Security Intelligence.
Think Integrated.

IBM X-Force: The Emerging Threat Landscape

October, 2014

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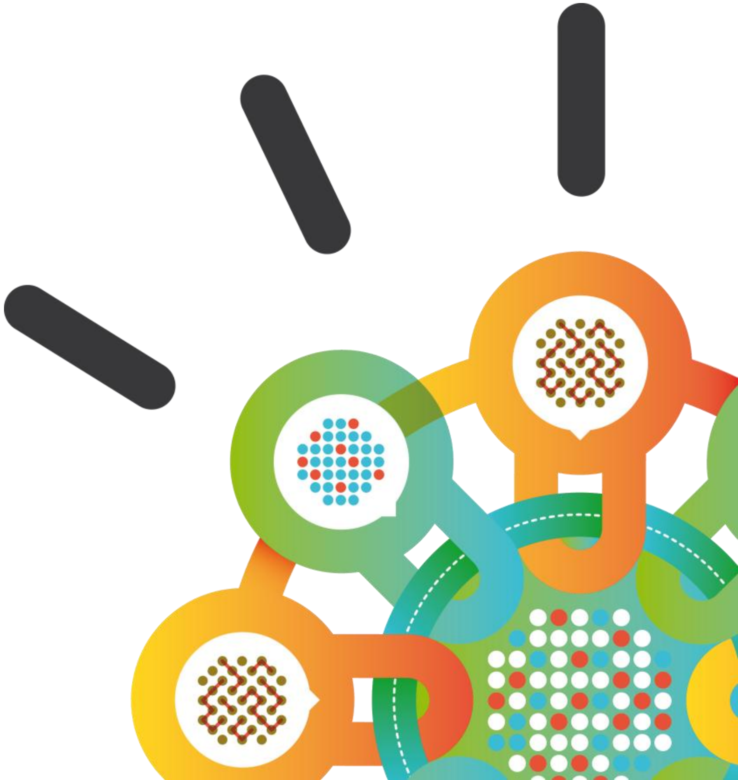
Infrastructure Security
IBM Security Systems



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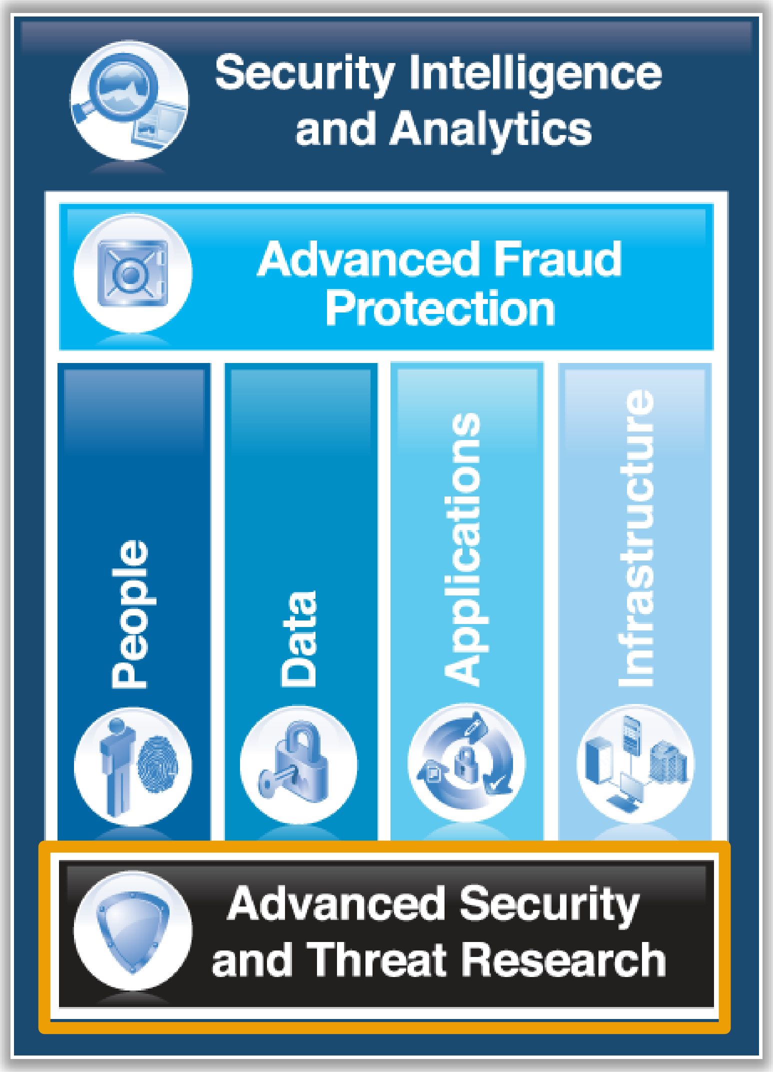
Security Intelligence and Analytics
Advanced Fraud Protection
People
Data
Applications
Infrastructure
Advanced Security and Threat Research

IBM X-Force

is the foundation for advanced security and threat research across the IBM Security Framework.

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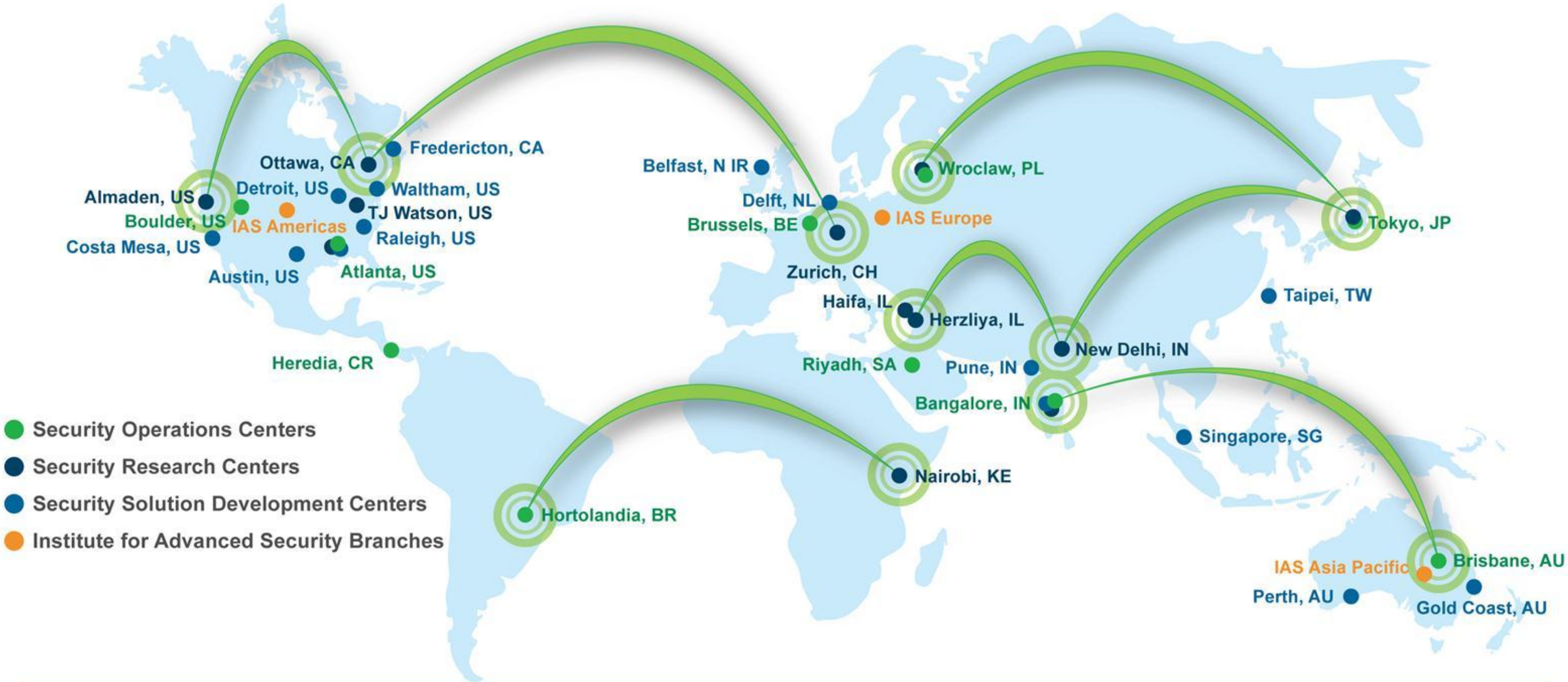
IBM Security has global reach



IBM Security by the Numbers

133 + monitored countries (MSS)

3300 + service delivery experts

20000 + devices under contract

270000000 + endpoints protected

15000000000 + events managed per day

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IBM X-Force® delivers expert analysis and threat intelligence

- Backdoors
- Botnets
- Buffer Overflow Attacks
- Client Side Attacks
- Cross-site Scripting (XSS)
- Distributed Denial of Service (DDoS)
- Exploit Toolkits
- Malicious Content
- Peer-to-Peer Networks
- Protocol Tunneling
- Reconnaissance
- SQL Injection
- Trojans
- Worms

Sharing real-time and anonymized threat intelligence

IBM Security Operations Centers and Security Products

X-Force Helps Keep Customers Ahead of the Threat

- Cataloging, analyzing and researching vulnerabilities since 1997
- Providing zero-day threat alerts and exploit triage to IBM customers worldwide
- Building threat intelligence from collaborative data sharing across thousands of clients
- Analyzing malware and fraud activity from 270M+ Trusteer-protected endpoints

