Future SOC: SANS 2017 Security Operations Center Survey

A SANS Survey

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May 2017

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Executive Summary

Security Operations Center (SOC)

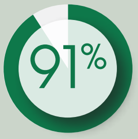
A team primarily composed of security analysts organized to detect, analyze, respond to, report on and prevent cybersecurity incidents.[1]

Security operations centers (SOCs) are growing up, according to our new SANS survey. Respondents indicated that the SOC's primary strengths are flexibility and adaptability while its biggest weakness is lack of visibility: SOCs still can't detect previously unknown threats, which is a consistent problem across many other SANS surveys. The survey also found a need for more automation across the prevention, detection and response functions—particularly in prevention and detection, where the tools respondents use are mostly the same.

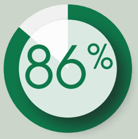
As a sign that SOCs are becoming multifunctional and maturing, 67% of respondents said they are satisfied with their flexibility of response, while 65% are satisfied with their overall response time and 64% felt satisfied with containment abilities. However, satisfaction numbers dip below 50% for SOC-NOC (network operations center) coordination and effectiveness, as well as the ability to detect previously unknown threats, which is also the capability that received the most "not satisfied" responses, at 45%. These are clear areas where more automation and integration will help organizations take their SOCs to the next level.

What SOCs Do

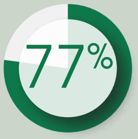
Respondents indicated a broad range of capabilities in their SOC:



provide **prevention** capabilities through network IDS/IPS, while **89%** provide either log management or network monitoring



provide **detection** capabilities through network IDS/IPS, while **85%** provide log management and **84%** provide SIEM reporting and analytics



provide **response** capabilities through endpoint detection and response (EDR), while **74%** use network forensic analysis and **72%** provide host-based forensics

Most SOCs (83%) have a defined notion of what an incident is, and 57% of respondents said they utilize metrics for assessing the SOC's performance. Yet, 69% of those who use metrics require substantial manual effort to compile those metrics. This is another area where better automation and SOC-NOC information sharing would help organizations take their SOCs to the next level. However, only 32% of SOCs have close integration with network operations and only 12% have strong technical integration between the groups.

This lack of integration may be due, in part, to the variety of architectures respondents utilize. Overall, 61% currently have centralized their security, response and remediation functions into a single SOC, and 28% disperse their SOC functions to different security, response and remediation departments. Respondents are also mixing up their capabilities with the cloud, particular for their preventive capabilities.

While organizational SOCs are maturing and expanding their capabilities today, there are clear opportunities to improve security operations, starting with better relationships and coordination with IT operations. SOCs can better self-assess with metrics and do a better job of understanding how to serve the organization more effectively. These and other issues, along with advice and best practices, are discussed in the following pages.

[1] "Ten Strategies of a World-Class Cybersecurity Operations Center," Carson Zimmerman, MITRE, 2014, www.mitre.org/sites/default/files/publications/pr-13-1028-mitre-10-strategies-cyber-ops-center.pdf

SOC Architectures

The 309 respondents who qualified for this survey most commonly described themselves as technical practitioners (50%), with roles such as developer, architect, analyst, administrator or operator of some form. Managers (manager, director, officer or C-level) made up 40% of respondents, while another 8% worked in a spectrum of jobs related to incident response and 2% were auditors.

The largest group (14%) worked for cyber security firms, while 13% were from banking and finance, 12% from technology, and 10% from government sectors. See Figure 1.

What is your organization's primary industry?

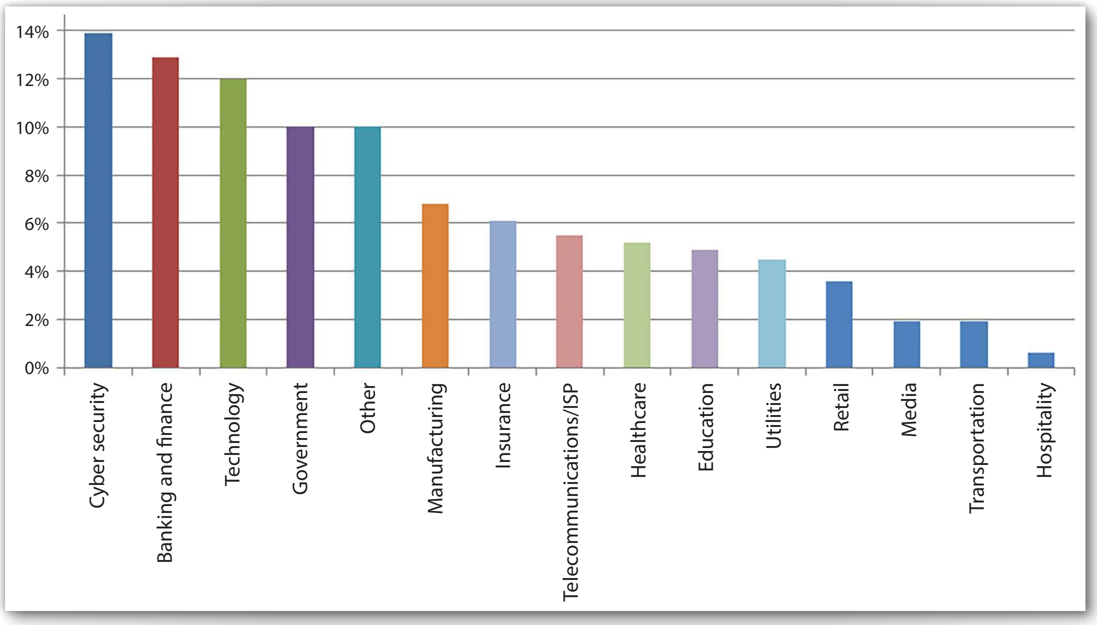


Figure 1. Industries Represented

These demographics are slightly different than those of most other SANS surveys, in which the top two respondent categories are usually government and finance. The high number of those in a cyber security business may indicate a growing trend for cloud-based SOCs and the staffs to fill them.

Locations and Centralization

Organizations represented in the survey run business operations all over the world (see Figure 2), with 54% headquartered in the United States and 22% headquartered in Europe.

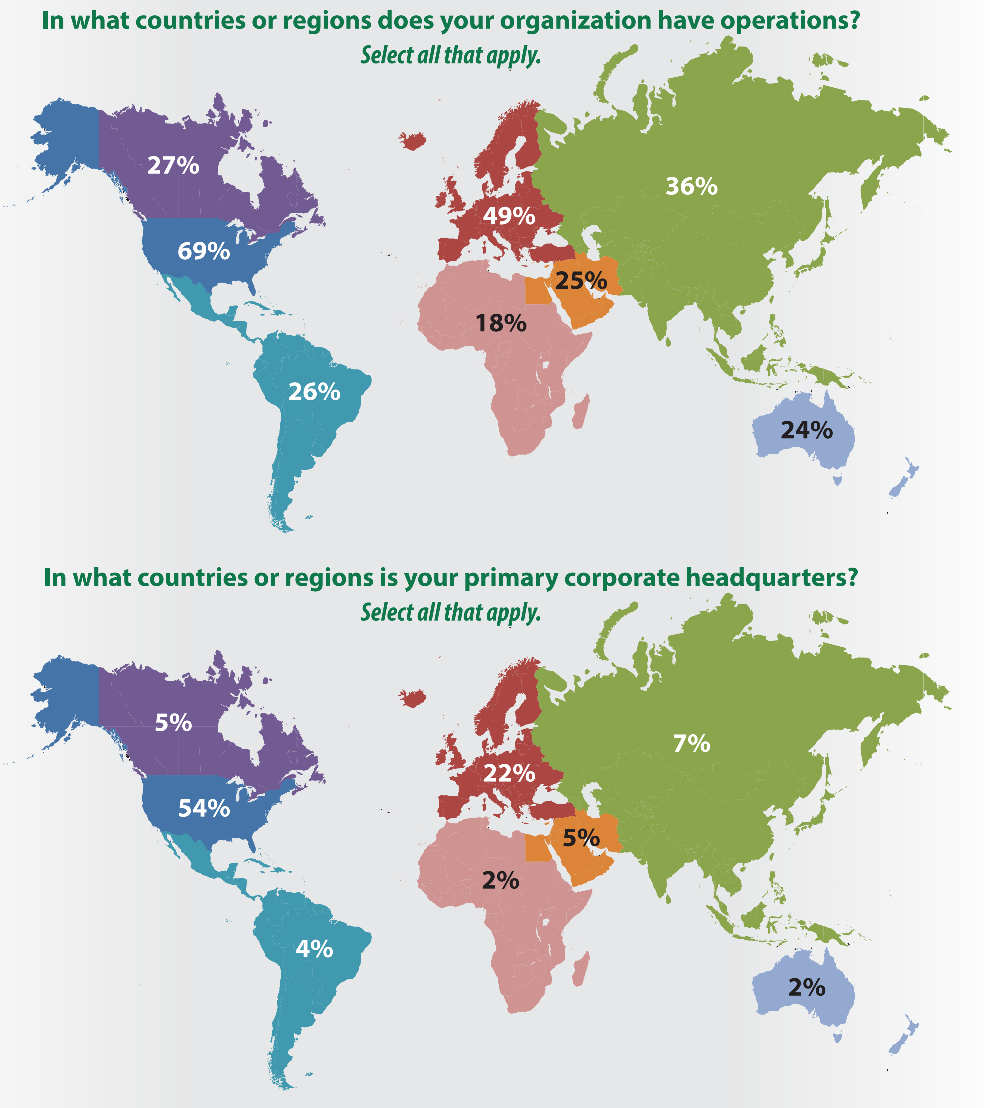

In what countries or regions does your organization have operations?
Select all that apply.
27%
69%
26%
49%
36%
25%
18%
24%
In what countries or regions is your primary corporate headquarters?
Select all that apply.
5%
54%
4%
22%
7%
5%
2%
2%

Figure 2. Regions and Headquarters of Organizations

Those with global operations said most of their SOCs (61%) are currently centralized into a single center, but we didn't ask where those centralized SOCs were actually located (inferring that they may or may not be in the same location as their headquarters).

