IBM Innovate 2011
“Look Ma, No Hands!”
A Practical Guide to Automated Source Code Scanning

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Agenda

- A successful security initiative
- The security policy
- Is automation the answer for you
- Cost and coverage of automation
- Demo
- Q&A

Qualities of a Successful Application Security Program

1. There is a Marketing Plan (*Really*)
2. Security begins with an organization, not an application
3. Organizational structure is well understood
4. Initial projects are carefully chosen
   - Impact
   - Exposure
   - Acceptance
5. Outcomes are demonstrable
   - Justify focus
   - Refine budgets and timelines
   - Coalesce key metrics and reporting
6. Implementations focus on automation and integration
   - Decreases disruption to existing processes
   - Increases value and leverage of existing investments in personnel and systems
7. Processes are consistent and repeatable to scale

Prerequisite: Craft a Starter App Sec Policy and Plan

- You decide: what is and is not acceptable in your production applications
- Consider application security as a whole: policy, organization, tools, resources and related support and training
- Limit the scope of the initial implementation, but imagine and plan for the complete portfolio
- Build capabilities through a sequence of steps that build upon each other
- Help communicate realistic expectations about how and when business benefits accrue

Phase I: Walk Before Run

- Select 3 or 4 vulnerability types to identify and correct

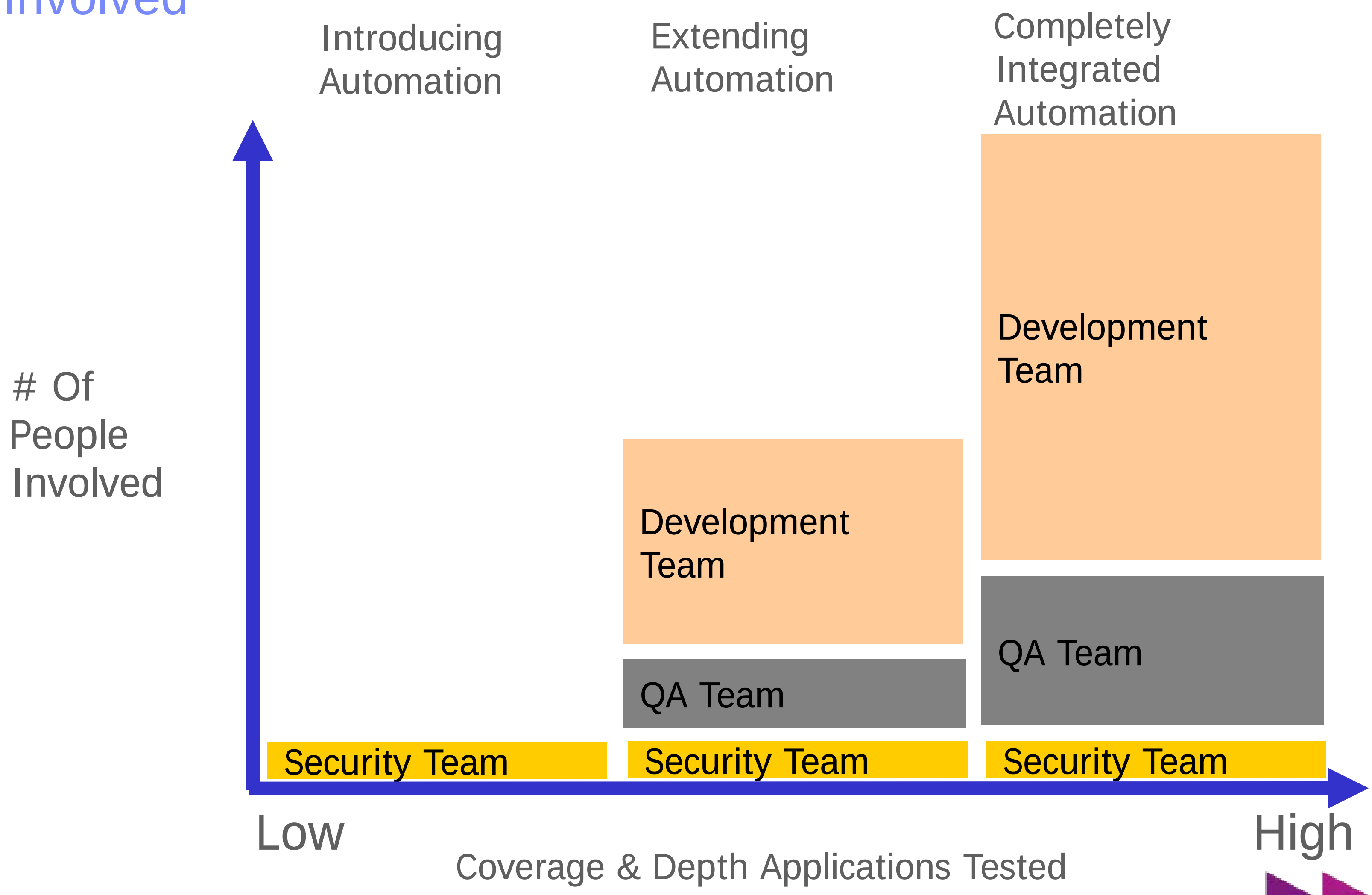
- Criteria
  - Easy to find (easy to hack)
  - Easy to fix
  - Ensure remediation assistance fits organizational requirements

