Pivotal

Improving Security while Reducing Toil with DevSecOps

Paul Czarkowski
@pczarkowski

Pivotal

Agenda

- Who I Am ✓
- Compliance
- DevOps
- DevOps + Compliance
- Q+A

Compliance ?

What is Compliance ?

Self Imposed

- CIS Controls / Benchmarks
- Security Technical Implementation Guide (STIG)
- Allowed opensource licenses

Regulatory

- PCI (US)
- HIPAA (US)
- Sarbanes-Oxley (US)
- EU GDPR
- NZ Information Security Manual (NZISM)

Compliance

Specifications

Documentation of requirements that need to be met in order to be compliant.

- PDFs
- Verbose

Controls

Checklists

Practice, Policy or Procedure established to meet compliance requirements.

- Spreadsheets
- Checklists
- Sharepoint Pages

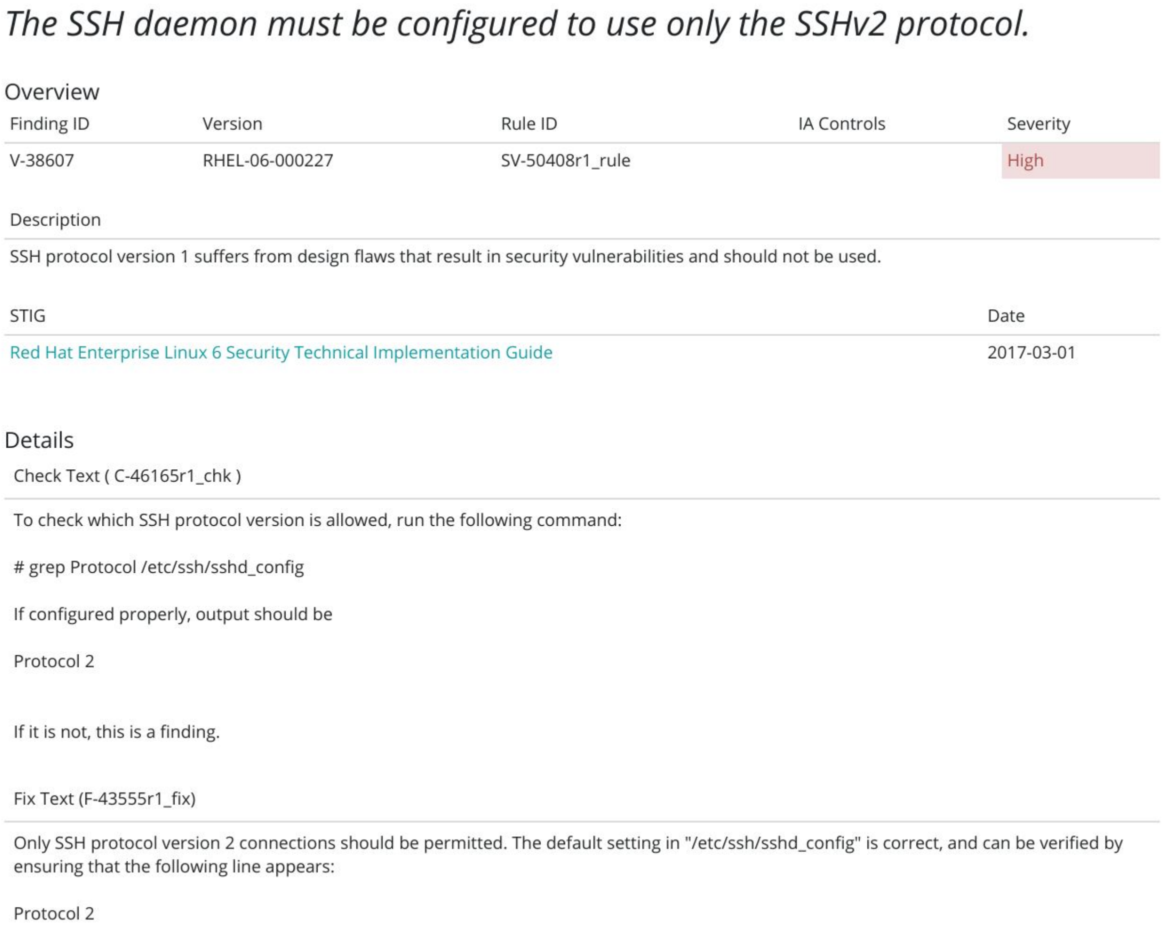
Audit

Verification

Validation of compliance based on Controls in place.

- Checklists
- External Auditors

Example of Compliance Specifications



The SSH daemon must be configured to use only the SSHv2 protocol.

Overview

Finding ID	Version	Rule ID	IA Controls	Severity
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Details

Check Text (C-46165r1_chk)

To check which SSH protocol version is allowed, run the following command:

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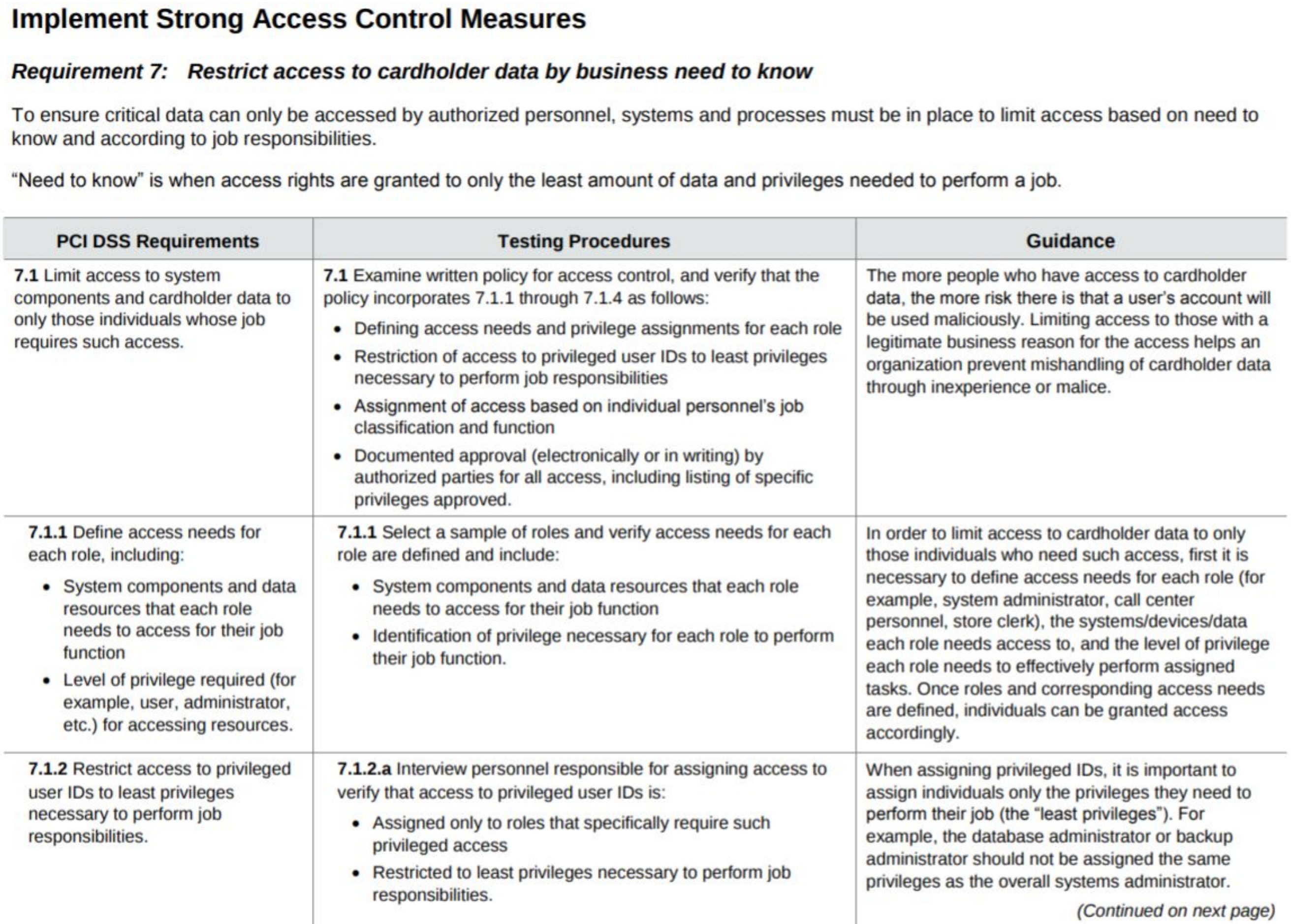

Implement Strong Access Control Measures

Requirement 7: Restrict access to cardholder data by business need to know

To ensure critical data can only be accessed by authorized personnel, systems and processes must be in place to limit access based on need to know and according to job responsibilities.

"Need to know" is when access rights are granted to only the least amount of data and privileges needed to perform a job.

PCI DSS Requirements	Testing Procedures	Guidance
7.1 Limit access to system components and cardholder data to only those individuals whose job requires such access.	**7.1** Examine written policy for access control, and verify that the policy incorporates 7.1.1 through 7.1.4 as follows: • Defining access needs and privilege assignments for each role • Restriction of access to privileged user IDs to least privileges necessary to perform job responsibilities • Assignment of access based on individual personnel's job classification and function • Documented approval (electronically or in writing) by authorized parties for all access, including listing of specific privileges approved.	The more people who have access to cardholder data, the more risk there is that a user's account will be used maliciously. Limiting access to those with a legitimate business reason for the access helps an organization prevent mishandling of cardholder data through inexperience or malice.
7.1.1 Define access needs for each role, including: • System components and data resources that each role needs to access for their job function • Level of privilege required (for example, user, administrator, etc.) for accessing resources.	**7.1.1** Select a sample of roles and verify access needs for each role are defined and include: • System components and data resources that each role needs to access for their job function • Identification of privilege necessary for each role to perform their job function.	In order to limit access to cardholder data to only those individuals who need such access, first it is necessary to define access needs for each role (for example, system administrator, call center personnel, store clerk), the systems/devices/data each role needs access to, and the level of privilege each role needs to effectively perform assigned tasks. Once roles and corresponding access needs are defined, individuals can be granted access accordingly.
7.1.2 Restrict access to privileged user IDs to least privileges necessary to perform job responsibilities.	**7.1.2.a** Interview personnel responsible for assigning access to verify that access to privileged user IDs is: • Assigned only to roles that specifically require such privileged access • Restricted to least privileges necessary to perform job responsibilities.	When assigning privileged IDs, it is important to assign individuals only the privileges they need to perform their job (the "least privileges"). For example, the database administrator or backup administrator should not be assigned the same privileges as the overall systems administrator. *(Continued on next page)*

