Immutable Awesomeness?

Where Containers Collide with SW Supply Chains

Joshua Corman - @joshcorman
John Willis - @botchagalupe

#DOES15

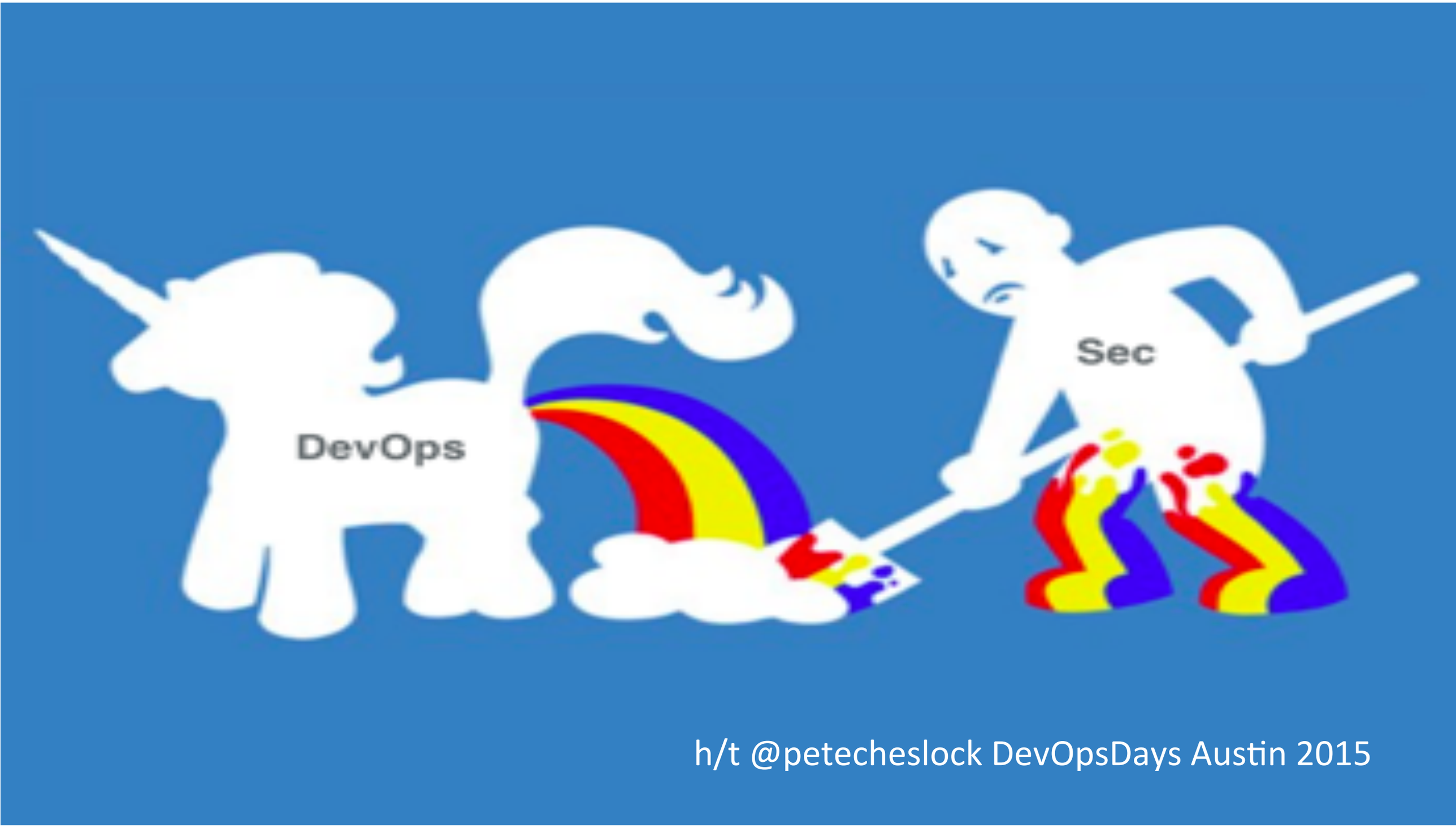
IMMUTABLE
AWESOMENESS

@joshcorman

- 20 Years in SW & Security
- IBM ISS, The 451 Group, Akamai, Sonatype
- Founder, Rugged Software
- Founder, I Am the Cavalry
- Adjunct Professor, Carnegie Mellon University Heinz College

@botchagalupe

- a.k.a. John Willis
- 35 Years in IT Operations
- Exxon, Canonical, Chef, Enstratius, Socketplane
- Devopsdays Core Organizer
- Devopscafe on iTunes


DevOps
Sec
h/t @petecheslock DevOpsDays Austin 2015

Security is Dead.
Long Live Rugged DevOps:
IT at Ludicrous Speed…

Josh Corman, Gene Kim

VERY ROUGH 1ST Draft

Session ID: CLD-106
Session Classification: Intermediate

RSACONFERENCE2012


QUALYS
CORETRACE
Akamai
FASTER FORWARD


DevOps.com
Sonatype
puppet labs
Sonatype
DevOps
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DevOps.com