Those in the second largest group (28%) indicated that their SOC functions are dispersed among different security and response groups, while 25% of SOCs are centralized and distributed regionally and 17% are putting all their SOC functions into the cloud, as illustrated in Figure 3.

TAKEAWAY

In the future, security teams will need to implement and follow security maturity curves for their SOCs if they want to see them get to the next level.[2]

What is the architectural approach for your SOC, and what additional architecture is planned for the next 24 months? ***Select those that most apply.***

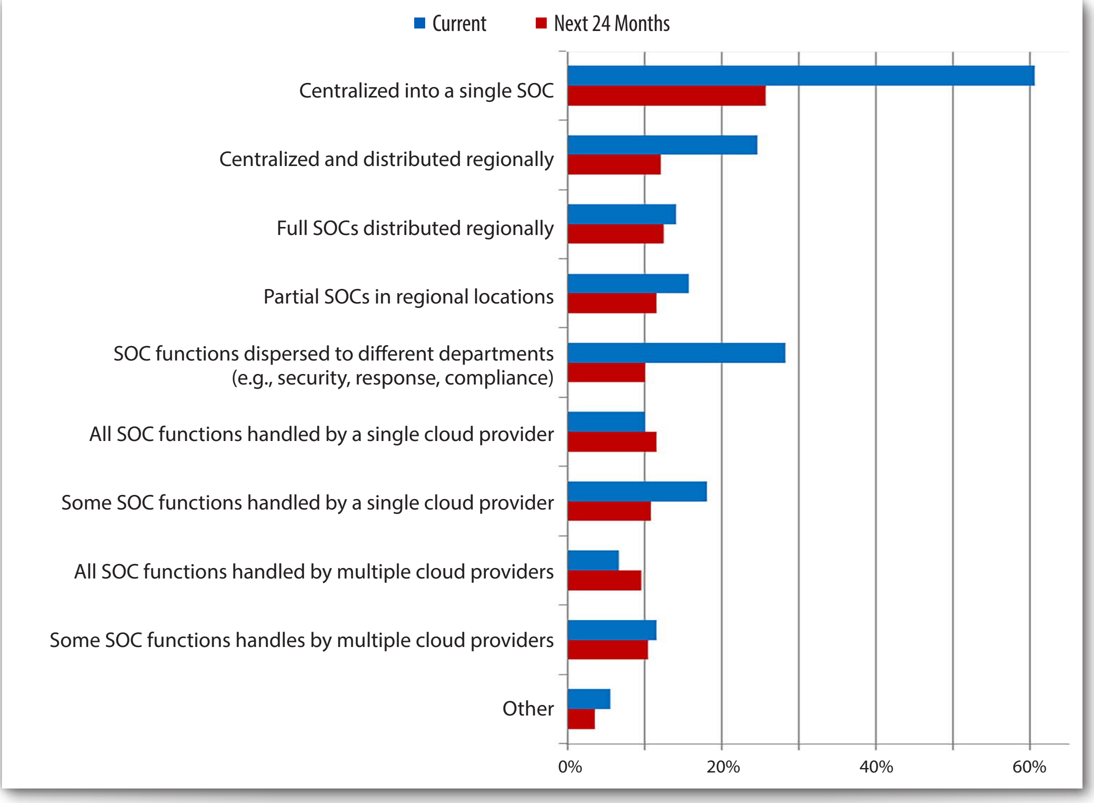


Figure 3. Architectural Approaches Used for SOCs

Because this was an "answer all that apply" question, there is some overlap between answers, indicating that there are a lot of different architectures being followed. It is clear, however, that SOC-related functions are becoming embedded, centralized or dispersed depending on organizational need. Some of this variation may also have to do with the maturity of the SOCs, which was not addressed in this study.

[2] "Getting C-Level Support to Ensure a High-Impact SOC Rollout," September 2016, www.sans.org/reading-room/whitepapers/analyst/c-level-support-ensure-high-impact-soc-rollout-37347

Size and the SOC

Another factor potentially affecting SOC architectures is the size of the organization. Respondents were from a variety of organizational sizes, the largest group being from midsize organizations (251 to 1,000 employees and contractors) and medium-to-large organizations (2,000 to 15,000 workers). Overall, 66% represented workforces of fewer than 10,000 employees and contractors. We decided to break the organizational sizes into these categories given the very large company sizes represented beyond the 1,000-sized organization (which is a traditional measurement of a "large" company). See Figure 4.

What is the size of the workforce at your organization, including employees, contractors and consultants?

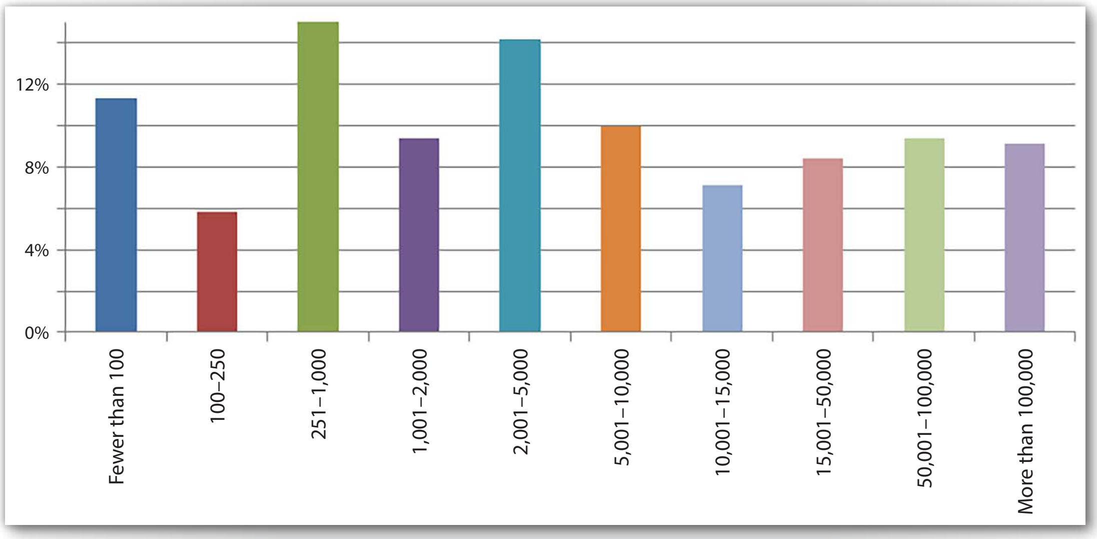


Figure 4. Organizational Size

Survey results indicate that SOC size does not closely depend on organizational size, at least for organizations with workforces under 10,000. The general size of the SOC for most small to what we're labeling medium and medium-to-large organizations (i.e., with workforces of 10,000 or fewer) seems to be between two and five full-time employee (FTE) positions authorized. See Figure 5.