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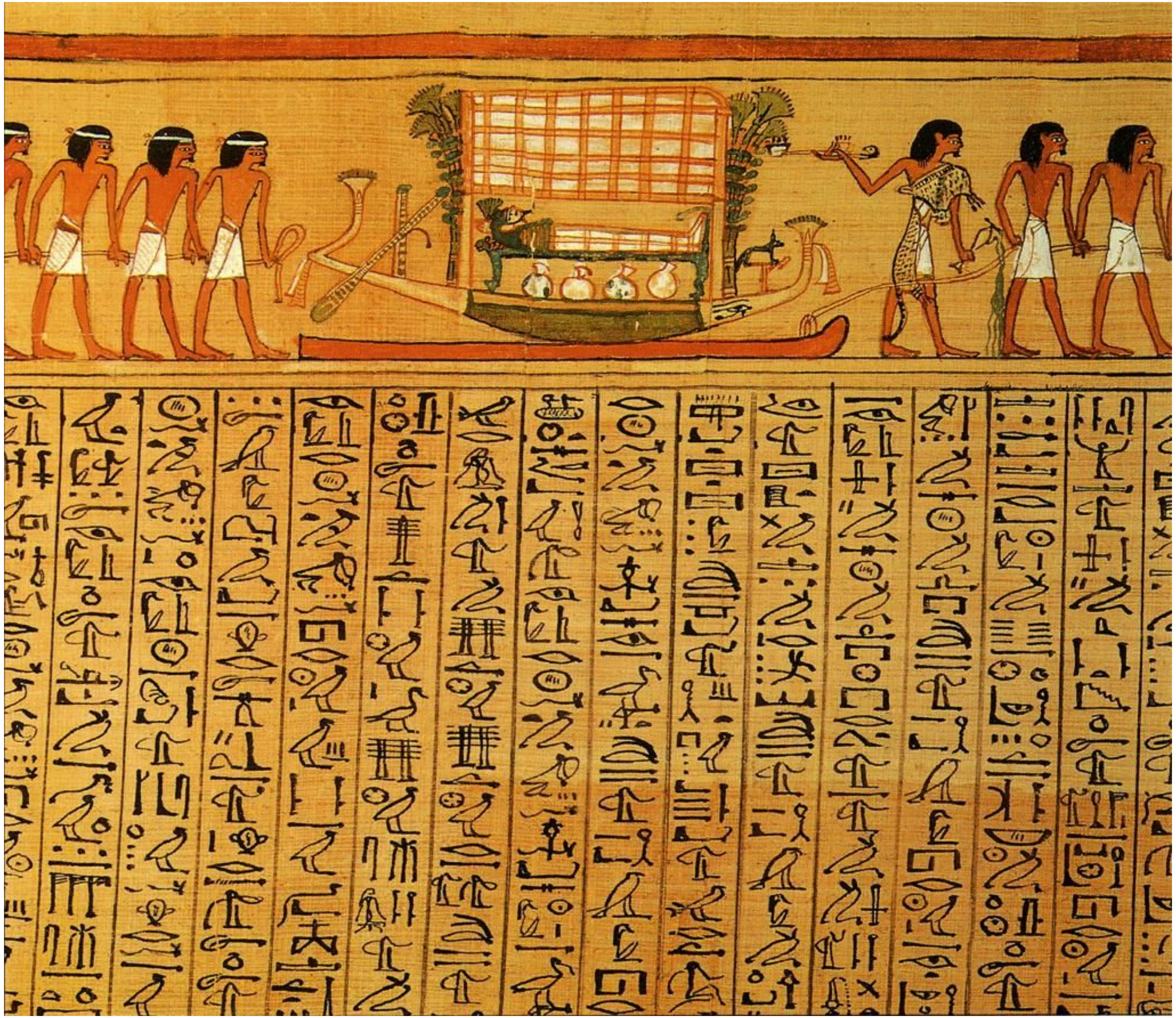
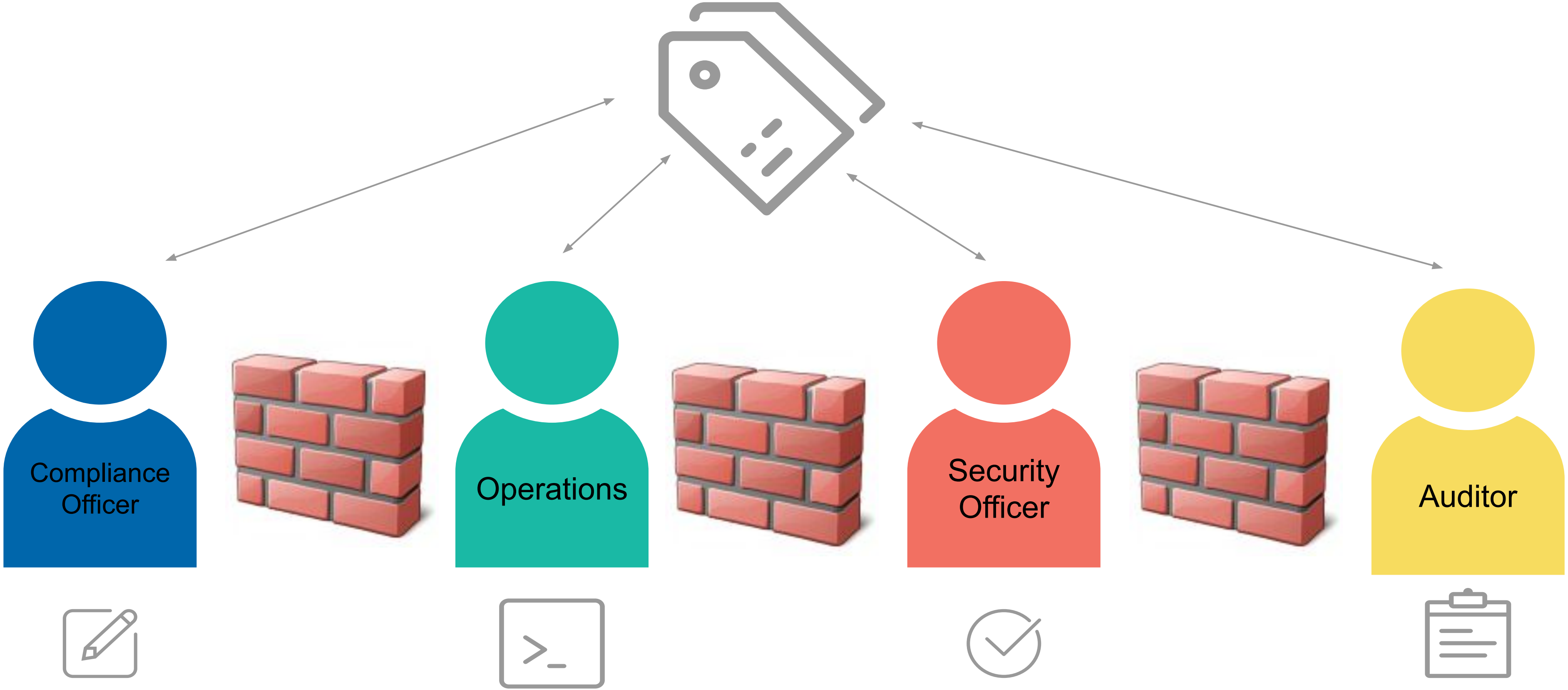
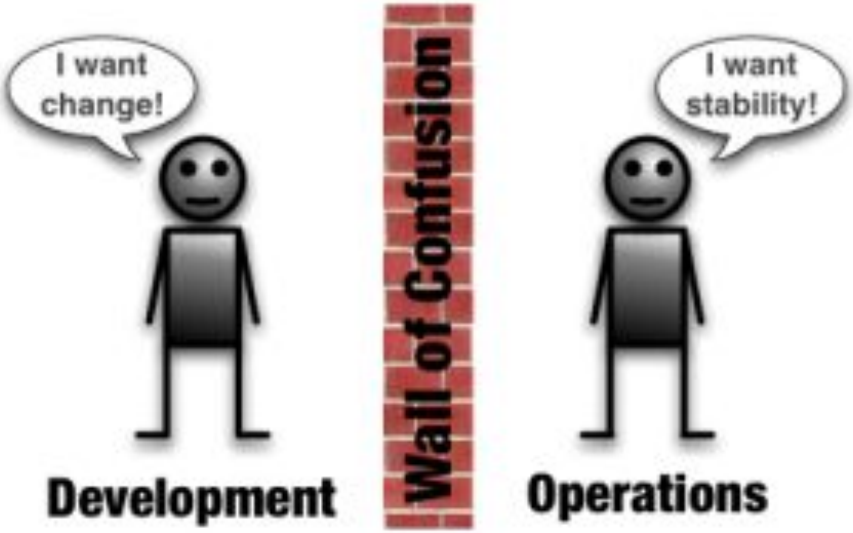
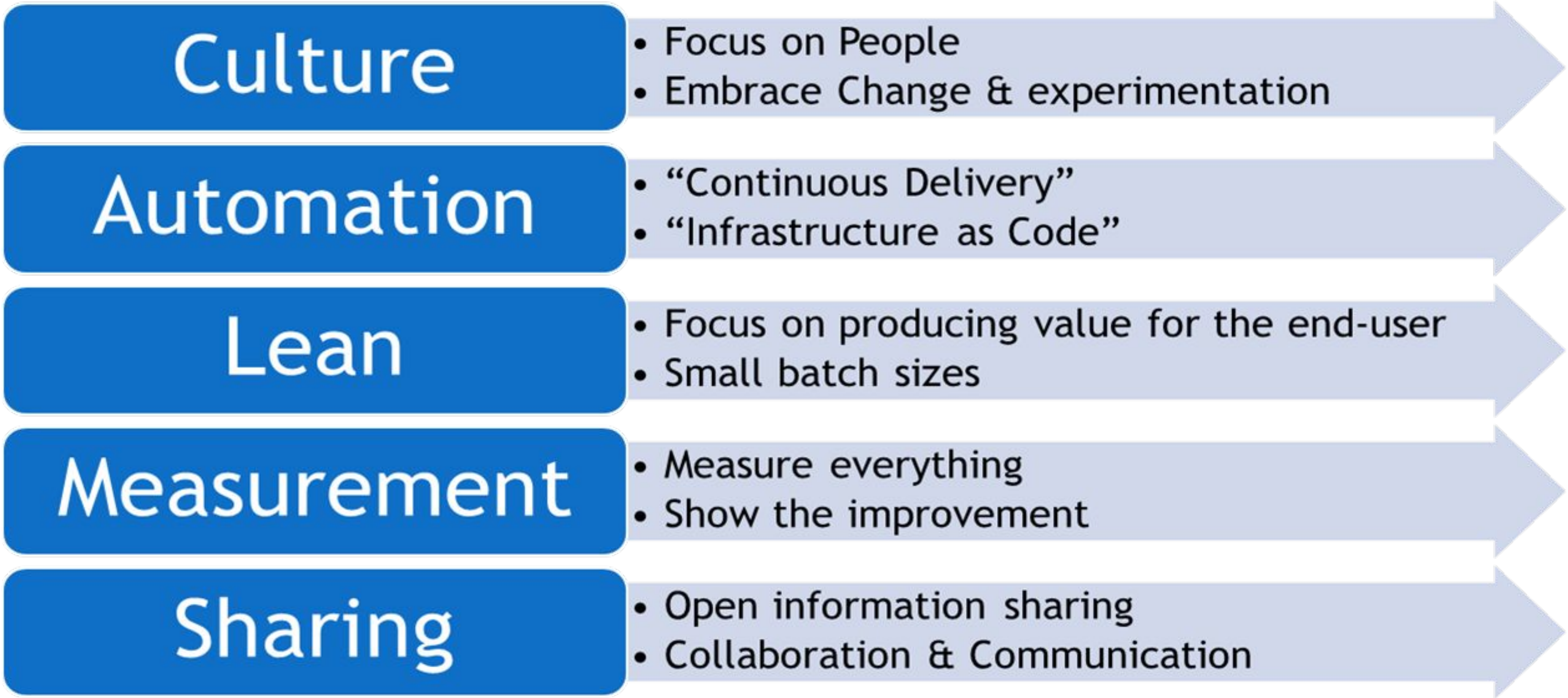



Compliance Officer
Operations
Security Officer
Auditor

DevOps


I want change!
Development
Wall of Confusion
I want stability!
Operations



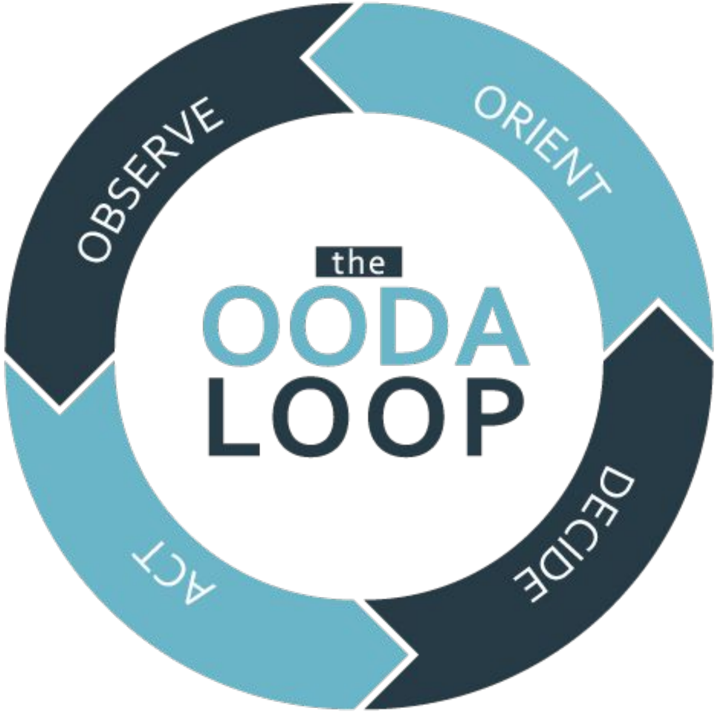
Culture
- Focus on People
- Embrace Change & experimentation

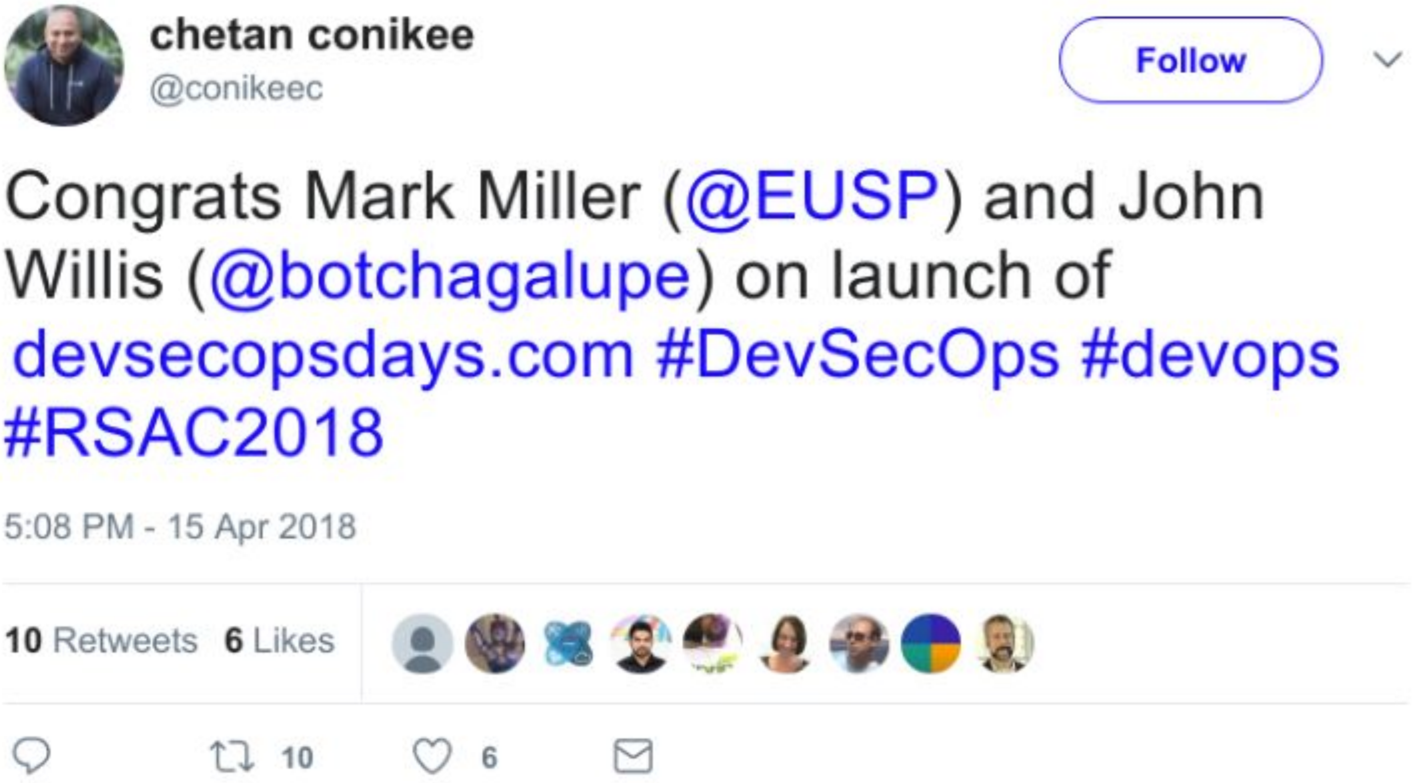
Automation
- “Continuous Delivery”
- “Infrastructure as Code”