- Candidates
  - Cross Site Scripting
  - SQL Injection
  - Command Injection
  - Authentication/Password problems (e.g. hardcoded, weak, clear text)

Phase II: Walk a Little Faster/Farther

- Once you’re underway and (somewhat) comfortable, consider expanding to the OWASP Top Ten or the SANS 25
  - OWASP
  - SANS 25
- 2010 list includes
  - A1: Injection
  - A2: Cross-Site Scripting (XSS)
  - A3: Broken Authentication and Session Management
  - A4: Insecure Direct Object References
  - A5: Cross-Site Request Forgery (CSRF)
  - A6: Security Misconfiguration
  - A7: Insecure Cryptographic Storage
  - A8: Failure to Restrict URL Access
  - A9: Insufficient Transport Layer Protection
  - A10: Unvalidated Redirects and Forwards

Phase III: Scaling Testing / Gradually Getting More Resources Involved



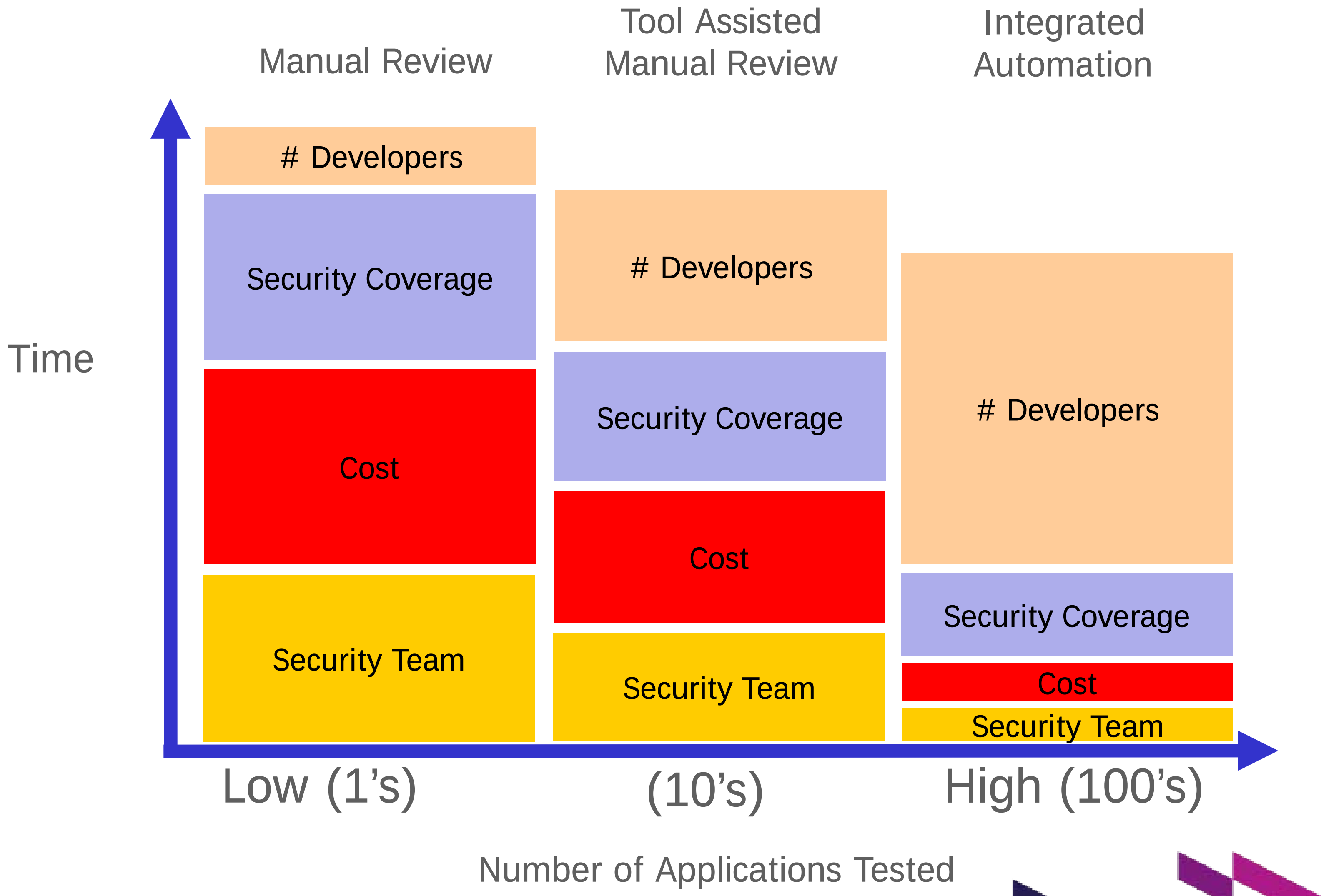
The Current State of Scanning at Many Organizations