Organization Size Versus Positions Authorized

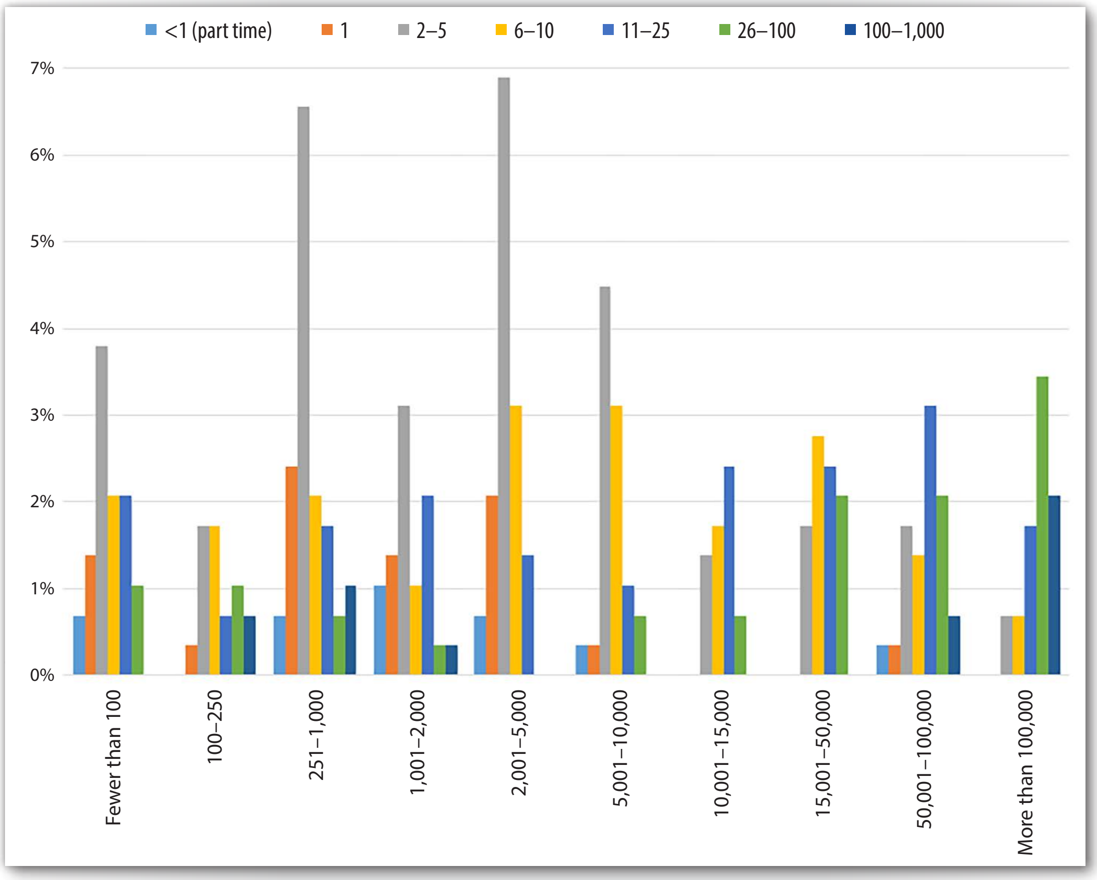
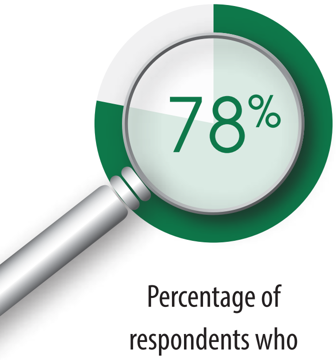


Figure 5. SOC Size in Positions Authorized Versus Organization Size

SOC Staffing

This survey asked the size of the SOC but not how the organization determined what the size should be. The primary parameters determining size are:

- **Capability required**—Compliance based, heavily customized, all in-house or mostly outsourced
- **Performance objectives**—Detection, response, forensics, hours of performance (9 to 5 or 24/7)
- **Duplication necessary**—Potential need for different SOCs in geographical areas, for example, an EU-specific SOC for European Union data
- **Budget**—Limits the delivery of capability, performance and duplication



Percentage of respondents who manage their security roadmap and planning, architecture and administration in-house

Mixing It Up with Cloud

Cloud computing is currently part of 46% of the SOC infrastructures represented in this survey, with 21% of respondents saying some functions will be cloud-based in the next 24 months and another 21% saying all of their SOC functions will be handled by one or multiple cloud providers in the next 24 months.

When it comes to managing specific capabilities in their SOCs, respondents said most activities are primarily handled in-house, particularly strategic activities such as their security roadmap and planning, security architecture and engineering, and security administration, all with over 78% claiming in-house management.

The leading activities for which organizations rely on outsourced services, either totally or in conjunction with internal resources, are threat research (44%), digital forensics (38%), security monitoring and detection (35%), and e-discovery and legal evidence collection (33%). See Figure 6.

TAKEAWAY

The best use of outsourcing is to augment the organization's competencies, which is what organizations are mostly using cloud services for.

What activities are you handling in-house? What activities have you outsourced, either totally or in part, to outside services through a managed security service provider (MSSP) or in the cloud? ***Check only those that apply to your organization.***

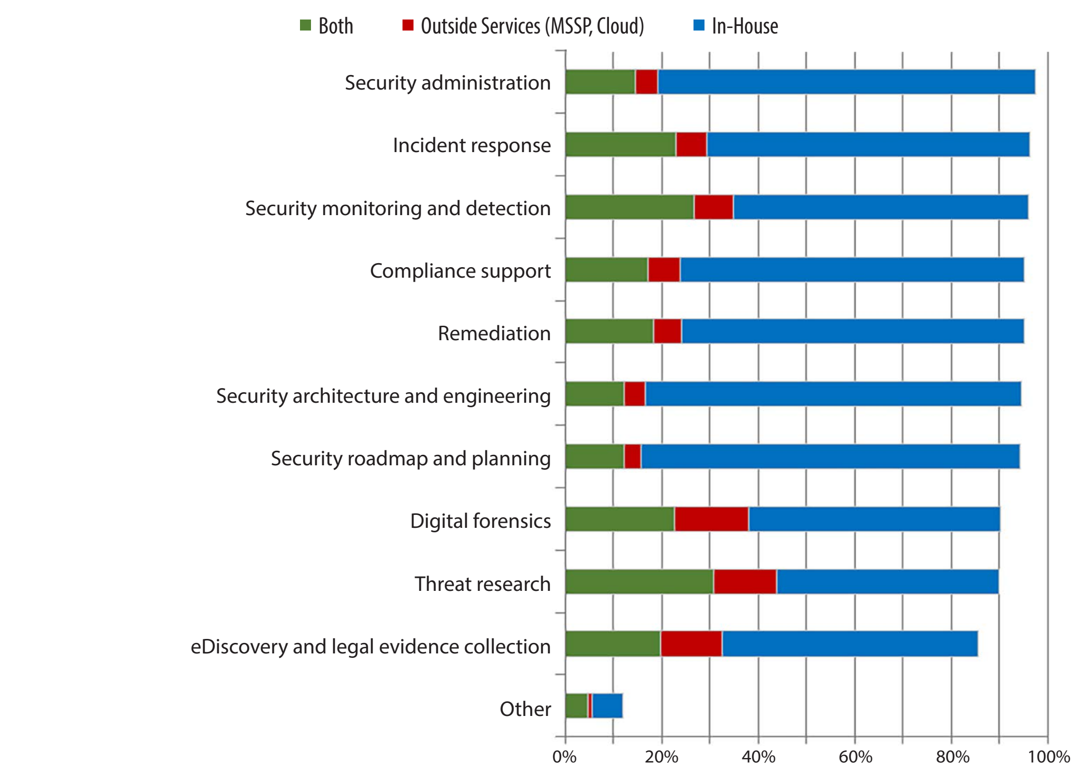


Figure 6. In-House Versus Outsourced SOC Activities

When outsourcing is done well, the upside of a managed/cloud resource is the availability of data from a cross-section of industries and systems from the central vantage point of the managed security service provider (MSSP). The managed service analysts have different environments from which to learn and gain visibility into threats. The downside is reduced customization.

If the organization isn't acting in response to the enhanced visibility, intelligence and use cases, it doesn't actually benefit from outsourcing.

SOC and NOC

Respondents described the SOC relationship to the NOC in multiple ways. There was separation (43%), which included no NOC, no relationship to the NOC and little direct communication. And there was integration to various degrees: 21% work together during emergencies, 20% work together but are not technically integrated, and only 12% are integrated technically (see Figure 7).

What is your SOC's relationship to your network operations center (NOC)?

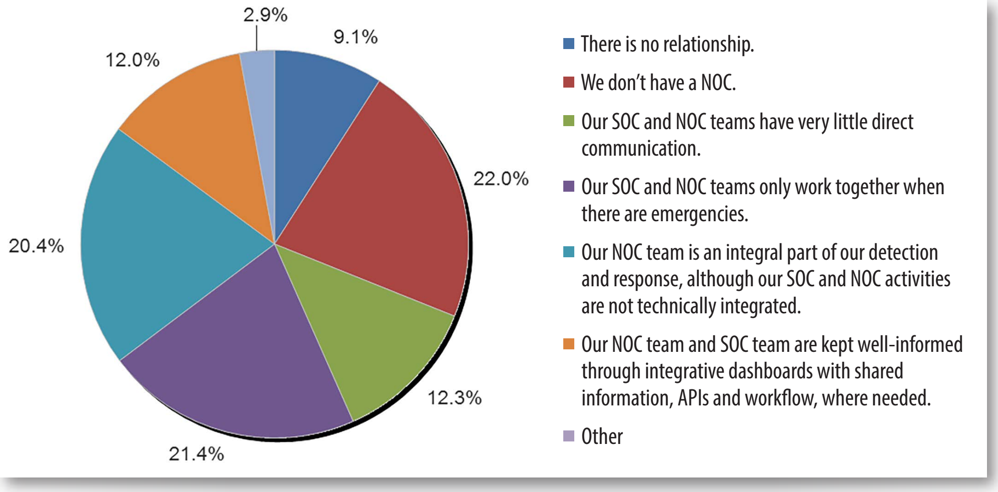


Figure 7. SOC and NOC Relationship

TAKEAWAY

Establish communication requests from the SOC to the NOC for visibility into the ongoing performance of the network, facilitating deconfliction of security incidents from operational problems.

Interaction between the SOC and NOC presents an opportunity for organizations to improve their detection and response capabilities, given that the SOC and NOC have similar objectives: protecting the information assets of the organization and keeping the business running.

In many organizations, separation of duties creates silos of visibility. In the 2017 SANS survey on security integration and optimization, more than 80% of respondents cited significant barriers in reporting, visibility into risk posture and the ability to detect new threats as their top three concerns with respect to lack of integration in their security and response functions.[3] Lack of management buy-in and staffing is also holding them back. Without management support and action, silos will continue to hamper the free sharing of information between SOC, NOC and response personnel.