Lean
- Focus on producing value for the end-user
- Small batch sizes

Measurement
- Measure everything
- Show the improvement

Sharing
- Open information sharing
- Collaboration & Communication


the
OODA
LOOP
OBSERVE
ORIENT
DECIDE
ACT



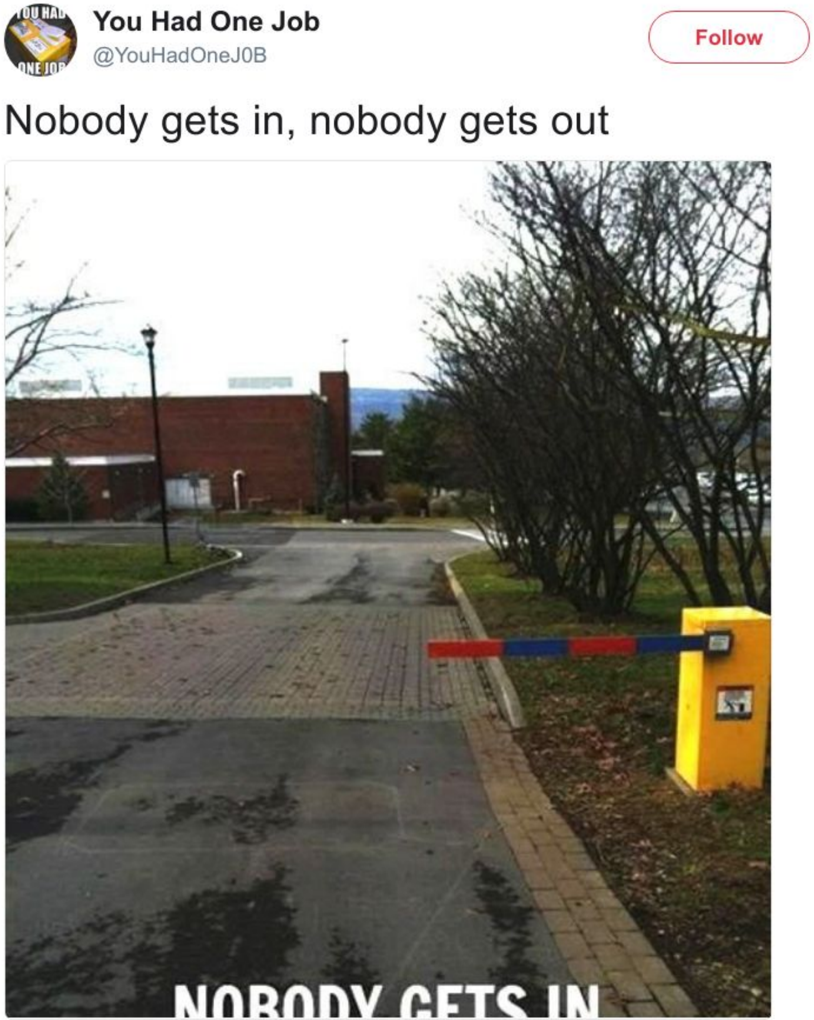
chetan conikee
@conikeec

Congrats Mark Miller (@EUSP) and John Willis (@botchagalupe) on launch of devsecopsdays.com #DevSecOps #devops #RSAC2018

5:08 PM - 15 Apr 2018

10 Retweets 6 Likes

http://blog.d2-si.fr/2016/02/22/devopsconnection/



You Had One Job
@YouHadOneJ0B

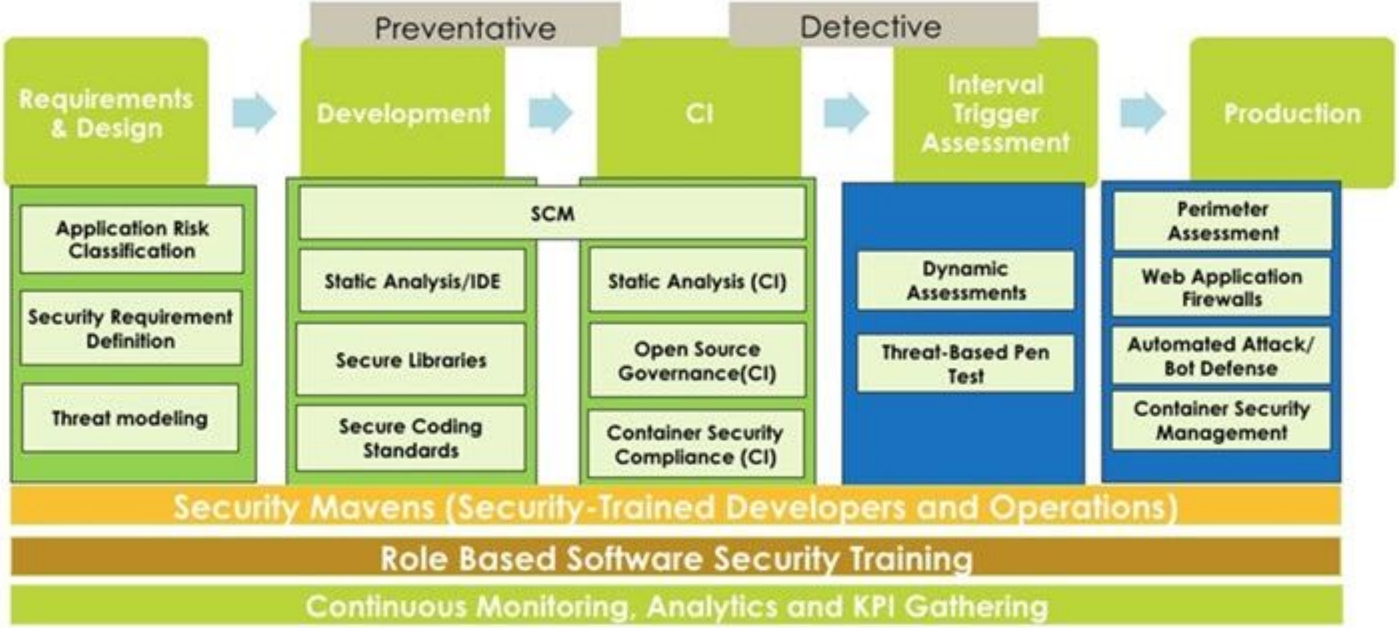
Nobody gets in, nobody gets out

Rugged DevOps

DevSecOps

Secure DevOps

Implementing DevOps in a Regulated Environment



Preventative

Detective

Requirements & Design

- Application Risk Classification
- Security Requirement Definition
- Threat modeling

Development

- Static Analysis/IDE
- Secure Libraries
- Secure Coding Standards

SCM

CI

- Static Analysis (CI)
- Open Source Governance(CI)
- Container Security Compliance (CI)

Interval Trigger Assessment

- Dynamic Assessments
- Threat-Based Pen Test

Production

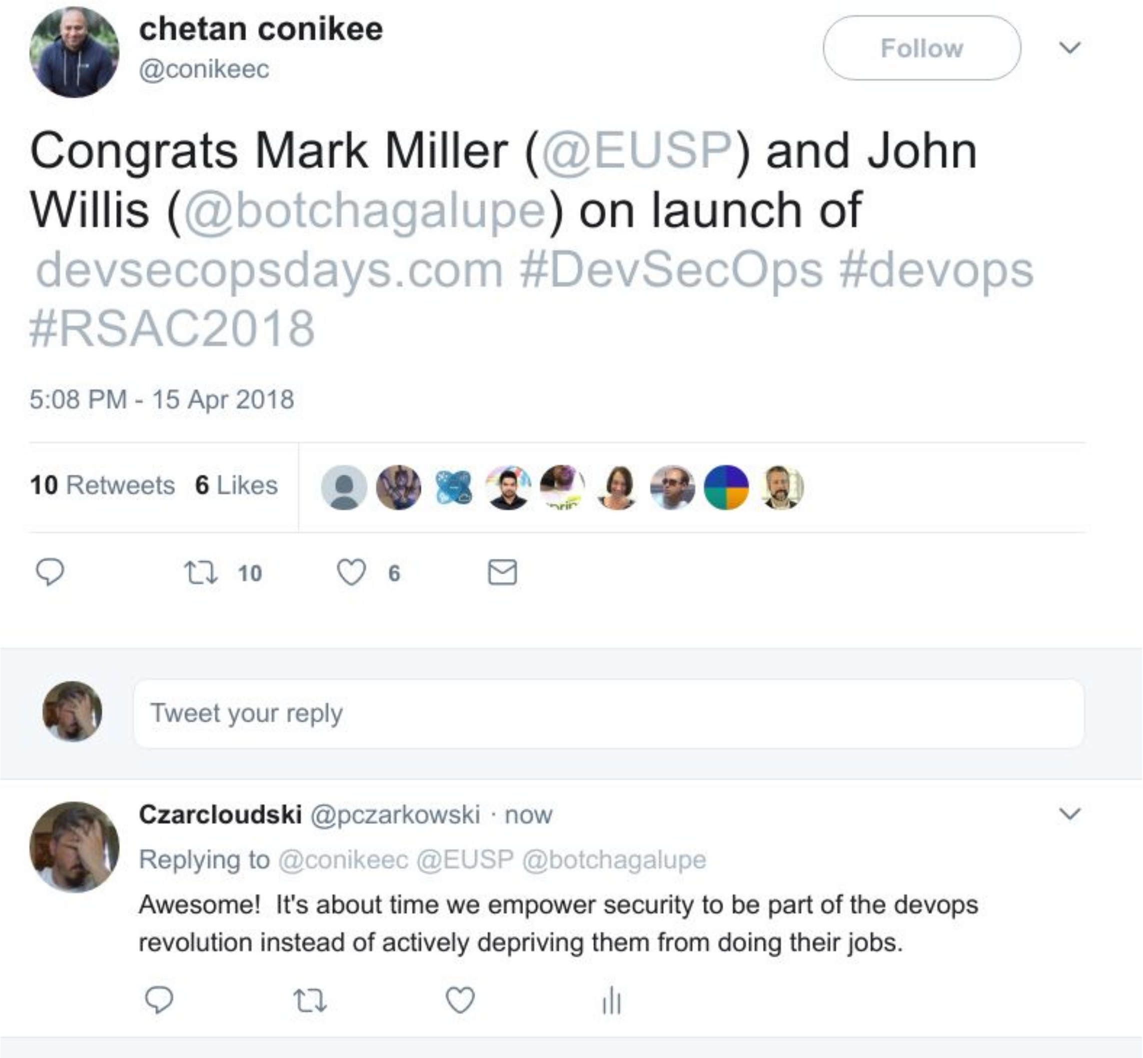
- Perimeter Assessment
- Web Application Firewalls
- Automated Attack/ Bot Defense
- Container Security Management

Security Mavens (Security-Trained Developers and Operations)

Role Based Software Security Training

Continuous Monitoring, Analytics and KPI Gathering

https://www.devsecopsdays.com/articles/its-just-a-name



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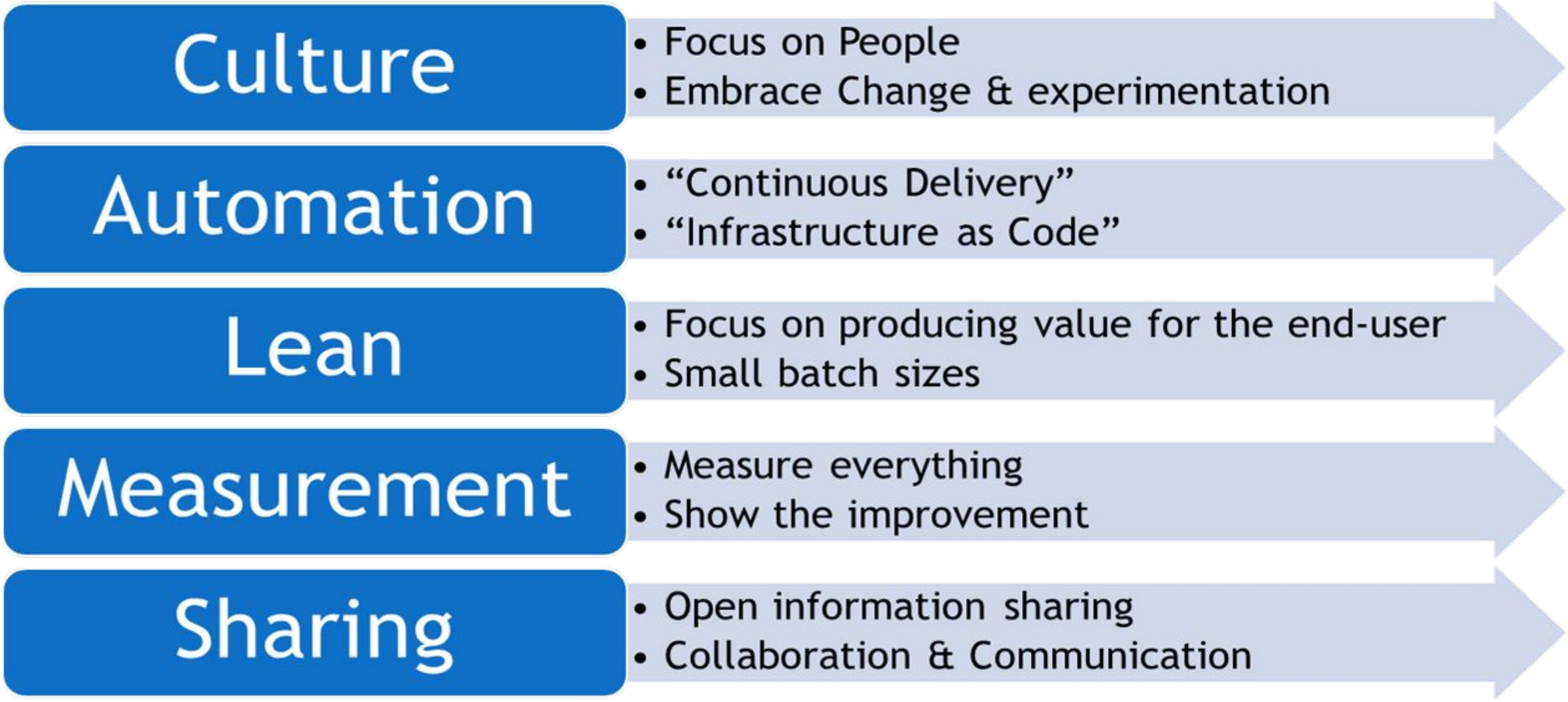
10 Retweets **6** Likes

Czarcloudski @pczarkowski · now

Replying to @conikeec @EUSP @botchagalupe

Awesome! It's about time we empower security to be part of the devops revolution instead of actively depriving them from doing their jobs.



