Define and Optimize Your Approach to Application Security

Avoid Common Pitfalls
Leverage Proven Tactics

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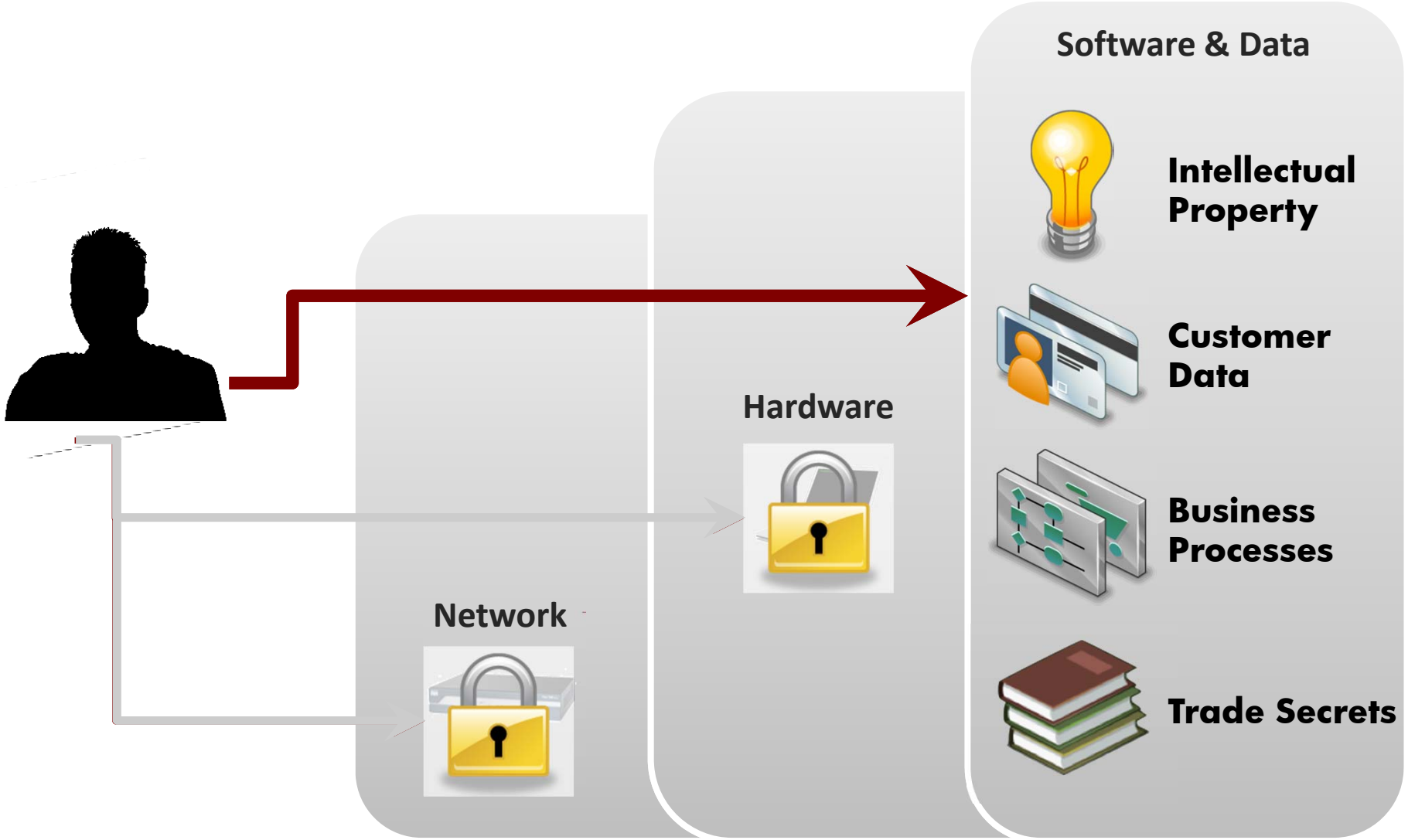
What this presentation is based on…

- More than 5 years of field experience from software security consultants working with hundreds of clients
- Anecdotal accounts from over 350 software security assessments across all industry sectors
- Personal involvement in over 60 professional services engagements July 2007 – Nov 2011

Agenda

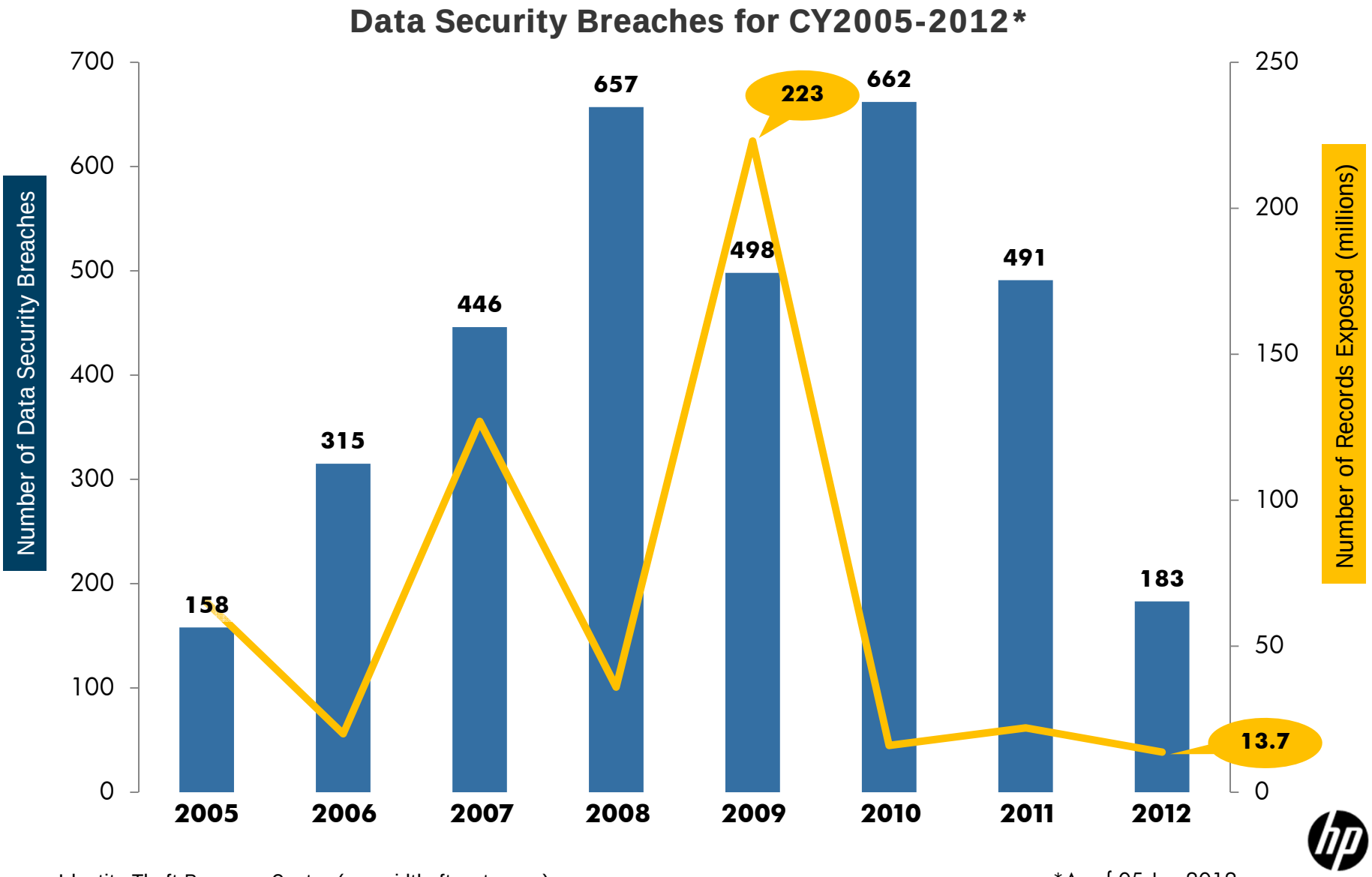
- Why Application Security?
- Obstacles to an Effective Program
- Define & Optimize (Tune)

