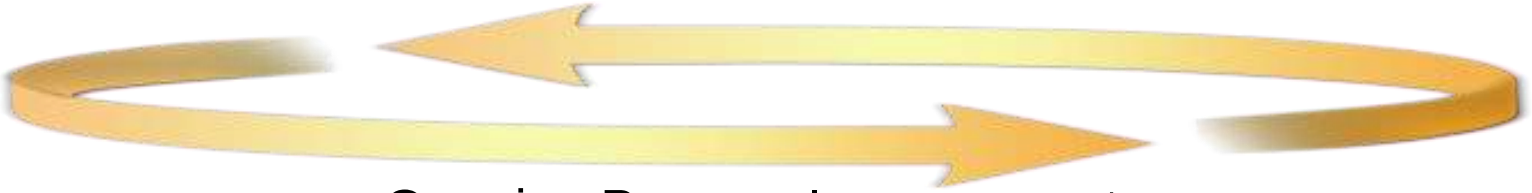
- Reducing the *number* of vulnerabilities
- Reducing the *severity* of vulnerabilities

Key Principles

- Prescriptive yet practical approach
- Proactive – not just "looking for bugs"
- Eliminate security problems early
- Secure by design

The Classic SDL at Microsoft





Ongoing Process Improvements

SDL for Agile at Microsoft

- Requirements defined by frequency, not phase
  - Every-Sprint (most critical)
  - One-Time (non-repeating)
  - Bucket (all others)
- Great for projects without end dates, like cloud services

Managing Change

- The first (2004) iteration of the SDL was pretty rough
  - Developed rapidly based on security push lessons
- Initial updates at 6-month intervals
  - Responses to new threats
  - New application classes (privacy, online services)
  - New requirements and techniques (e.g. banned APIs, new fuzzers)
- Since SDL v4 (October 2007), annual updates
  - More time for tool development
  - More time for beta and feedback
  - More time for usability
- Every update receives both broad and senior review

Process Improvement Timeline at Microsoft…

2002-2003

- Bill Gates writes "Trustworthy Computing" memo early 2002
- "Windows security push" for Windows Server 2003
- Security push and FSR extended to other products

2004

- Microsoft Senior Leadership Team agrees to require SDL for all products that:
  - Are exposed to meaningful risk and/or
  - Are Process sensitive data

2005-2007

- SDL is enhanced
  - "Fuzz" testing
  - Code analysis
  - Crypto design requirements
  - Privacy
  - Banned APIs
  - and more…
- Windows Vista is the first OS to go through full SDL cycle

Now

- Optimize the process through feedback, analysis and automation
- Evangelize the SDL to the software development community:
  - SDL Process Guidance
  - SDL for Agile
  - SDL Optimization Model
  - SDL Pro Network
  - SDL Threat Modeling Tool
  - SDL Process Templates

Automation and Tools

- At Microsoft today, the SDL requires three classes of tools
  - Automated tools to help find (and remove or mitigate) security problems
  - Automated tools to help product teams record and track their compliance with the SDL
  - Automated tools to help the MSEC PM (security advisor) help the product teams
- We started with only the first (problem finders)
- All three are critical to our implementation of the SDL – and we've changed our release cadence largely in recognition of this fact

Things we have learned

- "There is nothing special about security"
  - It's simply part of getting the job done.
- Get to a knowledge baseline
  - You must raise the collective security IQ to a baseline level
  - Don't try to make everyone a security expert
- You're in or you're out
  - Existing software development practices do not foster secure software, you must change your development process
- Executive Support is Key
  - If the execs don't "get it" you'll make marginal progress
- Deprecate old Functionality
  - Old functionality was developed in a different era, with different security landscape
  - Unfortunately, your users have become accustomed to the features!