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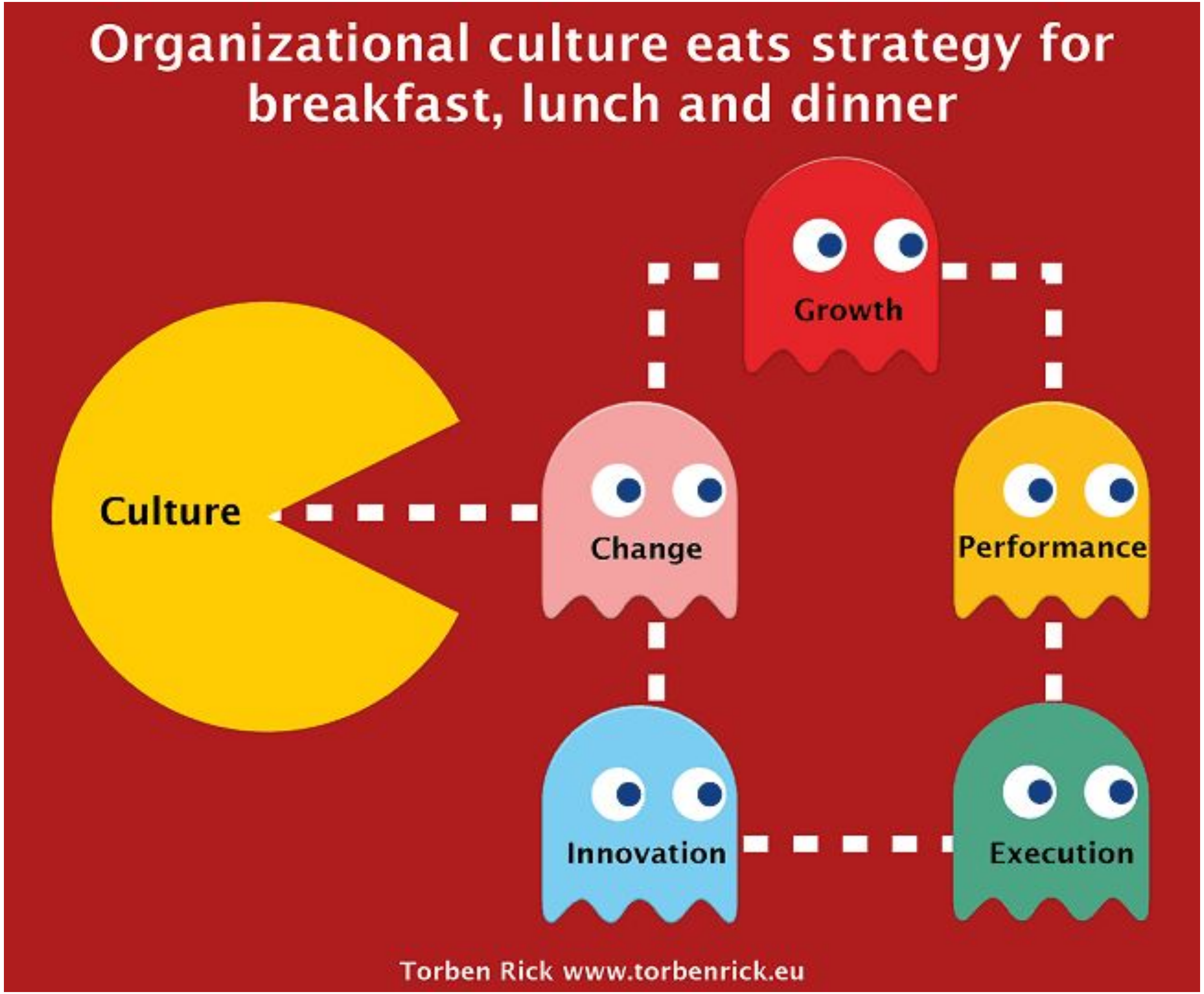
Culture



Organizational culture eats strategy for breakfast, lunch and dinner

Torben Rick www.torbenrick.eu

Adopting a DevOps culture

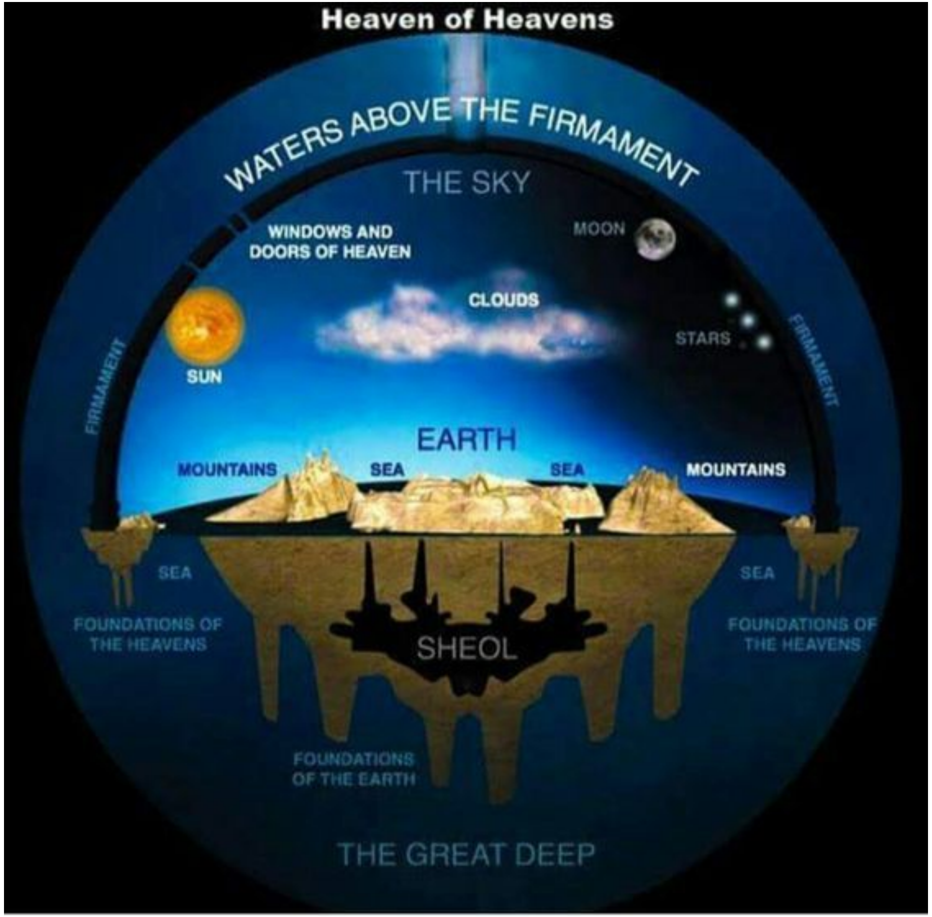
Despite varying approaches to describing high-performance teams there is a set of common characteristics that are recognised to lead to success.

- Participative leadership – using a democratic leadership style that involves and engages team members
- Effective decision-making – using a blend of rational and intuitive decision making methods, depending on that nature of the decision task
- Open and clear communication – ensuring that the team mutually constructs shared meaning, using effective communication methods and channels
- Valued diversity – valuing a diversity of experience and background in team, contributing to a diversity of viewpoints, leading to better decision making and solutions
- Mutual trust – trusting in other team members and trusting in the team as an entity
- Clear goals – goals that are developed using SMART criteria; also each goal must have personal meaning and resonance for each team member, building commitment and engagement
- Defined roles and responsibilities – each team member understands what they must do (and what they must not do) to demonstrate their commitment to the team and to support team success
- Positive atmosphere – an overall team culture that is open, transparent, positive, future-focused and able to deliver success

https://en.wikipedia.org/wiki/High-performance_teams

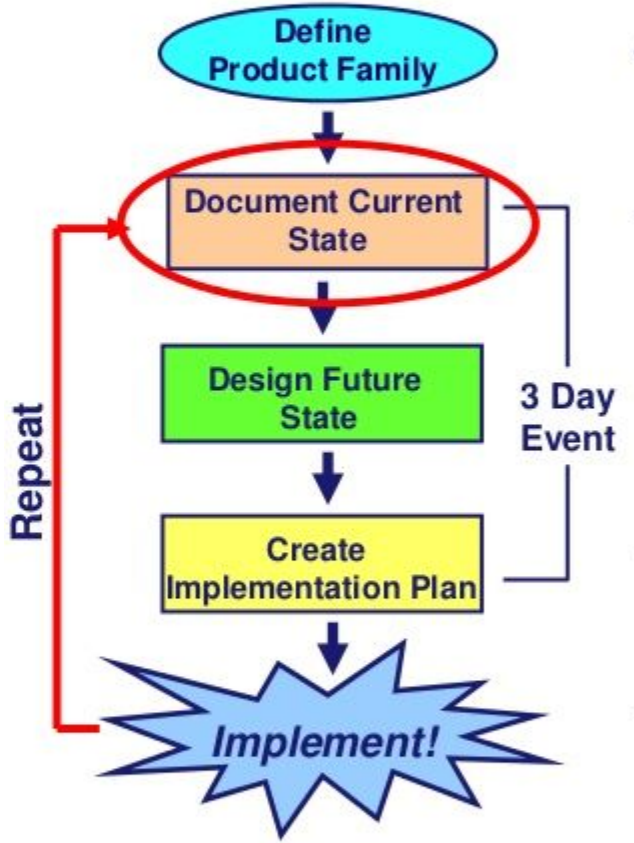
Lean

Pivotal



https://imgur.com/gallery/kMJWs

Value Stream Mapping Process



Products (good or services) with common process steps

Foundation (the basis) for the future state; 70-80% accurate is acceptable (directionally correct)

Create flow by eliminating waste it is now obvious from your current state map); typically 3-6 months out

Include accountability and timeframes for completion

The goal of mapping!

Pivotal https://www.slideshare.net/KarenMartinGroup/value-stream-mapping-in-office-service-setttings

Mappable Processes that include Security / Compliance

Infrastructure Provisioning

- OS Hardening
- Firewalling
- User Management
- Remote logging and auditing
- Intrusion Detection
- Vulnerability Scanning

Application Release

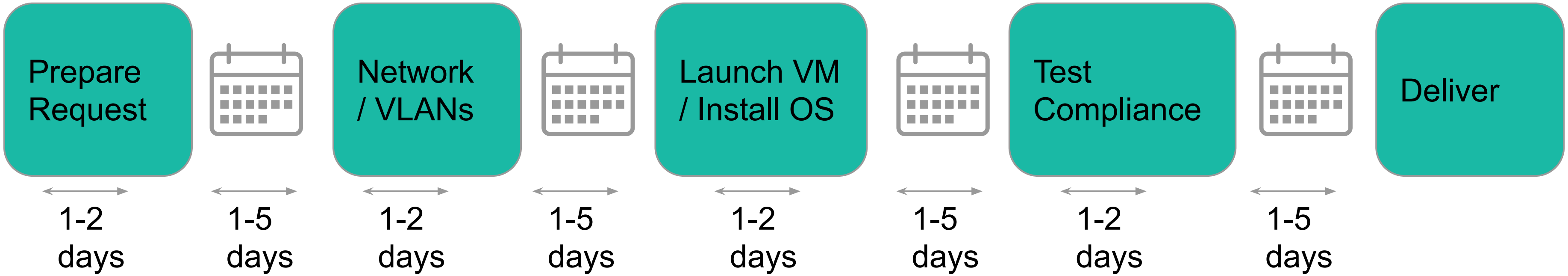
- Vulnerability Scanning
- Security Scanning (sql injection etc)
- License Scanning
- Attribution

Compliance Audits

- Vulnerability Scanning
- Security Scanning (sql injection etc)
- Package updates
- OS inspection