Why Software Applications are Attacked



Exploiting Weaknesses: Path of Least Resistance

Security Breaches Continue



Source: Identity Theft Resource Center (www.idtheftcenter.org)

*As of 05 Jun 2012

Why Application Security?

1. Customer Demands
2. Regulatory Compliance -- CY2010
3. Breach / Data Loss
4. Well-informed, Proactive

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Why Application Security?

1. Customer Demands
2. Regulatory Compliance -- CY2012
3. Breach / Data Loss
4. Well-informed, Proactive

   (This group has been breached and they're just not admitting it.)

Motivation for Developing Secure Systems

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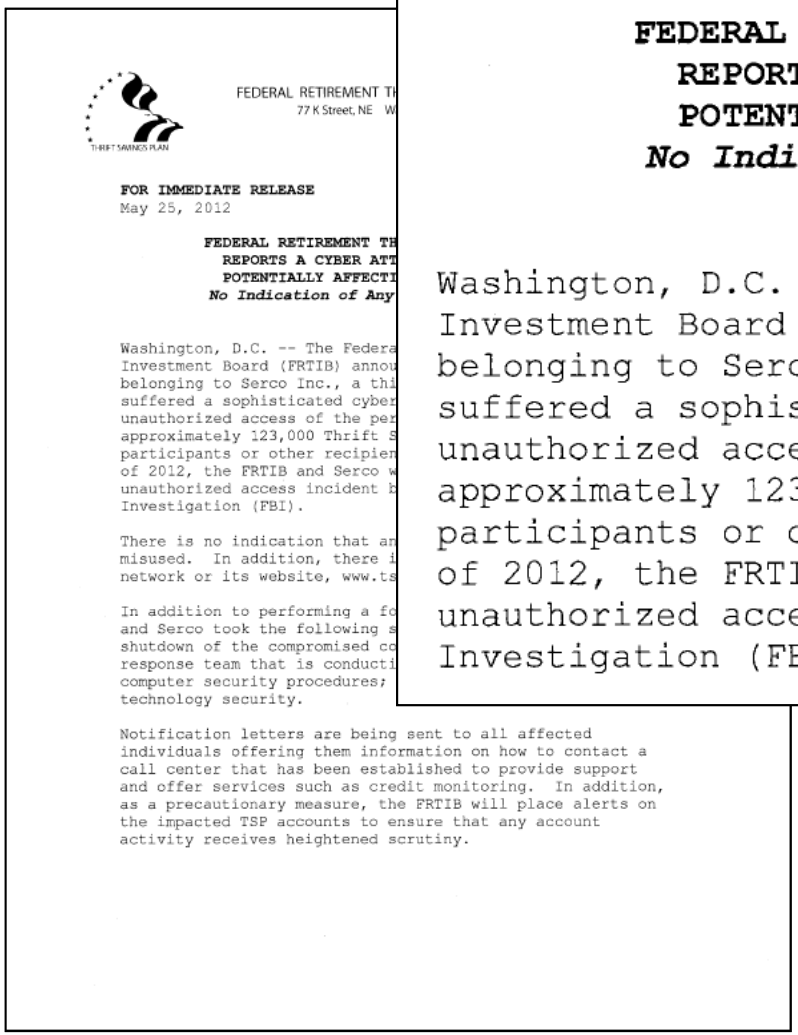

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77 K Street, NE W

FOR IMMEDIATE RELEASE
May 25, 2012

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Notification letters are being sent to all affected individuals offering them information on how to contact a call center that has been established to provide support and offer services such as credit monitoring. In addition, as a precautionary measure, the FRTIB will place alerts on the impacted TSP accounts to ensure that any account activity receives heightened scrutiny.