Things we have learned

- Reduce Friction
  - Few software people are true security experts so we must make security as easy as possible for them
  - Automate, use static analysis tools, better libraries, updated C/C++ compilers
- You'll never reach 'perfection'
  - As long as attackers and researchers are drawing breath, new bugs will be found
  - The odds are against you
- Today's DoS is tomorrow's RCE
  - We have seen time and again what's generally considered a DoS become a way to execute code: "Attacks only get better"
- You will never get the code right. Ever!
  - The software industry spends an incredible amount of time trying to get the code right
  - The SDL focuses a great deal on defenses, not just getting the code right

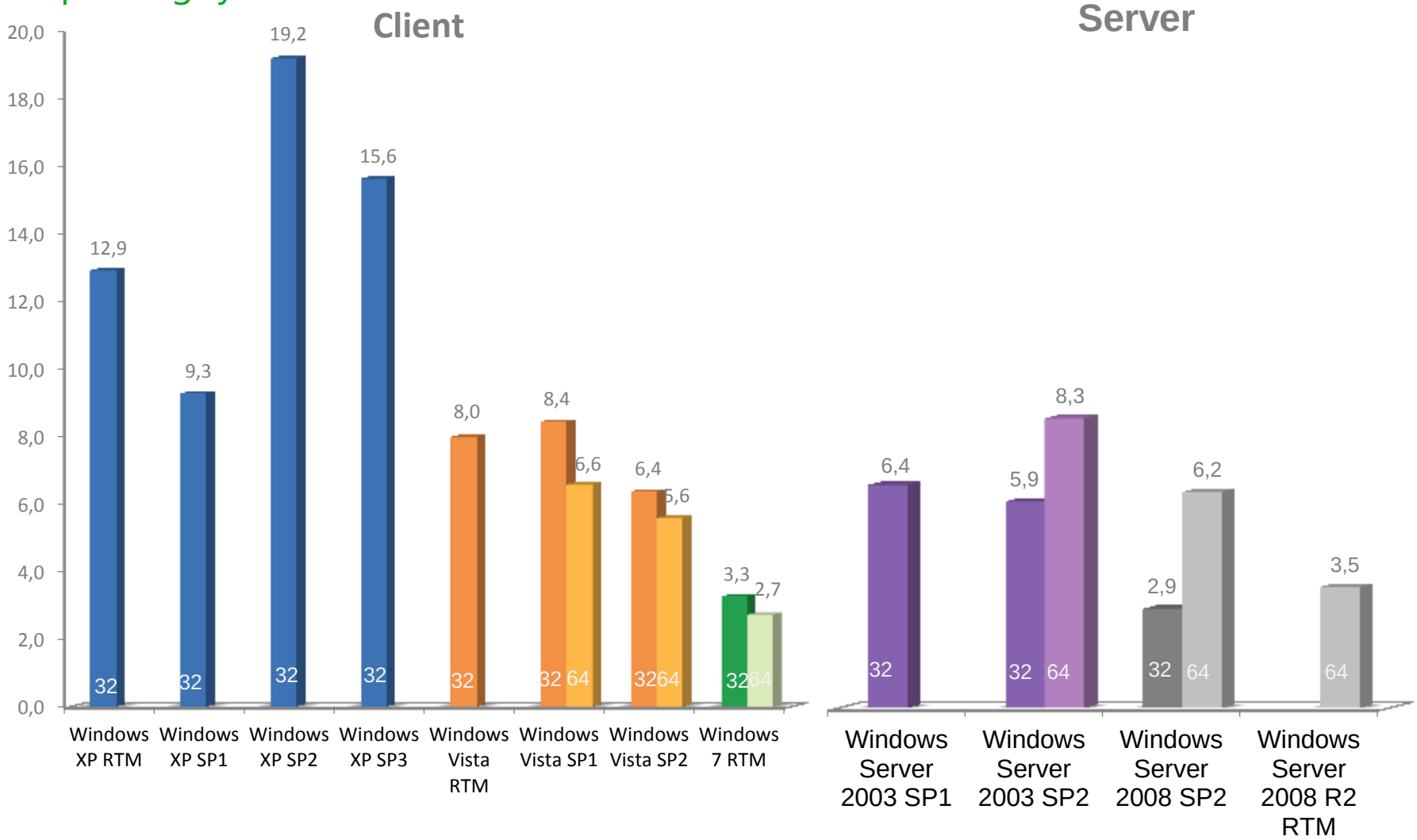
Why Defenses are so Important
Security Advisory 979352 – IE 0Day