- High degree of domain expertise required by Security and Development
  - Developers vs. Security vs. Scanning Tools
    - Need all three to get the job done
      - Scan configuration - language skill set for building
      - Deep product knowledge for triage workflow
      - Application security expertise to understand risk
- Poor data distribution and notification cycles
- Disruptive to development team
  - False positives creates low confidence in process
  - Integration of tools into development environment
- Roadblocks for the security team
  - Development environment is off limits to Security for build integration
  - Missing parts of the source code
  - Deep triage is too time consuming
- Bad assumptions and expectations
  - Identification of every security vulnerability

Goals of Automated Scanning

- Quick and easy configuration
- Scalable
- Produce high confidence results
- Provide automated notification of scan results to consumers
- Minimal disruptions for development and security
- Provide scan configuration confidence
- Ability to provide self service model

Manual Review vs Automation



Cost of Manual vs Automated Scanning

	Manual	Automated
Applications to assess	200	200
Dedicated security staff	2	1
Average application size	250 (KLoC)	250 (KLoC)
Average config & assessment time per application	40 (hours)	2 (hours)
Average remediation assessments per year	3	Unlimited
Average remediation assessment time per application	24 (hours)	0
Cost of security for 1 man year (fully loaded)	$200,000	$100,000
Total time for initial assessments	3.3 (years)	10 (weeks)
Total time for remediation assessments	3.5 (years)	0
Total LOE costs	$2,680,000	$19,230

Based on estimated labor costs only

What About Scanning on the Desktop?