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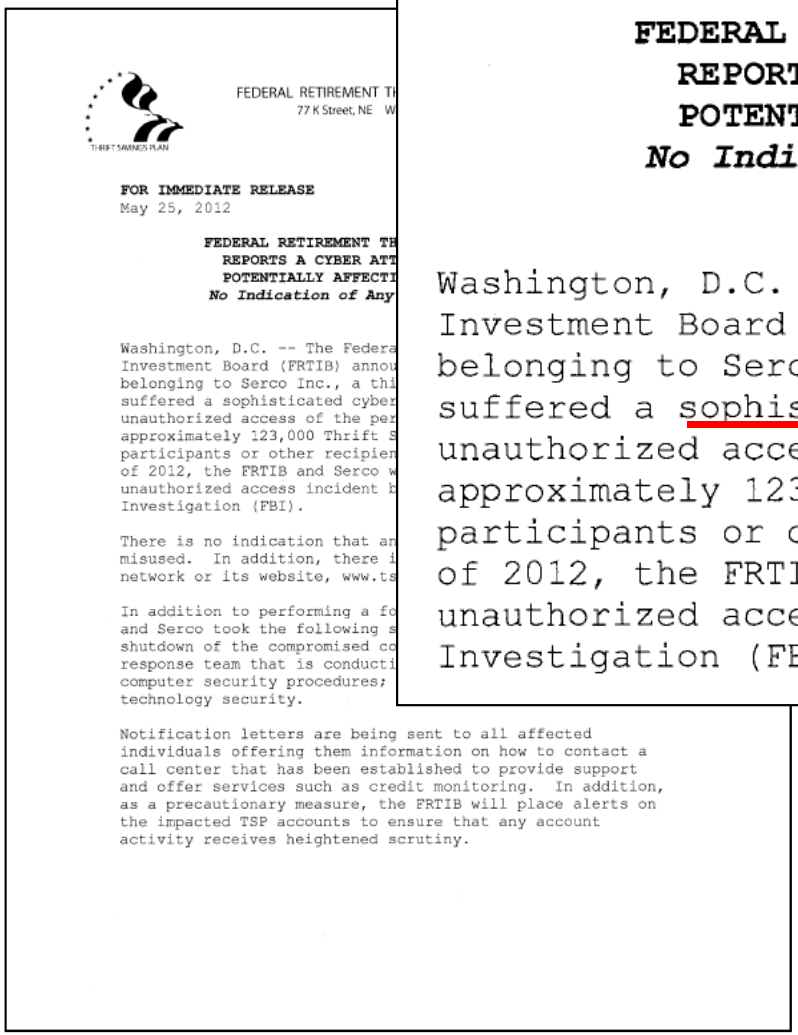
REPORTS A CYBER ATTACK ON A CONTRACTOR
POTENTIALLY AFFECTING TSP PARTICIPANTS
No Indication of Any Improper Use of Data

Washington, D.C. -- The Federal Retirement Thrift Investment Board (FRTIB) announced today that a computer belonging to Serco Inc., a third party service provider, suffered a sophisticated cyber attack that resulted in the unauthorized access of the personal information of approximately 123,000 Thrift Savings Plan (TSP) participants or other recipients of TSP payments. In April of 2012, the FRTIB and Serco were informed of the unauthorized access incident by the Federal Bureau of Investigation (FBI).

Motivation for Developing Secure Systems



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Identity Theft Resource Center

Report Date:

2012 Breach List: Breaches: 183 Exposed: 13,748,651

How is this report produced? What are the rules? See last page of report for deta

Another "sophisticated cyber attack"?

ITRC Breach ID	Company or Agency	State	Est. Date	Breach Type	Breach Category	Re	ptd
ITRC20120131-02	**Regions Financial Corp. - Ernst & Young**	AL		Electronic	Business	Yes - U #	0

Personal information about Regions Financial Corp. current and former employees was lost in November when a flash drive with the data came up missing after being mailed by outside auditor Ernst & Young in the same envelope as the decryption code.

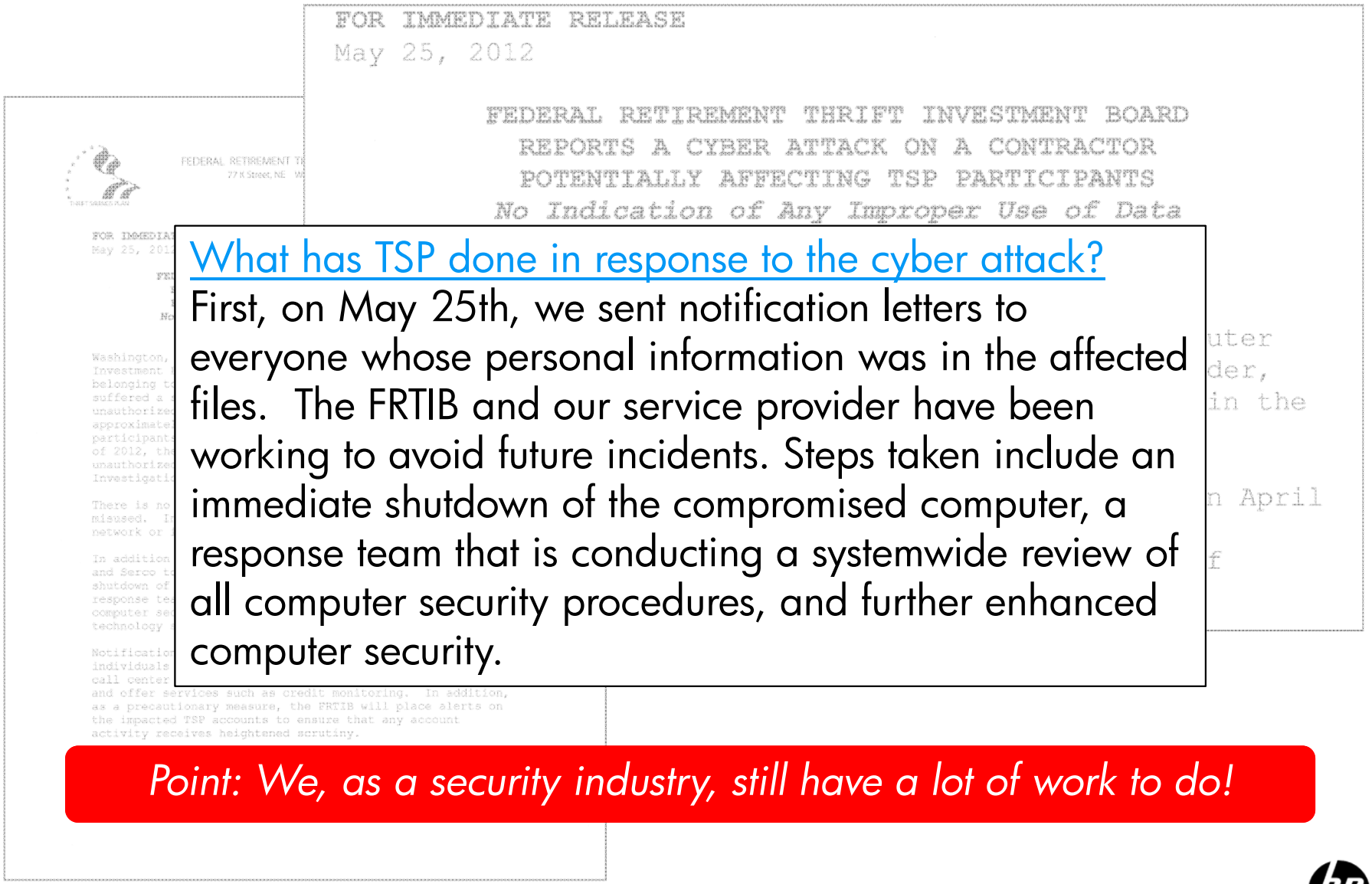
Attribution 1
Publication: al.com Author: Date Published:
Article Title: http://blog.al.com/businessnews/2012/01/regions_says_employee_401k_dat.html
Article URL: http://blog.al.com/businessnews/2012/01/regions_says_employee_401k_dat.html