	Windows 2000	Windows XP	Windows Vista	Windows 7
Internet Explorer 6	Exploitable	Exploitable (current exploit effective for code execution)	N/A (Vista ships with IE7)	N/A (Windows 7 ships with IE 8)
Internet Explorer 7	N/A (IE 7 will not install on Windows 2000)	Potentially exploitable (current exploit does not currently work due to memory layout differences in IE 7)	IE Protected Mode prevents current exploit from working.	N/A (Windows 7 ships with IE 8)
Internet Explorer 8	N/A (IE 8 will not install on Windows 2000)	DEP enabled by default on XP SP3 prevents exploit from working.	IE Protected Mode + DEP enabled by default prevent exploit from working.	IE Protected Mode + DEP enabled by default prevent exploit from working.

Source: http://blogs.technet.com/srd/archive/2010/01/15/assessing-risk-of-ie-0day-vulnerability.aspx

Malicious And Potentially Unwanted Software

Operating system trends



Number of computers cleaned for every 1,000 MSRT executions, by operating system, 2Q10

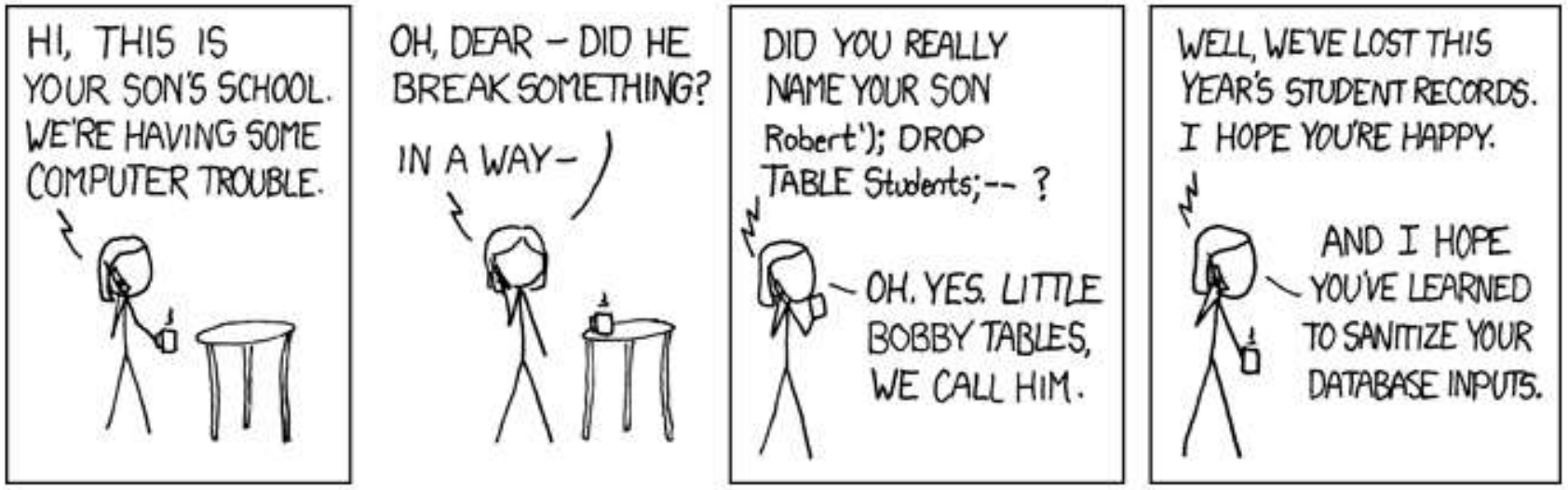
The SDL and the CWE/SANS Top 25

- The SDL addresses all CWE/SANS Top 2009 issues
- Through one or more of:
  - Education
  - Manual Process
  - Tools
  - Threat Model
- http://blogs.msdn.com/sdl/archive/2009/01/27/sdl-and-the-cwe-sans-top-25.aspx

Who Needs the SDL?

Subject: I swear, i'm giving our kids normal names...