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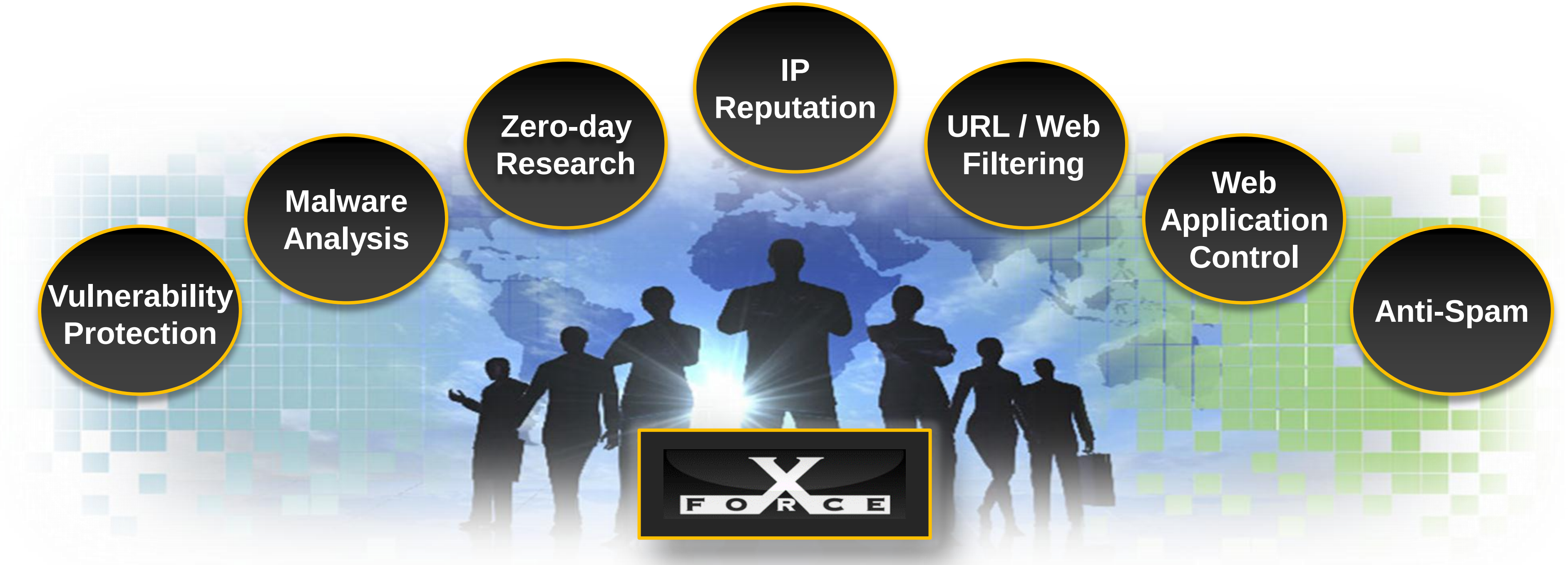
IBM X-Force® Research and Development

Expert analysis and data sharing on the global threat landscape



The IBM X-Force Mission

- **Monitor** and evaluate the rapidly changing threat landscape
- **Research** new attack techniques and develop protection for tomorrow's security challenges
- **Educate** our customers and the general public
- **Integrate** and distribute Threat Protection and Intelligence to make IBM solutions smarter

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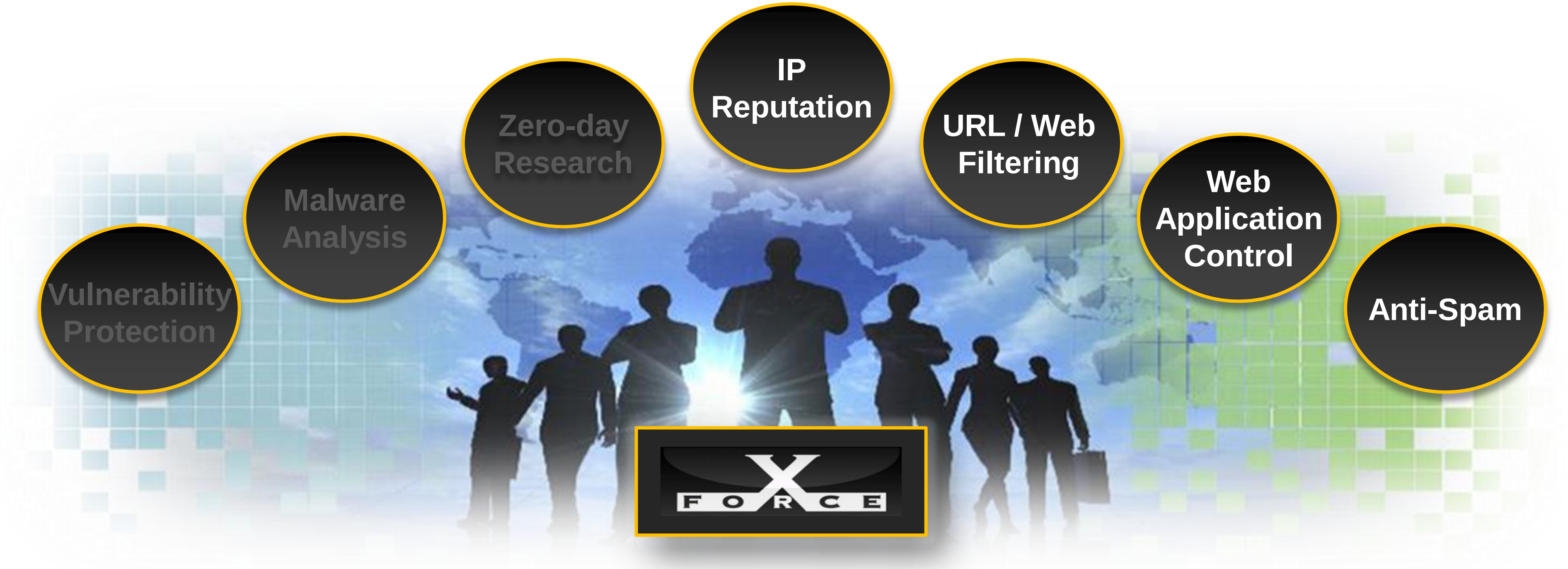

Vulnerability Protection

Malware Analysis

Zero-day Research

IP Reputation

URL / Web Filtering

Web Application Control

Anti-Spam

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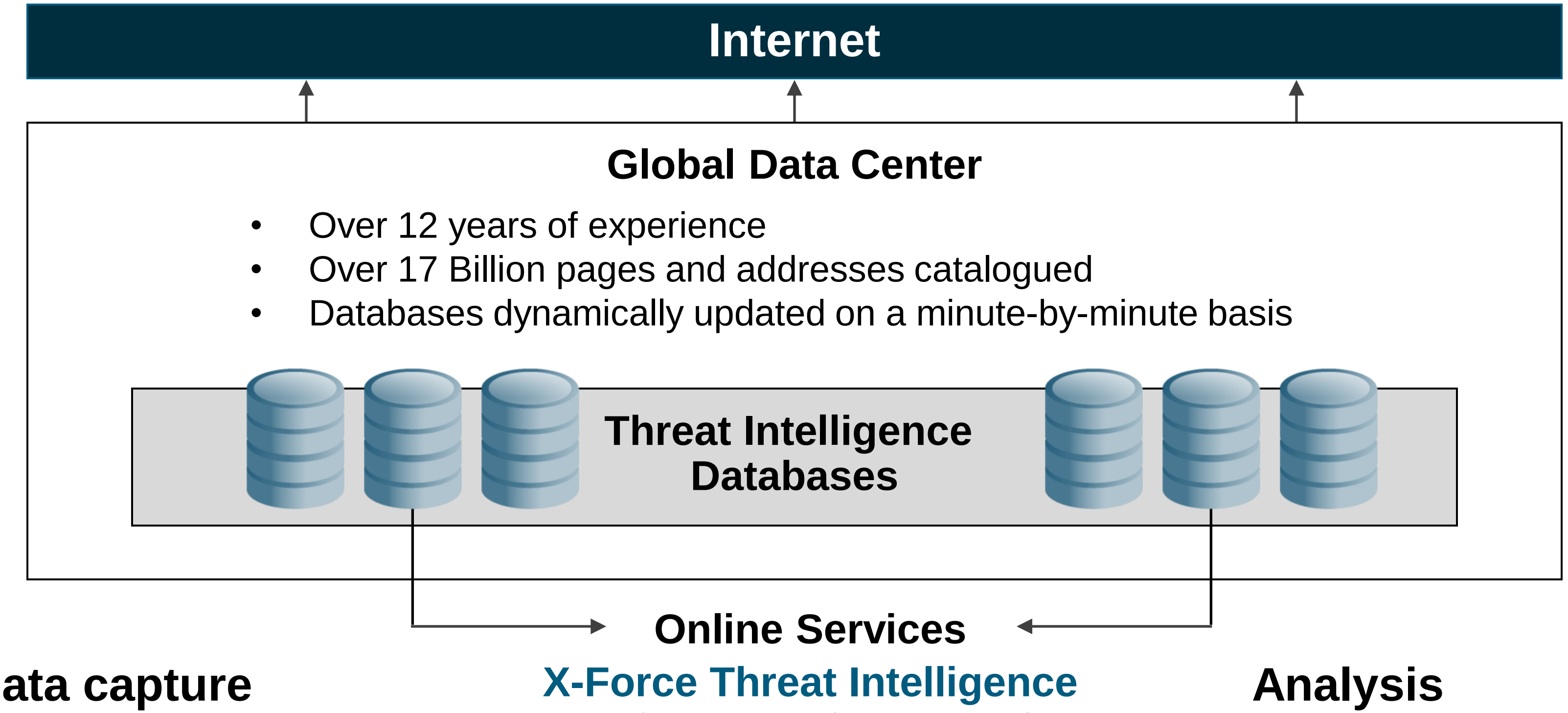
Monitor - X-Force has the skills and infrastructure for collecting and analyzing changing threats



Internet

Global Data Center

- Over 12 years of experience
- Over 17 Billion pages and addresses catalogued
- Databases dynamically updated on a minute-by-minute basis

Threat Intelligence Databases

Online Services

X-Force Threat Intelligence

Data capture

- Crawler robots search the web in parallel
- Honeypots & darknets capture information
- Spamtraps obtain Spam IPs and samples

Analysis

- Server clusters analyze the data acquired
- Insights for different threats are gleaned from the data and stored in an efficient manner

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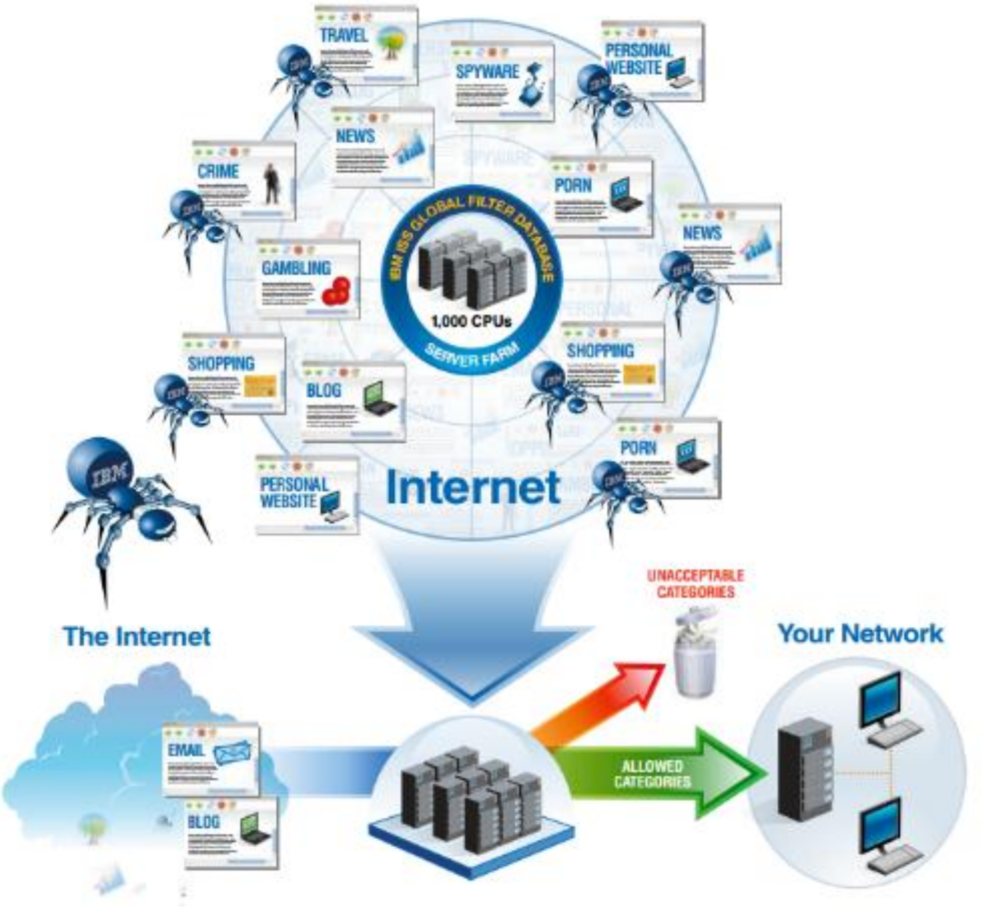
Monitor - Intelligence integrated into products for better accuracy



