Leveraging Continuous Visibility to Secure Global IT Assets for the Digital Transformation

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Vendor Landscape: Vulnerability Management, 2017

An Introduction To The Forrester Vendor Landscape: Vulnerabilty Management, 2017

CONTINUOUS VISIBILITY IS KEY TO SECURING TODAY'S ENTERPRISE

The widespread adoption of cloud computing services and mobile devices has drastically changed enterprise information security. Organizations are no longer well served by the conventional approach of protecting the traditional corporate perimeter, whose boundaries consisted primarily of desktop PCs sitting inside offices and servers humming in on-premises data centers. Today, organizations live in a perimeter-less world. Those clearly defined physical boundaries in which their IT infrastructure was housed have been pushed out, blurred, transformed and in some cases even erased.

Adoption of cloud computing software, platform and infrastructure services -- SaaS, PaaS and IaaS -- continues on the upswing among organizations of all sizes globally as they digitally transform. Workloads shift from on-premises systems to public, private and hybrid clouds, requirements for asset discovery, security and compliance change significantly, both from security and compliance perspectives.

This shift to virtualized, ephemeral and ever-growing infrastructure changes the size and nature of attack surfaces. If an organization's most critical vulnerabilities are patched across these assets, it greatly increases its protection against attacks that may get through the firewall, such as viruses that arrive via email. To protect against these critical threats, the challenge is effectively immunizing IT assets across an increasingly diverse and widespread landscape of assets: on-premises data centers, public cloud platforms and endpoints. Vulnerability Management has existed as an effective security and compliance method for years, but recent innovations in cloud-based continuous security and compliance have combined the core elements of data collection, central analysis of vulnerability data, and the incorporation of real-time threat data in the cloud to enable a holistic risk-based approach for security and compliance at scale.

IN THIS DOCUMENT

The Pillars of Effective Vulnerability Management

In today's IT environments powering digital transformation and business, there are three key pillars that create a sort of systemic vaccination for your IT environment against active vulnerabilities, slashing your risk of getting breached: Discovery, Detection and Prioritization-based Risk Management.

Discovery: Continuous Visibility - Effective security and compliance requires having comprehensive asset visibility and control, something which has become harder to accomplish as new types of devices proliferate on enterprise networks. Organizations need to generate and continuously update inventory of their assets across on-premises, public and private cloud environments, and consolidate all the asset details in one single-pane view. If your IT department can know within two seconds which assets exist across those environments, where they're located, who manages them and what security risks they carry, this allows security teams to work in lock-step with DevOps and enable faster development and deployment cycles.

Detection: Accuracy Is Critical - For reliable accuracy, vulnerability scans, the most difficult type of scan, must consistently exceed Six Sigma 99.99966% accuracy, the industry standard for high quality. This includes identifying the host operating system, services running and ports opened. Once this information has been captured, an inference-based scan engine can select only the appropriate vulnerability checks to run, runs them, and interprets the results. This approach, consisting of the pre-scan and the inference-based scan engine, accelerates the scanning process, minimizes traffic load and improves overall accuracy across diverse global environments.

Prioritization and Risk Management: At a time when new vulnerabilities are disclosed every day, amounting to thousands per year, correlating external threat data against an organization's inventory of internal vulnerabilities is critical. This leverages the data gathered, analyzed and classified by Vulnerability Management and IT asset inventory to precisely identify the IT assets that are most at risk within an organization at any given point. This sort of holistic and contextual view of their organization's ever-changing threat landscape, InfoSec and IT teams can collaborate on continuous risk management and DevSecOps.

The Power of Integrated Security and Compliance in the Qualys Cloud Platform

Qualys has been deliberately and thoughtfully crafting its integrated cloud platform to meet the challenges that organizations face today in this age of cloud computing and digital transformation. Today, the Qualys Cloud Platform provides continuous security for organizations that find themselves having to monitor and protect on-premises, cloud-hosted and endpoint IT assets across the global enterprise with a hybrid infrastructure in a perimeter-less world.