Establishing standard operating procedures with service-level agreements for the NOC to perform containment actions during incident response is a good use of resources that are already empowered to make operational changes to the network.

[3] "Integrating Prevention, Detection and Response Workflows: SANS Survey on Security Optimization," April 2017, www.sans.org/reading-room/whitepapers/analyst/integrating-prevention-detection-response-work-flows-survey-security-optimization-37730

SOC Capabilities

SOCs carry a lot of responsibility for organizational success, and as such, the capabilities they provide are continuing to grow. Based on responses, there is a lot of crossover between prevention and detection capabilities, while response operations differ greatly. For example, network intrusion detection and response were equally important for detection and prevention, while endpoint detection and response (EDR) was the most used capability for response. There are also some variations: Security information and event management (SIEM) is being used more often for detection and less for prevention—for example, threat intelligence is utilized slightly more for detection than prevention.

As suggested earlier in the architecture section of this paper, SOCs are beginning to combine cloud-based services with their own internal services, and responses show that services are used far more for prevention and detection capabilities. For example, more than 50% of respondent organizations are using some cloud-based services for penetration testing and threat intelligence for their prevention capabilities, while 10% fewer, on average, are using the two services for detection. The highest uses of cloud for detection were denial of service and distributed denial of service (DDoS) at just over 40%; intelligence was the second highest use of cloud-based services for detection at just under 40%.

Meanwhile, cloud services are used far less for response capabilities, where, with the exception of reverse engineering of malware, cloud services are utilized in less than 25% of respondents' organizations.

Prevention?

More than 71% of SOCs provide the top 17 prevention capabilities listed in Figure 8, either internally, through a SOC service or a combination of both.

What type of prevention capabilities are provided by your SOC?

Please indicate whether these services are provided by an internal SOC, a SOC service (including cloud-based) or both. Leave blank those that don't apply.

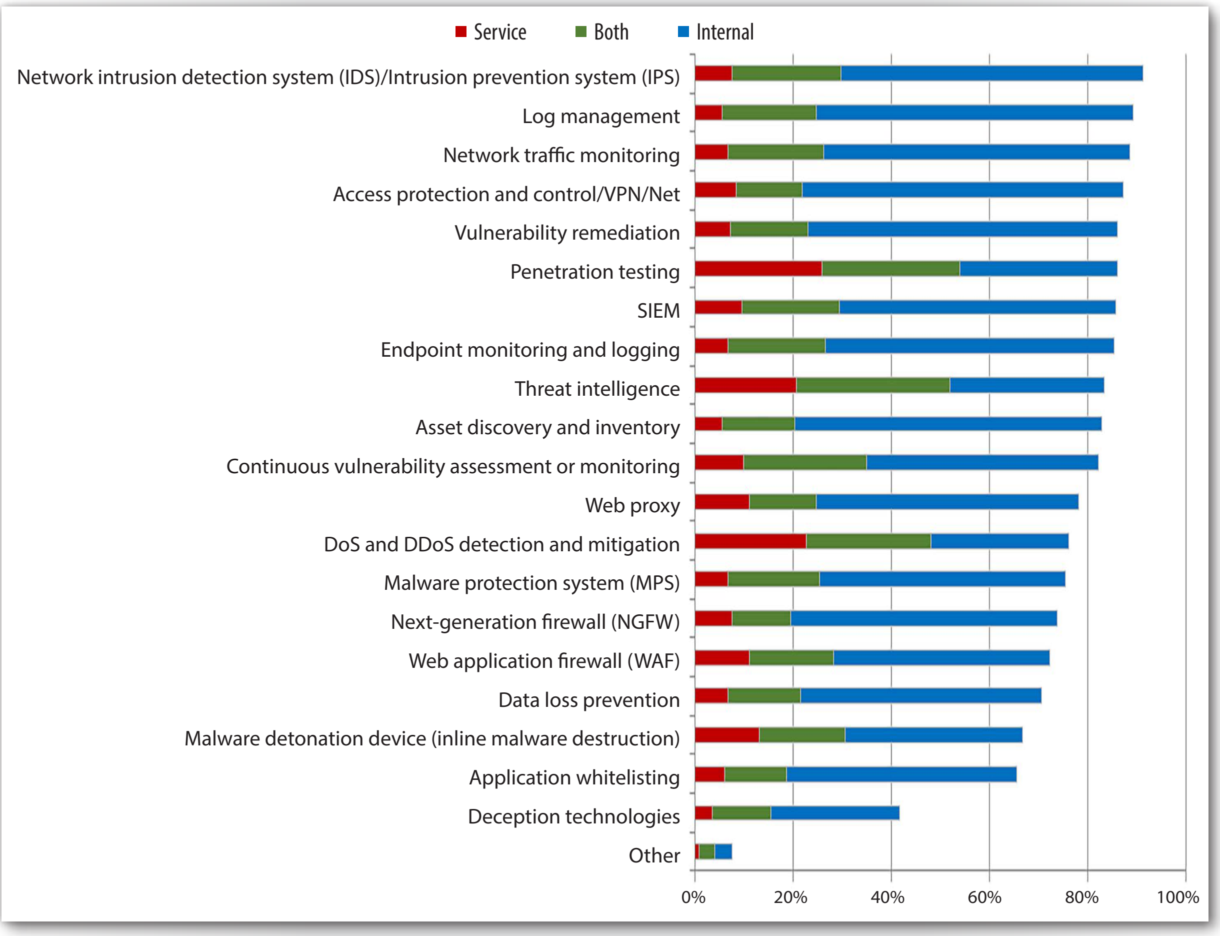


Figure 8. Prevention Capabilities Provided by SOCs

A preventive capability attempts to stop an attack from being successful. In the survey, 91% use in-line network intrusion detection and prevention systems (NIPS) to prevent attacks from succeeding. NIPS are the preventive component of this type of tool. This group of capabilities represents the network-based inspection of traffic content for unwanted actions and the termination of communication once inappropriate content or communications are identified.

Unfortunately, other network-based prevention tools such as next-generation firewalls (NGFWs) and web application firewalls (WAFs) are trailing near the end of the capabilities provided by SOCs, even though these are just as critical.

WAFs are the most specific type of network intrusion prevention, protecting only web applications, which is the probable cause of the lower adoption rate. But the general-purpose NIPS and NGFWs are ill-equipped to deal with custom web applications.

TAKEAWAY

SOCs are inclined to deploy a general-purpose preventive tool with broad coverage capabilities that may be lacking in quality in a preventive arrangement where false positives are intolerable. This creates evasion opportunities for attackers, making it a poor strategy. The better approach is to deploy tuned and targeted prevention tools and develop use cases for detection based on threat intelligence and understanding of deployed systems.

Cloud Services Preventing?

Of the 20 preventive controls listed in Figure 8, not including "Other," less than 10% use 14 of those controls as services. Three answers were 10% to 20% service only, while another three had over 20% service only. Then the picture emerges that the top three SOC functions used solely as services are penetration testing (26%), DoS/DDoS mitigation (23%) and threat intelligence (21%).

These three functions stand out as being far more likely to be outsourced than any of the other control capabilities, given their areas of specialization. They were also the top three in the "both" category of outsourced and internal capabilities but in slightly different order: threat intelligence (31%), penetration testing (28%) and DoS/DDoS mitigation (25%).

The least chosen preventive capabilities offered in the SOC include deception capabilities (42%) and application whitelisting (66%).

Whitelisting Isn't Easy

Application whitelisting is primarily a preventive tool, and there are some detective benefits as well. Yet, in our experience, SOCs are opting not to use application whitelisting because of the overhead of operations in establishing and maintaining the lists. In most environments, the tool to deploy application whitelists is already owned via enterprise versions of Microsoft Windows with AppLocker, available since Windows 7. Many endpoint protection suites also provide the ability to restrict execution. In most IT environments, whitelisting is difficult to maintain and keep up to date.

Detection?

In the survey, 82% of respondents said their SOCs deploy Windows event log monitoring, while 84% use SIEM reporting and analytics; 86% cited log management and network intrusion detection and prevention as their top detection tools. These are baseline detection controls that everyone is familiar with. See Figure 9.

What type of detective capabilities are provided by your SOC?

Please indicate whether these services are provided by an internal SOC, a SOC service (including cloud-based) or both. Leave blank those that don't apply.