Web Crawler

- Crawlers collect image and text data from the Internet 24x7x365
- Every day, hundreds of thousands of changes to customers
- Indexed into 80+ categories
- Extended to Application Control

IP Reputation

- Malicious IPs
- Malware hosts
- SPAM sources
- Dynamic IPs
- Anonymous Proxies
- and more…

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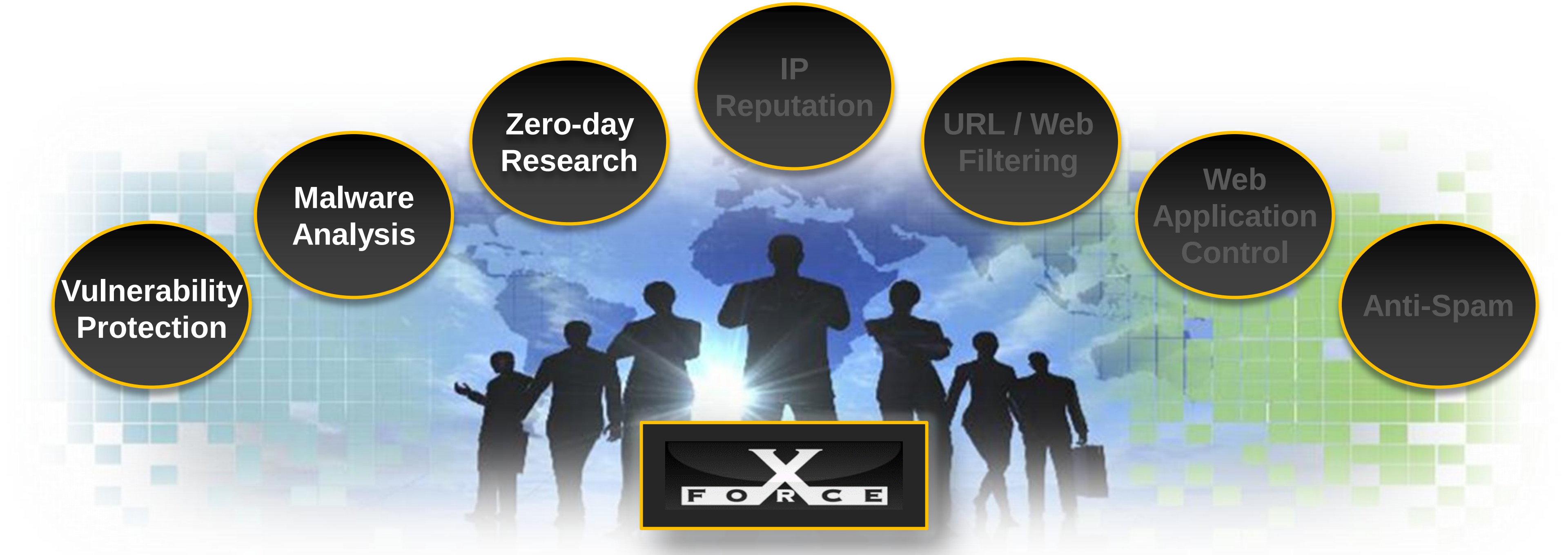
Expert analysis and data sharing on the global threat landscape



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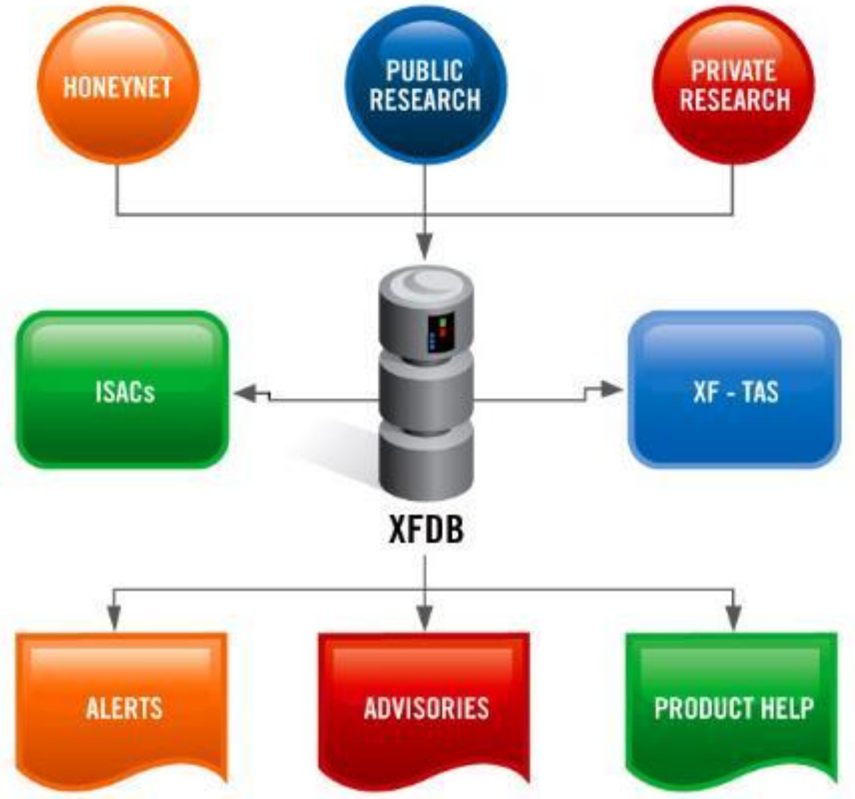
Research - We analyze them all - X-Force Database (XFDB)

Most comprehensive Vulnerability Database in the world

- Updated daily by a dedicated research team
- Entries date back to the 1990's
- Over 80,000 unique vulnerabilities



Research also turns into innovative product "engines"

- Protocol Analysis Module
- Shellcode Heuristics
- Web Injection Logic Engine
- Java and JavaScript Heuristics

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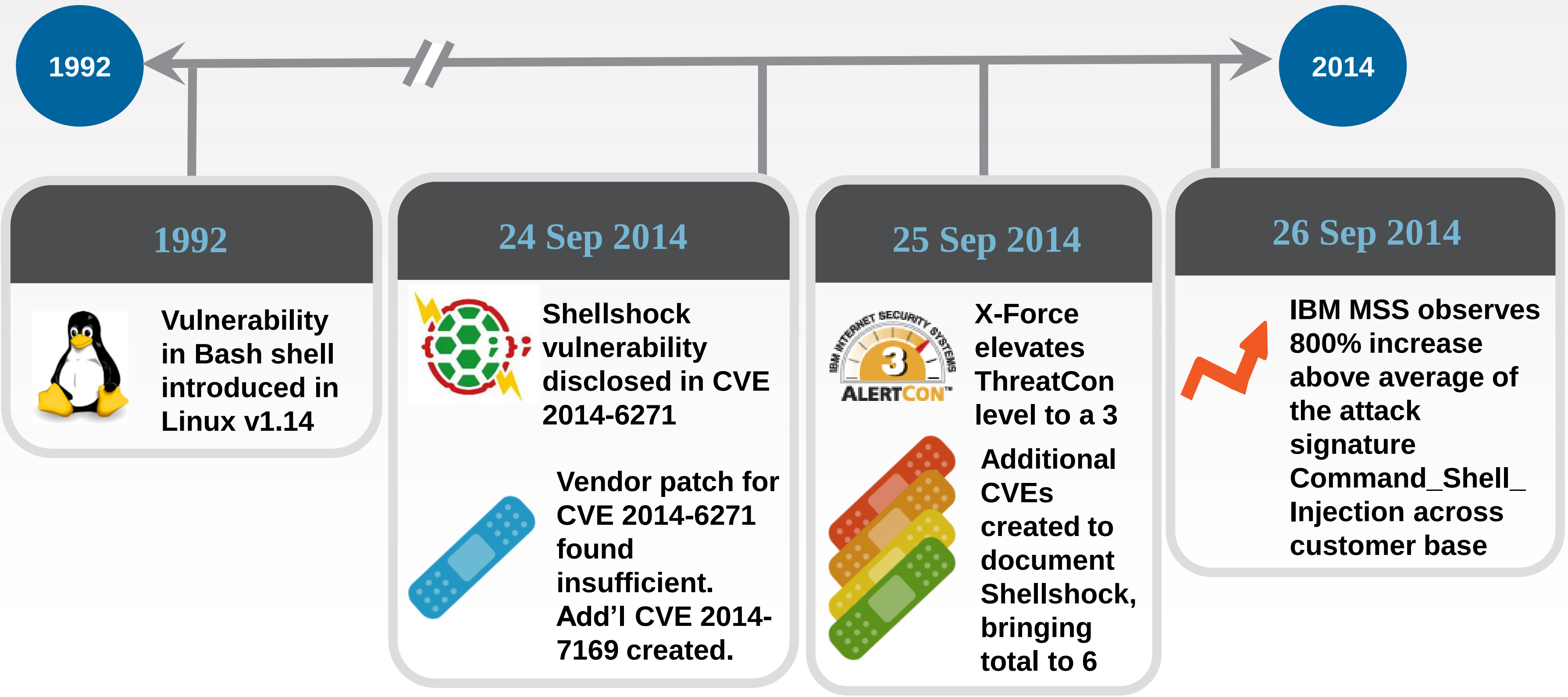
The disclosure of the Shellshock bug in September brought immediate exploit attempts.

Patching the original vulnerability was complicated by the development of additional exploit techniques, resulting in additional CVE numbers created.



1992

Vulnerability in Bash shell introduced in Linux v1.14

24 Sep 2014

Shellshock vulnerability disclosed in CVE 2014-6271

Vendor patch for CVE 2014-6271 found insufficient. Add’l CVE 2014-7169 created.