Today's XKCD (http://xkcd.com/327/)



Objections to the SDL

"…only for Windows"
- *Based on proven, generally accepted security practices*
- *Appropriate for non-Microsoft platforms*

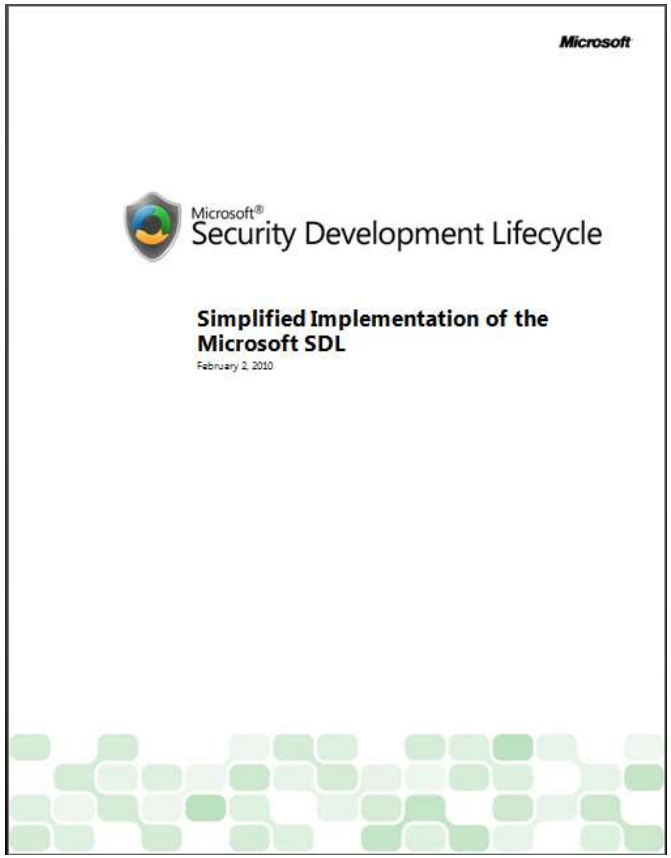
"…for shrink-wrapped products"
- *Also covers Line of Business (LOB) and online services development*

"…for waterfall or spiral development"
- *Agile methods are also supported*

"…requires Microsoft tools"
- *Use the appropriate tools for the job*

"…requires Microsoft-level resources to implement"
- *SDL as its applied at Microsoft != SDL for other development organizations*
- *Some smaller organizations have adopted*

Adapting the SDL to Organizations Beyond Microsoft



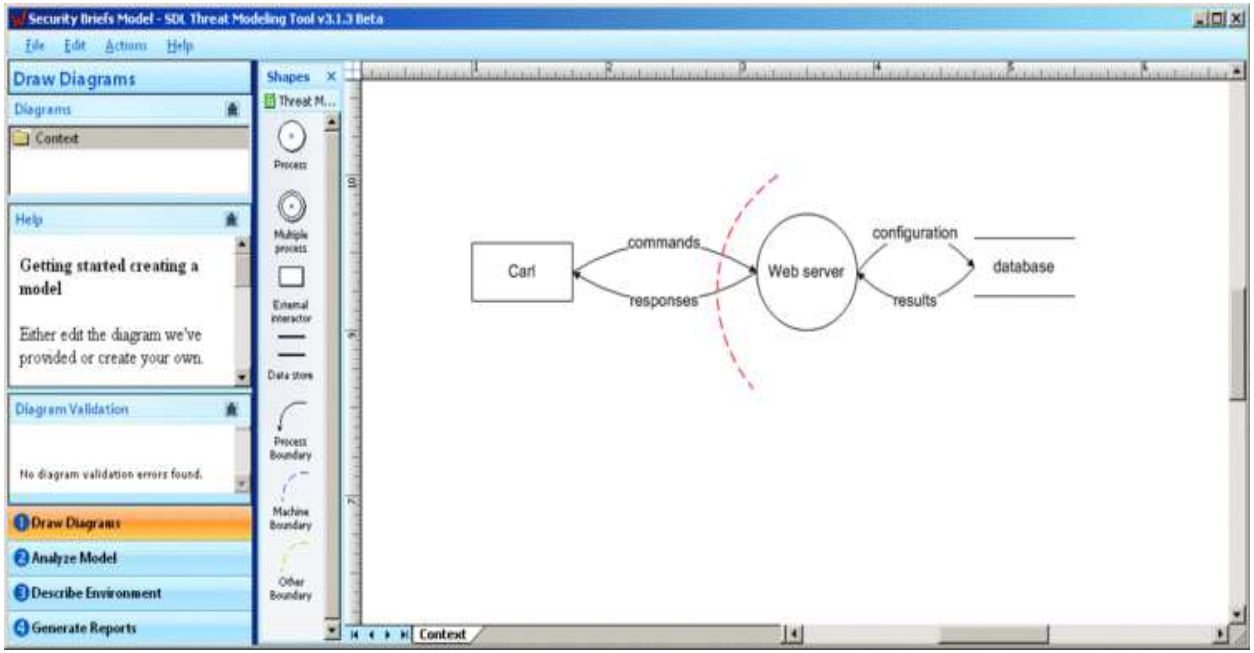
- *Non-proprietary*
- *Scalable to organizations of any size*
- *Platform agnostic*
- *Based on the SDL process used at Microsoft*

