Using Splunk to Comply With NIST Standards and Get Authorization to Operate

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Date | Washington, DC
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Introduction

▶ Antonio (Tony) Porras
  • I have been using Splunk about 10 years
  • I stated as a design engineer; designing network equipment
  • Have been doing security since before it was known as cybersecurity
  • I am also an Attorney
    • Don’t hold it against me!
    • Disclaimer: This does not create an Attorney/Client privilege.
Agenda

- The ATO process
- Review NIST standard
- Splunk ES and NIST
- Living with NIST ATO system
- Next steps
What is Authorization to Operate (ATO)

▶ **ATO is agency specific**
  - Agency is accepting the risk that your organization will run information system securely
  - ATO must be given before your system becomes operational
  - There are periodic re-inspections to make sure the risk level of your system has not changed

▶ **The agency uses the NIST standards to evaluate the information system’s security posture**
  - NIST FIPS 199 is used to determine the potential impact level of the data loss if the data in the system is compromised
  - NIST 800-53 identifies the necessary controls needed to protect the data in the system based on the impact level determined by the analysis done using the NIST FIPS 199
  - NIST 800-37 outlines the Risk Management Framework (RMF) and the continuous monitoring of the security controls selected in NIST 800-53
The system is built for DHS/CBP
- It was one of the first inspections after high profile breach of OPM in 2015
- New inspection team
- Requirements not clearly settled

The system has the highest FISMA classification because of the type of data we process is very sensitive
- Confidentiality: High
- Integrity: High
- Availability: Moderate

ATO deliverables
- Demonstrate that our controls protect the data being processed
- Independent Vendor Verification
- Vulnerability Testing
We have a small implementation team (5 people)
  • Over 600 remote users all over the country
  • Re-inspection every 6 months
    • Had to automate as much as possible
Nature of our data is high value target
  • Real threat of data loss
  • Many security tools, some overlap
    • IPS, antivirus, multiple factor authentication
  • Data segmentation
Compliance
  • Have to prove that we are doing what we say we are doing
  • Very burdensome inspections
Our Approach

- Establish clear system boundary
  - Traceability of all that data goes in and out of the system boundary
  - Account for all the software and hardware that is inside the system boundary
  - Track all user access to the data inside the system boundary

- Be able to protect our system from attacks
  - Implement control systems that will protect the data
  - Be able to react in real time or as close to real time to issues
  - Quickly determine positive from false positive issues

- Demonstrate that the data is protected
  - Be able to provide the government agency reports and data to prove that the data is being protected
  - Re-inspection every 6 months
Requires Federal agencies to assess their information systems for 3 objectives

- Confidentiality – A loss of confidentiality is the unauthorized disclosure of information
- Integrity – A loss of integrity is the unauthorized modification or destruction of information
- Availability – A loss of availability is the disruption of access to or use of the information

The impact is categorized as

- Low – The loss could be expected to have a limited adverse effect
- Moderate – The loss could be expected to have a serious adverse effect
- High – The loss could be expected to have a severe or catastrophic adverse effect

The security controls needed to comply are based on the impact level of each category
<table>
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<th>Potential Impact</th>
<th>Definitions</th>
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| Low              | The potential impact is **low** if—The loss of confidentiality, integrity, or availability could be expected to have a **limited** adverse effect on organizational operations, organizational assets, or individuals.  
A limited adverse effect means that, for example, the loss of confidentiality, integrity, or availability might: (i) cause a degradation in mission capability to an extent and duration that the organization is able to perform its primary functions, but the effectiveness of the functions is noticeably reduced; (ii) result in minor damage to organizational assets; (iii) result in minor financial loss; or (iv) result in minor harm to individuals. |
| Moderate         | The potential impact is **moderate** if—The loss of confidentiality, integrity, or availability could be expected to have a **serious** adverse effect on organizational operations, organizational assets, or individuals.  
A serious adverse effect means that, for example, the loss of confidentiality, integrity, or availability might: (i) cause a significant degradation in mission capability to an extent and duration that the organization is able to perform its primary functions, but the effectiveness of the functions is significantly reduced; (ii) result in significant damage to organizational assets; (iii) result in significant financial loss; or (iv) result in significant harm to individuals that does not involve loss of life or serious life threatening injuries. |
| High             | The potential impact is **high** if—The loss of confidentiality, integrity, or availability could be expected to have a **severe or catastrophic** adverse effect on organizational operations, organizational assets, or individuals.  
A severe or catastrophic adverse effect means that, for example, the loss of confidentiality, integrity, or availability might: (i) cause a severe degradation in or loss of mission capability to an extent and duration that the organization is not able to perform one or more of its primary functions; (ii) result in major damage to organizational assets; (iii) result in major financial loss; or (iv) result in severe or catastrophic harm to individuals involving loss of life or serious life threatening injuries. |
NIST Special Publication 800-53