25 Sep 2014

X-Force elevates ThreatCon level to a 3

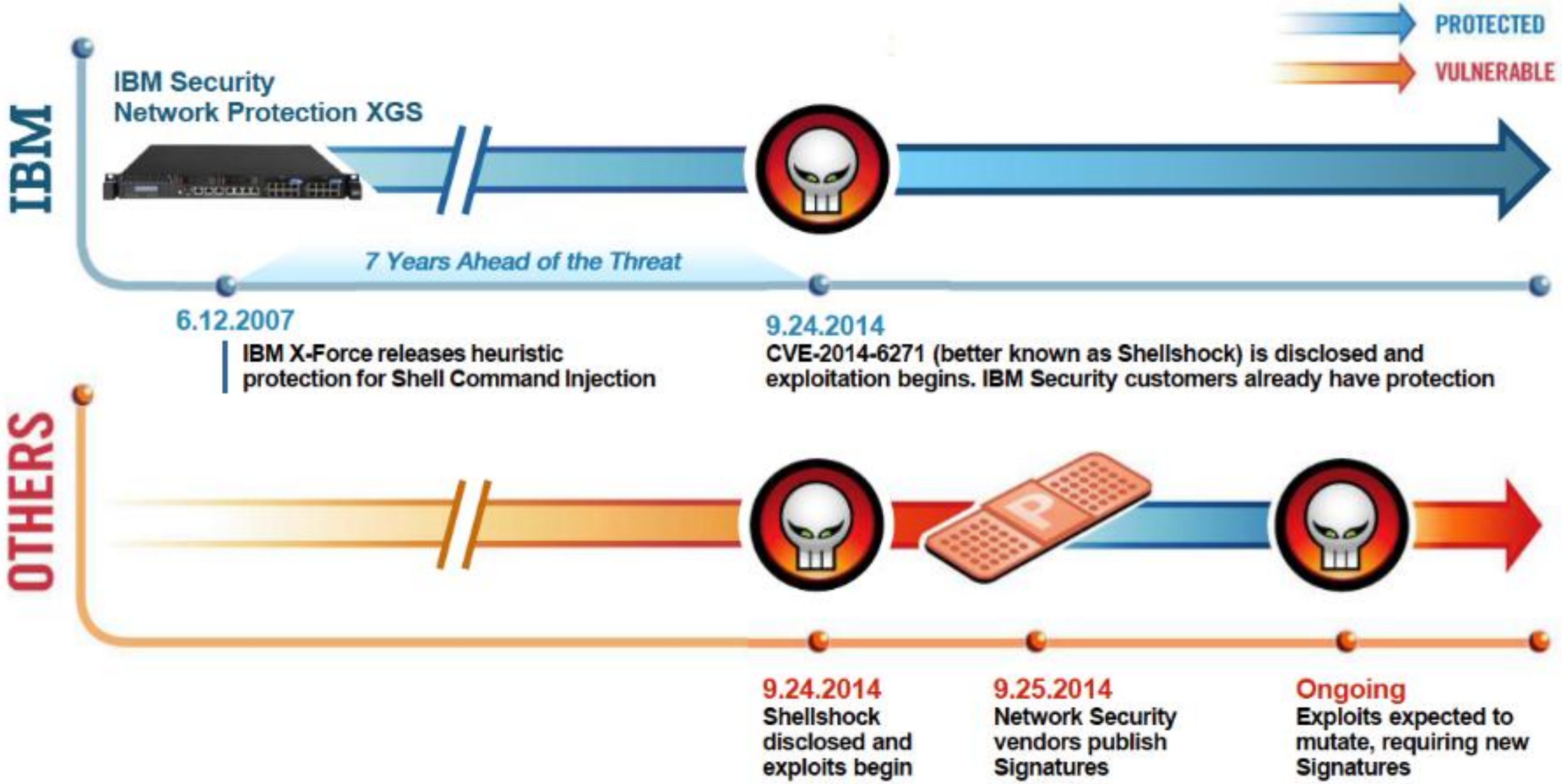
Additional CVEs created to document Shellshock, bringing total to 6

26 Sep 2014

IBM MSS observes 800% increase above average of the attack signature Command_Shell_ Injection across customer base

Avoiding the Shock

IBM's preemptive security helps protect customers against the Bash "Shellshock" vulnerability



PROTECTED

VULNERABLE

IBM

IBM Security
Network Protection XGS

7 Years Ahead of the Threat

6.12.2007
IBM X-Force releases heuristic protection for Shell Command Injection

9.24.2014
CVE-2014-6271 (better known as Shellshock) is disclosed and exploitation begins. IBM Security customers already have protection

OTHERS

9.24.2014
Shellshock disclosed and exploits begin

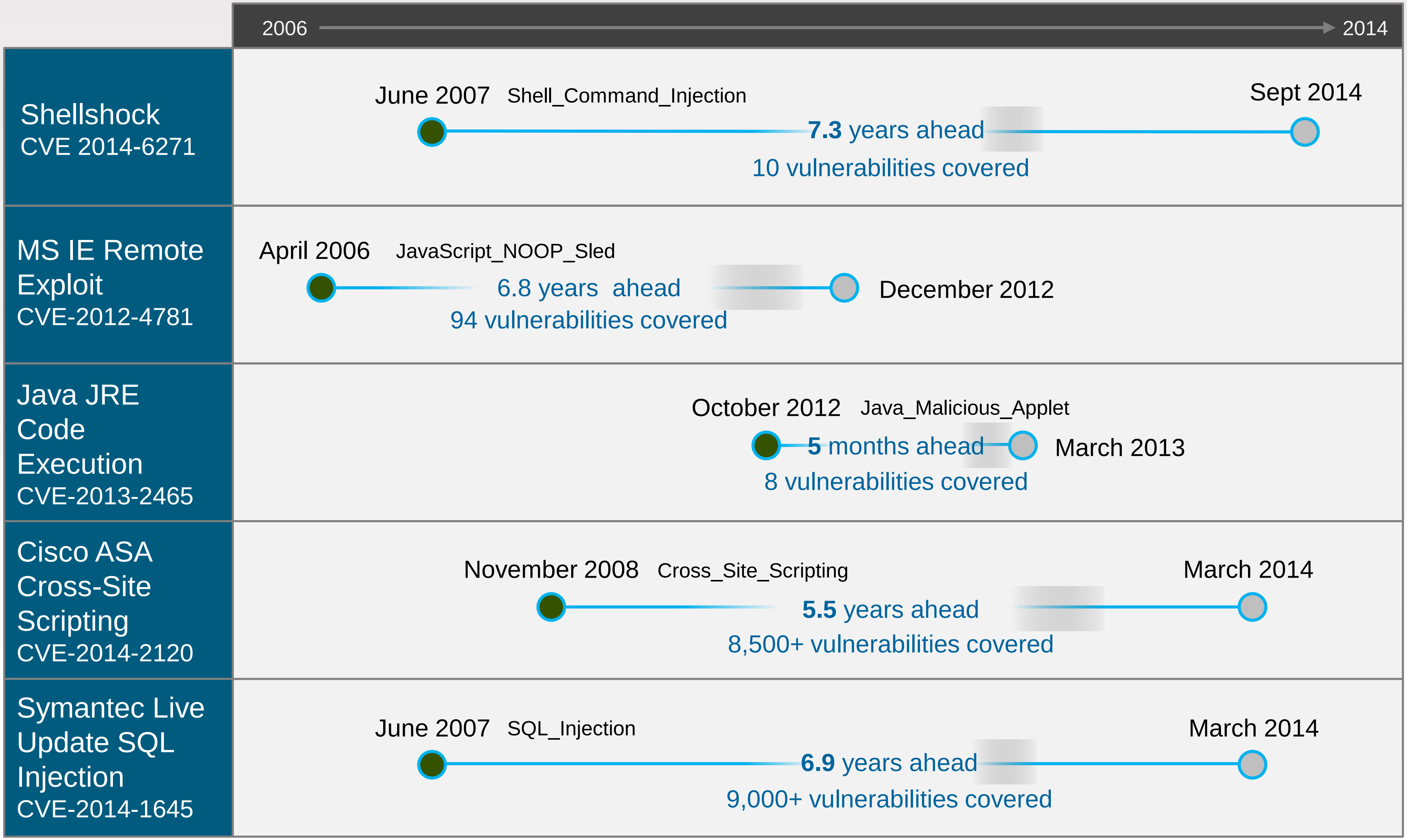
9.25.2014
Network Security vendors publish Signatures

Ongoing
Exploits expected to mutate, requiring new Signatures

IBM Security Network Protection XGS is the only network security solution to offer protection **2661 days** before impact.

Behavioral-based detection blocks attacks that have never been seen before

● IBM Protection ○ Disclosed



2006 → 2014

Shellshock
CVE 2014-6271

June 2007 Shell_Command_Injection

7.3 years ahead

10 vulnerabilities covered

Sept 2014

MS IE Remote Exploit
CVE-2012-4781

April 2006 JavaScript_NOOP_Sled

6.8 years ahead

94 vulnerabilities covered

December 2012

Java JRE Code Execution
CVE-2013-2465

October 2012 Java_Malicious_Applet

5 months ahead

8 vulnerabilities covered

March 2013

Cisco ASA Cross-Site Scripting
CVE-2014-2120

November 2008 Cross_Site_Scripting

5.5 years ahead

8,500+ vulnerabilities covered

March 2014

Symantec Live Update SQL Injection
CVE-2014-1645

June 2007 SQL_Injection

6.9 years ahead

9,000+ vulnerabilities covered

March 2014

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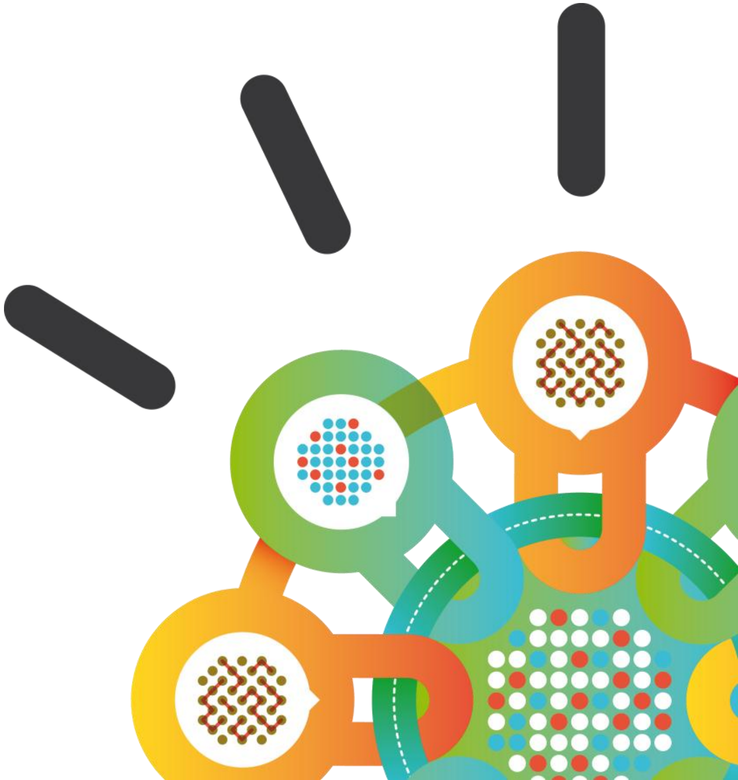
Security Intelligence.
Think Integrated.