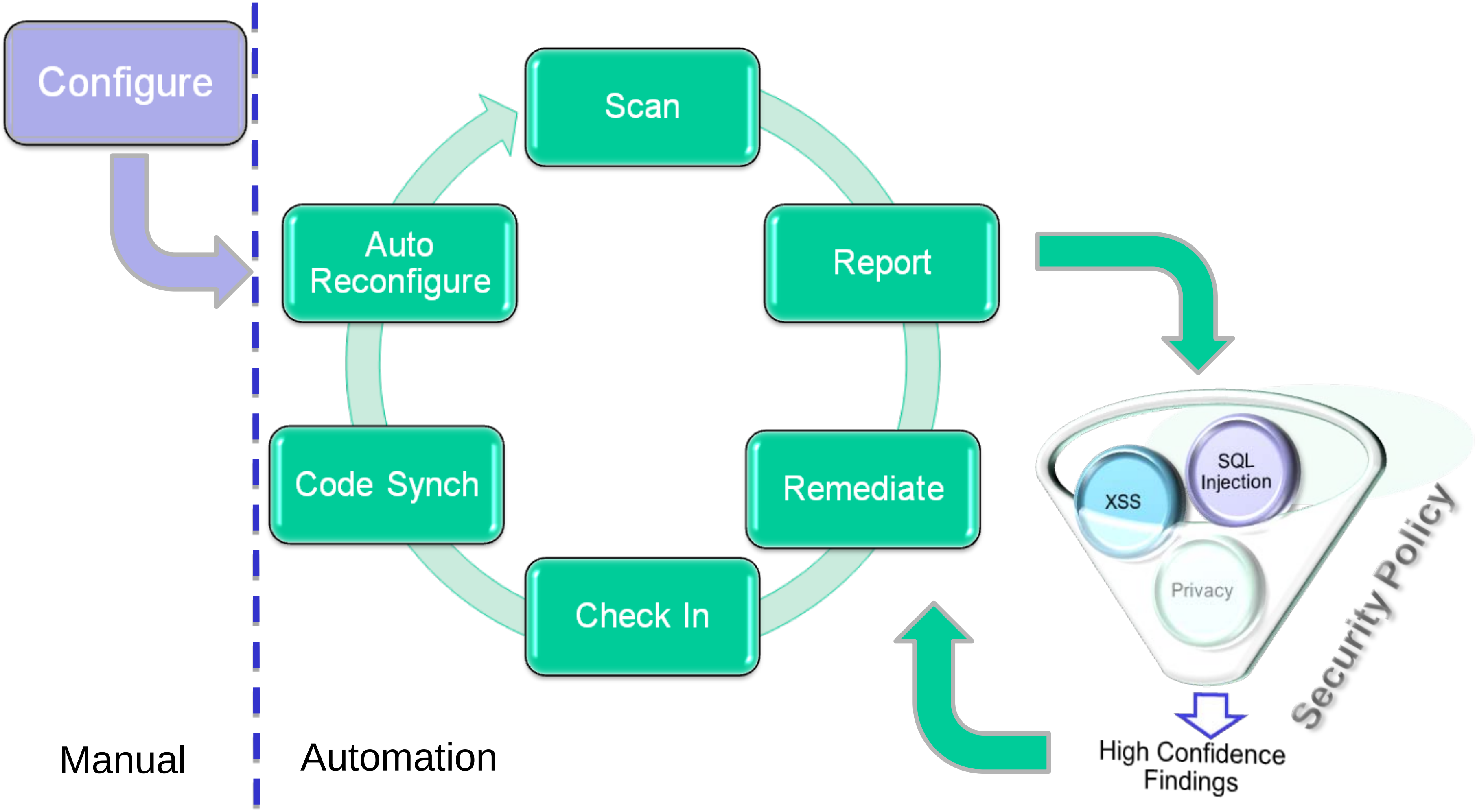
- Assume 200 Applications
  - Approximately 300 Developers
  - 20% are testing on any giving day. 60 developers per day run 1 scan
  - Average scan time: 30 Minutes