With its centrally managed cloud architecture, anchored by a robust back-end threat analysis engine and powered by an integrated suite of security and compliance apps, the Qualys Cloud Platform constantly collects, assesses and correlates asset and vulnerability information across customers' cloud instances, on-premises systems and mobile endpoints, giving them a real-time, holistic view of their threat landscape and helping them prioritize their security and compliance remediation.

By helping to pinpoint the IT assets that must be patched right now, Qualys ThreatPROTECT effectively expands Vulnerability Management to include Risk Management. It leverages the data gathered, analyzed and classified by Vulnerability Management, AssetView and other Qualys Cloud Platform components to precisely identify the IT assets that are most at risk within an organization at any given point. ThreatPROTECT has a Live Threat Intelligence Feed, a dynamic and customizable dashboard, graphing and reporting capabilities, and a powerful search engine. With ThreatPROTECT's holistic and contextual view of their organization's ever-changing threat landscape, InfoSec and IT teams can collaborate on continuous risk management and DevSecOps.

Qualys will soon bring this level of accuracy to container technology. Being introduced in Q3, Qualys Container Security provides vulnerability detection for images in registries (local or remote private repositories) and containers with sprawl and at scale.

Vendor Landscape: Vulnerability Management, 2017

Software Vulnerabilities Are The Leading Means Of External Attacks — It's Time To Do Something About It

by Josh Zelonis

April 21, 2017 | Updated: April 27, 2017

Why Read This Report

Breaches can undermine customer trust, endanger revenue growth and profits, and permanently tarnish reputations. According to our data, software vulnerabilities are the single largest factor in enterprise breaches. Identifying vulnerable systems on your network and applying patches is clearly not a rote process at enterprise scale. This report provides security and risk (S&R) pros an overview of the vulnerability management vendor landscape and information on trends that directly affect and enable business operations.

Key Takeaways

Vulnerability Management Solutions Are Embracing A Risk-Based Approach

Security teams have struggled with managing vulnerability reports and communicating critical patch mitigations that need to be applied. New vendors to the vulnerability management space are forgoing scanning technologies in favor of providing a central interface for managing the output of your tools, while enriching this data with threat intelligence and asset information to provide you a holistic view of risk.

Containers Are Changing Everything

Traditionally, security teams have used vulnerability management solutions in production environments and as a discussion tool between operations and security teams. Containers offer a tectonic shift to this dynamic, as developers now are responsible for specifying the runtime environments where their applications will live, at build definition, allowing security to integrate very early in the development life cycle.

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Software Vulnerabilities Are The Leading Means Of External Attacks — It's Time To Do Something About It

by Josh Zelonis
with Stephanie Balaouras, Bill Barringham, and Peggy Dostie

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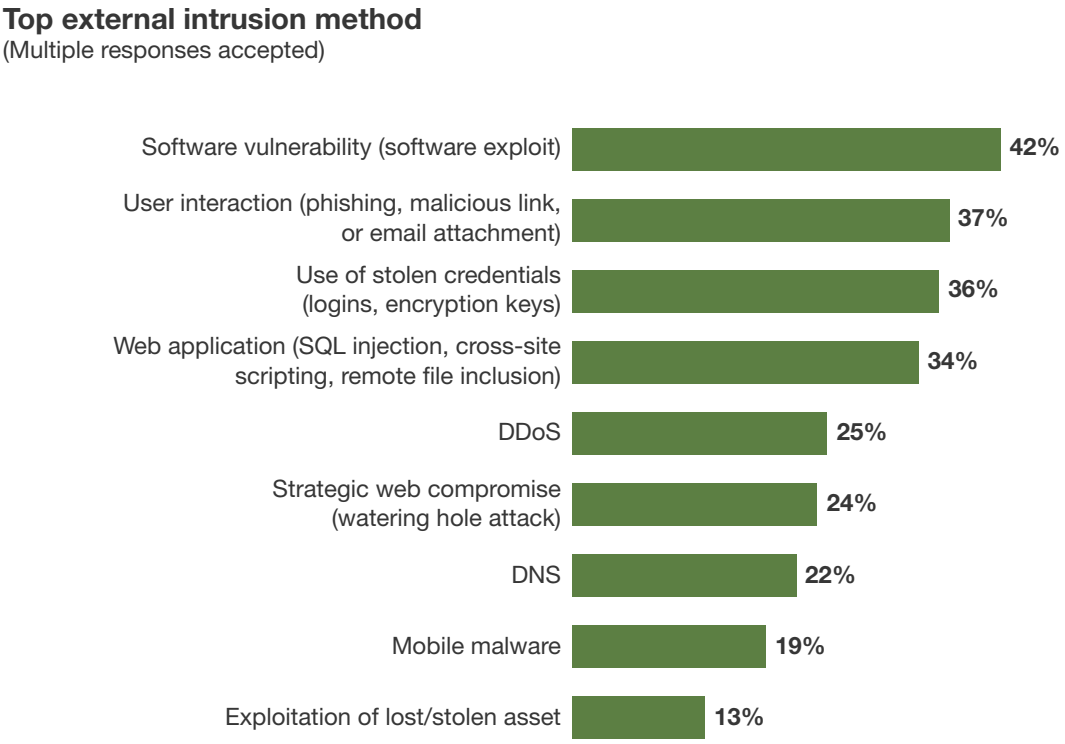
Vulnerability Management Remains A Critical Challenge