X-Force Threat Intelligence Quarterly Review



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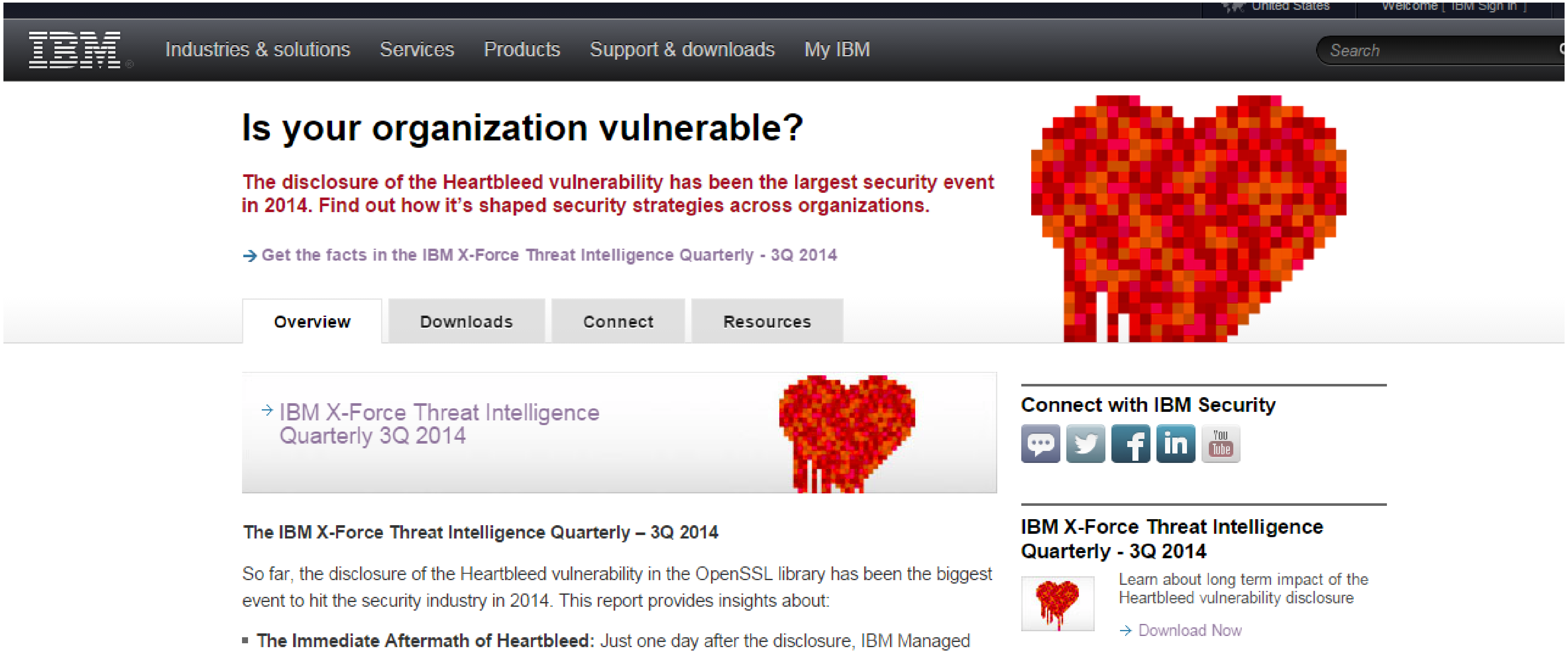
Threat Intelligence Quarterly



Is your organization vulnerable?

The disclosure of the Heartbleed vulnerability has been the largest security event in 2014. Find out how it's shaped security strategies across organizations.

→ Get the facts in the IBM X-Force Threat Intelligence Quarterly - 3Q 2014

→ IBM X-Force Threat Intelligence Quarterly 3Q 2014

The IBM X-Force Threat Intelligence Quarterly – 3Q 2014

So far, the disclosure of the Heartbleed vulnerability in the OpenSSL library has been the biggest event to hit the security industry in 2014. This report provides insights about:

- **The Immediate Aftermath of Heartbleed:** Just one day after the disclosure, IBM Managed

Connect with IBM Security

IBM X-Force Threat Intelligence Quarterly - 3Q 2014

Learn about long term impact of the Heartbleed vulnerability disclosure

→ Download Now

More than

half a billion records

of personally identifiable information (PII) were leaked in 2013.

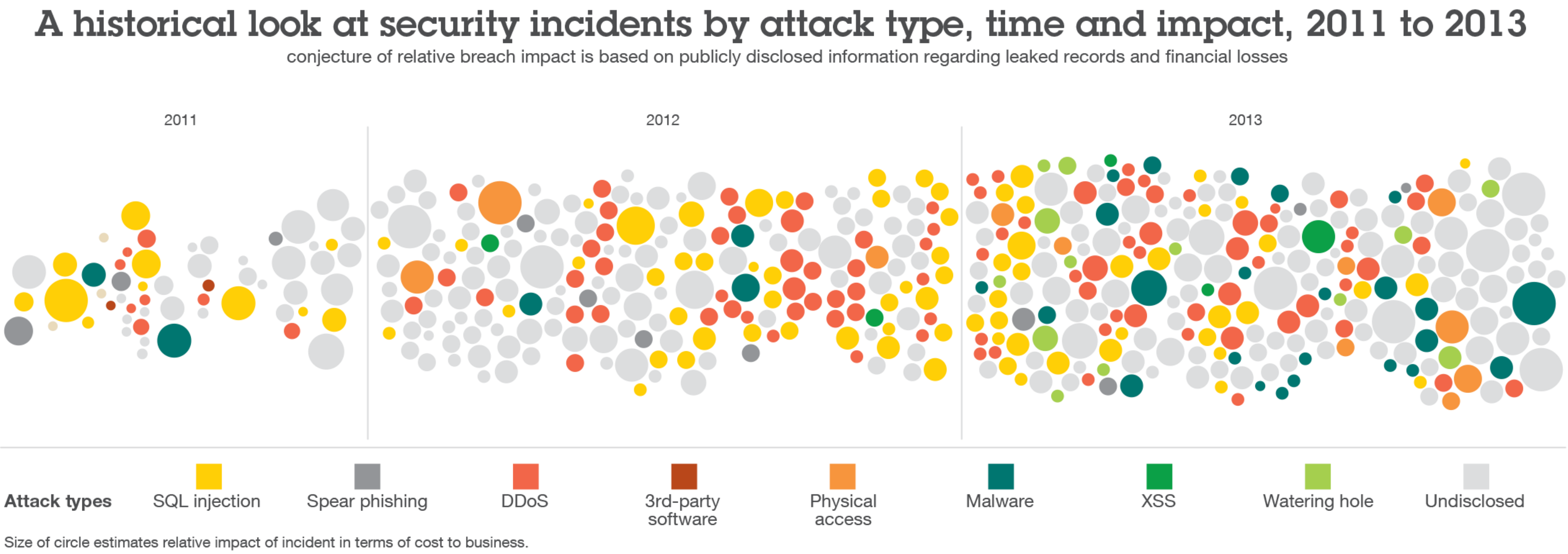


Figure 1. A historical look at security incidents by attack type, time and impact, 2011 to 2013

Source: IBM X-Force® Research and Development

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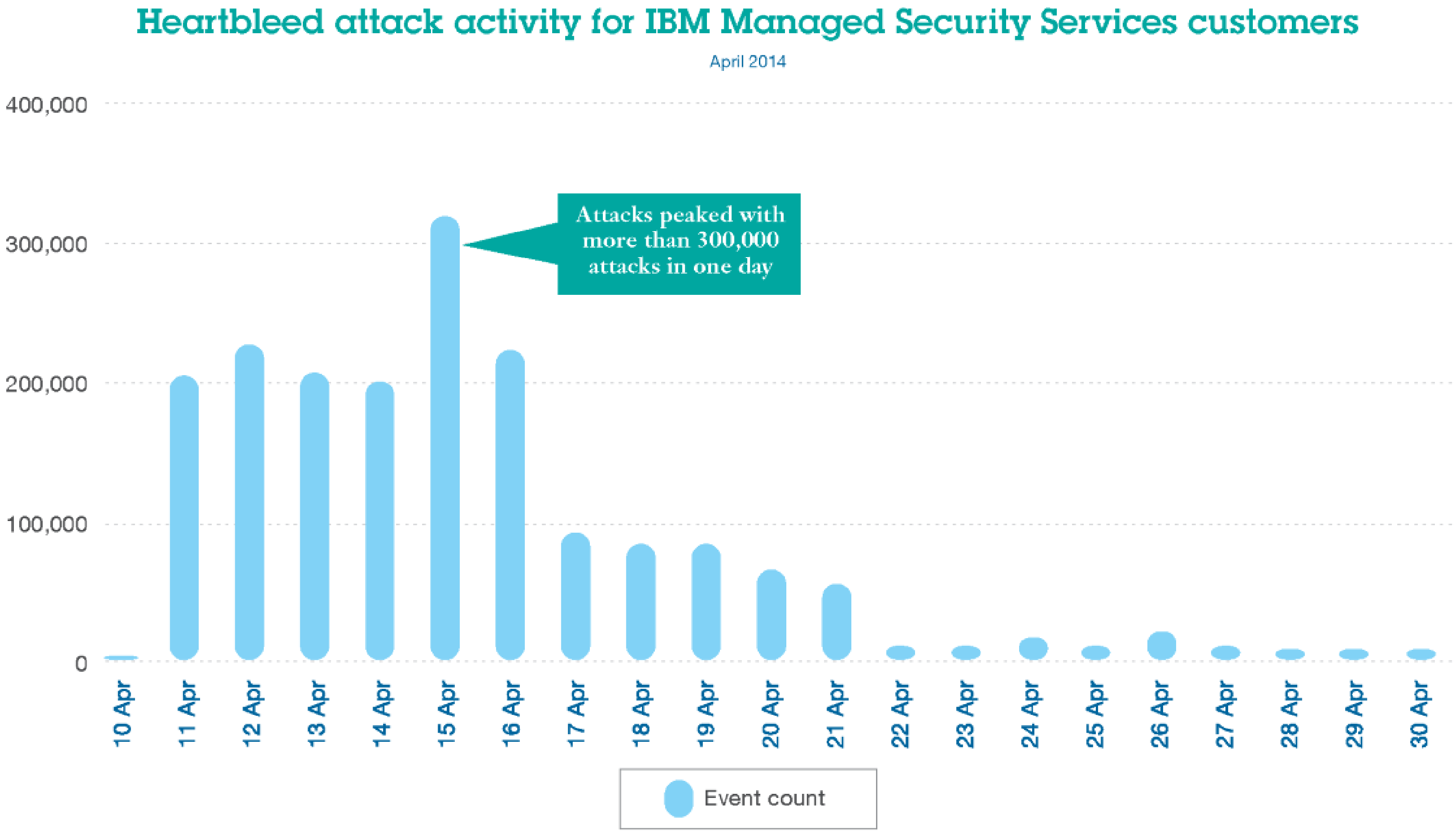
After Heartbleed was disclosed, MSS witnessed over 300,000 attacks in 24 hrs, and average of 3.47 attacks per second for more than hundreds of customers!