DevOps.com
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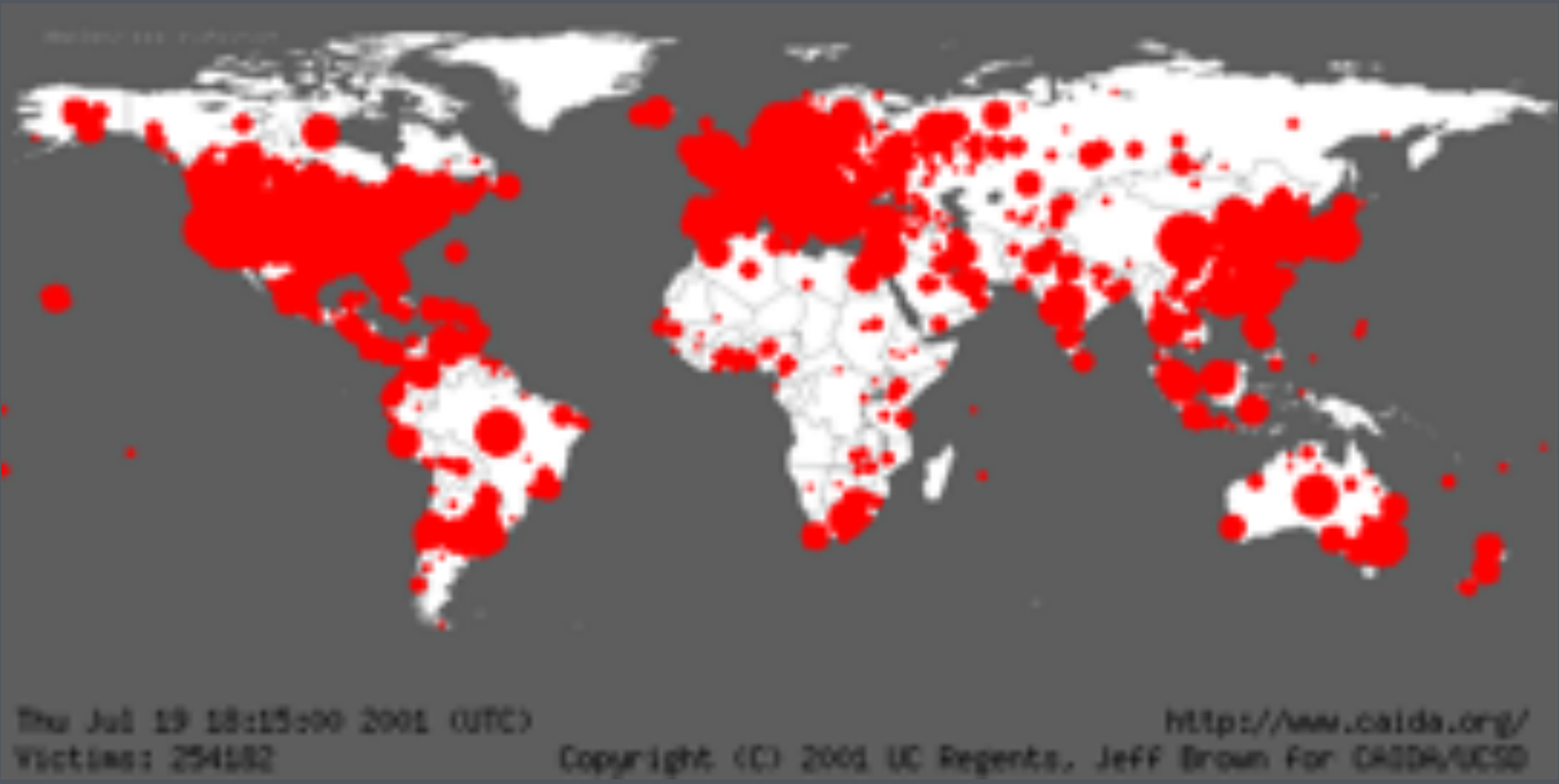
SOFTWARE IS EATING THE WORLD


Thu Jul 19 18:15:00 2001 (UTC)
Victims: 254182
http://www.caida.org/
Copyright (C) 2001 UC Regents, Jeff Brown for CAIDA/UCSD

Beyond Heartbleed: OpenSSL in 2014

(31 in NIST's NVD thru December)

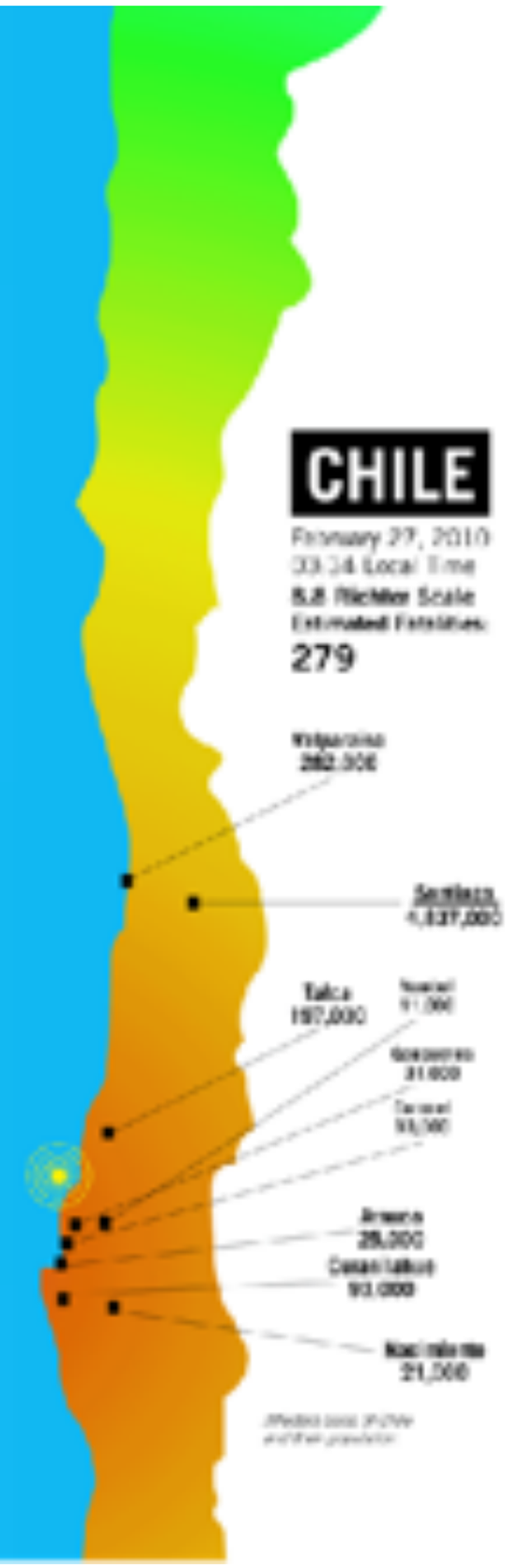
CVE-2014-3470	6/5/2014	CVSS Severity: 4.3 MEDIUM ← **SIEMENS** *
CVE-2014-0224	6/5/2014	CVSS Severity: 6.8 MEDIUM ← **SIEMENS** *
CVE-2014-0221	6/5/2014	CVSS Severity: 4.3 MEDIUM
CVE-2014-0195	6/5/2014	CVSS Severity: 6.8 MEDIUM
CVE-2014-0198	5/6/2014	CVSS Severity: 4.3 MEDIUM ← **SIEMENS** *
CVE-2013-7373	4/29/2014	CVSS Severity: 7.5 HIGH
CVE-2014-2734	4/24/2014	CVSS Severity: 5.8 MEDIUM ** DISPUTED **
CVE-2014-0139	4/15/2014	CVSS Severity: 5.8 MEDIUM
CVE-2010-5298	4/14/2014	CVSS Severity: 4.0 MEDIUM
CVE-2014-0160	**4/7/2014**	**CVSS Severity: 5.0 MEDIUM ← HeartBleed**
CVE-2014-0076	3/25/2014	CVSS Severity: 4.3 MEDIUM
CVE-2014-0016	3/24/2014	CVSS Severity: 4.3 MEDIUM
CVE-2014-0017	3/14/2014	CVSS Severity: 1.9 LOW
CVE-2014-2234	3/5/2014	CVSS Severity: 6.4 MEDIUM
CVE-2013-7295	1/17/2014	CVSS Severity: 4.0 MEDIUM
CVE-2013-4353	1/8/2014	CVSS Severity: 4.3 MEDIUM
CVE-2013-6450	1/1/2014	CVSS Severity: 5.8 MEDIUM