The vulnerability management market has been constantly evolving for the past 25 years and will continue to experience growth and innovation through necessity. According to Forrester Data Global Business Technographics® Security Survey, 2016, software vulnerabilities are the leading method of external intrusion in a breach (see Figure 1).[1] To help S&R pros better prioritize threats and harden their infrastructure against known vulnerabilities, we surveyed 15 vendors to understand their key capabilities, differentiation, and future direction.

FIGURE 1 Top External Intrusion Methods



Base: 346 global network security decision makers whose firms have had an external security breach in the past 12 months
Source: Forrester's Global Business Technographics® Security Survey, 2016

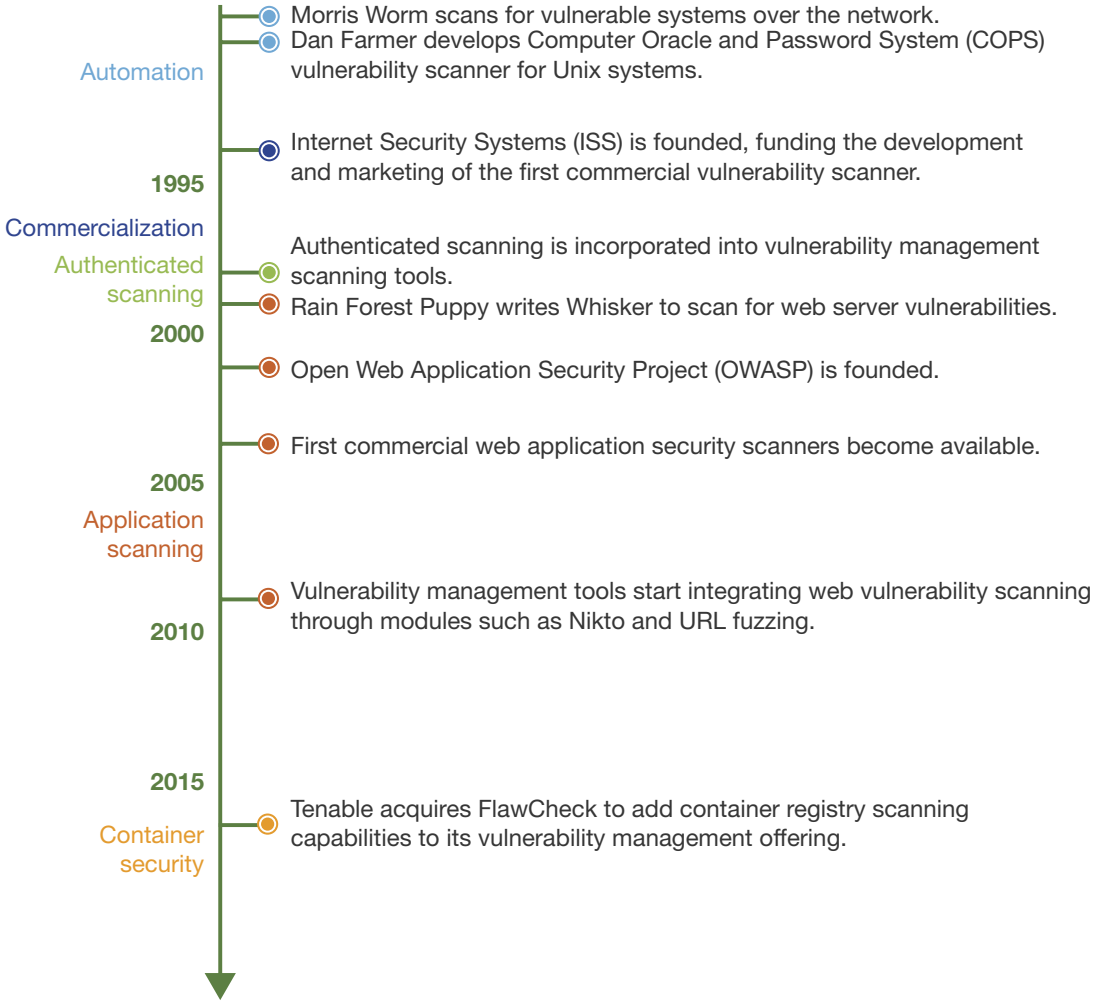
A BRIEF HISTORY OF VULNERABILITY MANAGEMENT