Heartbleed attack activity for IBM Managed Security Services customers

April 2014

Attacks peaked with more than 300,000 attacks in one day

Figure 1. Attack activity related to the Heartbleed vulnerability, as noted for IBM Managed Security Services customers, in April 2014

Source: IBM X-Force® Research and Development

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MSS continues to average 7k attacks per day – mostly from malicious hosts.

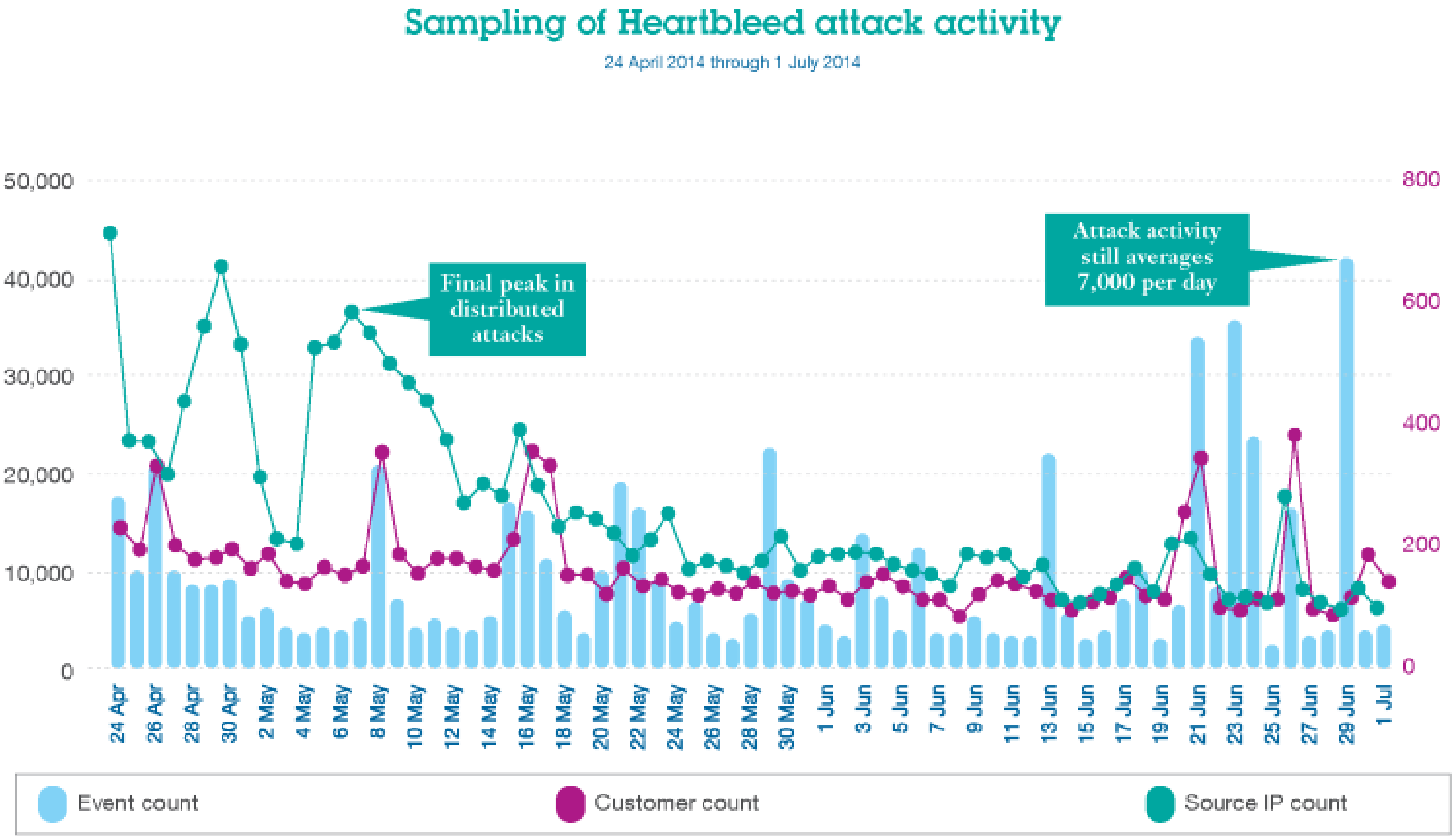

Figure 3. Sampling of Heartbleed attack activity for IBM Managed Security Services customers, 24 April 2014 through 1 July 2014

Source: IBM X-Force® Research and Development

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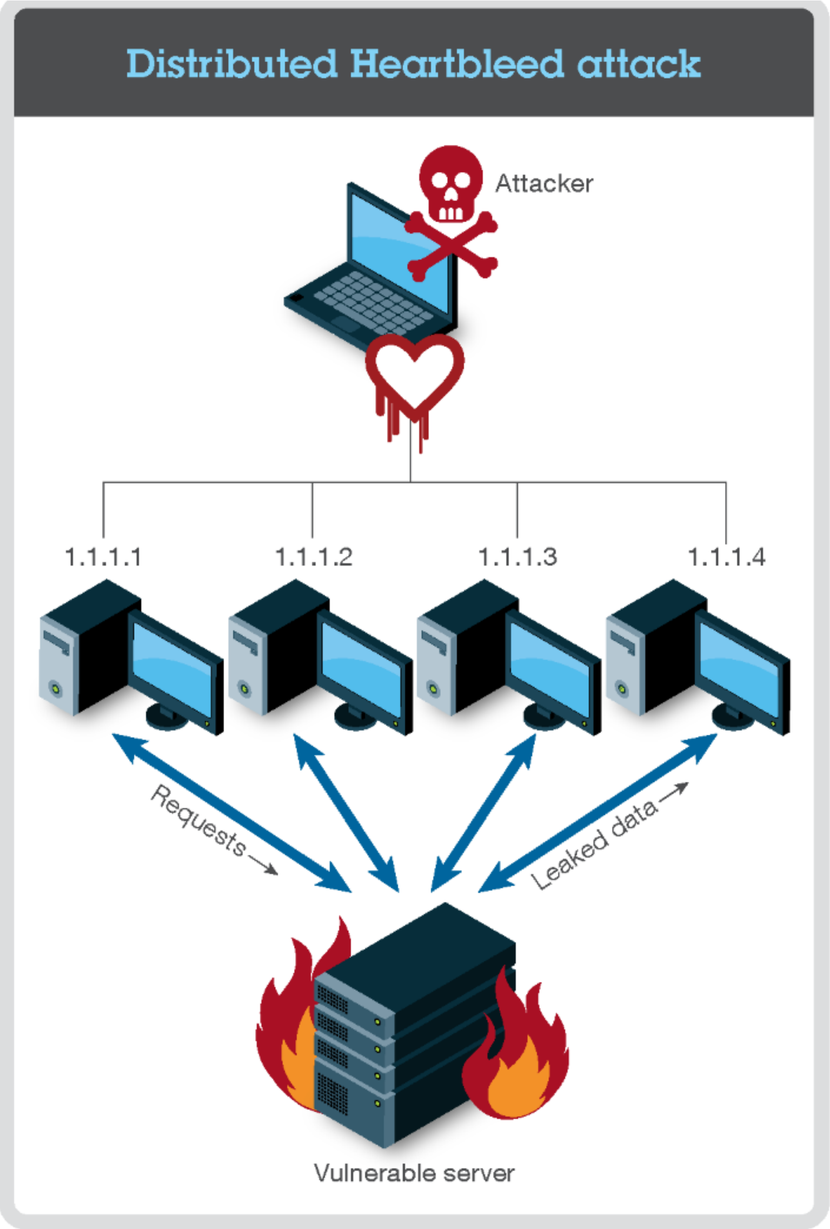
Rather than a single IP address executing the attack repeatedly, many of the attacks used a distributed method.

This enabled attackers to have a large, diversified attack surface and the flexibility to overcome rudimentary blocking strategies.



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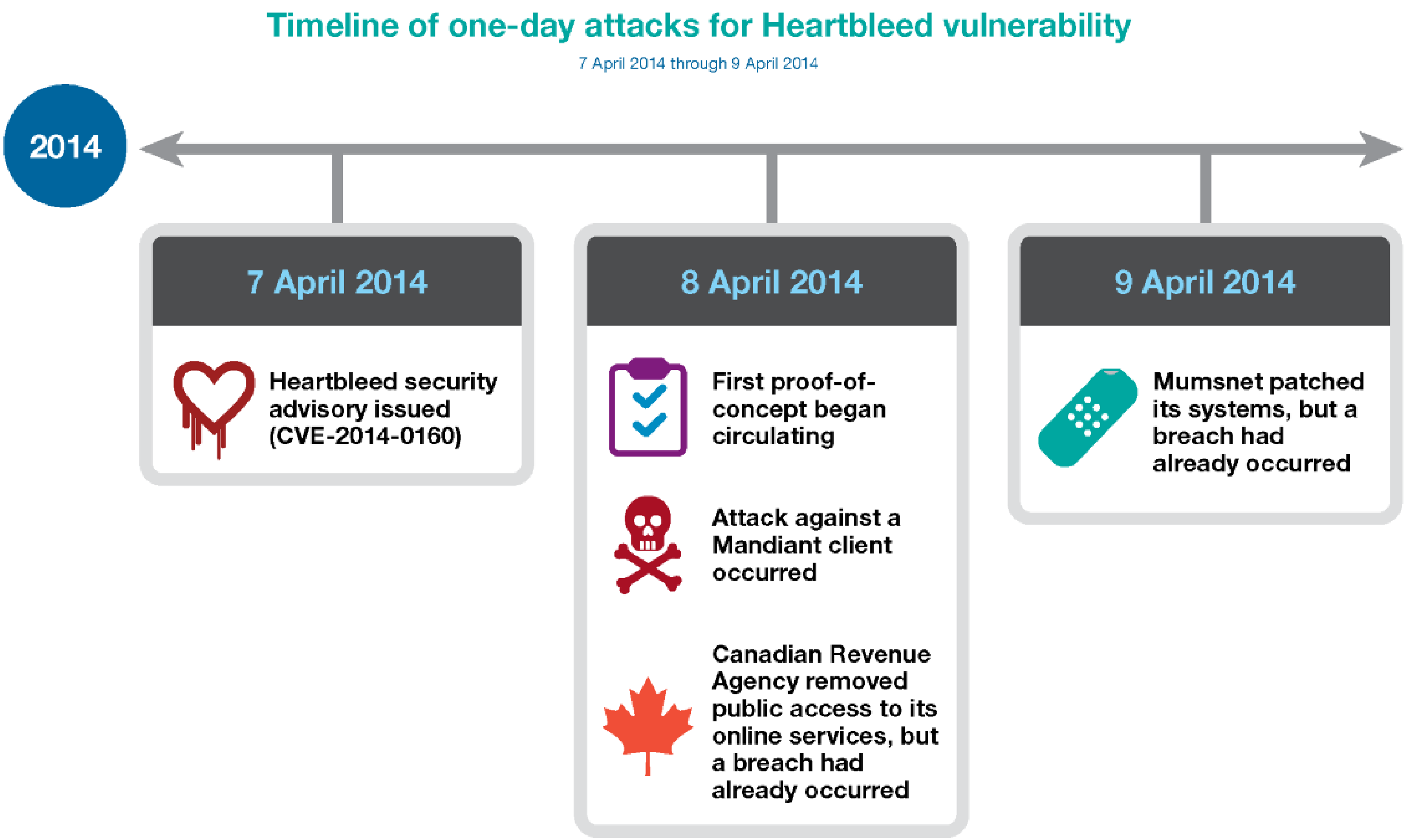
One-day attack methods demonstrate how quickly attackers rush to exploit a vulnerability like Heartbleed.