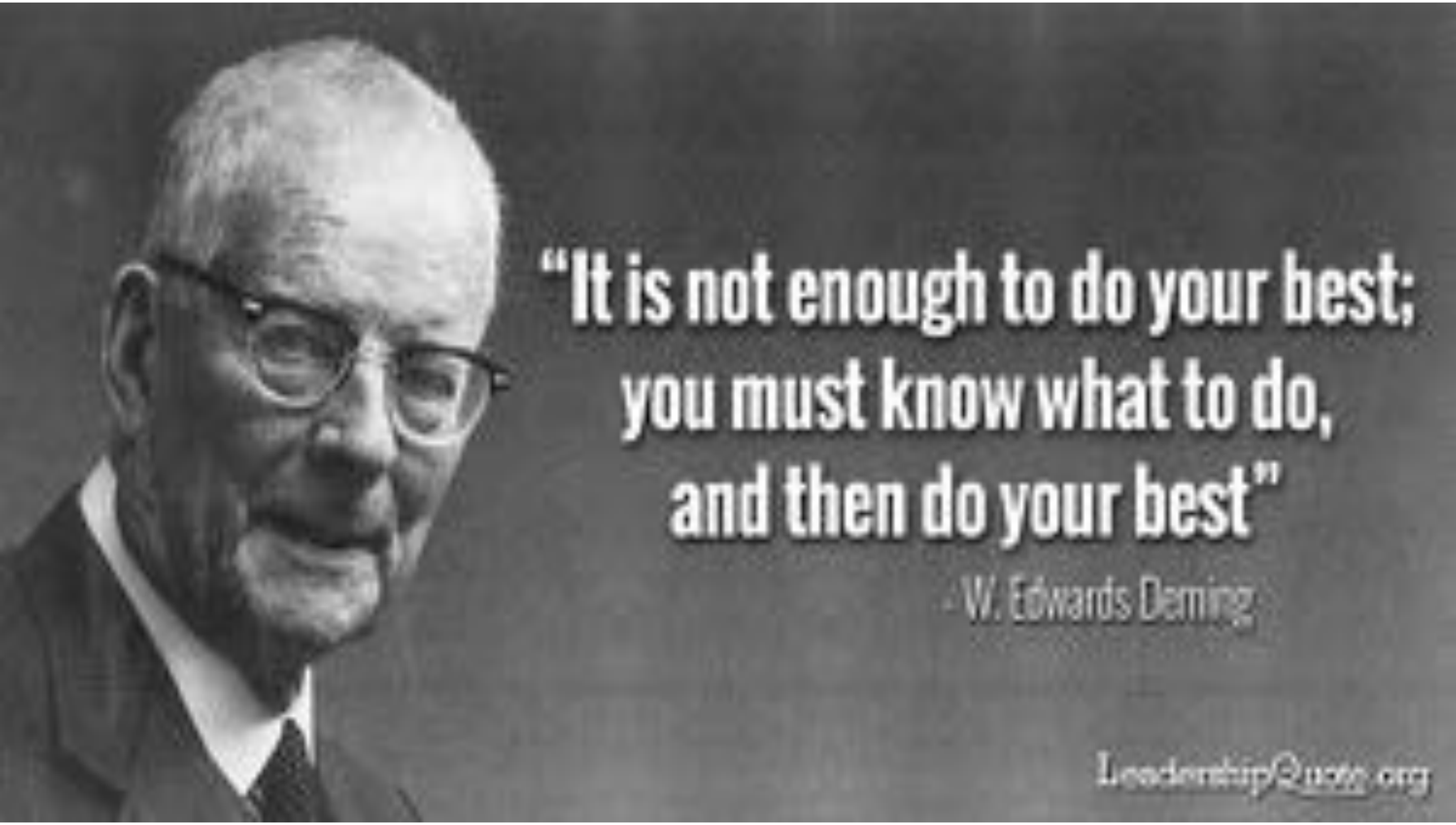
…

As of today, internet scans by MassScan reveal 300,000 of original 600,000 remain unpatched or unpatchable