Who Uses the SDL?

- Short answer: we don't know
- You have to click through a EULA to download the tools, but you don't have to register so…
- We have worked with some large organizations on adopting and adapting the SDL (mostly not public)
- We've seen the Errata survey, and had some users (large and small) tell us they're using the SDL
- Finding the answer is one of our objectives for the next year

Resources at a glance…

SDL Threat Modeling Tool

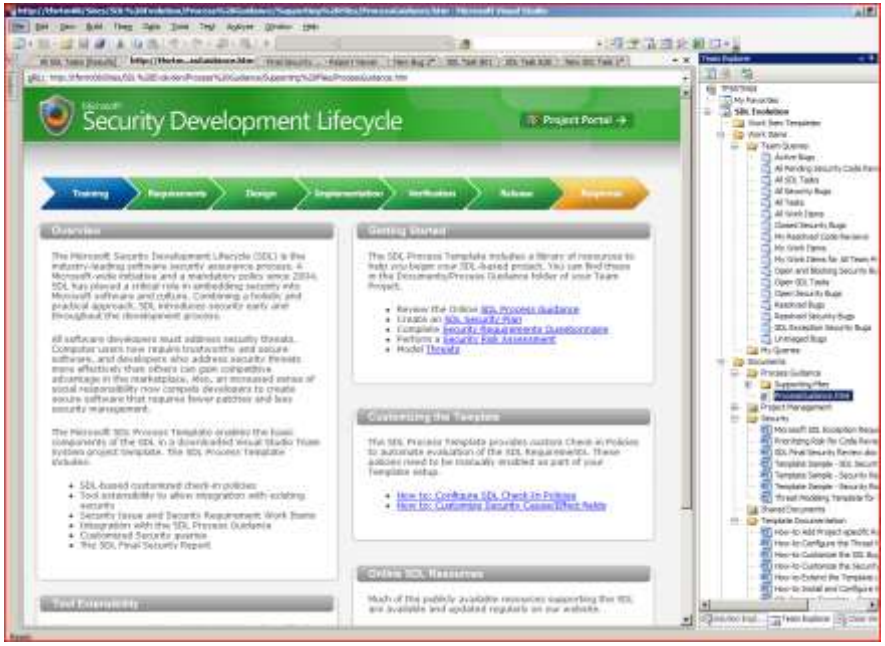


Transforms threat modeling from an expert-led process into a process that any software architect can perform effectively

Provides:

- Guidance in drawing threat diagrams
- Guided analysis of threats and mitigations
- Integration with bug tracking systems
- Robust reporting capabilities