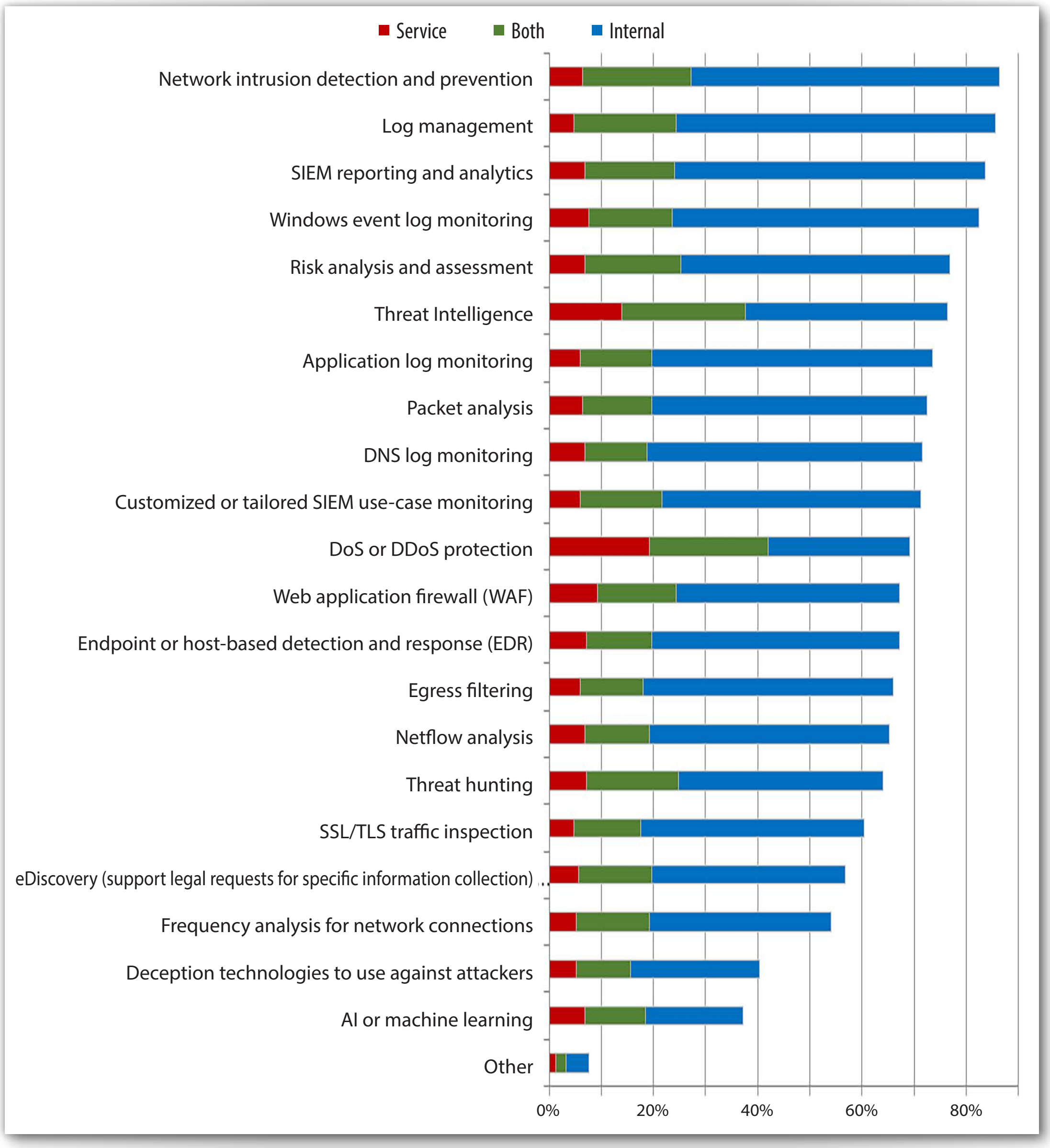


Figure 9. Detection Capabilities

Windows event log monitoring involves potentially overwhelming amounts of data to monitor the health and status of a system. To deal with the overload, a few strategies can be employed. First, organizations can employ targeted inspection for indicators of interest, usually from threat intelligence. This should be applied historically as new threat intelligence comes to light. A second option is threat hunting by analysts for relationships that might not be identified through automated correlation. This process is time consuming, but it's necessary for long-term improvement. Finally, SOCs can use system-provided correlation to identify scenarios of anomalies for detection and validation. This is also called use-case development, and this automation of correlation should be an output from threat hunting exercises.

Cloud Services Detecting?

As you can see from Figure 9 (on the previous page), respondent organizations are adopting even fewer cloud services for their detection functions. But the ones that do stand out—DoS/DDoS detection and threat intelligence—make sense, given that most intelligence providers are third parties and you need to externally choke off DoS attacks before they disrupt business.

Responding to the Call?

Most people think of incident response as the manifestation of the defense of the organization. In practice, we can respond only when we detect. This is where threat intelligence tools—such as adversary deception, threat campaign tracking, threat attribution and threat neutralization—should be used most. Yet these functions score lowest on the list of response capabilities SOCs offer. See Figure 10.

What response services does your SOC perform?

Please indicate whether these services are performed by an internal SOC staff, an outsourced SOC service, or both. Only select those that apply to your organization.

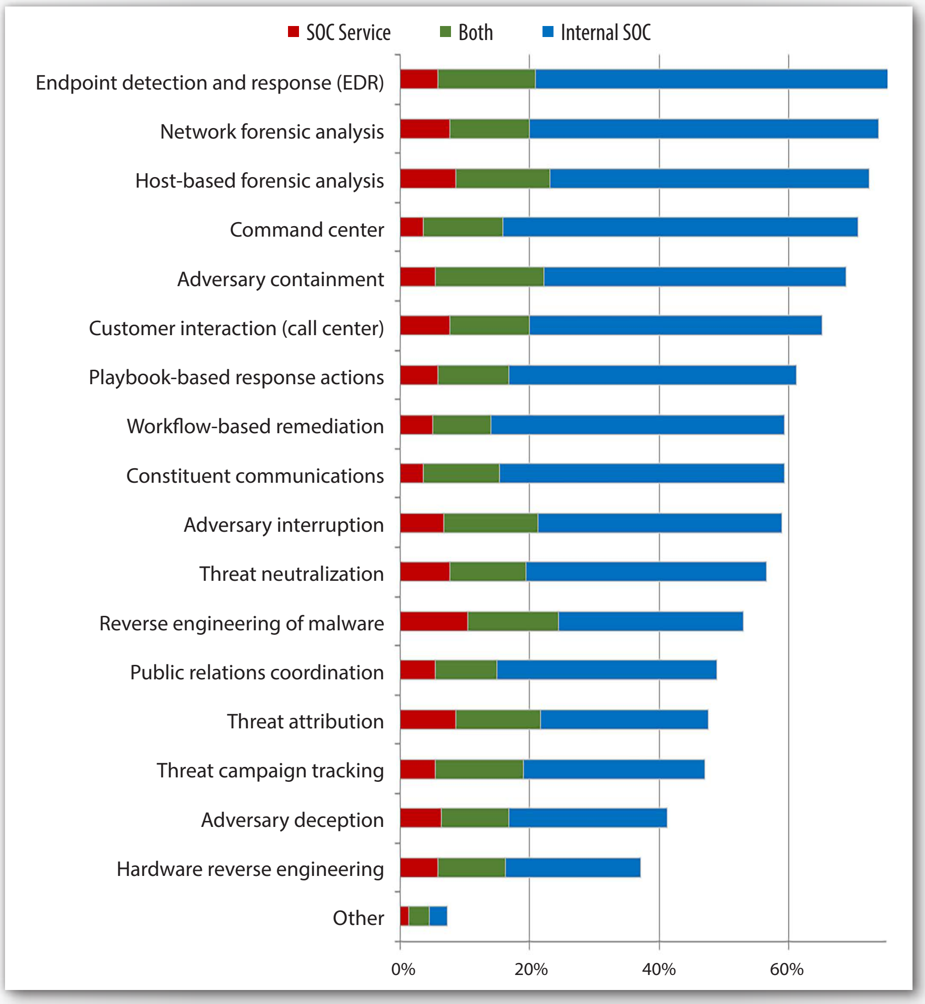


Figure 10. SOC Response Services

Endpoint Focus

Endpoints are the focus of many response capability scenarios, according to SANS surveys, which indicates that user-owned endpoints, in particular, represent the initial point for compromises.[4] Endpoints also represent the "untrusted but internal" users of an organization who are at risk of falling for phishing, being infected by drive-by downloads or carrying application vulnerabilities on their devices.

[4] "Next-Gen Endpoint Risks and Protections: A SANS Survey," March 2017, www.sans.org/reading-room/whitepapers/analyst/next-gen-endpoint-risks-protections-survey-37652

In the case of user endpoints, containment and remediation are easier because there is only a single user impacted by the remediation process. On servers, there is typically a larger community of employees or customers that the containment action affects, sometimes with an unacceptable availability interruption.

Cloud Services Responding?

SOCs use cloud-based services far less for response capabilities, which survey takers indicated is mostly done in-house. This makes sense, given that most tool vendors follow events and provide advice, maps and even patches. But remediation and other response functions are generally up to the impacted organizations to handle.

Organizations most commonly outsourced reverse engineering, likely because specialization is required and it is infrequently needed to perform incident response.

Monitoring Things?

Interestingly, the Internet of Things (IoT)—all the stuff that's connected to computer networks that isn't a traditional user system like a phone or a laptop—is not getting much SOC coverage. See Figure 11.

TAKEAWAY

SOCs need to act as the equivalent to "911" for computer emergencies. They should have clear means for customers to report issues. Yet in the survey, only 65% of respondents said they have this capability in any form.

Does your SOC support nontraditional computing devices (Internet of Things, such as smart sensors, building devices, building monitoring, manufacturing and industrial control systems, etc.)?