Vulnerability management has changed dramatically over the past 20-plus years, and the 15 vendors we surveyed in this landscape represent the maturation of a market that has evolved with the needs and requirements of security teams. To understand how the vendors in this market have evolved and to properly evaluate the solutions we've profiled in this report, it helps to put a historical context to the features behind them (see Figure 2):

- **Automated vulnerability assessment tools were initially feared.** The Morris Worm is frequently credited as being the first vulnerability scanner, as it incorporated four methods of attack to gain access to a system, including software exploits and weak password checks; however, it was not designed as a security tool.[2] Early pioneers in the vulnerability management space such as Dan Farmer, intrigued by the Morris Worm, began developing automated vulnerability assessment tools, combining remote checks for common security flaws and reporting the details to the end user.[3] Unfortunately, the duality of a tool that would identify security vulnerabilities in computer systems and bear such names as Security Administrator Tool for Analyzing Networks (SATAN) led to condemnation by some, including the US Department of Justice.[4]
- **Productized offerings appeared in the market in the mid-1990s.** In the mid-1990s and through the early 2000s, vulnerability management vendors and technology management professionals began to see vulnerability management as a commercially viable and even necessary process. Security was brand new, few organizations had dedicated security teams, and operations teams were desperately trying to get a handle on how malicious external hackers could penetrate their network. This also overlapped with the "cowboy era" of penetration testing where you could pay teenagers and 20-somethings to demonstrate they could find a way into your network — and hackers were as likely to be hired as prosecuted.[5] This was a tumultuous time in security, and while many products didn't make it (have you ever heard of CyberCop?), those that did are still around and appear in this landscape.
- **The introduction of authenticated scanning dramatically improved accuracy of scans.** Two significant advancements in vulnerability management came at the tail end of the 1990s when authenticated scanning became available. By allowing administrators to monitor all installed software on a system instead of just fingerprinting exposed network services, vendors were able to greatly increase the accuracy of security scans. Consequently, this provided much-needed endpoint visibility at a time when threat actors were leveraging ActiveX controls to automatically execute code out of your inbox. Twenty years later, the endpoint is still a battleground, but with culprits like Java and Flash instead of ActiveX.[6]
- **Application scanning emerged to identify critical app vulnerabilities.** As enterprises began to mature and responsibly apply vendor patches, the threat landscape shifted toward application security.[7] Early forays into the space focused on misconfiguration and CGI abuses, with full dynamic application security testing (DAST) coming later. These new capabilities allowed security teams to fuzz web applications to identify critical issues such as SQL injection, which allows remote command execution and direct database interaction.