Timeline of one-day attacks for Heartbleed vulnerability

7 April 2014 through 9 April 2014

2014

7 April 2014

Heartbleed security advisory issued (CVE-2014-0160)

8 April 2014

First proof-of-concept began circulating

Attack against a Mandiant client occurred

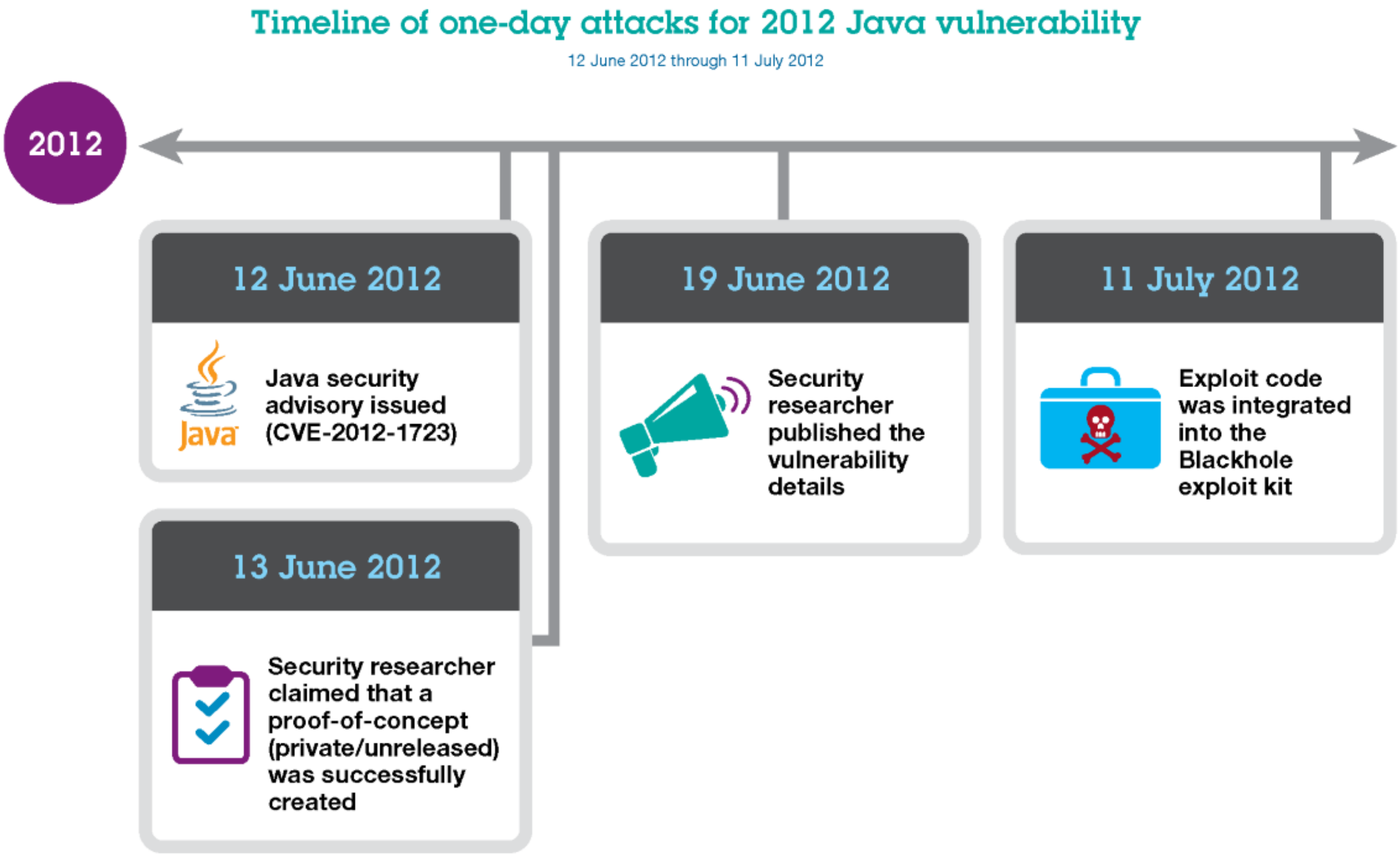
Canadian Revenue Agency removed public access to its online services, but a breach had already occurred

9 April 2014

Mumsnet patched its systems, but a breach had already occurred

Figure 4. Timeline of one-day attacks for Heartbleed vulnerability (CVE-2014-0160), 7 April 2014 through 9 April 2014

X-Force noted this trend was similar to a 2012 disclosure of a Java vulnerability.



Timeline of one-day attacks for 2012 Java vulnerability

12 June 2012 through 11 July 2012

2012

12 June 2012

Java security advisory issued (CVE-2012-1723)

13 June 2012

Security researcher claimed that a proof-of-concept (private/unreleased) was successfully created

19 June 2012

Security researcher published the vulnerability details

11 July 2012

Exploit code was integrated into the Blackhole exploit kit

Figure 5. Timeline of one-day attacks for 2012 Java vulnerability (CVE-2012-1723), 12 June 2012 through 11 July 2012

Source: IBM X-Force® Research and Development

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There was a decline in vulnerability disclosures in the first half of 2014; this could be the first reduction since 2011.

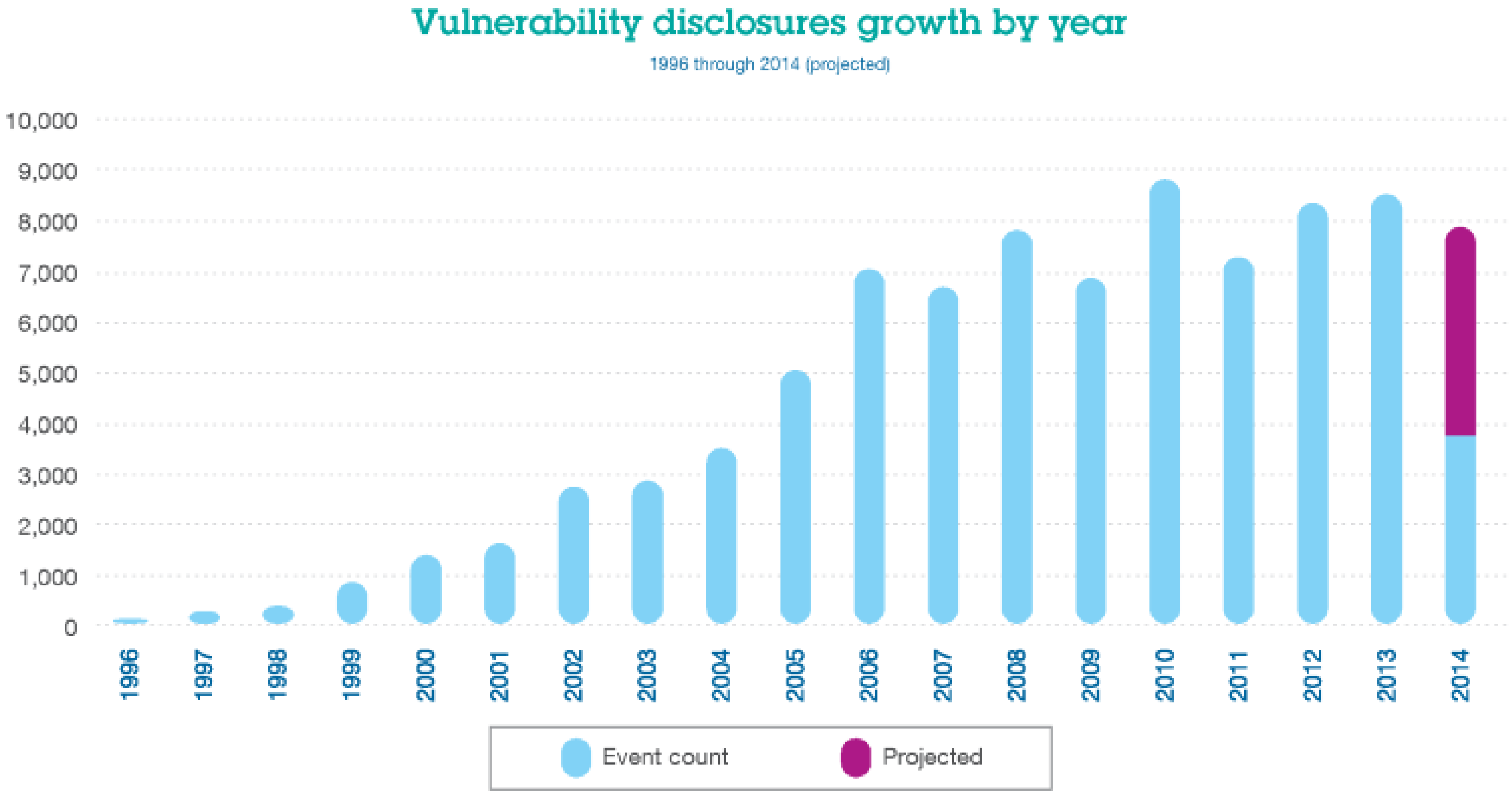

Figure 6. Vulnerability disclosures growth by year, 1996 through 2014 (projected)