- 30 hours per day of limited productivity while developers are scanning

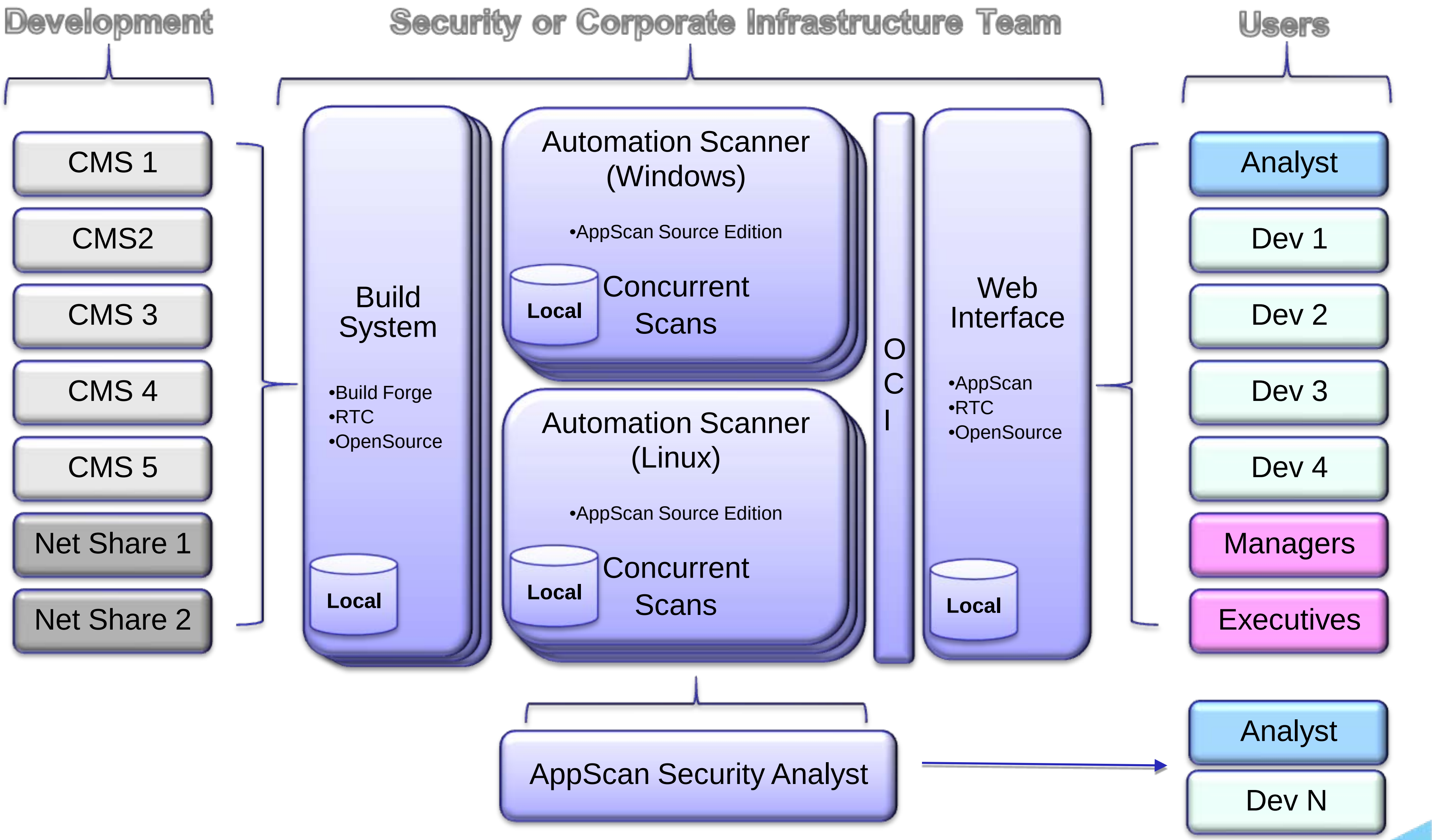
- Often don’t have ALL the pieces on the desktop

- Necessary in some environments
  - Should be incorporated into overall solution (champions)

Repeatable "Low Touch" High Confidence Findings



Scalable Solution



Development

Security or Corporate Infrastructure Team

Users

CMS 1

CMS2

CMS 3

CMS 4

CMS 5

Net Share 1

Net Share 2

Build System

- Build Forge
- RTC
- OpenSource

Local

Automation Scanner (Windows)

- AppScan Source Edition

Local

Concurrent Scans

Automation Scanner (Linux)

- AppScan Source Edition

Local

Concurrent Scans

OCI

Web Interface

- AppScan
- RTC
- OpenSource

Local

Analyst

Dev 1

Dev 2

Dev 3

Dev 4

Managers

Executives

AppScan Security Analyst

Analyst

Dev N

Automation Scanning Workflow

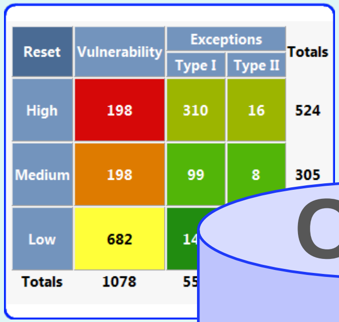
- Setup scan in build system
  - Assign repository
  - Assign notifications
  - Select filtering
- Configure application in AppScan Security client (if needed)
- Validate first scan (optional)
- Add scan to reporting console
- Assign rights to report data