ITRC Breach ID	Company or Agency	State	Est. Date	Breach Type	Breach Category	Records Exposed?	# Records Rptd
ITRC20120131-01	**Lexington Clinic**	KY	12/7/2011	Electronic	Medical/Healthcare	Yes - Published #	1,018

Following the Dec. 7 theft of an unencrypted laptop, Lexington Clinic in Kentucky is notifying 1,018 patients who received services in the neurology department.

Attribution 1
Publication: Health Data Management Author: Date Published:
Article Title: Laptop Loaded with PHI Stolen from Lexington Clinic

Motivation for Developing Secure Systems



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What has TSP done in response to the cyber attack?

First, on May 25th, we sent notification letters to everyone whose personal information was in the affected files. The FRTIB and our service provider have been working to avoid future incidents. Steps taken include an immediate shutdown of the compromised computer, a response team that is conducting a systemwide review of all computer security procedures, and further enhanced computer security.

Point: We, as a security industry, still have a lot of work to do!

Obstacles to an Effective AppSec Program

- Awareness
- Education, Training
- Source Integrity (*this is about trust)*
- Issue Management

Obstacles to an Effective AppSec Program

- Awareness (lack of)
  - Don't know about the issue
  - Don't know about the *requirement*
- Education, Training (little or none)
  - Don't know how to fix it
  - Definitely don't have time to get trained on how to fix it
- Source (Messenger) Integrity
  - Lack of trust between Security and Development teams
  - Poor understanding (by Security) of how software is developed; poor understanding (by Developers) of Security team's strategic mandate
- Issue Management (huh?)
  - Too many issues: "What am I going to do with 35,000 findings?"
  - Improper focus on "everything" instead of on what is most important

Who is Responsible for Software Security?

"I just want to be a coder; I'm really not interested in security."

– Anonymous

Elements of Success

Elements of Success

1. Define Program Goals
   - Associate AppSec goals with organizational goals
   - Consider tying to bonus / promotion incentives

Goals Examples

- Collaborate amongst teams to improve security
- Report the status of security risk exposure on individual or groups of applications
- Avoid being front-page news on the WSJ
- Measure security risk of individual applications
- Identify and prioritize our application portfolio

Application Portfolio Example

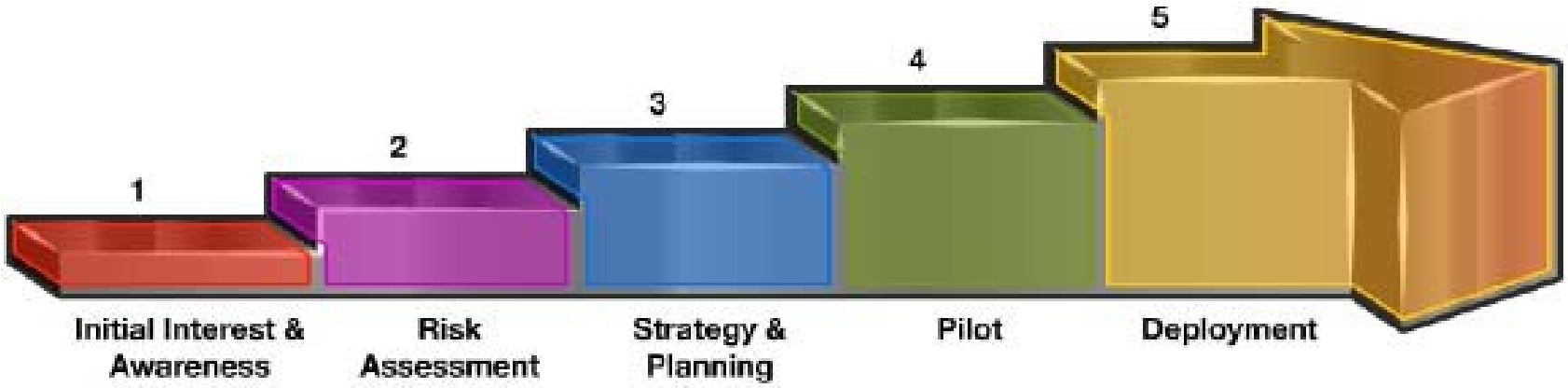
Application / Project	Cost of breach (H, M, L)	Likelihood of target (H, M, L)	Potential impact	Application owner	Date of Initial Deployment	Last update
Administrative and Forest Fire Information Retrieval and Management System (AFFIRMS)	M	L		ADMIN IT	3/4/1999	7/21/2006
Aircraft Data Manager System (ADAM)	H	M		AIR IT	8/28/2003	1/22/2007
Aircraft Incident Reporting System (AIRS)	M	M		AIR IT	11/13/2002	3/6/2007
Aircraft Use Database (ACUSE)	L	L		AIR IT	2/3/2001	3/18/2005
Aircraft Utilization (AUS)	L	L		AIR IT	4/22/2006	6/30/2007
ALLOCATE	H	M		ADMIN IT	7/8/2004	8/23/2006
Approved Aircraft and Pilot Database (APPROVE)	H	M		AIR IT	3/16/2002	7/15/2007
Atlas GIS	M	M		GEO IT	5/15/2000	6/10/2007
Automated Fire Situation Report (AUTO209)	H	M		ADMIN IT	12/20/2006	3/13/2007
Automated Incident Status Summary (ISR-209)	M	L		ADMIN IT	9/14/2003	6/10/2006
Automated Lightning Detection System (ALDS)	M	L		WEATHER IT	10/3/2006	10/3/2006