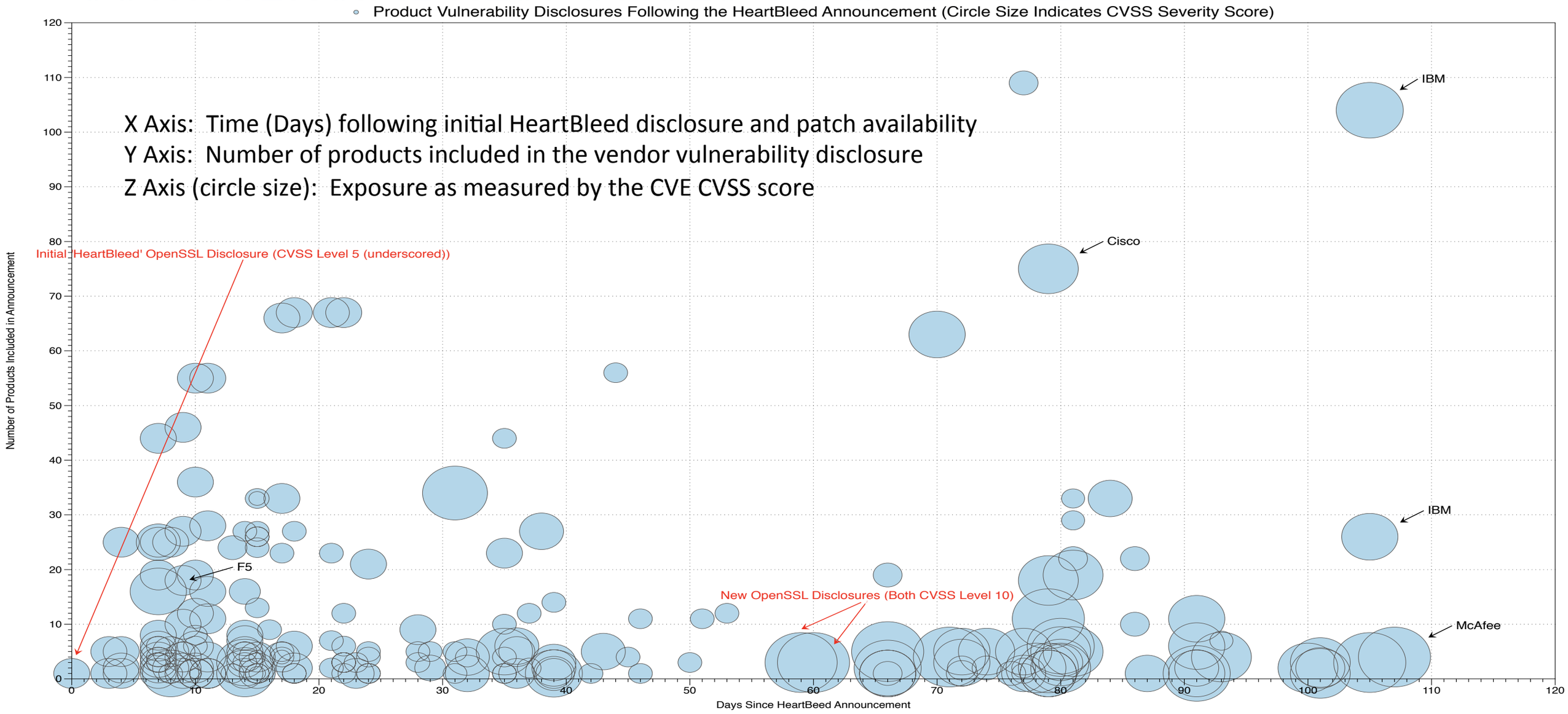
A TALE OF TWO QUAKES

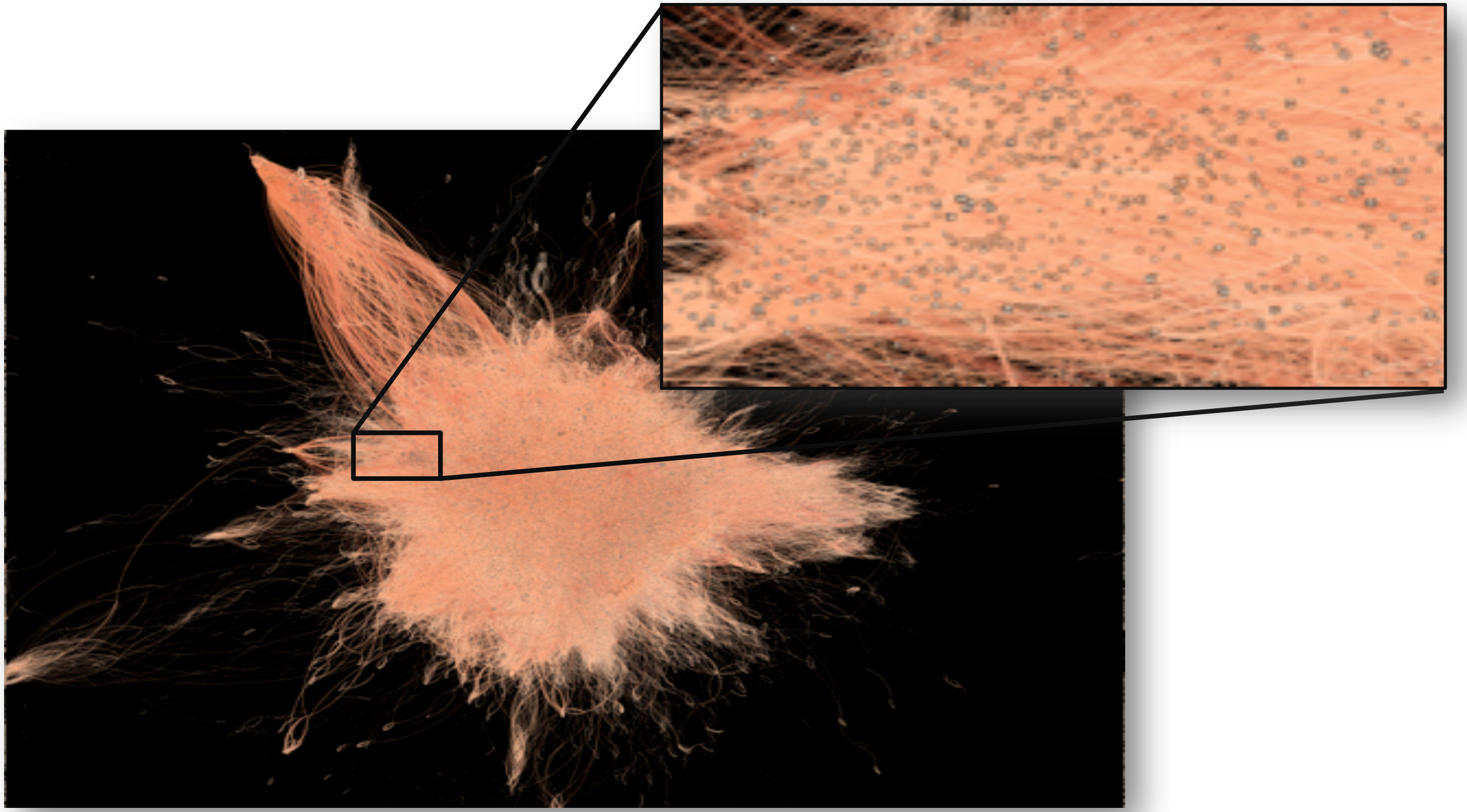
In the span of two months, two massive earthquakes struck in Haiti and Chile. But while the tremblor in Chile registered much higher on the Richter scale, the loss of life and damage in Haiti was far more severe. Why is that? Chile—which has experienced serious earthquakes in recent decades—has a robust building code to make sure buildings are earthquake resistant. Haiti has no code to speak of. And a look at both quake's scores on the Modified Mercalli Intensity Scale—which is used to measure how earthquakes affect those experiencing them—shows that while Chile's quake may have been stronger overall, Haiti had a larger population and more urban areas hit by more intense and damaging shaking.