- NIST 800-53 defines the controls available to secure an information system based on the impact level of the data that is being protected
- It’s a living document and its changing as needed
  - Our first implementation started with revision 3
  - When revision 4 came out it added data privacy controls
- Current version is revision 4
  - Revision 5 is in public draft
  - Major change is that it will shift focus from addressing Federal systems to all systems
- DoD is requiring its suppliers to adhere to NIST 800-171
  - It’s an 800-53 lite
- Currently 18 Control Families
NIST 800-53 Control Families
Control Families 800-53

- AC - Access Control
- AU - Audit and Accountability
- AT - Awareness and Training
- CM - Configuration Management
- CP - Contingency Planning
- IA - Identification and Authentication
- IR - Incident Response
- MA - Maintenance
- MP - Media Protection
- RA - Risk Assessment
- CA - Security Assessment and Authorization
- SC - System and Communications Protection
- SI - System and Information Integrity
- SA - System and Services Acquisition
- PS - Personnel Security
- PE - Physical and Environmental Protection
- PL - Planning
- PM - Program Management
NIST Special Publication 800-37

NIST 800-37 outlines the Risk Management Framework (RMF) and the continuous monitoring of the security controls selected in NIST 800-53.
Federal Trade Commission (FTC) is becoming the cybersecurity police

- Cybersecurity breaches are being seen as an “unfair or deceptive business practice in or affecting commerce”
  - In 2015, FTC brought an action against Wyndham Worldwide Corp. because it had been hacked 3 times and if failed to protect customer data
  - In 2016, FTC brought an action against ASUS for having critical security flaws in its routers and putting home networks at risk
  - In 2017, FTC brought an action against D-Link, alleging that inadequate security measures taken by the company left its wireless routes and internet cameras vulnerable to hackers

FTC “Making sure companies keep their privacy promises to consumers”

- Companies must have “Reasonable Security”
- Reasonable security is what has been published by government agencies to protect systems
- NIST Standards are the published and mandated government standards
Why NIST?

- National Institute of Standards and Technology (NIST) developed framework for approaching risk in information systems

- Biggest risk to information systems today?

- NIST has become the standard for cybersecurity frameworks

- NIST will become the de facto standard of care of Cybersecurity litigation

- Holistic approach for security
Splunk

Evaluation

• Splunk Enterprise w/ FISMA App vs Splunk Enterprise Security

Splunk ES

• Flexibility and adaptability to new and changing requirements
• Allowed us to start with a lot of controls that were covered with minor modifications and configuration (64 controls)
• Full SIEM capability to alert of possible threats
• Quick incident response investigations tracking
• Automate generation of reports to provide evidence of our implementation

Government agencies are using Splunk

• Common language to communicate
Implemented ES as the top level reporting tool
- Ability to change security tools without changing reporting
- Many security tools: IPS, Antivirus, HIDS, 2 Factor, Firewalls
- Able to meet the log requirements

We are required to implement and monitor 507 controls
- 64 are directly mapped to ES out of the box
- Can probably increase in next re-inspection

Ability to provide evidence of compliance
- Provide reports based on the controls we monitor
- Provide compound reports to show security metrics
- Automate the creation of report
Selected Controls

- Our strategy is to have as many controls possible being monitored through Splunk
  - Easy to monitor
  - Automate the creation of inspection reports

- Example of easy ones:
  - Account Management: AC-2
  - Incident Monitoring: IR-5
  - Continuous Monitoring: CA-7

- Examples of interesting ones:
  - Information System Backup: CP-9
  - Information System Component Inventory: CM-8
  - System and Information Integrity Policy and Procedures: SI-1
Splunk ES and NIST 800-37

- Risk management framework NIST 800-37
  - Monitoring the controls that were selected from NIST 800-53 as determined by NIST 199
  - Able to automate the report creation for inspections

- Real Time Threat Intelligence
  - Investigating as they pop up
  - Trackability and resolution
  - Resolve inside of ES

- Incident Response
  - Tracking and resolving issues from the same interface
  - Ability to document the investigations
  - Able to prioritize the issues
Living with NIST ATO System

- Mitigate the risk
  - Following the controls helps us protect our system
  - ES gives us visibility into the system in real time
  - Threat intelligence helps us look at external threats

- Able to manage with a small team
  - Inspections every 6 months
  - Ability to focused on problem areas
  - Helps us with regular IT issues

- Getting better as we learn
  - VPN Access, tracked location
    - We extended to alert on non US activity and multiple sessions
  - Get performance data to help operations
Going Forward

- Ability to manage risk in real time
- The standard is changing and we need to adapt quickly
- Threats are also changing
- We see that we can leverage User Behavior Analytics to further distinguish false positives
- Goal is automate more of the inspection reports
- Add more controls that can be covered by Splunk
  - Will help with inspection artifacts
  - Simplify inspection
Things to Consider

▶ Leverage ES
  • Can help small teams with big tasks

▶ Monitoring
  • A must for security

▶ Validate compliance
  • If done right, compliance will make you more secure
  • It’s a daily task
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