Value Stream map for Provisioning a New Server

Current State



Prepare Request

1-2 days

1-5 days

Network / VLANs

1-2 days

1-5 days

Launch VM / Install OS

1-2 days

1-5 days

Test Compliance

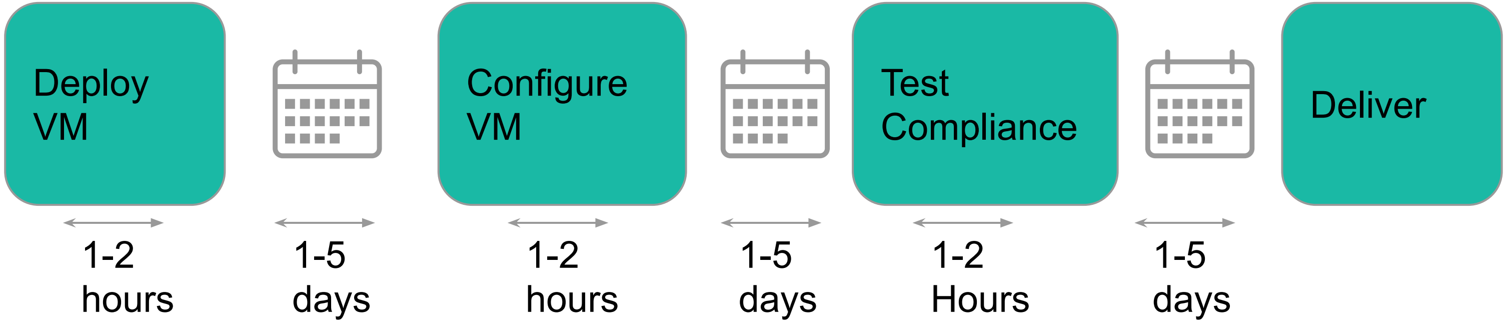
1-2 days

1-5 days

Deliver

Value Stream map for Provisioning a New Server

Future State



Deploy VM

1-2 hours

1-5 days

Configure VM

1-2 hours

1-5 days

Test Compliance

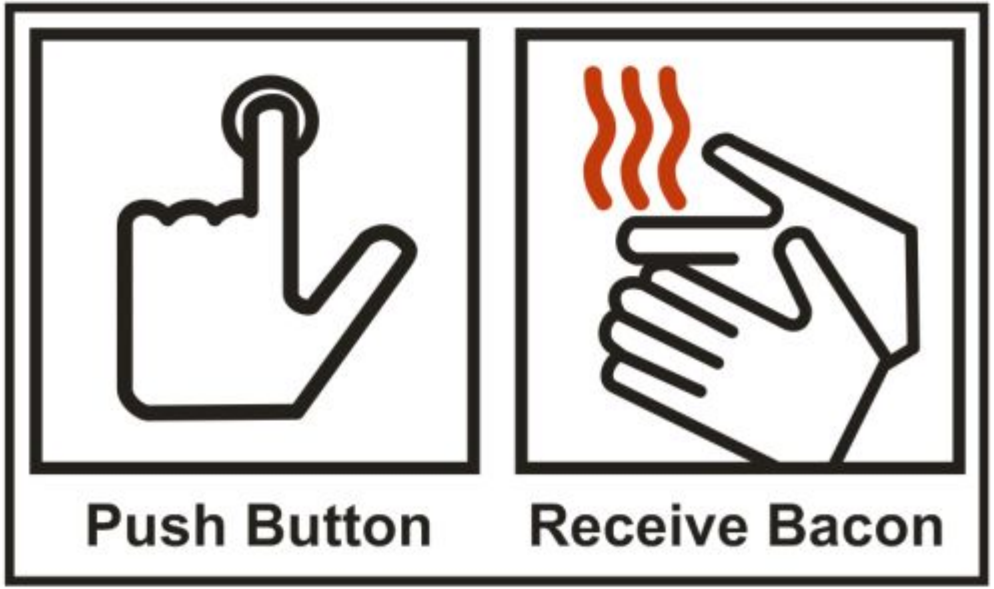
1-2 Hours

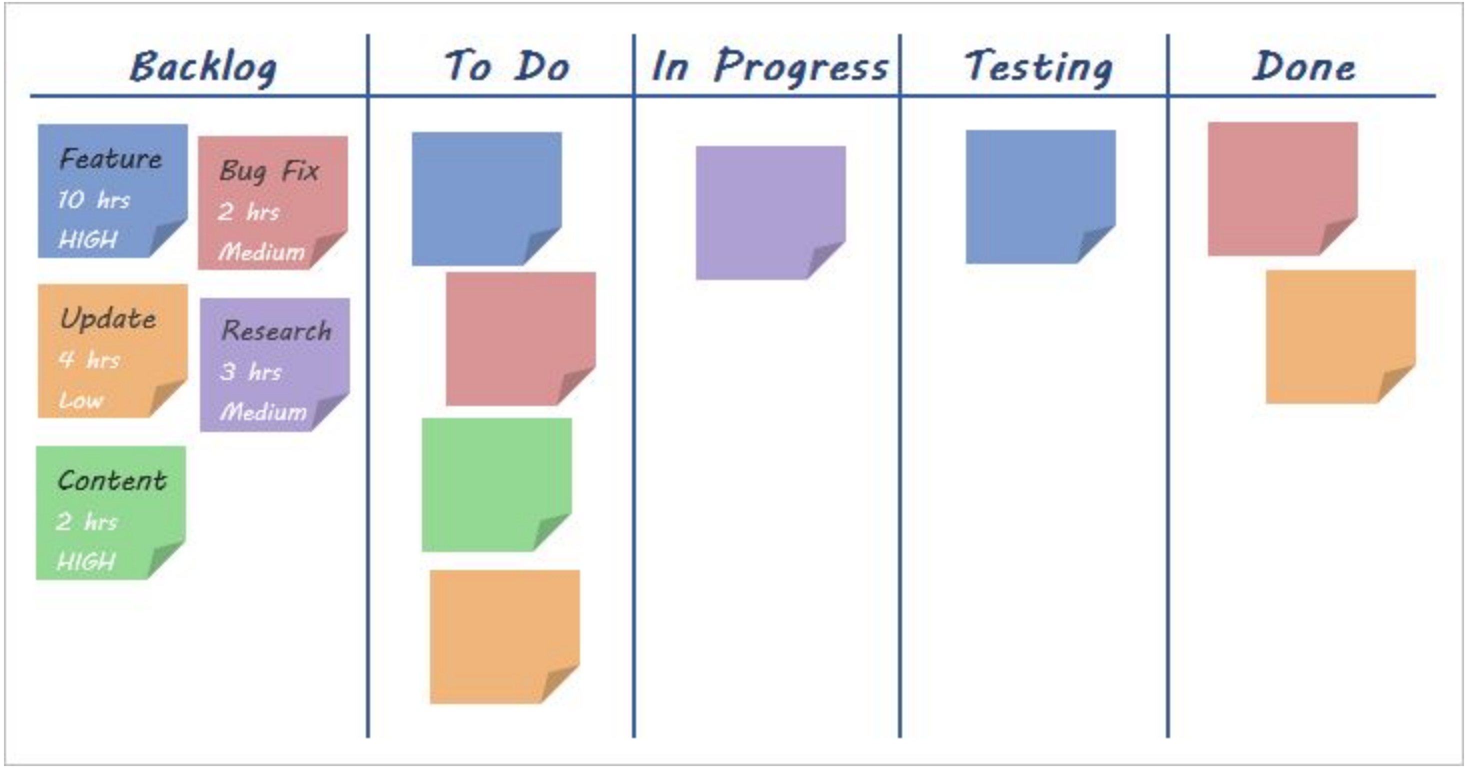
1-5 days

Deliver

Value Stream map for Provisioning a New Server

Future State





Backlog

To Do

In Progress

Testing

Done

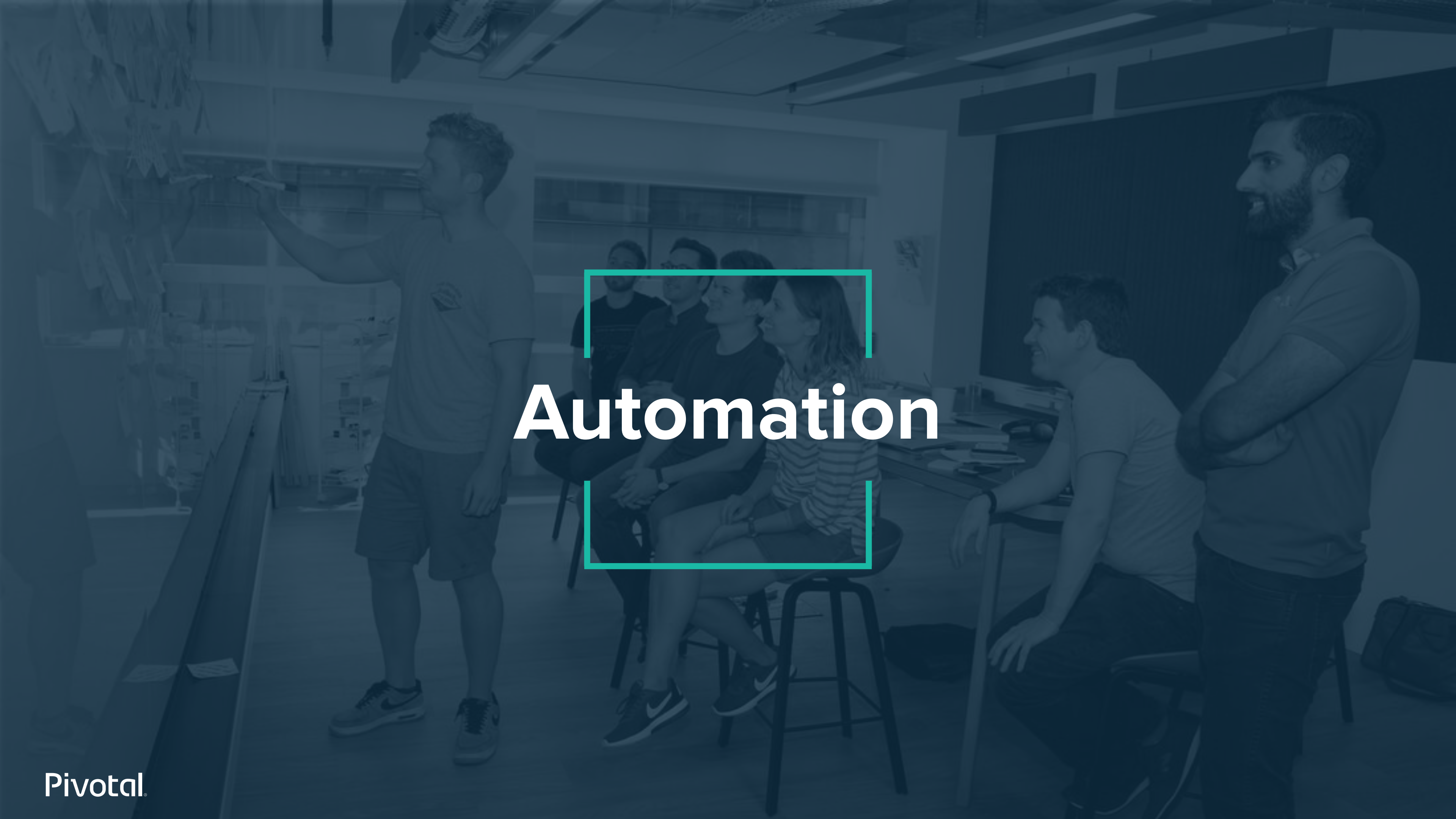
Feature
10 hrs
HIGH

Bug Fix
2 hrs
Medium

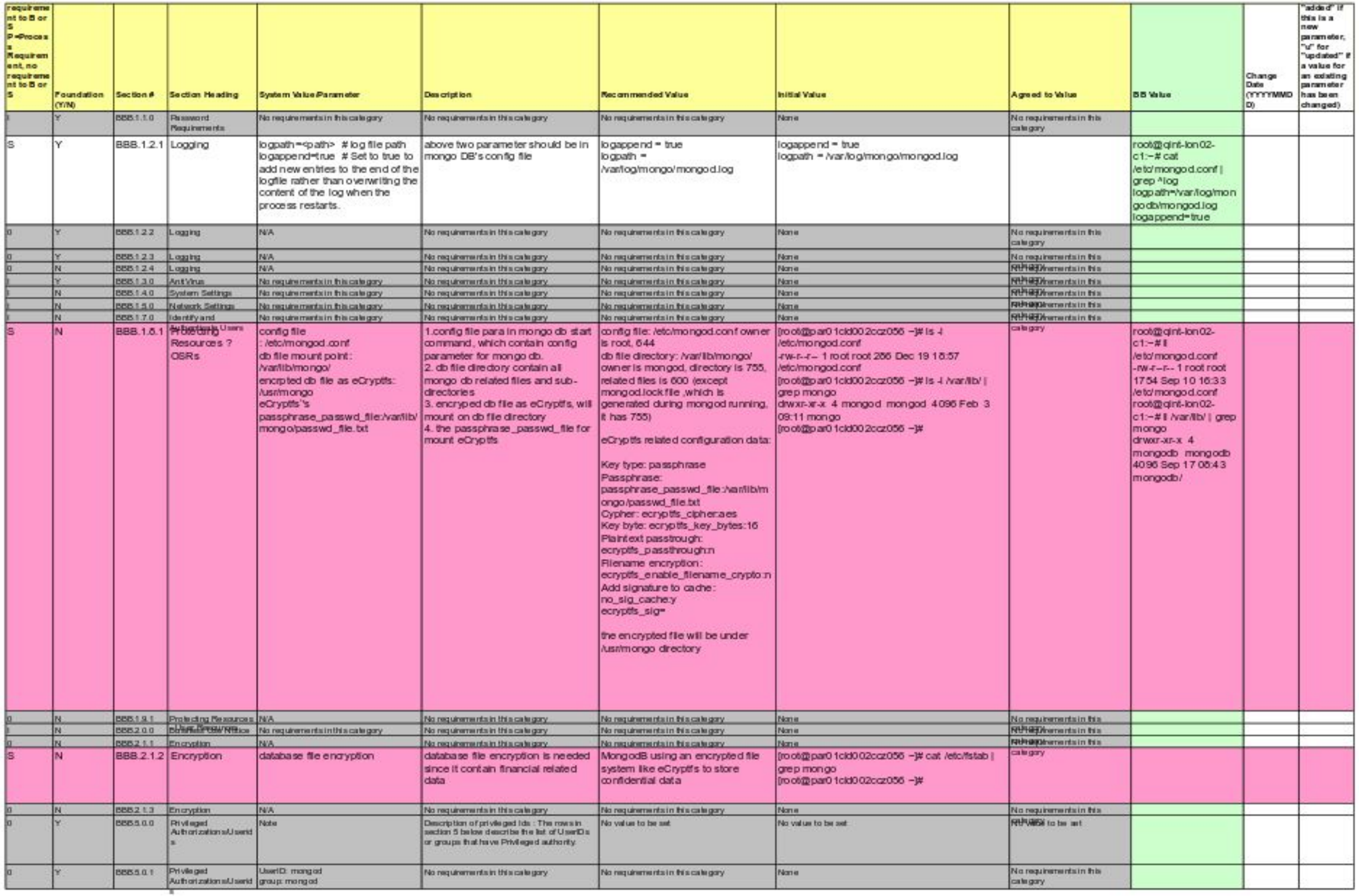
Update
4 hrs
Low

Research
3 hrs
Medium

Content
2 hrs
HIGH



Automation



requirement to B or S P=Process Requirement, no requirement to B or S	Foundation (Y/N)	Section #	Section Heading	System Value/Parameter	Description	Recommended Value	Initial Value	Agreed to Value	BB Value	Change Date (YYYYMMDD)	"added" if this is a new parameter, "u" for "updated" if a value for an existing parameter has been changed)
I	Y	BBB.1.1.0	Password Requirements	No requirements in this category	No requirements in this category	No requirements in this category	None	No requirements in this category			