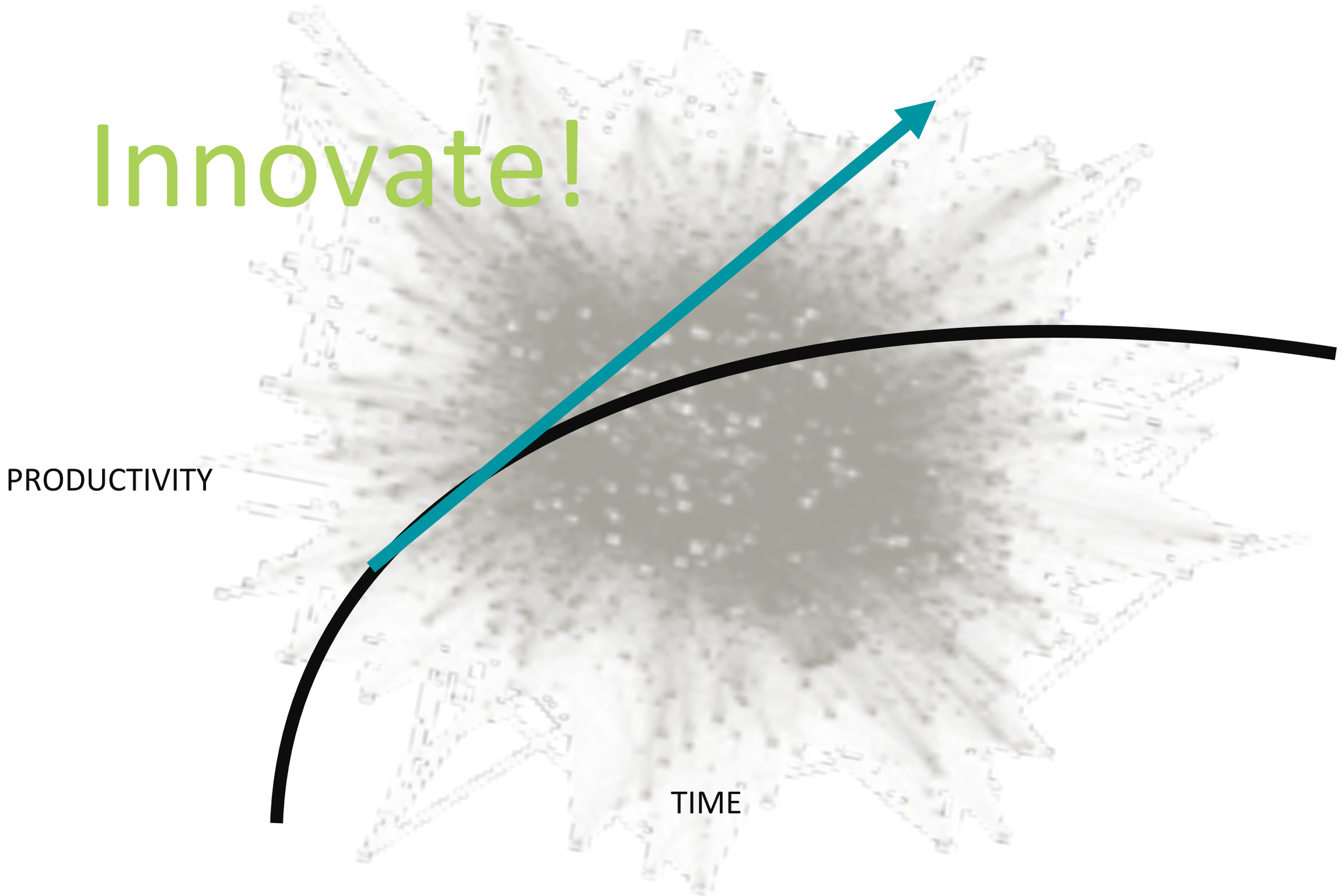

"It is not enough to do your best;
you must know what to do,
and then do your best"
- W. Edwards Deming
LeadershipQuote.org

COMMERCIAL RESPONSES TO OPENSSL





Innovate!



Raw innovation
Innovation at any cost

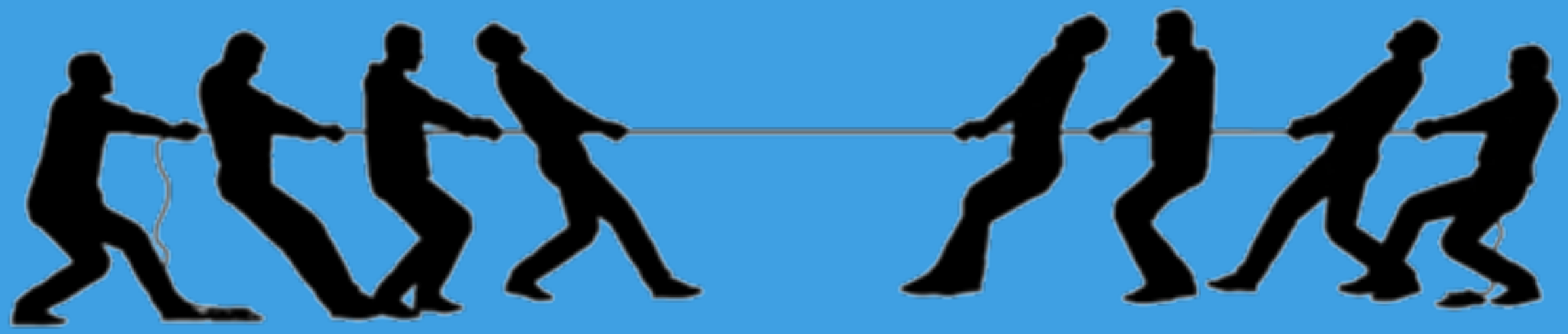
Quality?

Security?

Maintainability?

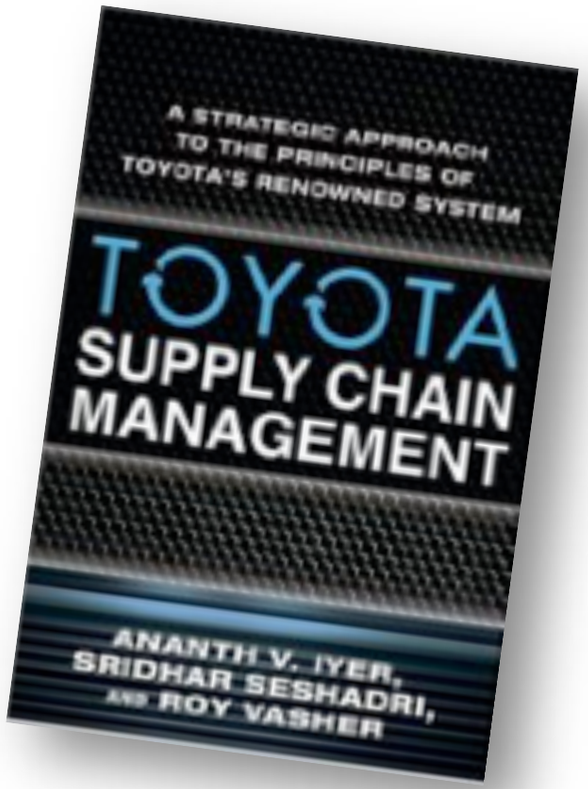
Repeatability?

Net innovation
Net value to the organization



Supply chain advantage

	Toyota Advantage	Toyota Prius	Chevy Volt
Unit Retail Price	**61%**	$24,200	$39,900
Units Sold/Month	**13x**	23,294	1,788
In-House Production	**50%**	27%	54%
Plant Suppliers	**16%**	125	800
Firm-Wide Suppliers	***4%***	*224*	*5,500*



Source: Toyota Supply Chain Management: A Strategic Approach to Toyota's Renowned System, by Ananth Iyer and Sridhar Seshadri

Use fewer, better suppliers

Use their highest quality parts

Track which parts you use & where

Demo?