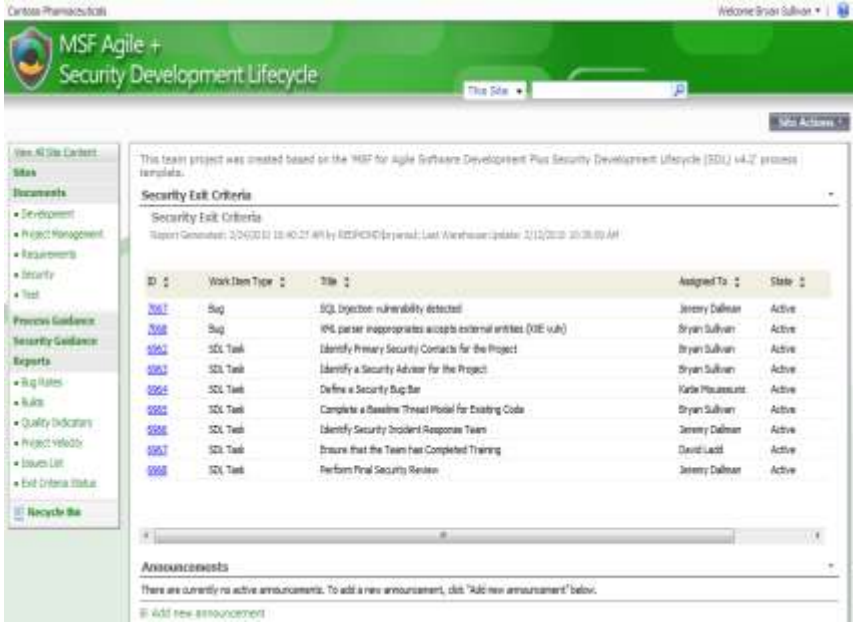
SDL Template for VSTS (Spiral)



The SDL Process Template integrates SDL 4.1 directly into the VSTS software development environment.

- Incorporates
  - SDL requirements as work items
  - SDL-based check-in policies
  - Generates Final Security Review report
  - Third-party security tools
  - Security bugs and custom queries
  - A library of SDL how-to guidance
- Integrates with previously released free SDL tools
  - SDL Threat Modeling Tool
  - Binscope Binary Analyzer
  - Minifuzz File Fuzzer

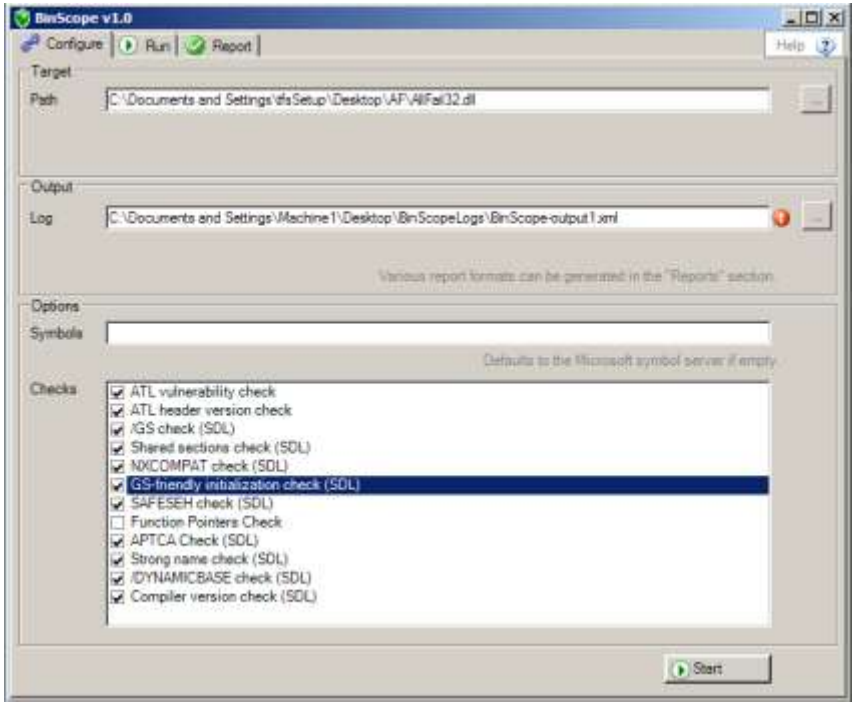
MSF Agile + SDL Template for VSTS



- Incorporates SDL-Agile secure development practices directly into the Visual Studio IDE - now available as beta (planned release at the end of Q2CY10)