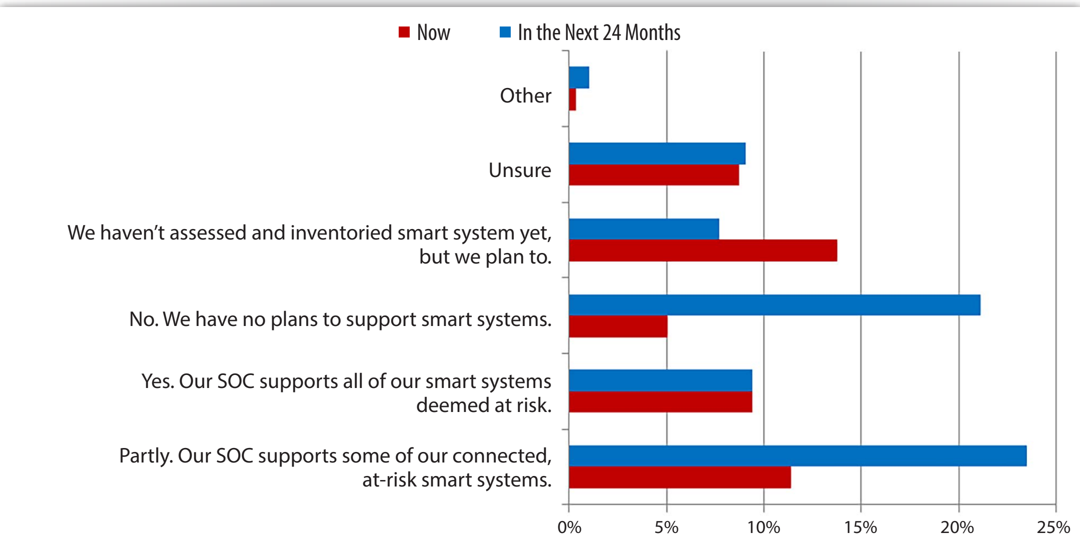
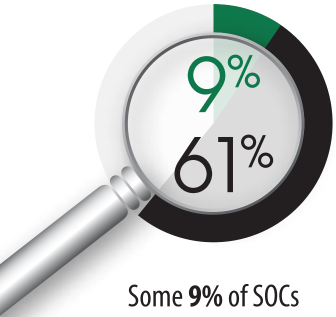


Figure 11. SOC Support of Nontraditional Computing Devices

Only 9% said they support all organizational IoT systems, while 21% currently have no plans for their SOC to support smart systems. The most common answer was that currently there's partial coverage (24%).

Logging?

Central collection and aggregation of all logs and longer retention times (even if it takes a long time to access the logs) facilitates effective monitoring, cyber threat intelligence and threat hunting. Further, logs facilitate the root-cause inspection of compromises that started well before the initial detection. Yet, according to respondents, only 9% are centralizing 100% of their logs, while the largest group (26%) centralize 51% to 75% of logs, as illustrated in Figure 12.



Some **9%** of SOCs fully aggregate logs centrally, even though **61%** of respondents said they're currently "centralized into a single SOC." Even SOCs that are "centralized" often don't centralize log data.

What percentage of logs, including all application-, network-, host- and infrastructure-related logs, are centrally collected by your SOC?

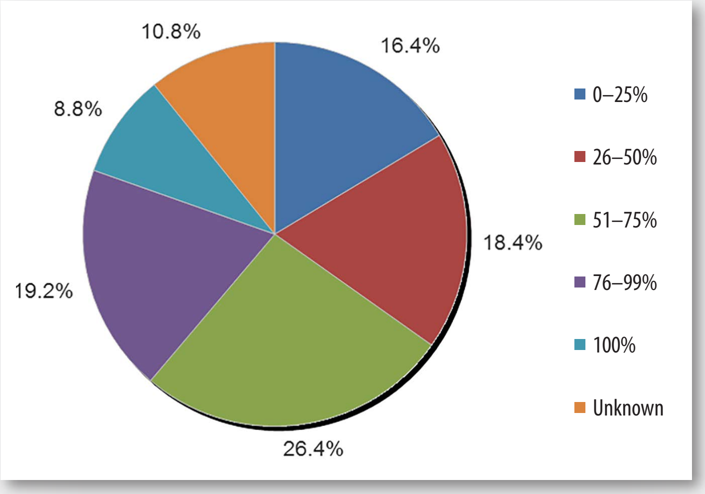


Figure 12. Centralization of Logs

Operating without all available data is an often-encountered situation in incident response activity. There are a few possible explanations for not centralizing 100% of logs, including:

- **The technical challenge of getting all the data to a single place.** Network bandwidth can be expensive, and shipping log data is frequently foregone.
- **The political challenge in receiving the logs.** Considering that many SOCs serve in an advisory role rather than a technical analytical capacity, they receive data only when some subordinate part of the organization requests assistance and shares specific data.
- **The space limitation challenge of retaining logs.** Most SOCs retain and store logs for a limited duration, which is discussed next.

Of the logs that are being retained for the SOC, 57% of regulated data is retained for one year or less, while 42% of unregulated data is retained for one year or less. This is adequate if the incidents being investigated are fully wrapped up within one year. Unfortunately, industry studies such as Verizon's 2016 data breach report and SANS surveys show there is a longer duration than one year before discovery in many instances.[5, 6]

Making Sense?

In the survey, 77% of respondents said their SOCs are using SIEM tools to stitch together the disparate sources and look for patterns. This is a costly proposition, but usually more cost-effective than custom, internally developed APIs and dashboards, which 23% of respondents said they are using. See Figure 13.

TAKEAWAY:

Collection of information is valuable for the purpose of correlation. Aggregating massive amounts of data to look for anomalies is what the SOC does as a matter of ongoing operations.

How does your SOC correlate and analyze event data, IOCs and other security- and threat-related data?
Select those that most apply.

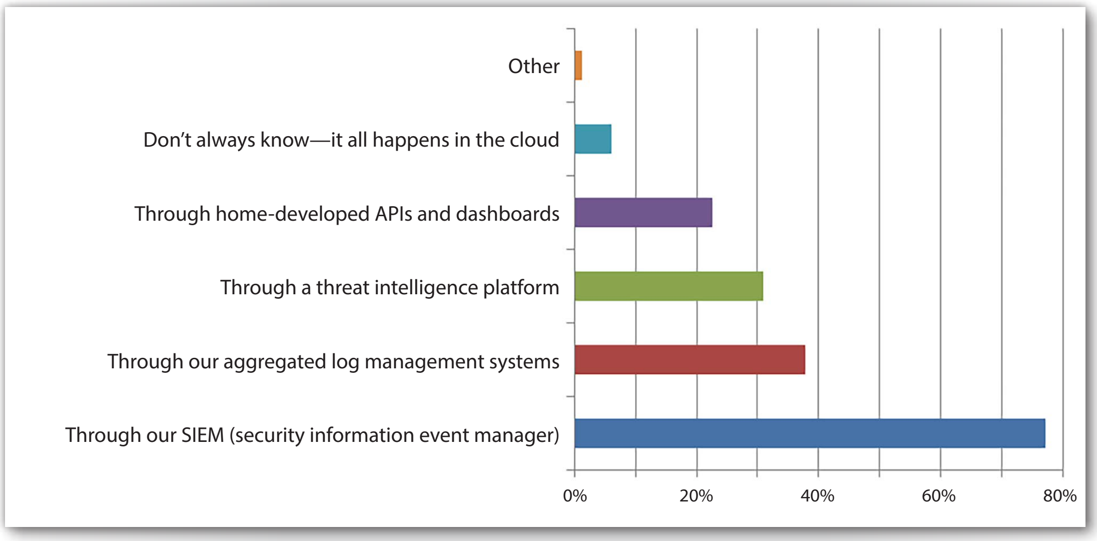


Figure 13. Data Correlation and Analysis Methodologies

As with most of our questions, respondents were able to select all that apply so there is some overlap, reflecting the real-world environments in which teams use multiple tools to perform analytics functions.

[5] "2016 Verizon Data Breach Investigations Report," www.verizonenterprise.com/verizon-insights-lab/dbir

[6] "Incident Response Capabilities in 2016: The 2016 SANS Incident Response Survey," June 2016, www.sans.org/reading-room/whitepapers/analyst/incident-response-capabilities-2016-2016-incident-response-survey-37047

There are many specialized systems in place to assist with pattern matching and guidance. For example, cyber threat intelligence (CTI) platforms, selected by 38% of respondents as part of their SOC capability, have created opportunities to correlate information. Their ongoing collection of attacker behavior helps analysts seek out indicators, such as:

- IP addresses
- SMTP gateways
- Malware programming techniques
- Commonly employed adversary tactics
- Adversary working hours
- Preferred targets

In the survey, 38% of respondents said they are using log collection and aggregation tools to analyze their event data. Or, as one respondent candidly responded, they correlate through "luck, mostly." SIEM tools tend to have a challenge with massive amounts of data because they attempt to process everything as it is ingested. On the other hand, log aggregation maintains a raw collection of data, with analytical processing happening as needed.

Threat hunting is an area of responsibility for the SOC. Even with an armada of equipment and software, analysts must tune that technology to suit the organization's changing IT landscape, as well as the adaptive threat environment. The adversaries defrauding and damaging organizations are human. Adversaries are adaptive, motivated and profitable. Some SOCs are embracing threat hunting as a part of standard operations.