› **The emergence of containers has necessitated features to support secure DevOps.** The emergence of containers is reshaping the traditional paradigm of operations building systems to execute development code; now it's developers who specify and build the entire runtime environment their applications should execute in.[8] This shift will have a wide-ranging impact on vulnerability management in the enterprise, as security must truly become the third leg of the secure DevOps stool.[9]

FIGURE 2 Key Innovations In Vulnerability Management



Vulnerability Management Isn't Just Scanners Anymore

The vulnerability management market has traditionally been dominated by names such as Qualys, Rapid7, and Tenable, but new requirements within enterprise environments have given emerging vendors an opportunity to compete in this market. Today, vulnerability management is dividing into two distinct segments: 1) solutions focused on detecting vulnerabilities and 2) solutions focused on providing a holistic view of vulnerability and configuration management issues. However, both of these segments deliver a set of critical features for enterprise security teams (see Figure 3).

FIGURE 3 Essential Features Of Today's Vulnerability Management Solutions

Service	Description
Application security	In addition to scanning for vulnerabilities in exposed services, this product includes dynamic application security testing (DAST) capabilities to identify common web vulnerabilities such as SQL injection and cross-site scripting.
Authenticated scanning	This product has the ability to authenticate to systems it is scanning to obtain more granular system and software vulnerability details beyond network-exposed services.
Endpoint agent	This product incorporates or has an integrated endpoint offering that offers the ability to obtain granular system and software details beyond exposed-network services.
Configuration auditing	This product performs configuration and compliance checks in addition to identifying vulnerable software.
Container registries	Registries are the distribution point for container images. These products allow you to perform vulnerability management at the source and predeployment.
Prioritization based on threat intelligence	This product integrates threat intelligence to help organizations prioritize patching based on exploit trends.
Prioritization based on business context	The Zero Trust model prioritizes data classification and understanding the data flows within your organization. These products allow you to identify systems as being business critical to prioritize remediation.

VETERAN VULNERABILITY MANAGEMENT PLAYERS AVERAGE OVER 15 YEARS' EXPERIENCE

Vulnerability management is unique in the security space in that the majority of vendors have been around, figuratively, forever. Many of the names have changed as some of the players have been acquired, and, in some cases, the products themselves have as much name recognition as the brand itself. In this section, we provide key differentiation and critiques of each of the players (see Figure 4):

- **Beyond Security.** Beyond Security has a full-featured scanning capability, and the vendor purports to have a false positive rate of less than 0.01%. It offers cash bounties for reporting false positive results, as well as integrations with third-party exploitation tools, both of which make this offering ideal for independent researchers and penetration testers.
- **BeyondTrust.** BeyondTrust has a dedicated focus on reporting and analytics, even ingesting threat data from next-generation firewalls to provide broader intelligence in prioritizing vulnerability remediation. Its ideal implementation in most environments would include external scanning, internal network scanners, endpoint integrations, and an IT risk-management platform, which, although carrying an operations management burden, offers flexibility into hardened environments.
- **Digital Defense.** Digital Defense heavily focuses on providing vulnerability management-as-a-service in addition to offering its own scanning technology. While it does not incorporate threat intelligence for assisting customers with patch prioritization, it does incorporate client feedback for prioritization of critical systems as well as the availability of exploit code in the wild. This approach makes a lot of sense for the firm, as approximately 40% of its business is related to ethical hacking, which would require access to exploit code.
- **Outpost24.** Outpost24, headquartered in Sweden, offers a comprehensive scanning solution focused on reduced false positive rates, data sovereignty, and risk management integration, which is very relevant given its geographic presence (UK/Ireland, the Nordic countries, and France/Benelux). Its solution can generate alerts based on system or vulnerability criticality when key performance indicators are not being met, enabling users to stay informed based on their needs without having to request this information through system interaction.
- **Qualys.** Qualys is the 800-pound gorilla in the vulnerability management space. Long dedicated to developing its own technologies instead of growing through acquisition, it has an extremely broad platform and came up more frequently than any other vendor in discussions about the competitive landscape. That said, one area it currently does not cover is the ability for customers to scan container registries, although this is currently in Qualys' production road map.
- **Rapid7.** Rapid7 has two products that feature significantly in the vulnerability management space: Nexpose is a fully featured vulnerability scanner that even leverages the Dynamic Host Configuration Protocol (DHCP) to identify transient assets as they join the network, and Metasploit, a ubiquitous exploitation framework that many vendors in this space choose to partner with to achieve exploit capabilities. Rapid7 is also well known for its digital forensics consulting capabilities, although, surprisingly, it does not factor any of the reactive intelligence gathered from these investigations into helping customers prioritize patching based on threat actor trends.