- Press GO

IBM Rational AppScan Source Edition Solution

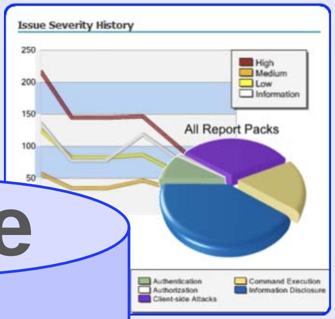
Security

- Configure Software
- Scan
- Triage Results
- Manage Security Policies



Reset	Vulnerability	Exceptions		Totals
		Type I	Type II	
High	198	310	16	524
Medium	198	99	8	305
Low	682	14		
Totals	1078	55		

Reporting Console



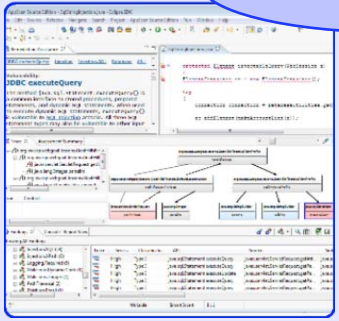
- Correlate BB/WW results
- Compare Applications
- Manage Portfolio Risk

Core

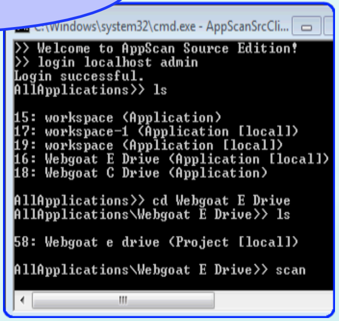
- Knowledgebase
- Assessment DB
- Custom Rules

Development

- Investigate Flaws
- Remediate with Guidance
- Scan
- Confirm Fix



Automation



```
>> Welcome to AppScan Source Edition!
>> login localhost admin
Login successful.
AllApplications>> ls

15: workspace (Application)
17: workspace-1 (Application [local])
19: workspace (Application [local])
16: Webgoat E Drive (Application [local])
18: Webgoat C Drive (Application)

AllApplications>> cd Webgoat E Drive
AllApplications\Webgoat E Drive>> ls

58: Webgoat e drive (Project [local])

AllApplications\Webgoat E Drive>> scan
```

- Build integration
- Automate Scans
- ANT, Make, Maven integration
- Data Access API