#DOES15

Actual Exploitation 2015 VZ DBIR

NOT ALL CVES ARE CREATED EQUAL.

If we look at the frequency of exploitation in Figure 11, we see a much different picture than what's shown by the raw vulnerability count of Figure 12. Ten CVEs account for almost 97% of the exploits observed in 2014. While that's a pretty amazing statistic, don't be lulled into thinking you've found an easy way out of the vulnerability remediation rodeo. Prioritization will definitely help from a risk-cutting perspective, but beyond the top 10 are 7 million other exploited vulnerabilities that may need to be ridden down. And therein, of course, lies the challenge: once the "mega-vulns" are roped in (assuming you could identify them ahead of time), how do you approach addressing the rest of the horde in an orderly, comprehensive, and continuous manner over time?

About half of the CVEs exploited in 2014 went from publish to pwn in less than a month.

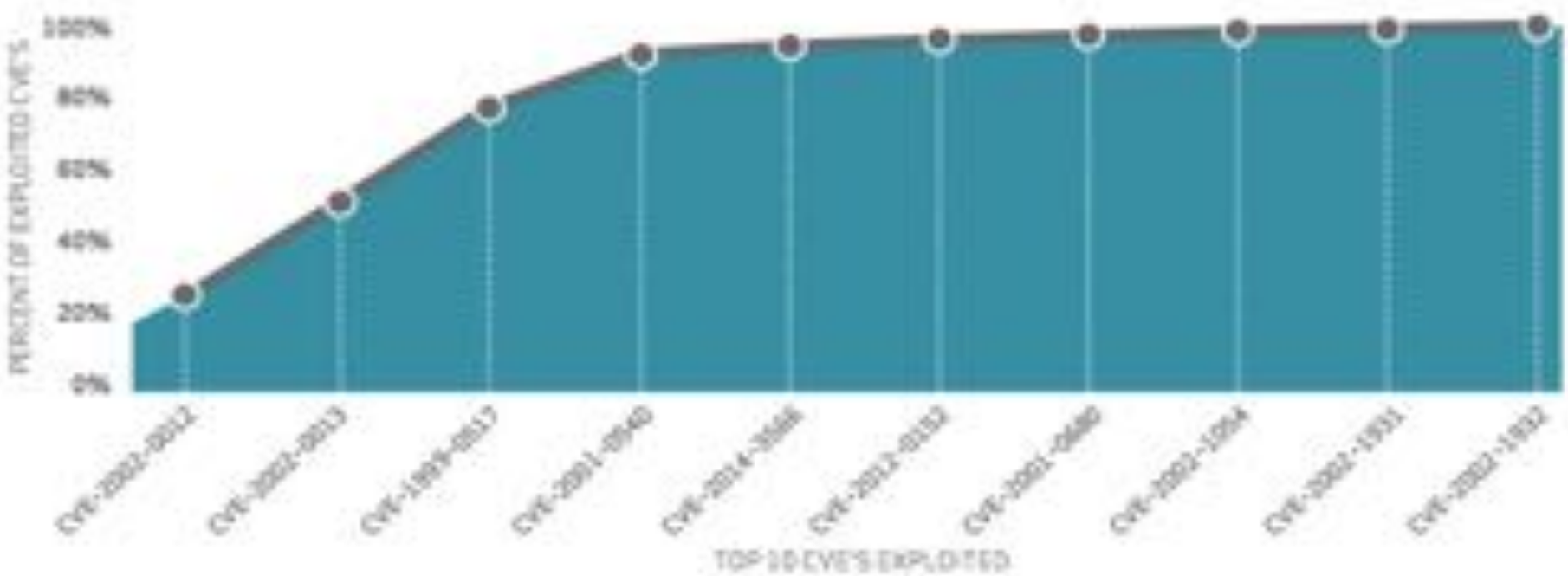


Figure 11.

Cumulative percentage of exploited vulnerabilities by top 10 CVEs

Less unplanned, unscheduled work

Fewer service interruptions

Faster MTTD & MTTR

“Operational pain can neither be created nor destroyed - only moved to someone else”
-Nick Galbreath

“Well… you can create it… :)”
-Joshua Corman

Immutable Awesomeness?: Where Containers Collide with SW Supply Chains

John Willis
Director of Ecosystem Development

Guns Germs and Microservices

@bglpe

Immutable Infrastructure

NETFLIX

The Netflix Tech Blog

Saturday, August 13, 2011

Building with Legos

In the six years that I have been involved in building and releasing software
evolved and improved significantly. When I started, we would build a WAR,
production host, and then run a script that would stop tomcat on the host be
structure and then start tomcat again. Each host would be manually pushed
with very few hosts this took quite some time and a lot of human interaction

Our next iteration was an improvement in automation, but not really in archit
tool that would handle the process of stopping and starting things as well as
extracting the new code. This meant that people could push to a number of
check boxes. The tests to make sure that the servers were back up before p
automated and have failsafes in the tool.

Links

MARTIN FOWLER

Intro Videos Design Agile Refactoring NoSQL DSL Continuous Delivery Microservice

ImmutableServer

Kief Morris
13 June 2013

Automated configuration tools (such as CFEngine, Puppet, or Chef) allow you to specify how servers should be configured, and bring new and existing machines into compliance. This helps to avoid the problem of fragile SnowflakeServers. Such tools can create PhoenixServers that can be torn down and rebuilt at will. An Immutable Server is the logical conclusion of this approach, a server that once deployed, is never modified, merely replaced with a new updated instance.

@bglpe

Immutable Matters

Why Order Matters: Turing Equivalence in Automated Systems Administration

Steve Traugott - TerraLuna, LLC
Lance Brown - National Institute of Environmental Health Sciences

Pp. 99-120 of the *Proceedings of LISA '02: Sixteenth Systems Administration Conference*, (Berkeley, CA: USENIX Association, 2002).

"The least-cost way to ensure that the behavior of any two hosts will remain completely identical is always to implement the same changes in the same order on both hosts."

Management Methods

- Divergence
- Convergence
- Congruence

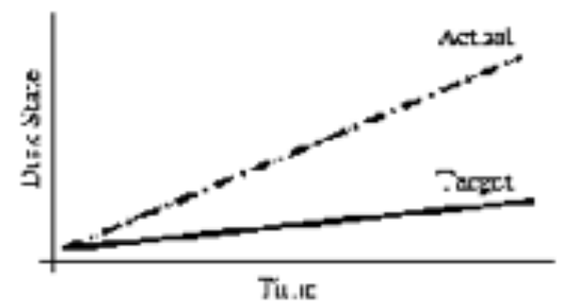


Figure 1: Divergence.