Elements of Success

1. Define Program Goals
   - Associate AppSec goals with organizational goals
   - Consider tying to bonus / promotion incentives
2. Develop a Reasoned Strategy (a plan with objectives) for supporting Program Goals
   - Keep it simple
   - Ensure Objectives are measurable and time-boxed

Strategy Example

"**Develop and implement a five-phased approach** to raising awareness of application security (by <date>), educating and training stakeholders on process changes (by <date>), and building security into the SDLC (by <date>)."



Strategy Example #2

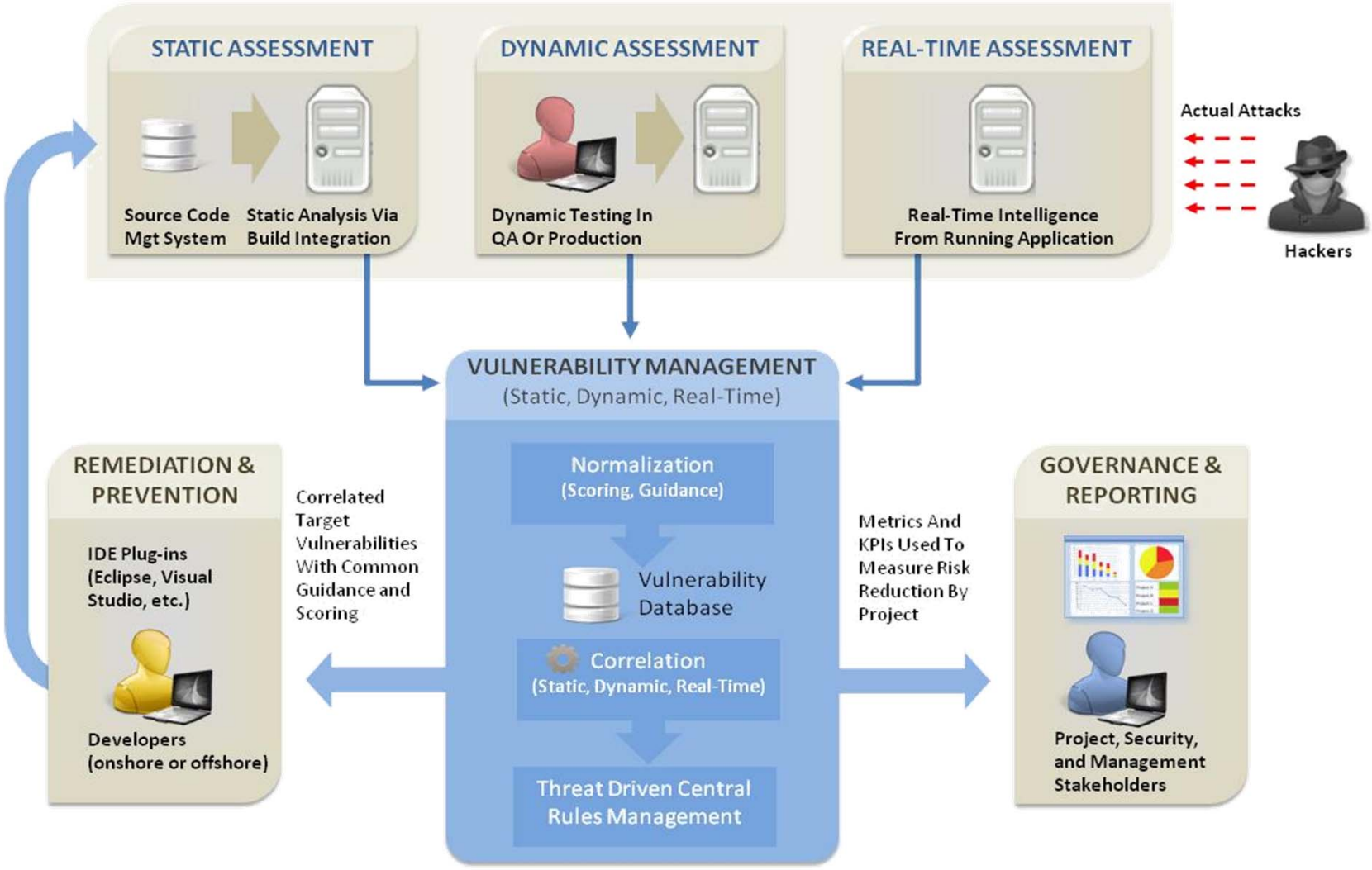
Step 1: Implement A Security Gate

Establish security acceptance testing program by 2012Q2

Step 2: Build In Security

Reduce cost of developing secure applications at least 20 percent by July 2013

Strategy: The Technical Component



Elements of Success

1. Define Program Goals
   - Associate AppSec goals with organizational goals
   - Consider tying to MBOs
2. Develop a Reasoned Strategy (with Objectives!) for supporting Program Goals
   - Keep it simple
   - Ensure Objectives are measurable and time-boxed
3. Obtain Executive Sponsorship
   - Influence spans business units
   - Supports… and holds accountable

Elements of Success (cont'd)

4. Communicate the Plan
   - Who, what, when, where, why (and how)
   - Communicate again (and again) (and again)

Elements of Success (cont'd)

4. Communicate the Plan
   - Who, what, when, where, why (and how)
   - Communicate again (and again) (and again)
5. Measure Progress
   - Collect metrics for a specific reason, not simply because you can
   - Use the right KPIs

A bit about Metrics & KPIs…

Tough Questions

Will it be possible to perform an analysis of 100% of enterprise web applications?

Will a zero vulnerability metric be reachable, practical or even desirable?

Is vulnerability reduction the same as risk reduction?