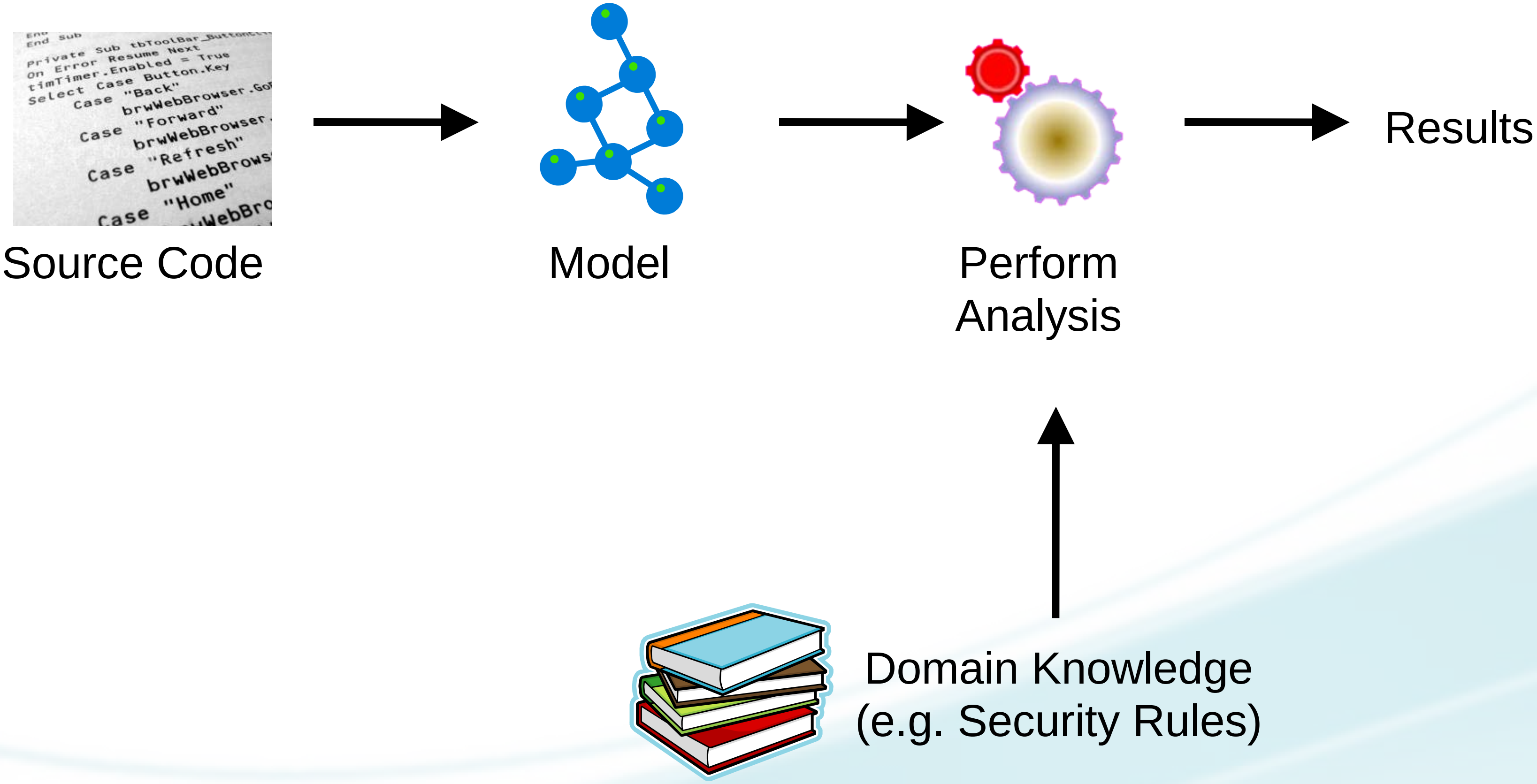
Broad Application Language Support

Out-of-the-Box

- Java
- JSP
- C
- C++
- .NET
  - C#
  - VB.NET
  - ASP.NET
- Classic ASP (VB6)
- COBOL
- PL/SQL
- T-SQL

- PHP
- HTML
- Perl
- ColdFusion
- Client-Side JavaScript
- Server-Side JavaScript
- VBScript

Static Analysis



```
End
End Sub

Private Sub tbToolBar_ButtonCl
On Error Resume Next
timTimer.Enabled = True
Select Case Button.Key
    Case "Back"
        brwWebBrowser.GoB
    Case "Forward"
        brwWebBrowser.
    Case "Refresh"
        brwWebBrows
    Case "Home"
        wWebBro
```