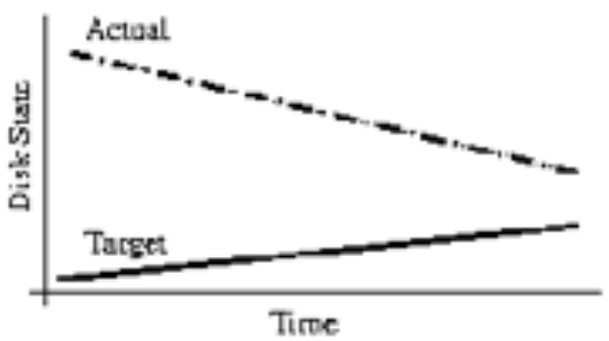


Figure 2: Convergence.

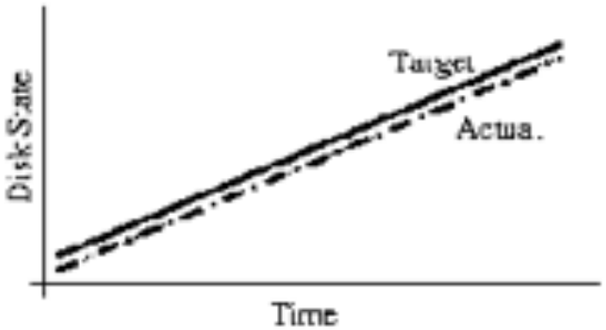


Figure 3: Congruence.

Immutable Delivery

Gartner

WHY GARTNER ANALYSTS RESEARCH EVENTS CONSULTING ABOUT

Assessing Docker and Containers for Five Software Delivery Use Cases

27 April 2015 G00275476

Analyst(s): Richard Watson

Summary

Docker offers application-focused, container-based virtualization to DevOps-minded developers and administrators. This document assesses Docker for use cases spanning development and test, continuous integration (CI), production deployment, and building private PaaS.

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Forgot use

docker What is Docker? Use Cases Try it! Install & Docs

May 26, 2015

DOCKER AND THE THREE WAYS OF DEVOPS

written by John Willis, Evangelist at Docker

Have you read Gene Kim's The Phoenix Project? Some of the principles behind the Phoenix Project and an upcoming book I am co-authoring with Gene (The DevOps Cookbook) have been referred to as the "Three Ways of DevOps". These are particular patterns of applying DevOps principles in a way that yields high performance outcomes.

We assert that the Three Ways describe the values and philosophies that frame the processes, procedures, practices of DevOps, as well as the prescriptive steps.

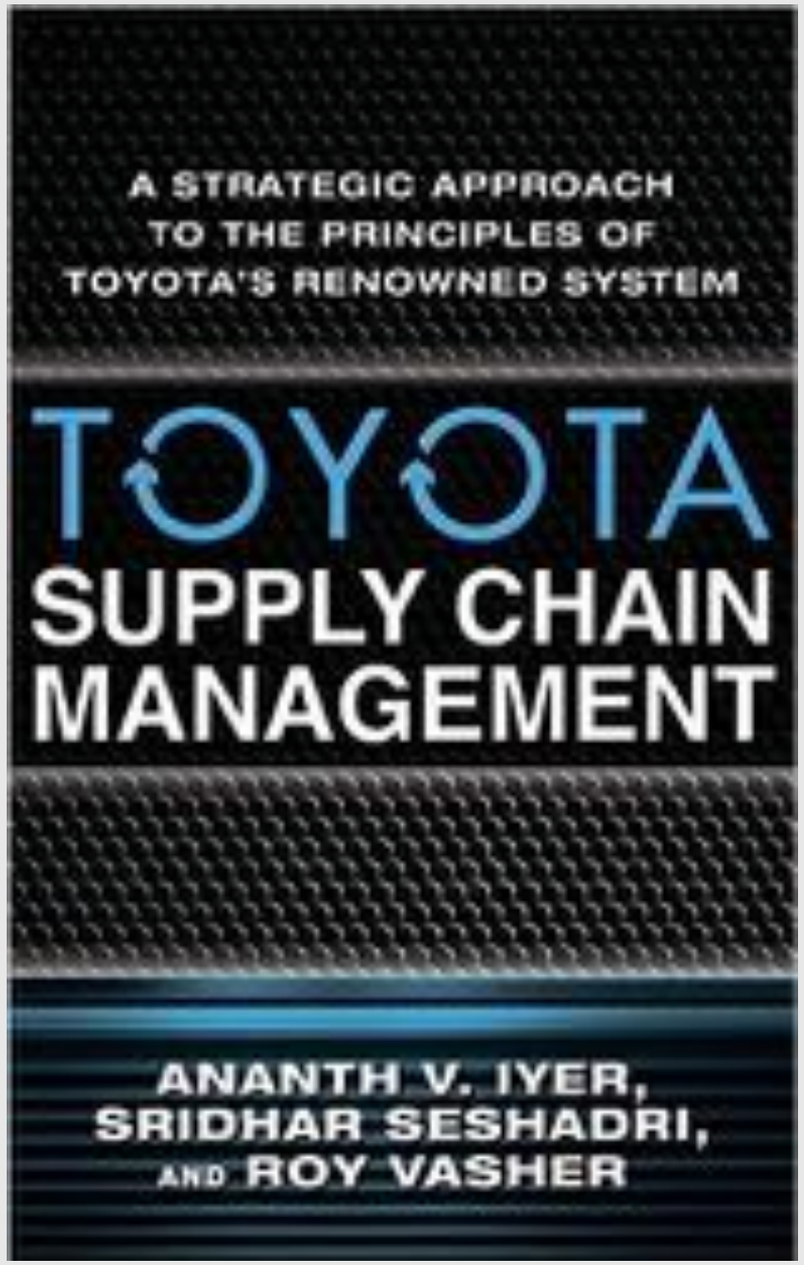
Gene Kim

Immutable Infrastructure Myth


Lead Time
Shorten
Dev
Remove
Ops
Ah-ha!
Wall of Confusion
Feedback

V4L : Left to Right Flow

- **Variety**
  - Determine your variety of offerings based on operational efficiency and market demand
- **Velocity**
  - Maintain a steady flow through all processes of the supply chain
- **Variability**
  - Manage inconsistencies carefully to reduce cost and improve quality
- **Visibility**
  - Ensure the transparency of all processes to enable continuous learning and improvement