S	Y	BBB.1.2.1	Logging	logpath=<path> # log file path
				logappend=true # Set to true to add new entries to the end of the logfile rather than overwriting the content of the log when the process restarts.
					above two parameter should be in mongo DB's config file	logappend = true
						logpath = /var/log/mongo/ mongod.log
							logappend = true
							logpath = /var/log/mongo/mongod.log
									root@qint-lon02-c1:~# cat /etc/mongod.conf | grep ^log
									logpath=/var/log/mongodb/mongod.log
									logappend=true		

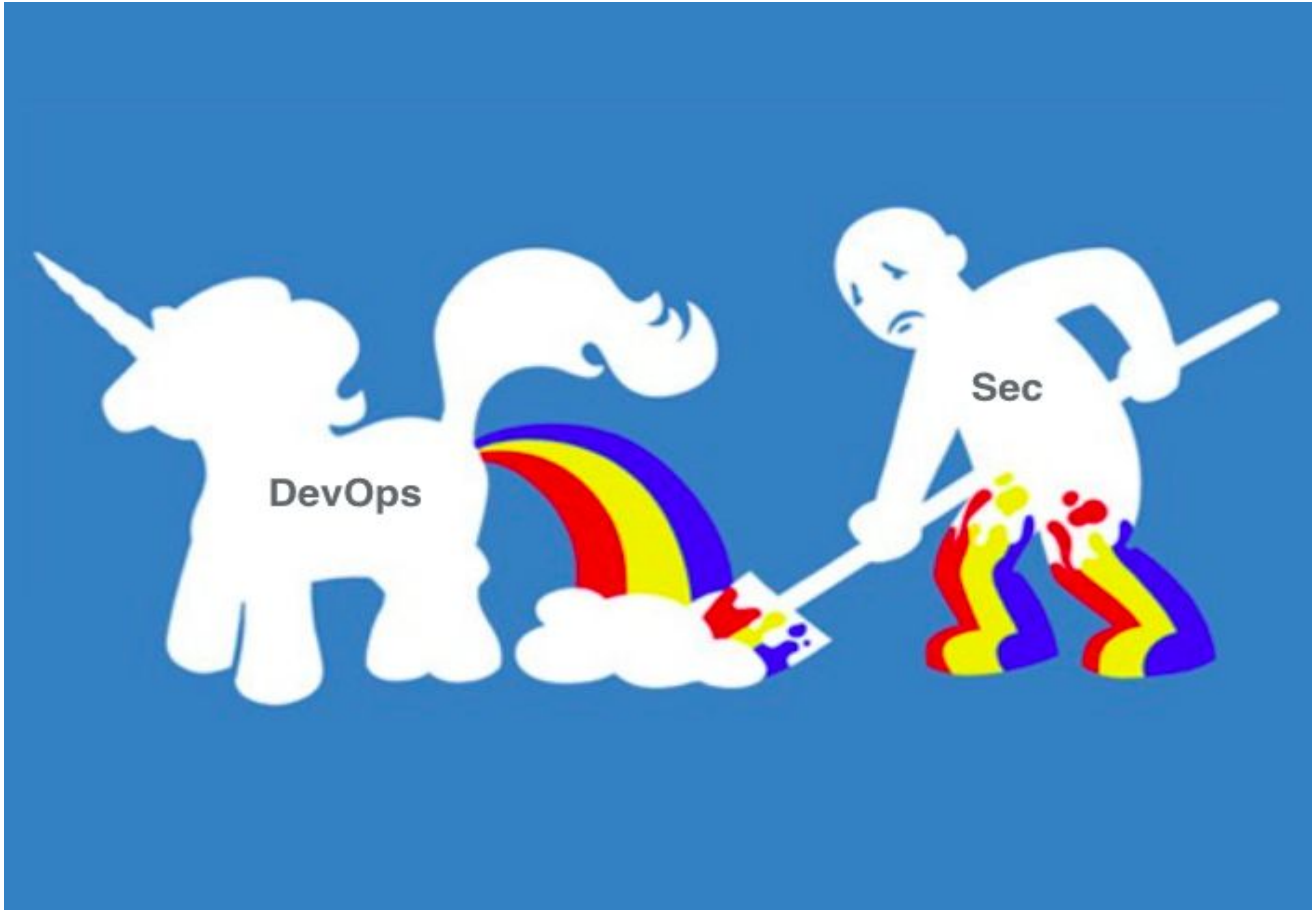
0	Y	BBB.1.2.2	Logging	N/A	No requirements in this category	No requirements in this category	None	No requirements in this category			
0	Y	BBB.1.2.3	Logging	N/A	No requirements in this category	No requirements in this category	None	No requirements in this category			
0	N	BBB.1.2.4	Logging	N/A	No requirements in this category	No requirements in this category	None	No requirements in this category			
I	Y	BBB.1.3.0	AntiVirus	No requirements in this category	No requirements in this category	No requirements in this category	None	No requirements in this category			
I	N	BBB.1.4.0	System Settings	No requirements in this category	No requirements in this category	No requirements in this category	None	No requirements in this category			
I	N	BBB.1.5.0	Network Settings	No requirements in this category	No requirements in this category	No requirements in this category	None	No requirements in this category			
I	N	BBB.1.7.0	Identify and Authenticate Users	No requirements in this category	No requirements in this category	No requirements in this category	None	No requirements in this category			
S	N	BBB.1.8.1	Protecting Resources ? OSRs	config file : /etc/mongod.conf db file mount point: /var/lib/mongo/ encrpted db file as eCryptfs: /usr/mongo eCryptfs's passphrase_passwd_file:/var/lib/mongo/passwd_file.txt	1.config file para in mongo db start command, which contain config parameter for mongo db. 2. db file directory contain all mongo db related files and sub-directories 3. encryped db file as eCryptfs, will mount on db file directory 4. the passphrase_passwd_file for mount eCryptfs	config file: /etc/mongod.conf owner is root, 644 db file directory: /var/lib/mongo/ owner is mongod, directory is 755, related files is 600 (except mongod.lock file ,which is generated during mongod running, it has 755) eCryptfs related configuration data: Key type: passphrase Passphrase: passphrase_passwd_file:/var/lib/mongo/passwd_file.txt Cypher: ecryptfs_cipher:aes Key byte: ecryptfs_key_bytes:16 Plaintext passtrough: ecryptfs_passthrough:n Filename encryption: ecryptfs_enable_filename_crypto:n Add signature to cache: no_sig_cache:y ecryptfs_sig= the encrypted file will be under /usr/mongo directory	[root@par01cld002ccz056 ~]# ls -l /etc/mongod.conf -rw-r--r-- 1 root root 286 Dec 19 18:57 /etc/mongod.conf [root@par01cld002ccz056 ~]# ls -l /var/lib/ | grep mongo drwxr-xr-x 4 mongod mongod 4096 Feb 3 09:11 mongo [root@par01cld002ccz056 ~]#		root@qint-lon02-c1:~# ll /etc/mongod.conf -rw-r--r-- 1 root root 1754 Sep 10 16:33 /etc/mongod.conf root@qint-lon02-c1:~# ll /var/lib/ | grep mongo drwxr-xr-x 4 mongodb mongodb 4096 Sep 17 08:43 mongodb/		
0	N	BBB.1.9.1	Protecting Resources - User Resources	N/A	No requirements in this category	No requirements in this category	None	No requirements in this category			
I	N	BBB.2.0.0	Business Use Notice	No requirements in this category	No requirements in this category	No requirements in this category	None	No requirements in this category			
0	N	BBB.2.1.1	Encryption	N/A	No requirements in this category	No requirements in this category	None	No requirements in this category			
S	N	BBB.2.1.2	Encryption	database file encryption	database file encryption is needed since it contain financial related data	MongodB using an encrypted file system like eCryptfs to store confidential data	[root@par01cld002ccz056 ~]# cat /etc/fstab | grep mongo [root@par01cld002ccz056 ~]#				
0	N	BBB.2.1.3	Encryption	N/A	No requirements in this category	No requirements in this category	None	No requirements in this category			
0	Y	BBB.5.0.0	Privileged Authorizations/Userids	Note	Description of privileged Ids : The rows in section 5 below describe the list of UserIDs or groups that have Privileged authority.	No value to be set	No value to be set	No value to be set			
0	Y	BBB.5.0.1	Privileged Authorizations/Userids	UserID: mongod group: mongod	No requirements in this category	No requirements in this category	None	No requirements in this category			

ansible hardening

- Implements STIG controls via Ansible playbooks
- Opensource project started at Rackspace
- Plays well with existing config management
- Easily override problematic controls

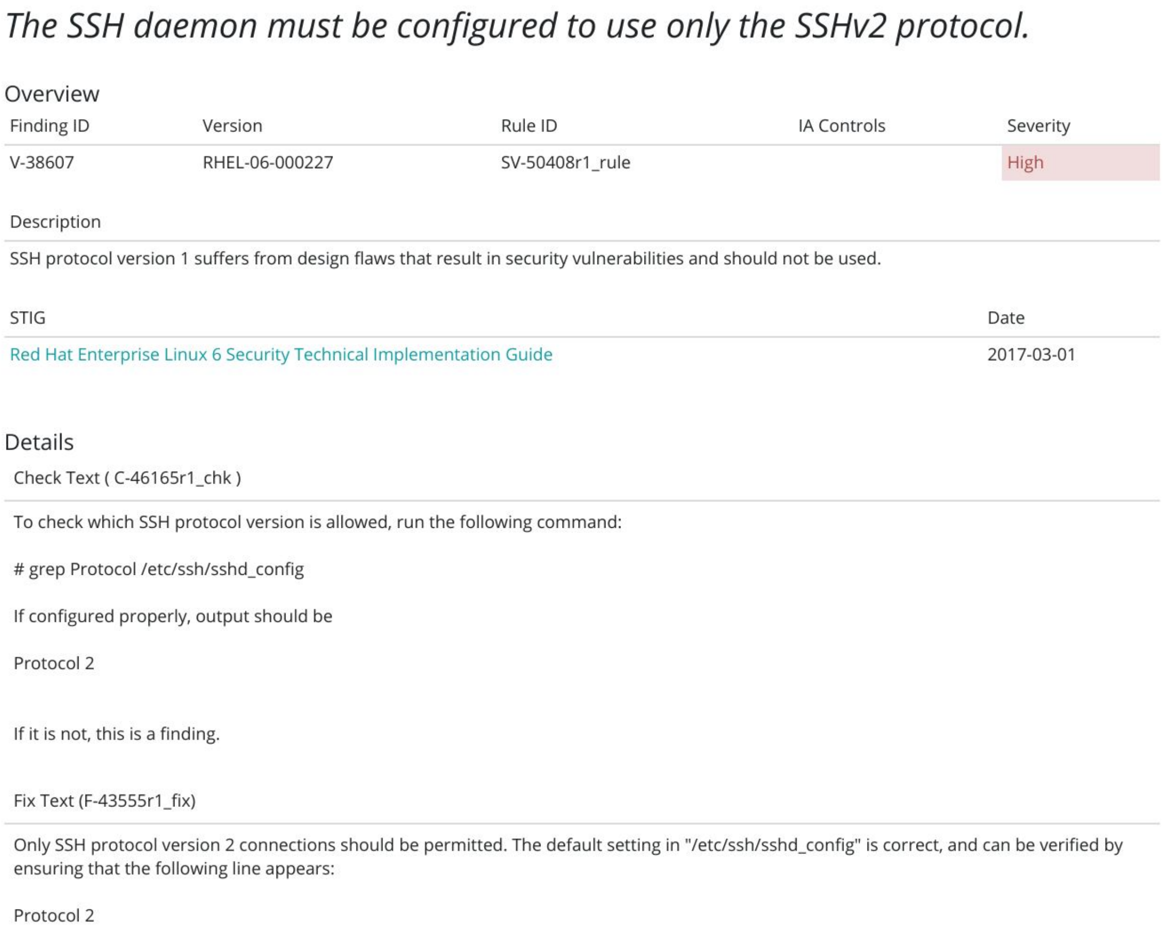
INSPEC

- Extends RSPEC for Compliance testing
- Similar to Serverspec, but better.
- Easy to go from serverspec to inspec
- Inspec-STIG is all of STIG already written into inspec tests.