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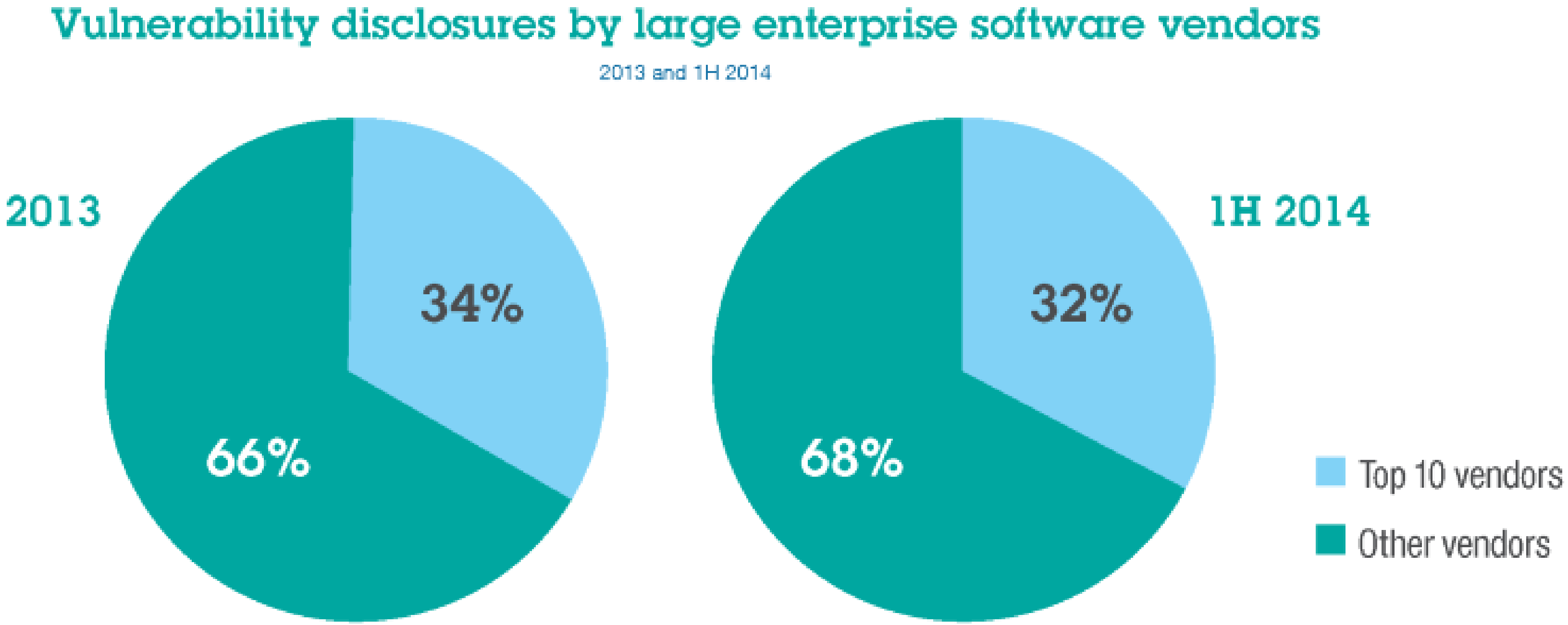
It is difficult to point to any one factor that has contributed to the decline in the number of vulnerability disclosures in 2014.

A decreasing number of vendors consistently reporting vulnerabilities might be contributing to the recent decline in total overall vulnerabilities disclosed.



Vulnerability disclosures by large enterprise software vendors

2013 and 1H 2014

Figure 7. Vulnerability disclosures by large enterprise software vendors, 2013 and 1H 2014

Source: IBM X-Force® Research and Development

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Plug-ins are responsible for 90% of total CMS vulnerabilities disclosed. This heightened risk leads to mass infection.

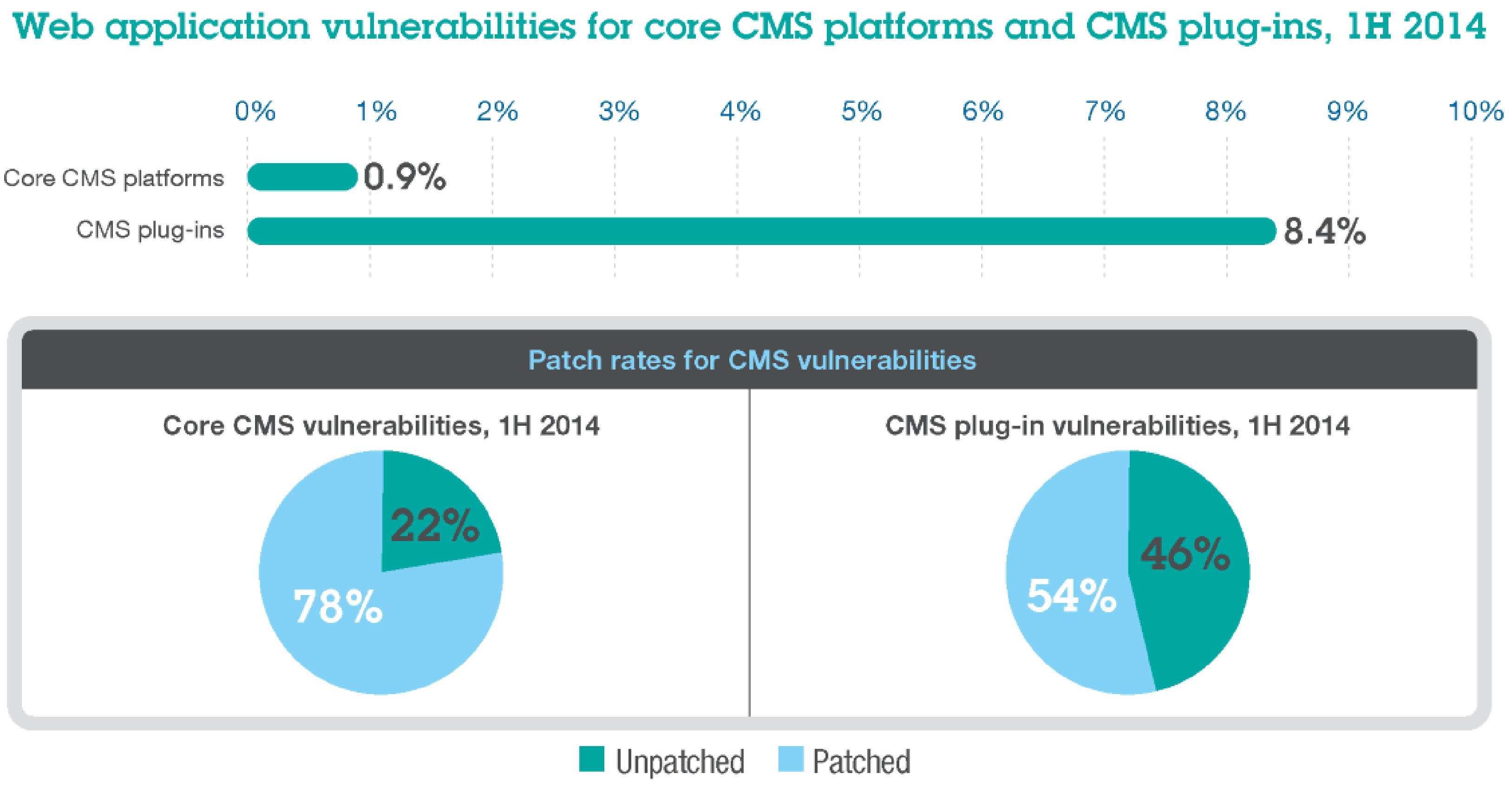

Figure 8. Web application vulnerabilities for core CMS platforms and CMS plug-ins, as a percentage of all disclosures and corresponding patch rates, 1H 2014

Source: IBM X-Force® Research and Development

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Does current CVSS scoring represent actual risk to networks and systems?

Heartbleed existed for two years and received a CVSS medium base score of 5.0.

CVSS base scores, 2012 through 1H 2014

CVSS score	Severity level
10	**Critical** A successful exploit is likely to have catastrophic adverse effects
7.0 – 9.9	**High** A successful exploit is likely to have significant adverse effects
4.0 – 6.9	**Medium** A successful exploit is likely to have moderate adverse effects
0.0 – 3.9	**Low** A successful exploit is likely to have limited adverse effects

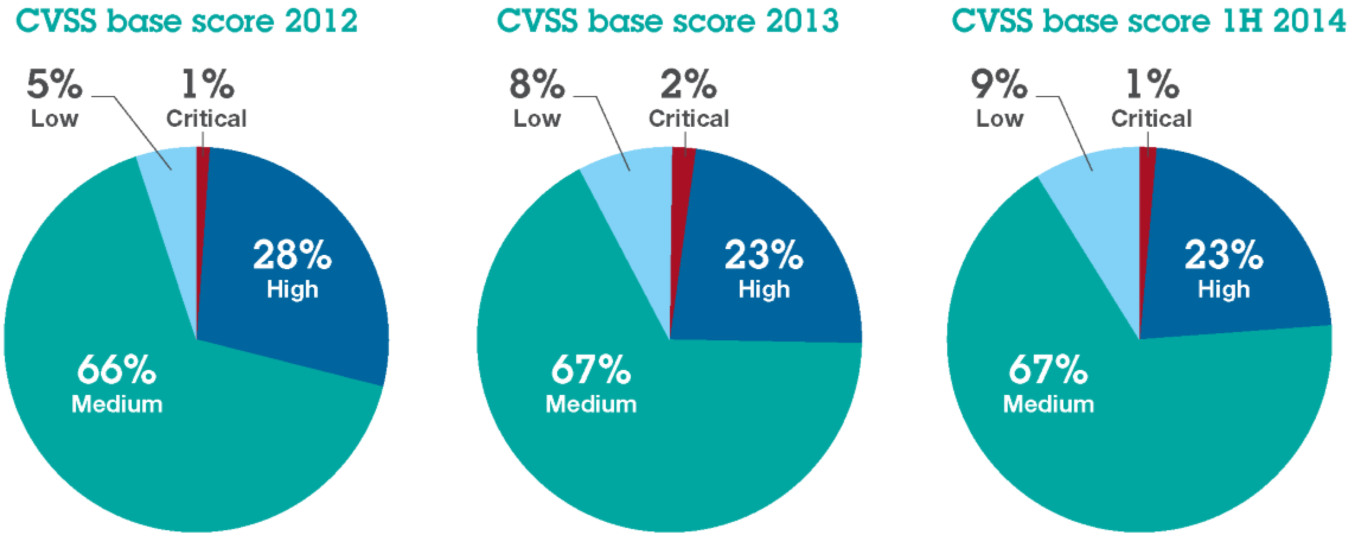

Figure 9. CVSS base scores, 2012 through 1H 2014

Source: IBM X-Force® Research and Development

What can you do to mitigate these threats?

- Keep up with threat intelligence.
- Maintain a current and accurate asset inventory.
- Have a patching solution that covers your entire infrastructure.
- Implement mitigating controls.
- Instrument your environment with effective detection.
- Create and practice a broad incident response plan.

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