- **SAINT.** SAINT offers an excellent, full-featured vulnerability management solution for a fraction of the per-asset cost of many of the competitors in this space — making the company particularly appealing to small businesses as well as managed security service providers. SAINT is extremely engineering focused with a small sales staff, which likely explains why it doesn't garner more attention, although it reports 25% growth year over year.
- **Tenable.** Tenable has as much brand equity as a company could have with Nessus, yet it strives to be one of the most forward-thinking companies in the vulnerability management space. With its acquisition of FlawCheck in October 2016, Tenable is the first, and so far the only, traditional vulnerability management vendor to add container registry scanning capabilities. Further evidence of innovation is a strategy of divorcing the concept of assets from IP addresses in its licensing, which has proven popular with customers, although it is too early to know if this will translate into actual cost savings.
- **Tripwire.** Tripwire IP360 uses a distributed architecture to enable speed and scalability while utilizing a dynamic host tracking function to fingerprint devices and correlate results over time. There is a tight integration with Tripwire Enterprise, but it is a little surprising not to see vulnerability management capabilities built into an agent which already includes file integrity monitoring and software configuration management on the endpoint.
- **Trustwave.** Trustwave is unique compared with other vendors in this space; it was offering application security scanning capabilities before it began offering a traditional vulnerability management scanning solution. That focus shows to this day, as there are obvious gaps such as the inability to perform credentialed scanning of hosts. Primarily a services company, Trustwave offers application and network penetration testing, forensic investigation, and managed security services.

FIGURE 4 Vulnerability Management Vendors Employing Scanning Technologies

	Application security	Authenticated scanning	Endpoint agent	Configuration auditing	Container registries	Prioritization based on threat intelligence	Prioritization based on business context
Beyond Security	●	●		●		●	●
Beyond Trust	●	●	●	●		●	●
Digital Defense	●	●		●			●
Outpost24	●	●		●		●	●
Qualys	●	●	●	●		●	●
Rapid7	●	●	●	●			●
SAINT	●	●	●	●		●	●
Tenable	●	●	●	●	●	●	●
Tripwire	●	●		●			●
Trustwave	●						

RISK-MANAGEMENT VENDORS ARE CENTRALIZING VULNERABILITY DATA AND DECISION MAKING

For many organizations, the vulnerability management maturity life cycle begins with Excel spreadsheets and matures to a homegrown solution that is cumbersome and never quite solves their biggest vulnerability management challenges. The following vendors have productized a commercial offering that replaces these struggling homegrown solutions (see Figure 5):

- **Bay Dynamics.** Bay Dynamics offers an integrated view of assets, attack trends, and vulnerability information to prioritize applications and systems based on the financial impact if those systems were compromised. Their product, Risk Fabric, offers a unique approach of putting responsibility for vulnerability remediation on the line of business or application owner instead of it being a negotiation between security and operations.
- **Core Security.** The Vulnerability Insight offering from Core Security is a shift into the vulnerability management market, leveraging its strong red team exploitation toolkit. By consolidating web and network scan data with topology and threat intelligence, it helps customers prioritize vulnerability remediation through threat modelling and attack simulation to validate attack paths.

- **Kenna Security.** Kenna Security markets itself as a security and risk intelligence platform. By centralizing application and network vulnerability scan data with threat intelligence, it provides security and operations with a shared interface from which to prioritize vulnerability remediation and understand risk posture.
- **NetSPI.** As a company providing enterprise security testing services, NetSPI developed a collaboration tool in CorrelatedVM for centrally managing customer assessment data and the workflow through remediation. This platform has experienced a great deal of commercial success over the past two years as an offering to internal assessment teams while not just a penetration testing tool.
- **Skybox.** Skybox offers a security management platform that centralizes vulnerability and configuration management data. Skybox helps customers prioritize remediation and contextually understand risk through attack path visualization using a combination of network modeling and threat intelligence.