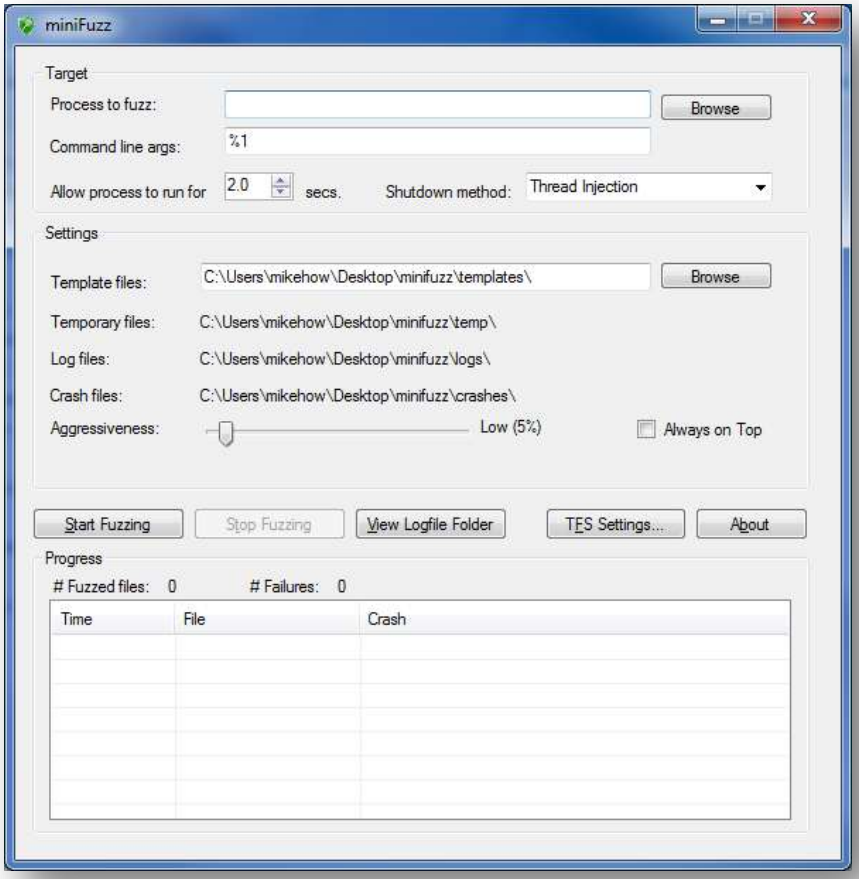
- Automatically creates new security workflow items for SDL requirements whenever users check in code or create new sprints
- Ensures important security processes are not accidentally skipped or forgotten
- Integrates with previously released free SDL tools
  - SDL Threat Modeling Tool
  - Binscope Binary Analyzer
  - Minifuzz File Fuzzer
- Will be updated for VS2010

Binscope Binary Analyzer



- Provides an extensive analysis of an application binary
- Checks done by Binscope
  - /GS - to prevent buffer overflows
  - /SafeSEH - to ensure safe exception handling
  - /NXCOMPAT - to prevent data execution
  - /DYNAMICBASE - to enable ASLR
  - Strong-Named Assemblies - to ensure unique key pairs and strong integrity checks
  - Known good ATL headers are being used
- Use either standalone or integrated with Visual Studio (VS) and Team Foundation Server (TFS)

MiniFuzz File Fuzzer



- MiniFuzz is a basic testing tool designed to help detect code flaws that may expose security vulnerabilities in file-handling code.
  - Creates corrupted variations of valid input files
  - Exercises the code in an attempt to expose unexpected application behaviors.
  - Lightweight, for beginner or advanced security testing
  - Use either standalone or integrated with Visual Studio (VS) and Team Foundation Server (TFS)

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- First two papers republished under CC license:
  - **"Simplified Implementation of the Microsoft SDL"** whitepaper and the **Microsoft Security Development Lifecycle (SDL) - Version 5.0**

Summary

- You're here, so you all understand the importance of building secure software
- Integrating security into a development process *and organization* requires commitment and time
- Our experience has shown that the SDL is an effective process – and that it can be applied beyond Microsoft
- We've made a lot of resources freely available to help other organizations apply the SDL

Online Resources

SDL Portal

http://www.microsoft.com/sdl

SDL Blog

http://blogs.msdn.com/sdl/

SDL Process on MSDN (Web)

http://msdn.microsoft.com/en-us/library/cc307748.aspx

Simplified Implementation of the Microsoft SDL

http://go.microsoft.com/?linkid=9708425

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