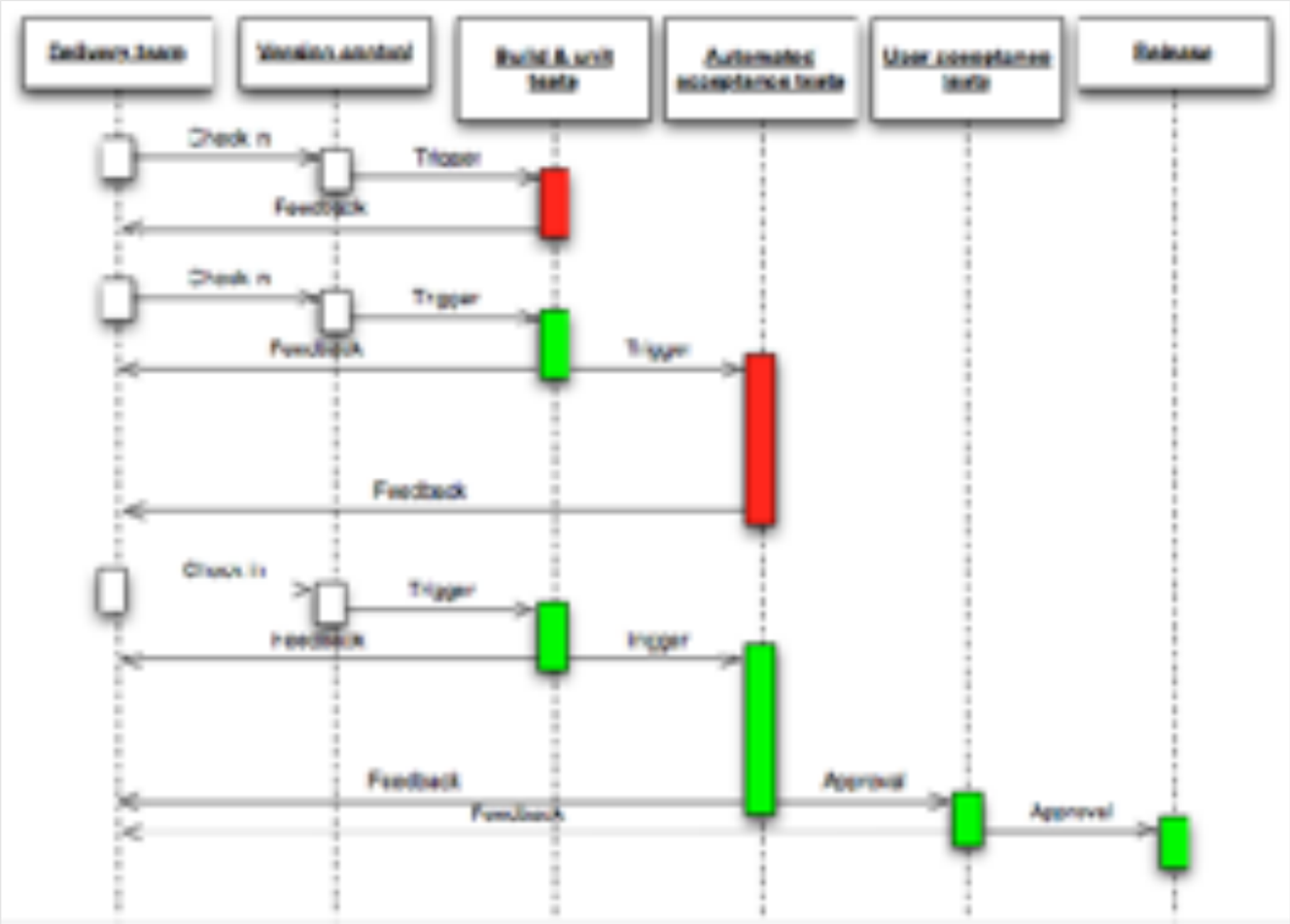


Left to Right Flow

- **Variety**
  - **Lean Startup**
  - **Minimal Viable Product**
  - **Pivot**
  - **Build Measure Learn**
  - **Customer Development Methodology**

Left to Right Flow

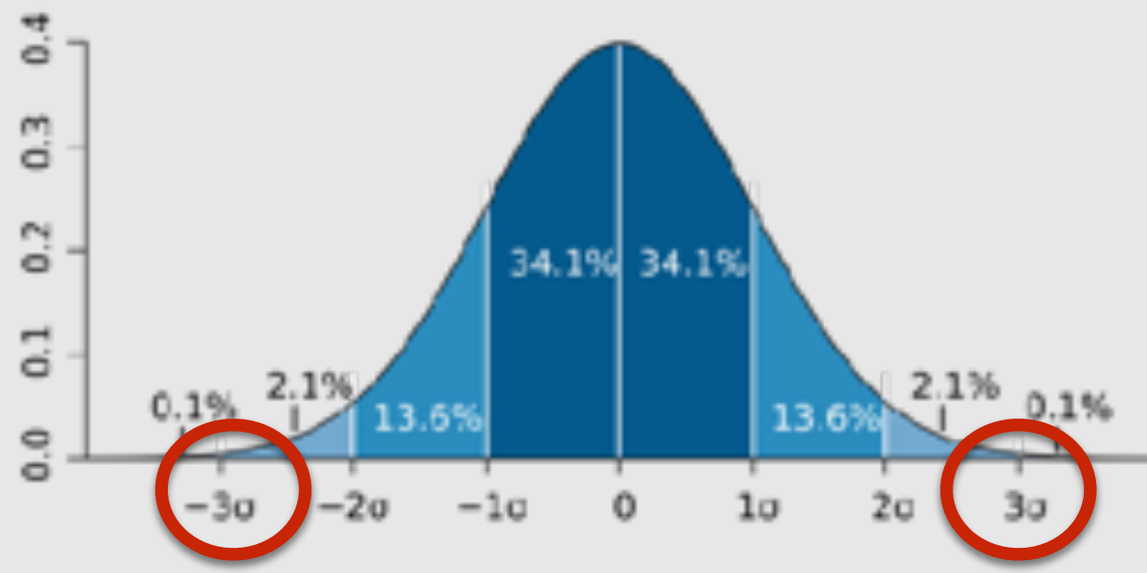
- **Velocity**
  - Developer Flow
  - Integration Flow
  - Deployment Flow



https://upload.wikimedia.org/wikipedia/commons/7/74/Continuous_Delivery_process_diagram.png

Left to Right Flow

- **Variation**
  - Converged Isolation
  - Immutable Infrastructure
  - Immutable Delivery



https://en.wikipedia.org/wiki/Standard_deviation

Left to Right Flow

- **Visibility**
  - Containerization
  - Microservices
  - Data Gravity

Case Studies

Immutable Infrastructure with Docker and EC2 by Michael Bryzek (Gilt)

References

DOCKER AND THE THREE WAYS OF DEVOPS PART 1: THE FIRST WAY – SYSTEMS THINKING
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https://www.youtube.com/watch?v=GaHzdqFithc

Toyota Kata: Managing People for Improvement, Adaptiveness and Superior Results
http://www.amazon.com/Toyota-Kata-Managing-Improvement-Adaptiveness/dp/0071635238

Sonatype

docker

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