

## 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

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#### 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



## **ATO For Our System**

- The system is built for DHS/CBP
  - It was one of the first inspection 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 process
  - Independent Vendor Verification

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Vulnerability Testing



#### **Rubber Meets the Road**

#### ► 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



## **NIST FIPS Publication 199**

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



#### **NIST FIPS Publication 199**

#### **Table 2: Potential Impact Levels**

| Potential<br>Impact | Definitions   |
|---------------------|---|
| Low                 | The potential impact is <b>low</b> if—The loss of confidentiality, integrity, or availability could be expected to have a <b>limited</b> adverse effect on organizational operations, organizational assets, or individuals. <sup>7</sup>   |
|                     | A limited adverse effect means that, for example, the loss of confidentiality, integrity, or<br>availability might: (i) cause a degradation in mission capability to an extent and duration that the<br>organization is able to perform its primary functions, but the effectiveness of the functions is<br>noticeably reduced; (ii) result in minor damage to organizational assets; (iii) result in minor<br>financial loss; or (iv) result in minor harm to individuals.   |
| Moderate            | The potential impact is <b>moderate</b> if—The loss of confidentiality, integrity, or availability could be expected to have a <b>serious</b> adverse effect on organizational operations, organizational assets, or individuals.   |
|                     | A serious adverse effect means that, for example, the loss of confidentiality, integrity, or<br>availability might: (i) cause a significant degradation in mission capability to an extent and duration<br>that the organization is able to perform its primary functions, but the effectiveness of the functions<br>is significantly reduced; (ii) result in significant damage to organizational assets; (iii) result in<br>significant financial loss; or (iv) result in significant harm to individuals that does not involve loss<br>of life or serious life threatening injuries. |
| High                | The potential impact is <b>high</b> if—The loss of confidentiality, integrity, or availability could be expected to have a <b>severe or catastrophic</b> 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.  |

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## **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



#### **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

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## **Non-Government Agency NIST**

#### ► 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 where 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



## Splunk ES and NIST 800-53

- 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

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#### Monitoring

- A must for security
- Validate compliance
  - If done right, compliance will make you more secure
  - It's a daily task



# Thank You

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