Hunting Means Looking for Something

The lucky ones are those who are looking for something rather than waiting for it to find them. This involves collecting data (registry, process, file, user, etc.) and correlating it to find suspicious behavior in your enterprise environment. Every correlation and use case built into EDR, SIEM and incident response platforms or homegrown tools stems from an analyst investigating something that is a bit off.

Responses show that organizations are using multiple platforms to help with the correlation, meaning there are multiple platforms and consoles from which analysts collect, correlate and remediate.

Threat hunting with automated data collection and correlation improves the speed with which analysts can investigate and remediate unknown threats. For known threats, inclusion of learned intelligence in correlation engines is the way to improve accuracy and performance.

SOCs are clearly on their toes for incident definition. In this survey, only 17% of respondents lack a formal definition of what an incident is or is not, which is an important starting measurement for defenders and analysts alike (see Figure 14).

Which of these most closely resembles your organization's definition of a security incident?

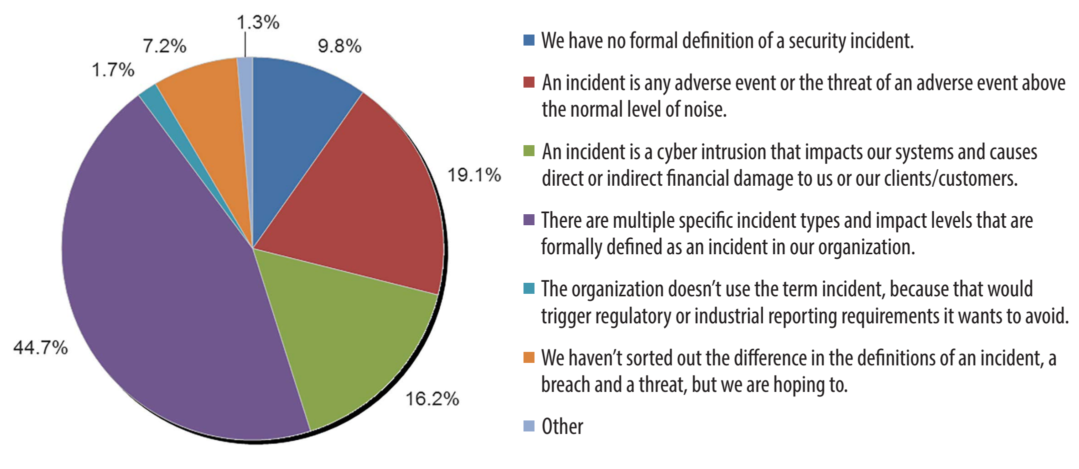


Figure 14. Organizational Definitions of "Incident"

An incident is "an observed and declared occurrence of the compromise or imminent compromise of our system."

—Survey respondent

The prospect of running a SOC without a formal definition of what is appropriate to detect or respond to represents a major obstacle to effective SOC operation. Most organizations (45%) do have a formal definition with specific impact categories. The next largest group uses a less formal approach: "any adverse event above the normal level of noise."

Even the 2% who stated their organization purposefully avoids the term incident because it would trigger legal action know what they're trying to avoid. This represents an interesting but not uncommon problem. All SOCs must conform to the legal guidance provided by the organization, and there are specific actions that might be very expensive for the organization. This legal maneuvering takes care and caution. The danger is when the legal caution prevents the SOC from doing optimal work.

Assessing the SOC?

Ed Koch, former mayor of New York, was well known for a persistent and affable request for performance metrics. At press conferences, he often asked, "How 'm I doing?" Yet, according to the survey, only 57% of respondents know they have SOC metrics. The rest either answered "no" or "unknown" as to whether metrics are available. That means 43% of the SOCs don't know "how they're doing," and they're not actually asking the necessary questions to find out. See Figure 15.

Does your SOC provide metrics that can be used in your reports and dashboards to gauge the ongoing status of and effectiveness of your SOC's capabilities?

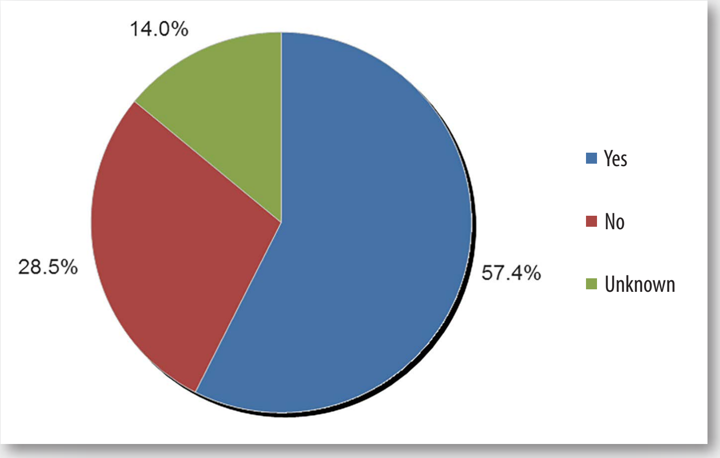


Figure 15. Use of Metrics

TAKEAWAY:

Not attempting to measure your SOC's operational performance is a lot like trying to land an airplane without the benefit of an altimeter: An accurate measure of an important attribute of the distance between the plane and the earth helps to assure the plane will land safely.

As survey results show, compiling metrics involves a substantial amount of manual work, with 69% of respondents saying the process is either a substantial or completely manual effort. See Figure 16.

Manual vs. Automated Metrics Condensed Results

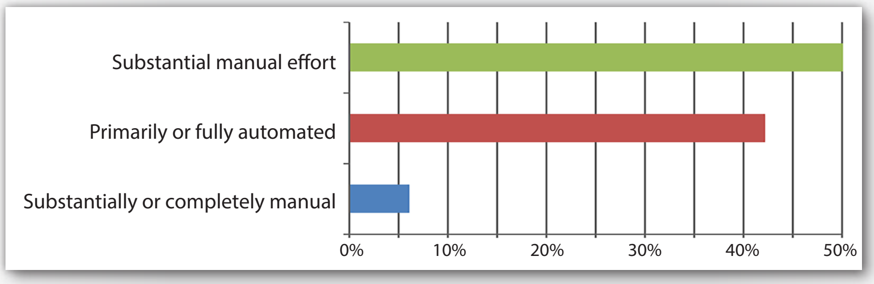


Figure 16. Manual Versus Automated Effort to Produce Metrics

If you compare this with Jaquith's assertion of what a metric should be, we see that the manual components are not in alignment with the ideal state: "consistently measured, without subjective criteria; cheap to gather, preferably in an automated way…."[7]

The key is to equip the systems for data collection and compile the data on an ongoing basis to see what the SOC is doing and how well it is doing it. Figure 17 shows how the 57% of respondents who are collecting metrics are tracking and reporting on them.

How are metrics tracked and reported?

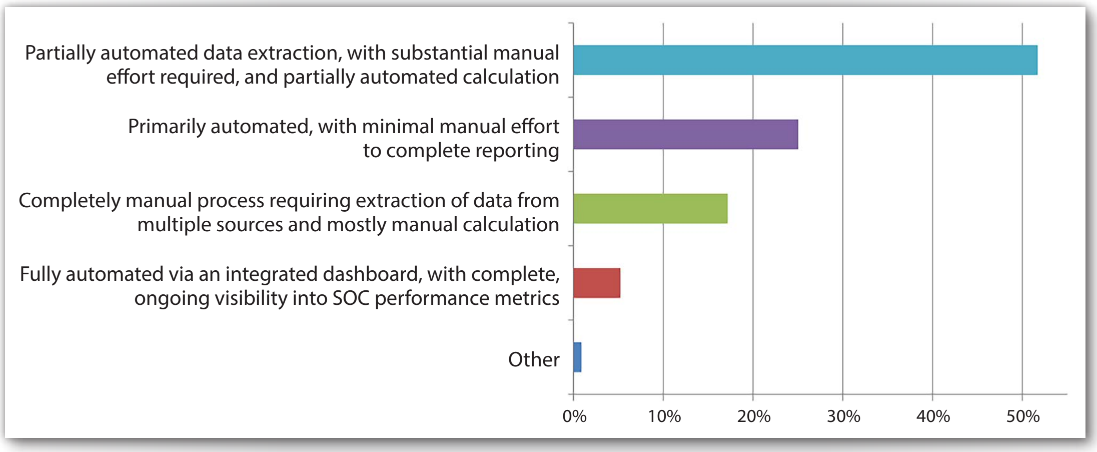


Figure 17. How SOCs Track and Report Metrics

Security Expert on Metrics

"A good metric should be: consistently measured, without subjective criteria; cheap to gather, preferably in an automated way; expressed as a cardinal number or percentage, not with qualitative labels like "high," "medium" and "low"; expressed using at least one unit of measure, such as "defects," "hours" or "dollars." Ideally it should also be "contextually specific, relevant enough to decision-makers so that they can take action."

It's a simple analogy. Anyone can relate. But we frequently lack such simple metrics for SOCs.[8]

[7] Jaquith, Andrew. Security Metrics: Replacing Fear, Uncertainty, and Doubt. Upper Saddle River, NJ: Addison-Wesley, 2010. p. 22.

[8] Jaquith, Andrew. Security Metrics: Replacing Fear, Uncertainty, and Doubt. Upper Saddle River, NJ: Addison-Wesley, 2010. p. 22

Metrics Tracked

Primarily, those organizations that do track metrics are looking at how many times they respond to an incident, followed by whether or not those occurrences were based on a known threat and time to contain. See Figure 18 for a full list of metrics respondents are tracking.