FIGURE 5 Vulnerability Risk Management Vendors

	Application security	Authenticated scanning	Endpoint agent	Configuration auditing	Container registries	Prioritization based on threat intelligence	Prioritization based on business context
Bay Dynamics						●	●
Core Security						●	●
Kenna Security						●	●
NetSPI							●
Skybox				●		●	●

Recommendations

Vulnerability Management Tools Are Evolving; Evolve With Them

When software vulnerabilities are the leading attack vector for external breaches, it's clear that security teams must stop struggling with spreadsheets and homegrown vulnerability management tools. There are commercial offerings to simplify your life by coalescing scanner data, tying in threat intelligence to help you quantify risk, and communicate prioritization to the relevant teams for remediation. As you evaluate solutions, we recommend that you also:

- **Seek to integrate vulnerability management earlier in the development cycle.** Application security scanning capabilities as well as the emerging container space are providing unprecedented insight into what is going to be deployed in production, sometimes weeks in advance. Harness the opportunity to get involved identifying security issues ahead of time, serving the business by reducing the cost of remediation, which increases dramatically as these issues hit production.
- **Realize that exploitation capabilities are overrated.** At no point should you send an exploit downstream to find out if your system is vulnerable. Do not sacrifice system stability for a proof of concept. If you're trying to prove an attack path exists, test your firewall with a port scanner (or telnet for that matter). If you're not sure if your system or service is vulnerable after scanning, review patch notes or contact the vendor.

What It Means

Expect More Acquisitions In The Container Security Space

Similar to trends we saw starting around 2007 with application security scanners, container registry scanning capabilities are shaping up to become mainstream in the vulnerability management market over the next two years. Tenable has led this charge with the acquisition of FlawCheck, and Qualys is about a year behind with this feature on the development road map for Q3 2017. Expect market pressure from these two huge players to lead to more acquisitions in the space. Two vendors that have added features through acquisition, Rapid7 and Tripwire, would pair nicely with a Twistlock or Aqua Security, who offer the ability to scan Docker container registries. Expect to see them acquire one of these companies in the next 12 to 24 months.

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SURVEY METHODOLOGY

Forrester Data Global Business Technographics Security Survey, 2016, was fielded in March to May 2016. This online survey included 3,588 respondents in Australia, Brazil, Canada, China, France, Germany, India, New Zealand, the UK, and the US from companies with two or more employees.

Forrester's Business Technographics ensures that the final survey population contains only those with significant involvement in the planning, funding, and purchasing of business and technology products and services. Research Now fielded this survey on behalf of Forrester. Survey respondent incentives include points redeemable for gift certificates.

COMPANIES INTERVIEWED FOR THIS REPORT

We would like to thank the individuals from the following companies who generously gave their time during the research for this report.

Bay Dynamics
Beyond Security
BeyondTrust
Core Security
Digital Defense
Kenna Security
NetSPI
Outpost24
Qualys
Rapid7
SAINT
Skybox
Tenable
Tripwire
Trustwave

Endnotes

[1] See the Forrester report "Top Cybersecurity Threats In 2017."

[2] Source: "United States of America, Appellee v. Robert Tappan Morris, Defendant-Appellant." United States Court of Appeals, Second Circuit, David Loundy's E-LAW Web Page, March 7, 1991 (http://www.loundy.com/CASES/US_v_Morris2.html).

[3] Source: Daniel Farmer and Eugene H. Spafford, "The COPS Security Checker System," Purdue University, July 16, 1990 (http://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1844&context=cstech).

[4] Source: Rik Farrow, "Interview with Dan Farmer," Usenix, December 2014 (https://www.usenix.org/system/files/login/articles/login_dec14_07_farmer.pdf).

[5] Source: Larry Lange, "The Rise of the Underground Engineer," Black Hat, September 22, 1997 (https://www.blackhat.com/media/bh-usa-97/blackhat-eetimes.html).

[6] Source: Sead Fadilpašić, "Outdated programs main cause for security incidents," Beta News, March 28, 2017 (http://betanews.com/2017/03/28/outdated-programs-cause-security-incidents/).

[7] See the Forrester report "The State Of Application Security: 2016 And Beyond."

[8] See the Forrester report "Brief: Why Docker Is All The Rage."

[9] See the Forrester report "Secure Applications At The Speed Of DevOps."

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