The 5 Key Performance Indicators (KPIs)

WRT – Weighted Risk Trend

DRW – Defect Remediation Window

RDR – Rate of Defect Recurrence

SCM – Specific Coverage Metric

SQR – Security to Quality defect Ratio

- KPIs provide business-level context to security-generated data
- KPIs answer the "so what?" question
- Each additional KPI indicates a step forward in program maturity
- None of these KPIs draw strictly from security data

KPI #1 – Weighted Risk Trend

Maturity Rank: 1

A business-based representation of risk from vetted web application security defects over a specified time-period, or repeated iterations of application development.

Formula: $[(\text{Multiplier}_{critical} \times \text{defects}) + (\text{Multiplier}_{high} \times \text{defects}) + (\text{Multiplier}_{medium} \times \text{defects}) + (\text{Multiplier}_{low} \times \text{defects})] \times *\text{Criticality}_{business}$

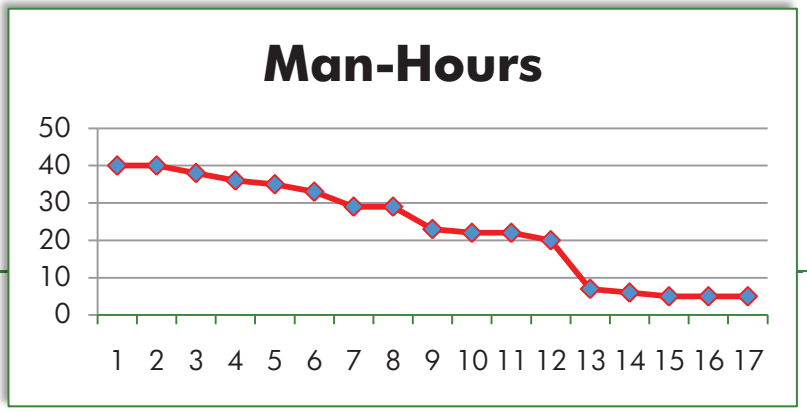
Requirements

- Web application registry with business-level criticality assigned
- *Pull *business criticality* rating from DR documents
- Vetted web applications security defects by criticality level
- Mathematic plot capability

KPI #2 – Defect Remediation Window

Maturity Rank: 2

The length of time from when a vetted web application security defect is identified until it is verified closed.



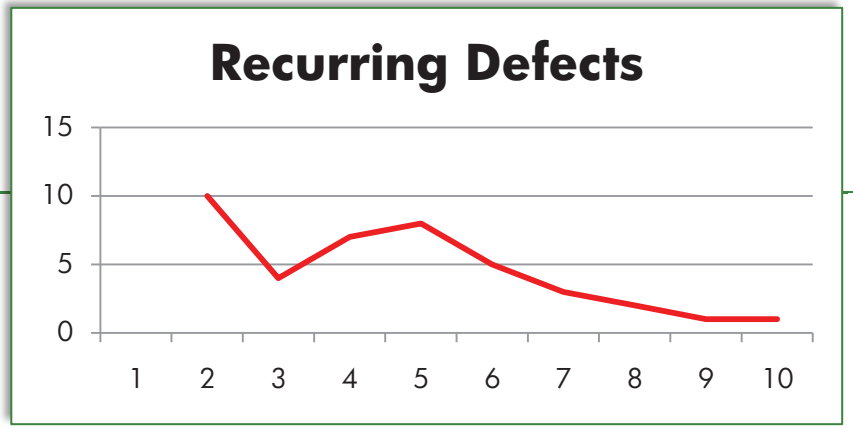
Requirements

- Defect tracking system, tracking web application security vulnerabilities in development, testing, and production environments
- Self-service testing, bug tracking, and reporting capabilities
- Cooperative security enablement thru development, QA, OPS teams

KPI #3 – Rate of Defect Recurrence

Maturity Rank: 3

The rate, over time, at which previously closed web application security defects are re-introduced into a given application, organization, or other logical unit.



Requirements

- Advanced defect tracking system
- Advanced web application security testing capabilities
- Capabilities to identify similar or *like* defects across an application or logical trackable unit

KPI #5 – Security to Quality Defect Ratio

Maturity Rank: 4

The ratio of security defects to the total number of software quality defects being generated (functional + performance + security).

Formula: $\frac{D_s}{D_t}$ defects D_s = Total Security defects; D_t = Total Overall Quality

Requirements

– Mature defect reporting system (tracking combined quality defects)
  - Security as a quality defect
  - Performance as a quality defect
  - Functional (+related) as a quality defect

– Tight cooperation of Information Security & Quality Assurance

Failures of Common Metrics

Common Metrics	Failure Mode(s)	Options?
1. Number of vulnerabilities found	1. So what? No context!	Business Context.
2. Number of pages scanned/tested	2. So what? Do "pages" matter?	**KPIs** provide business context to standard metrics reporting practices.
3. Critical vulnerabilities found	3. Business-critical? Or IT-critical? Or…?	
4. Critical vulnerabilities fixed	4. Business-critical? Or IT-critical? Or…?	