Metrics Collected

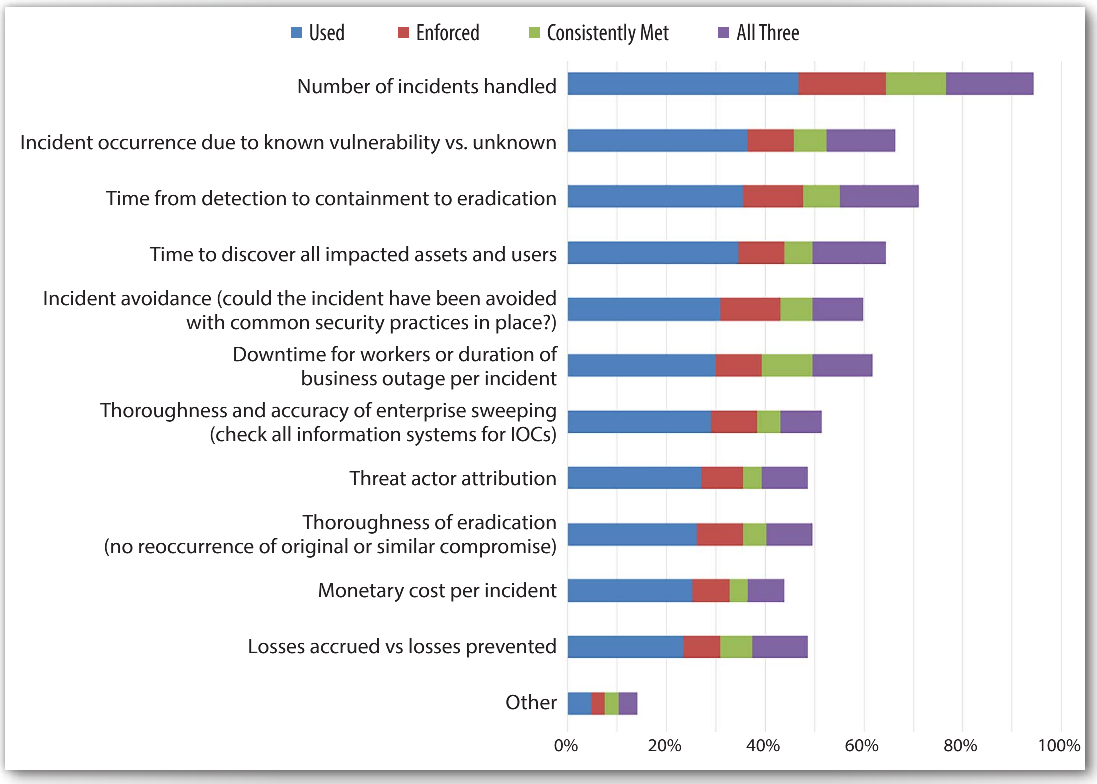


Figure 18. Metrics Collected

Interestingly, there's a sense of "enforcement" and "meeting an objective" with the number of incidents handled. Attackers determine how many times they will attack—it's not in the security options purview of control. While an important measure of the activity of the SOC, a simple number of incidents isn't "contextually specific, relevant enough to decision-makers so that they can take action." Perhaps the count is used as a moving average display? If so, that's much more useful. That's the sort of display of collected data that provides contextual relevance: It would identify change in volume of incidents.

Most Important Metrics

The most important metrics to the SOC are time-based measures: time to detection, time to containment from detection and time to eradication from detection. Of course there are many others that are important, but these three get to the crux of SOC functionality. The data source can be a ticketing system or any action-tracking software. The label is "hours." It meets Jaquith's guidance for consistently measured, as all tickets opened would be tracked.

Satisfaction with Performance

Those collecting metrics are most satisfied with their own flexibility of response. See Figure 19.

Percent Satisfied Versus Percent Answered

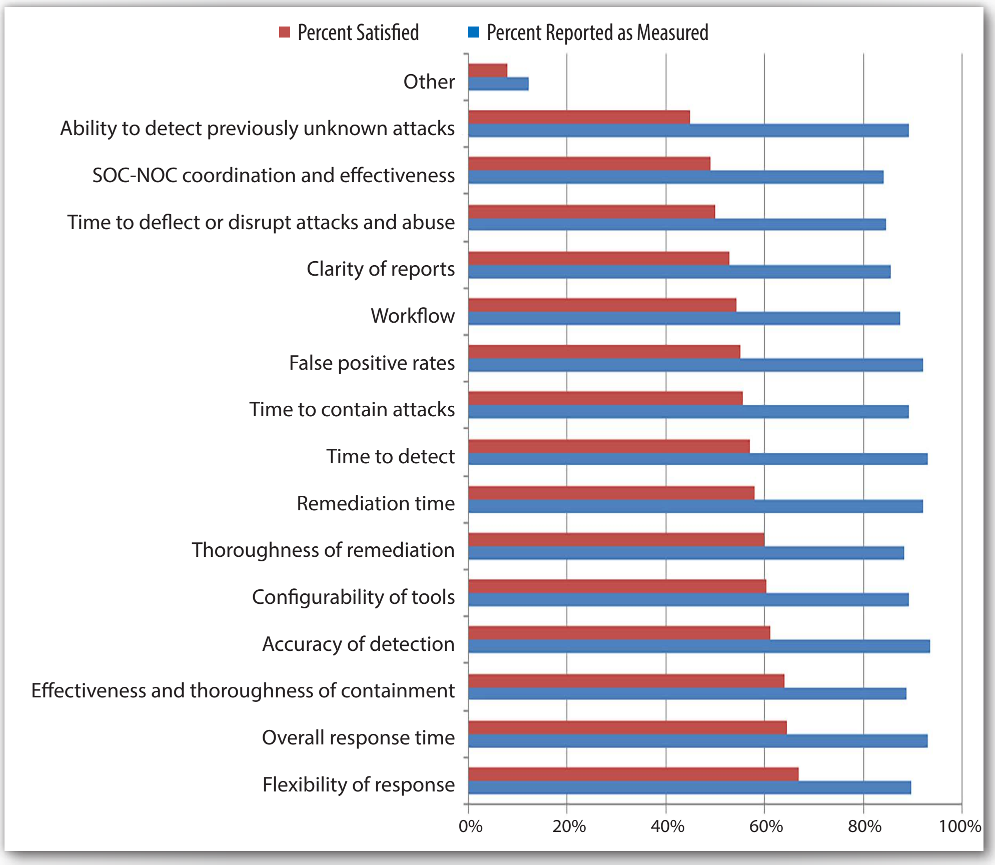


Figure 19. Satisfaction with Metrics

If the "Satisfied" rankings were a report card, our parents would be disappointed.

Addressing unknown problems means discovering them. This entails unveiling what appears to be normal as actually problematic. Taking this step includes looking for malicious activity via log review, etc. Second, this entails analysis using externally provided information, as well as developing internal threat information via threat hunting.

Respondents are most satisfied with their SOC's flexibility response. While it is common advice to be flexible, and this is very important, routines and automation are methods for efficiency and speed, which are represented by the second-most satisfied response, "Overall response time." Speed of discovery and satisfaction with discovering likely incidents in advance is an advisable strategic and tactical objective. This likely takes the form of more organizational awareness, which leads to better SIEM use cases, which is further informed by threat intelligence.

Conclusion

The SOC is a new and developing space architected in many ways across organizations with some consensus on what should be done: log, monitor, correlate and respond. The notion of an incident seems to be clear in the SOC, yet performance assessment capability and alignment to business appears lacking and is an important area for improvement.

The survey highlights that a lot of SOC data collection and analysis is done via manual methods, meaning the need to sift through and correlate hundreds of events every day. Automation of data collection and analysis can empower SOC teams to deal with the overwhelming number of alerts with confidence.

Results also show that many organizations are moving some portion of their SOC to managed service providers. This model seeks efficiency by transferring tasks to a third party, but it risks diminishing the tailored actions and localized knowledge associated with the needs of the business.

The use of clearly articulated metrics to express performance offers an opportunity to improve SOCs. Development of useful metrics requires reuse of available data and selection of performance criteria that are valuable to the specific business needs and measure the effectiveness of the SOCs detection and remediation activities. Metrics are challenging, however, because there's not always a consensus on what makes good metrics within the SOC.

Another opportunity for enhancement is more effective collaboration between NOCs and SOCs. Organizations have been performing IT operations for a long time, while SOCs typically are newer phenomena. The SOC and NOC can share data access to help IT operations make effective architecture decisions and to help the SOC make effective containment and monitoring decisions. Hunting and correlation are other areas organizations should improve on over the next 24 months.

The alchemical formula for completely effective SOCs won't be cracked in the immediate future. But over the course of the next year, we will likely see a better community consensus of what a SOC is.

About the Author

Christopher Crowley, a principal SANS instructor and course author for SANS courses in Managing Security Operations and Incident Response Team Management, holds multiple certifications. He received the SANS 2009 Local Mentor of the Year award for excellence in providing mentor classes to his local community. Chris is a consultant based in Washington, D.C., who has more than 15 years of experience in managing and securing networks. His areas of expertise include network and mobile penetration testing, mobile device deployments, security operations, incident response and forensic analysis.

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