Source: @petecheslock

Example of Compliance Specifications



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# grep Protocol /etc/ssh/sshd_config
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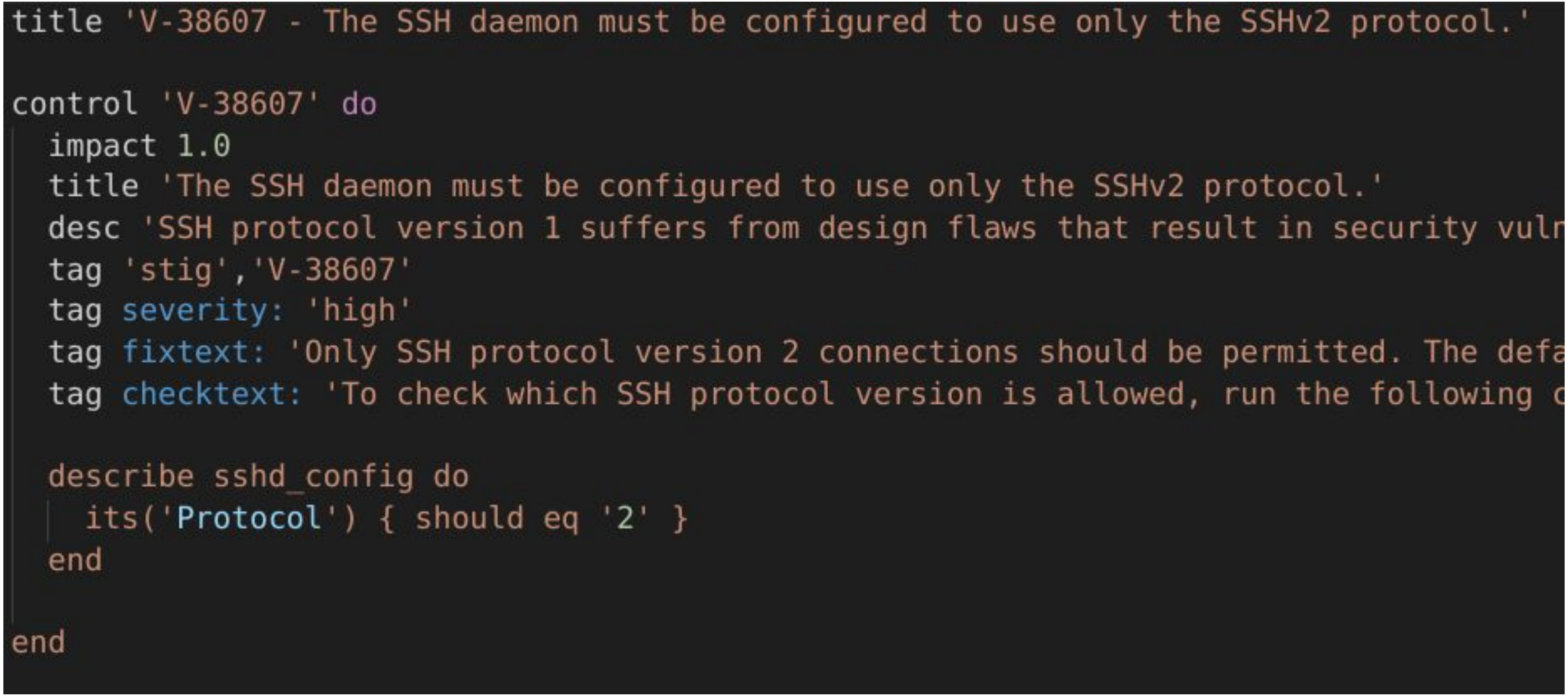
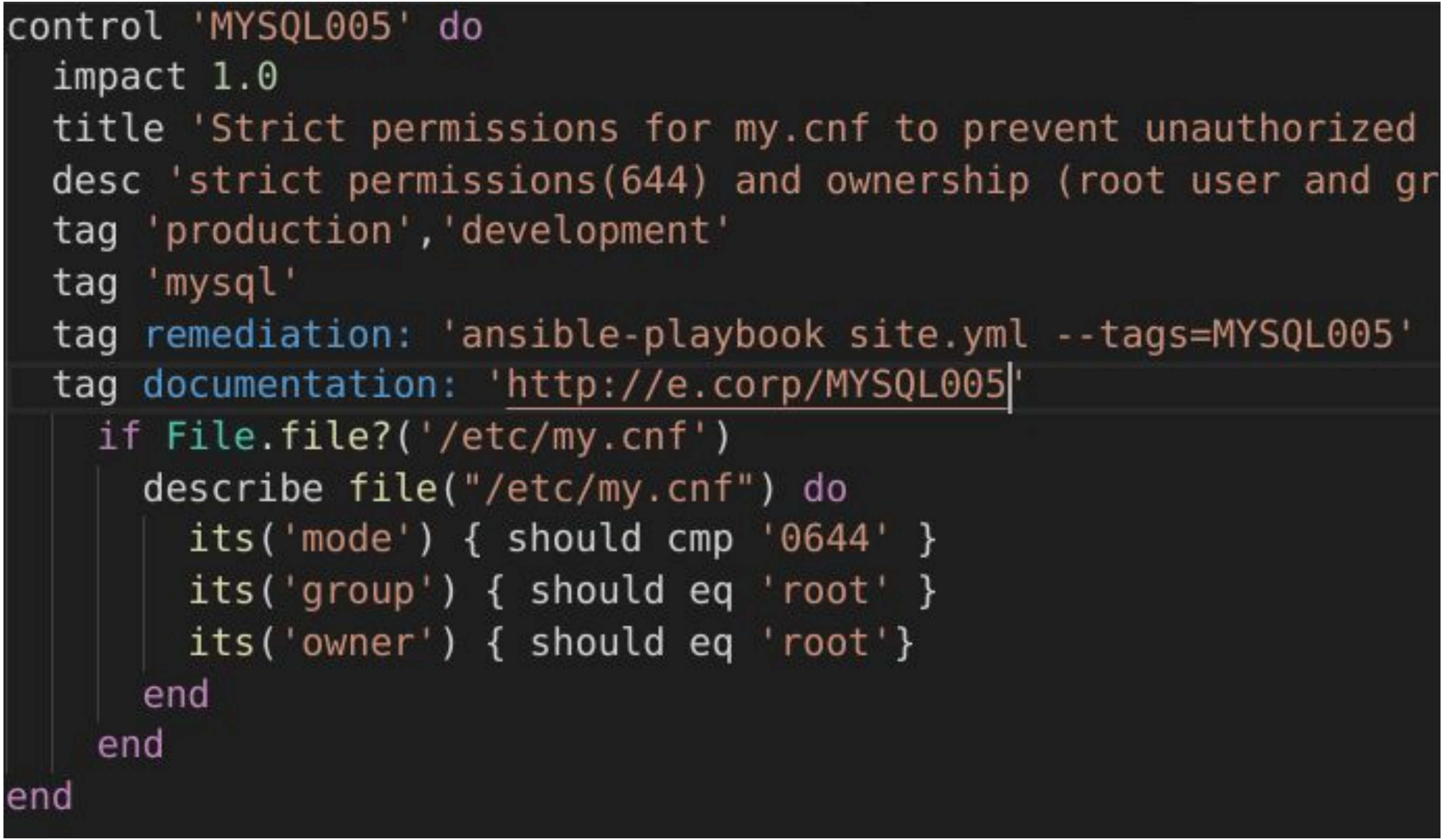
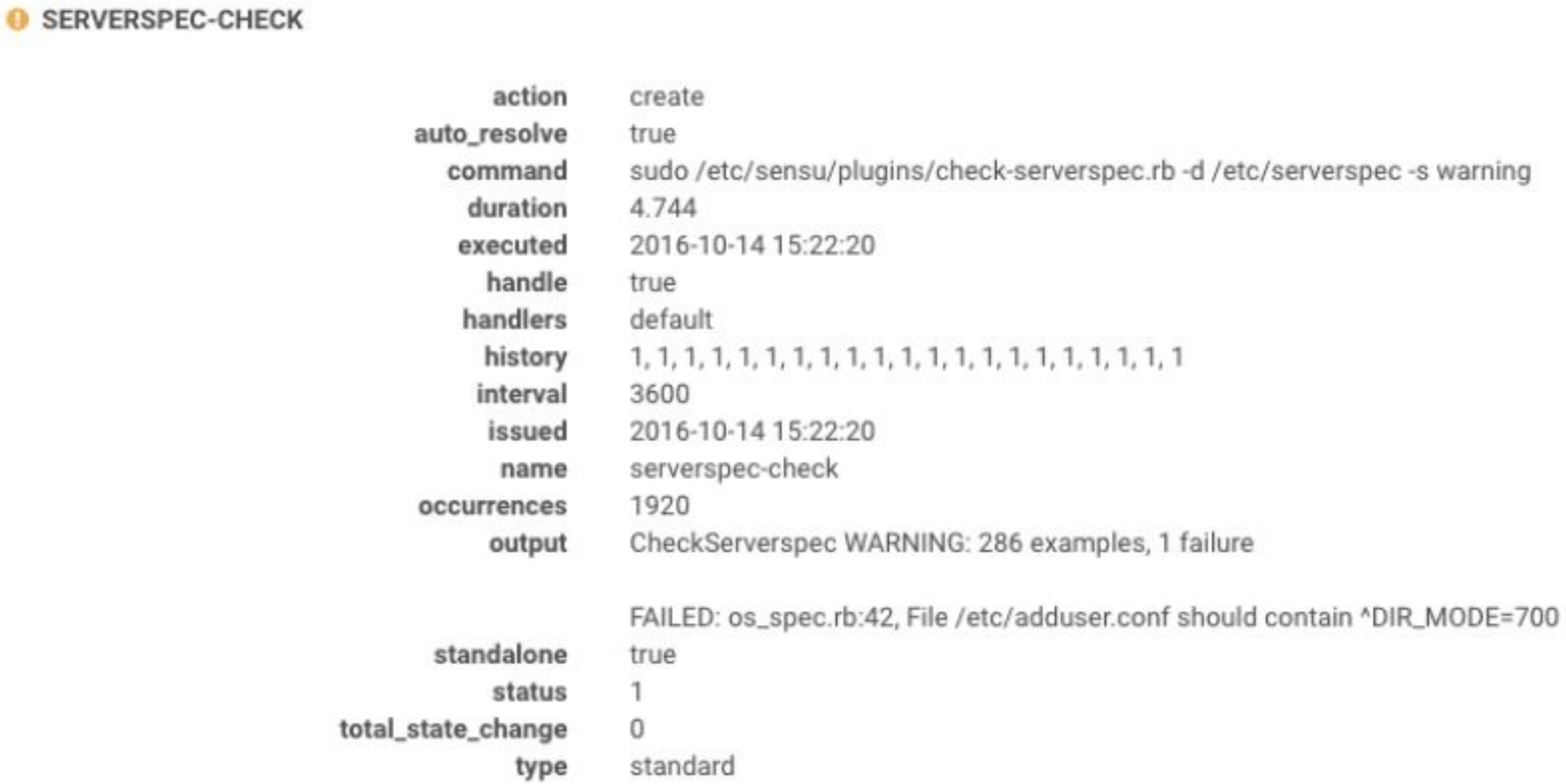


```
title 'V-38607 - The SSH daemon must be configured to use only the SSHv2 protocol.'

control 'V-38607' do
  impact 1.0
  title 'The SSH daemon must be configured to use only the SSHv2 protocol.'
  desc 'SSH protocol version 1 suffers from design flaws that result in security vuln
  tag 'stig','V-38607'
  tag severity: 'high'
  tag fixtext: 'Only SSH protocol version 2 connections should be permitted. The defa
  tag checktext: 'To check which SSH protocol version is allowed, run the following c

  describe sshd_config do
    its('Protocol') { should eq '2' }
  end

end
```

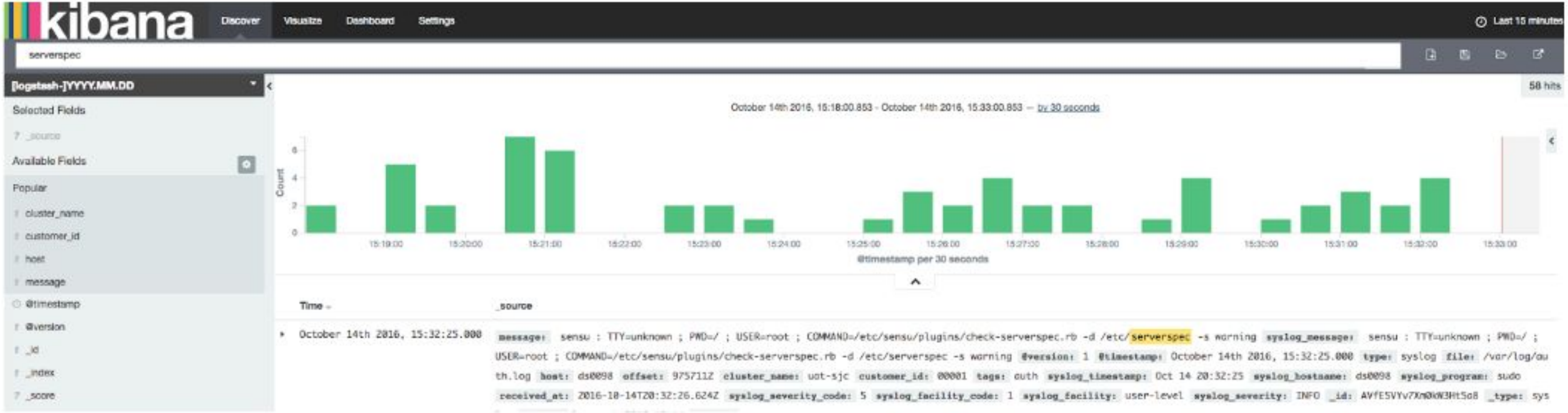


```
control 'MYSQL005' do
  impact 1.0
  title 'Strict permissions for my.cnf to prevent unauthorized
  desc 'strict permissions(644) and ownership (root user and gr
  tag 'production','development'
  tag 'mysql'
  tag remediation: 'ansible-playbook site.yml --tags=MYSQL005'
  tag documentation: 'http://e.corp/MYSQL005'
    if File.file?('/etc/my.cnf')
      describe file("/etc/my.cnf") do
        its('mode') { should cmp '0644' }
        its('group') { should eq 'root' }
        its('owner') { should eq 'root'}
      end
    end
end
```