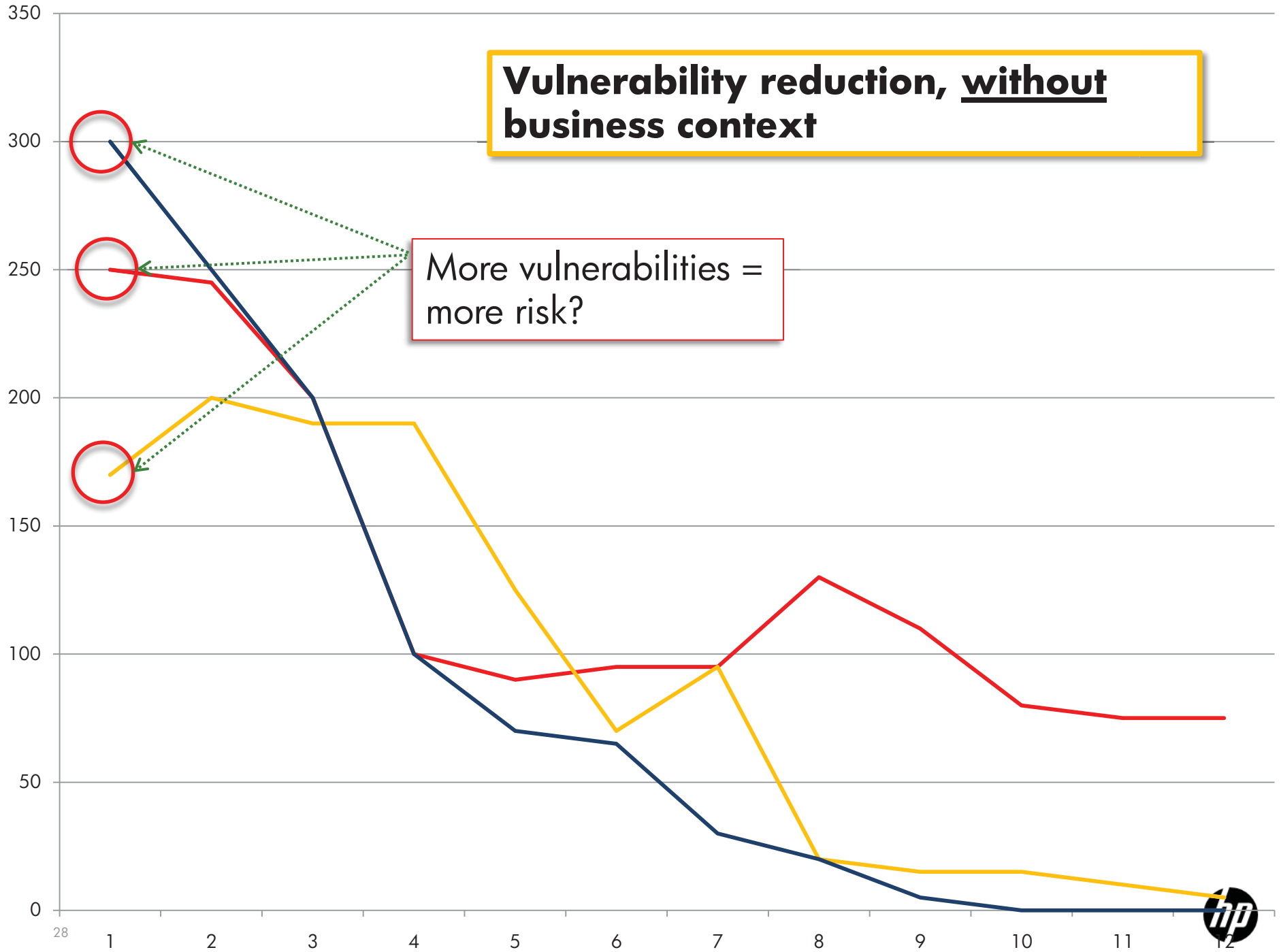
When Metrics Aren't Enough

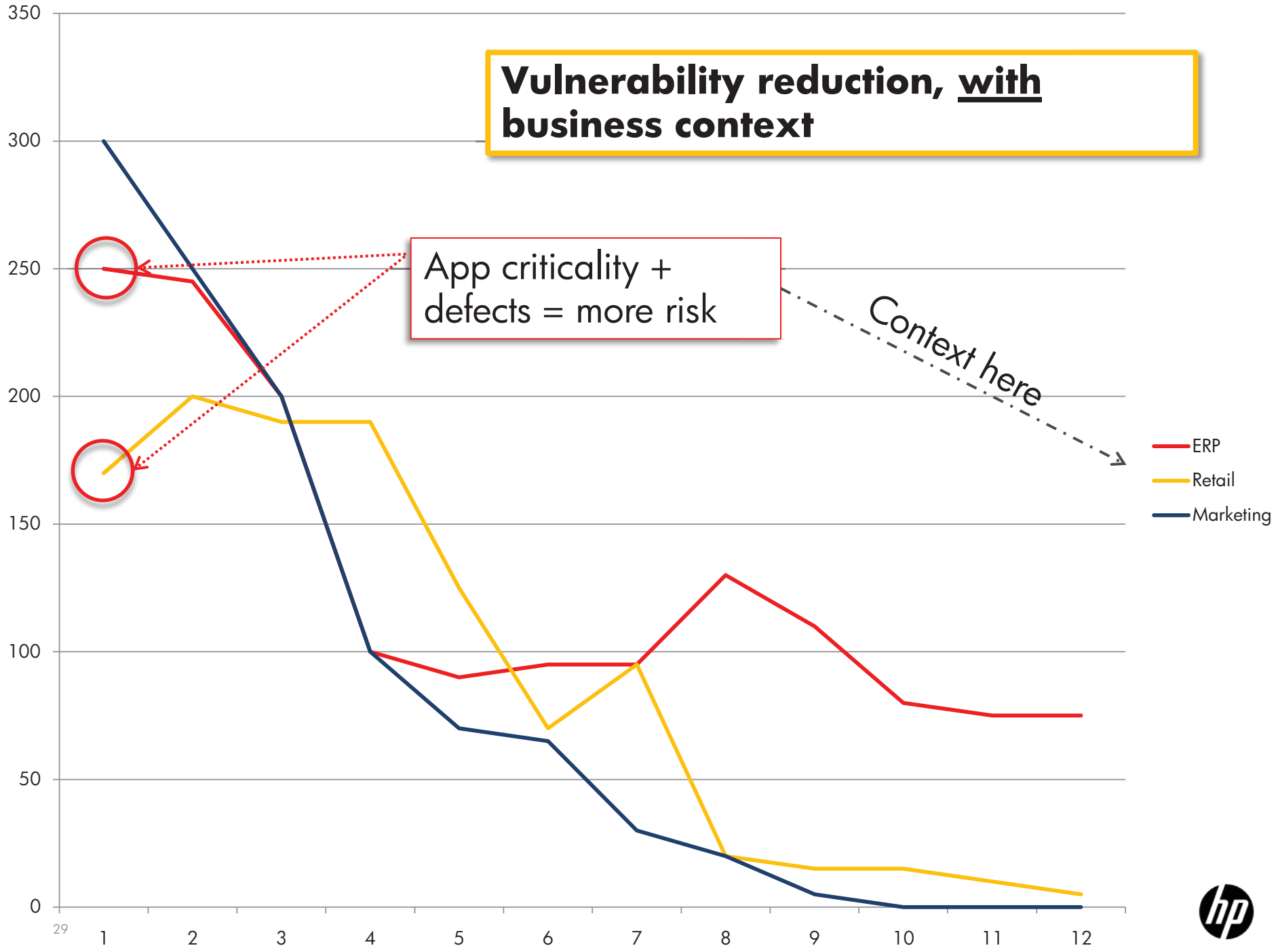
Objective

- Conclusively prove that risk is being reduced through program effort
- Remove subjectivity of metrics by providing business context
- Bring IT Security into higher-level business discussion
- Unify "testing" methodologies