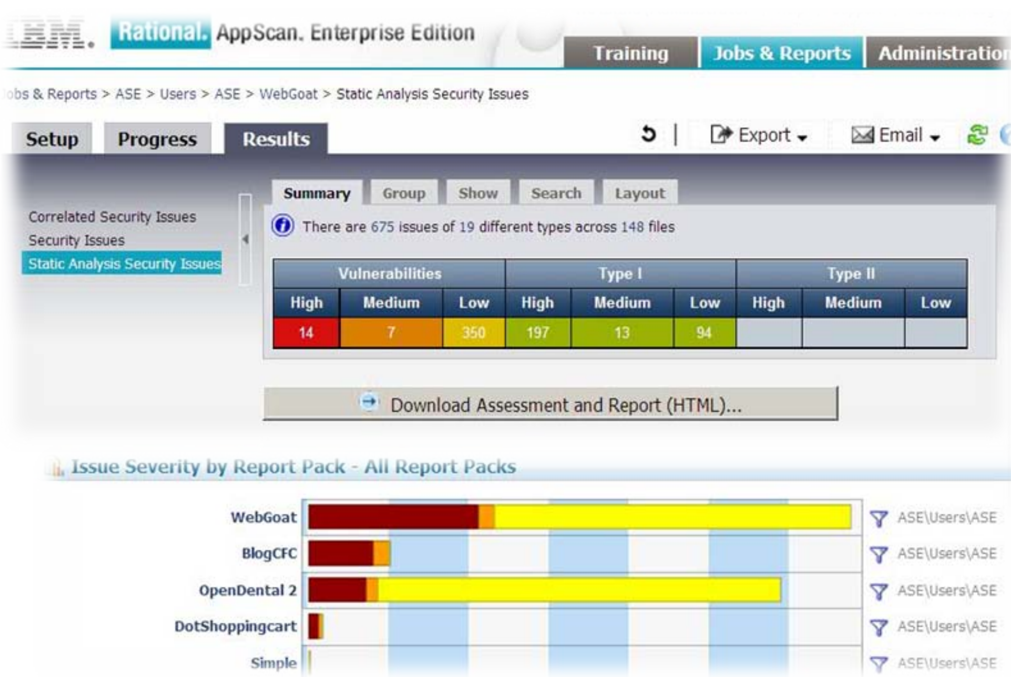
Source Code

Model

Perform Analysis

Results

Domain Knowledge
(e.g. Security Rules)

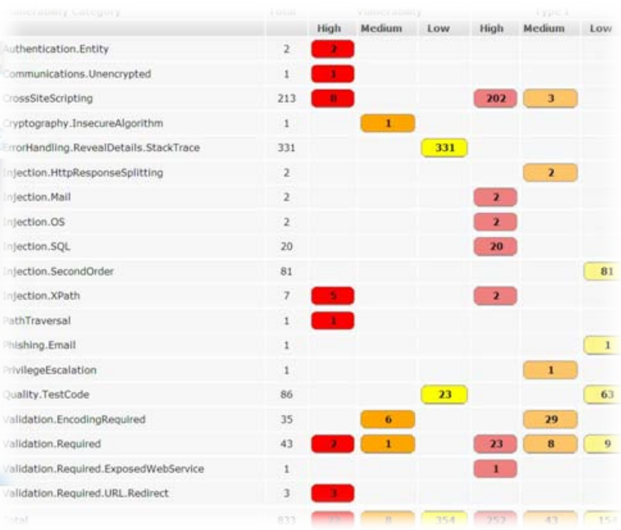


obs & Reports > ASE > Users > ASE > WebGoat > Static Analysis Security Issues

There are 675 issues of 19 different types across 148 files

Vulnerabilities			Type I			Type II		
High	Medium	Low	High	Medium	Low	High	Medium	Low
14	7	350	197	13	94			

Issue Severity by Report Pack - All Report Packs



Vulnerability Category	Total	Vulnerability			Type I		
		High	Medium	Low	High	Medium	Low
Authentication.Entity	2	2					
Communications.Unencrypted	1	1					
CrossSiteScripting	213	8			202	3	
Cryptography.InsecureAlgorithm	1		1				
ErrorHandling.RevealDetails.StackTrace	331			331			
Injection.HttpResponseSplitting	2					2	
Injection.Mail	2				2		
Injection.OS	2				2		
Injection.SQL	20				20		
Injection.SecondOrder	81						81
Injection.XPath	7	5			2		
PathTraversal	1	1					
Phishing.Email	1						1
PrivilegeEscalation	1					1	
Quality.TestCode	86			23			63
Validation.EncodingRequired	35		6			29	
Validation.Required	43	2	1		23	8	9
Validation.Required.ExposedWebService	1				1		
Validation.Required.URL.Redirect	3	3					
Total	833	22	8	354	252	43	154

Rational. Build Forge

Summary: Goals of Automated Scanning

- 2 hours per application for configuration
- High confidence reports
- Differential reporting
- Facilitate the distribution of scanning artifacts
- Automated notification of scan results to consumers
- Configuration confidence indicators for misconfigured scans
- Minimal disruptions for development and security
- Provide self serve scanning model

Benefits: Automated Scanning

- Scan large number of applications very quickly
- Scans initiated by schedule – no remediation “costs”
- Non-intrusive, low maintenance
- Immediate notifications of security issues to development staff
- Easy access to high confidence assessment data for developers
- Catches critical issues early in SDLC

- Quickly raises the overall security state of the enterprise

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