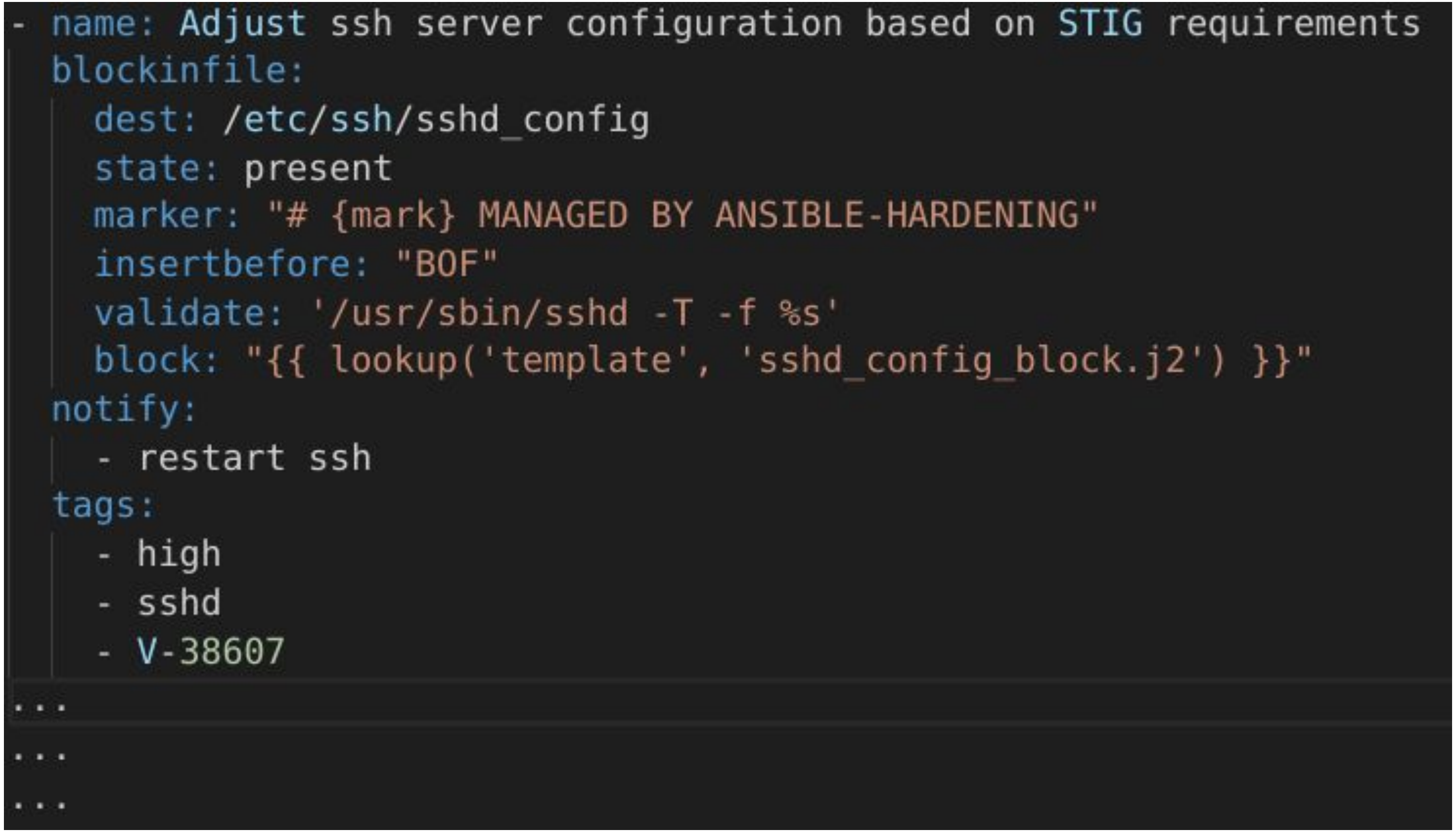
ANSIBLE
sensu
elastic
+
+
kibana



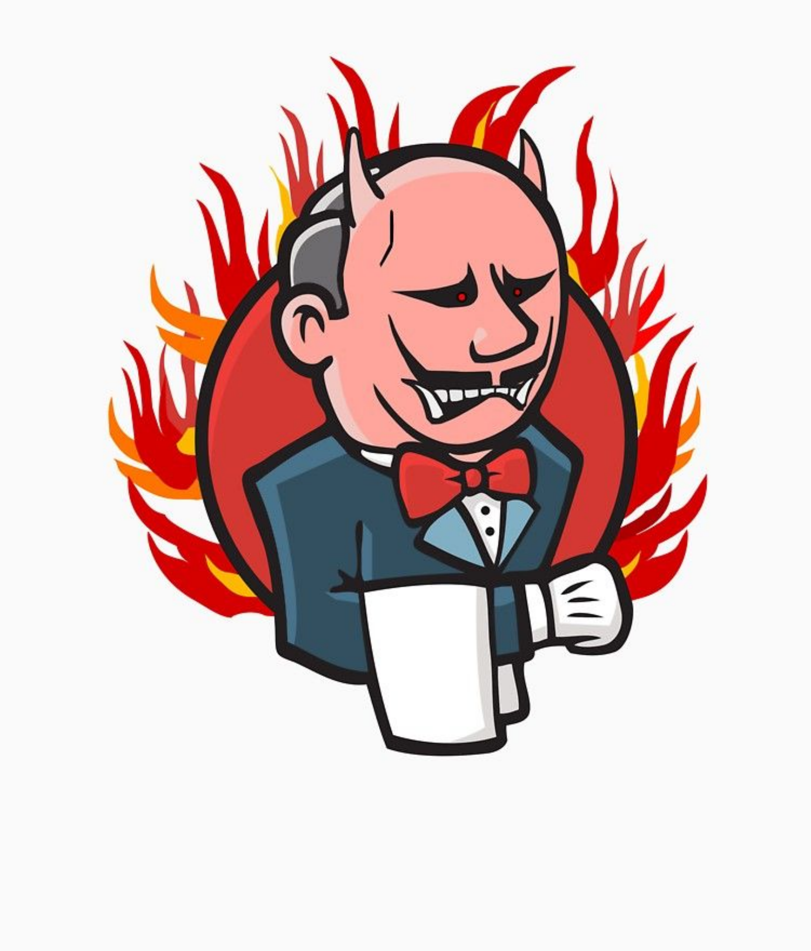
```
SERVERSPEC-CHECK

           action    create
     auto_resolve    true
          command    sudo /etc/sensu/plugins/check-serverspec.rb -d /etc/serverspec -s warning
         duration    4.744
         executed    2016-10-14 15:22:20
           handle    true
         handlers    default
          history    1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
         interval    3600
           issued    2016-10-14 15:22:20
             name    serverspec-check
      occurrences    1920
           output    CheckServerspec WARNING: 286 examples, 1 failure

                     FAILED: os_spec.rb:42, File /etc/adduser.conf should contain ^DIR_MODE=700
       standalone    true
           status    1
total_state_change   0
             type    standard
```



```
October 14th 2016, 15:32:25.000   message: sensu : TTY=unknown ; PWD=/ ; USER=root ; COMMAND=/etc/sensu/plugins/check-serverspec.rb -d /etc/serverspec -s warning syslog_message: sensu : TTY=unknown ; PWD=/ ;
                                  USER=root ; COMMAND=/etc/sensu/plugins/check-serverspec.rb -d /etc/serverspec -s warning @version: 1 @timestamp: October 14th 2016, 15:32:25.000 type: syslog file: /var/log/au
                                  th.log host: ds0098 offset: 9757112 cluster_name: uat-sjc customer_id: 00001 tags: auth syslog_timestamp: Oct 14 20:32:25 syslog_hostname: ds0098 syslog_program: sudo
                                  received_at: 2016-10-14T20:32:26.624Z syslog_severity_code: 5 syslog_facility_code: 1 syslog_facility: user-level syslog_severity: INFO _id: AVfESVYv7Xm0kW3Ht5o8 _type: sys
```



```yaml
- name: Adjust ssh server configuration based on STIG requirements
  blockinfile:
    dest: /etc/ssh/sshd_config
    state: present
    marker: "# {mark} MANAGED BY ANSIBLE-HARDENING"
    insertbefore: "BOF"
    validate: '/usr/sbin/sshd -T -f %s'
    block: "{{ lookup('template', 'sshd_config_block.j2') }}"
  notify:
    - restart ssh
  tags:
    - high
    - sshd
    - V-38607
...
...
...
```



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Measurement

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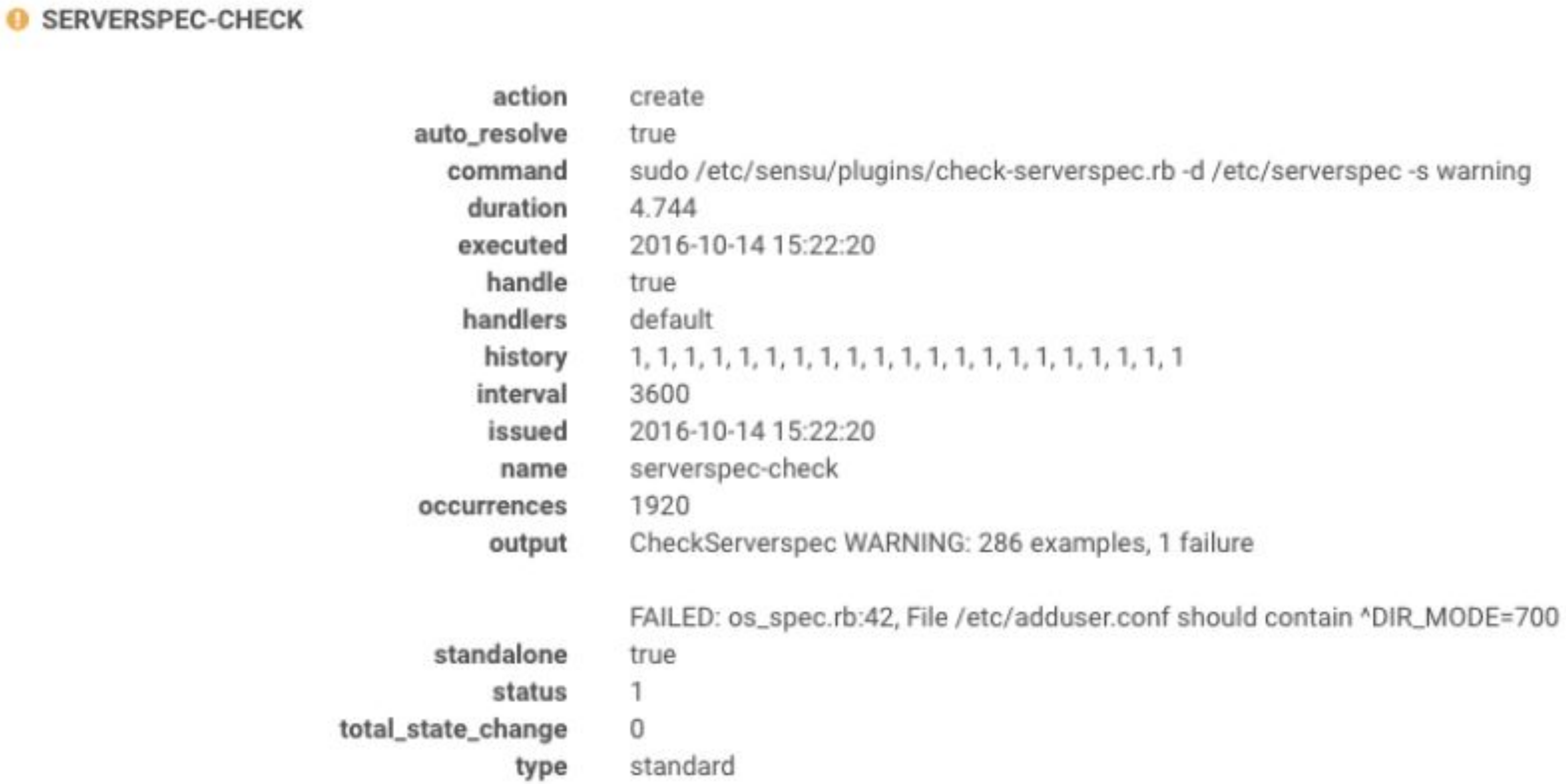

SERVERSPEC-CHECK

action	create
auto_resolve	true
command	sudo /etc/sensu/plugins/check-serverspec.rb -d /etc/serverspec -s warning
duration	4.744
executed	2016-10-14 15:22:20
handle	true
handlers	default
history	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1
interval	3600
issued	2016-10-14 15:22:20
name	serverspec-check
occurrences	1920
output	CheckServerspec WARNING: 286 examples, 1 failure FAILED: os_spec.rb:42, File /etc/adduser.conf should contain ^DIR_MODE=700
standalone	true
status	1
total_state_change	0
type	standard

Sharing

What’s Next ?

Other Security / Compliance tools

- GauntIt (Security Testing Framework)
- Metasploit (Penetration Testing)
- Syntribos (API security testing)
- Pivotal LicenseFinder (Scanning licenses of dependencies)
- Snort (Intrusion Detection)
- Fossology (license compliance)
- OpenVAS (vulnerability scanning)
- OSSEC (Intrustion Detection)

Questions ?

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