KPIs Answer

- Combine metrics with business-level context
- Provide direct feedback to the business to target ongoing effort
- Track program effectiveness including education, corporate remediation strategies
- Consolidate technical metrics into business-level dashboards
- Successfully break the "security silo"


Vulnerability reduction, without business context
More vulnerabilities = more risk?
350
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12


Vulnerability reduction, with business context
App criticality + defects = more risk
Context here
ERP
Retail
Marketing
350
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12

Data is raw information

Metrics are refined data

KPIs are metrics with business-context

Business context makes security **relevant**.

The 5 Key Performance Indicators (KPIs)

WRT – Weighted Risk Trend

DRW – Defect Remediation Window

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SQR – Security to Quality defect Ratio

KPIs are the difference between technical data points, and the actionable intelligence that information security needs.

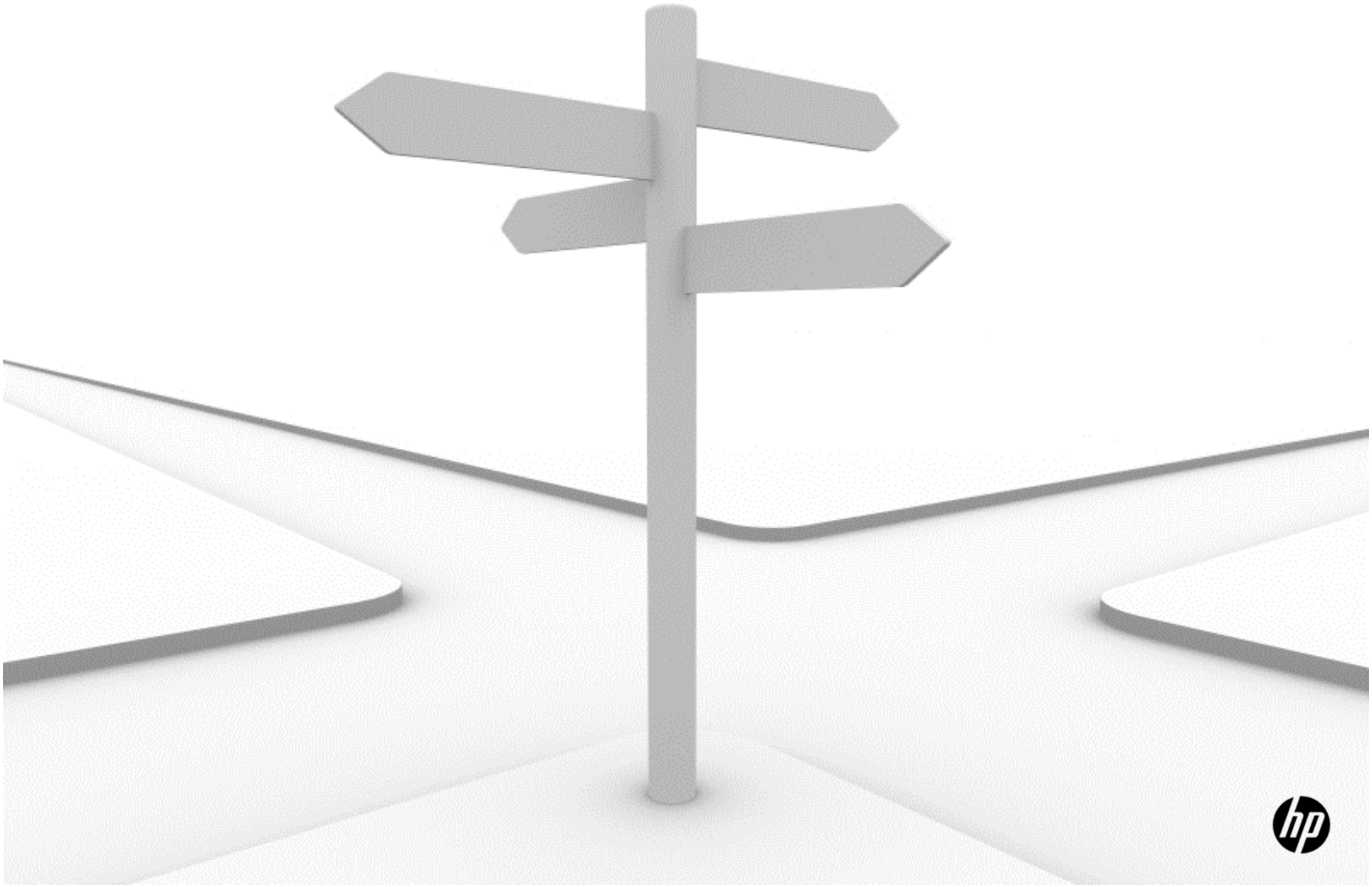
Elements of Success (cont'd)

4. Communicate the Plan
   - Who, what, when, where, why (and how)
   - Communicate again (and again) (and again)
5. Measure Progress
   - Collect metrics for a specific reason, not simply because you can
   - Use the right KPIs
6. Report Results
   - Agree on what will be reported, when and to whom
   - Be creative with rewards
   - Hold people accountable

How to Save the Day… (a few more tips)

- Put Experienced Developers on the Security Team
- Publish Secure Coding Standards
- Train Developers and Security Teams
- Collaborate on the "Top *n*" Security Issues for <period>
- Obtain C-level Sponsorship / Approval of Your Top *n*
- "Tune" Your Security Testing Product(s) to Support the Identification and Presentation of the Top *n* Security Issues
- Treat *All* Security Issues as You Would Any Other Software Defect (i.e., get the issues into your defect tracking system)

Where are you now?



Summary

- Why Application Security?
- Obstacles to an Effective Program
- Define & Optimize (Tune)

QUESTIONS?