



Four years of reflection: How (not) to secure Web Applications

@JulianBerton



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291

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459

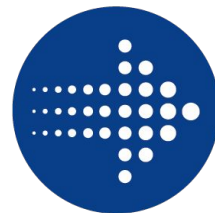
Likes
943

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2

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@JulianBerton

julianberton.com



seek



Part of **OWASP Foundation** – 81 groups ?

OWASP Melbourne - Application Security

📍 Melbourne, Australia

👤 1,629 members · Public group ?

👤 Organized by **OWASP F.** and 1 other

Share:   

OWASP AppSec Day 2019

Australia's biggest software security conference for technology professionals
Training 30th-31st October | Conference 1st November
Melbourne, Australia

[BUY TICKETS](#)[BECOME A SPONSOR](#)

Application Security Essentials (28th & 29th) (2 days)

EN



Abhay Bhargav
we45

Attacking and Defending Containers and Kubernetes (28th & 29th) (2 days)

EN



Nithin Jois
we45

Hacking and Securing Cloud Infrastructure (28th & 29th) (2 days)

EN



Anthony Webb
NotSoSecure

Mobile Security Testing Guide Hands-On (28th & 29th) (2 days)

EN



Sven Schleier
Standard Chartered Bank



Ryan Teoh
Grab

DevSecOps and AppSec Automation MasterClass (30th & 31st) (2 days)

EN



Abhay Bhargav
we45

Seth & Ken's Excellent Adventures in Secure Code Review (30th & 31st) (2 days)

EN



Ken Johnson
Github



Seth Law
Security Consultant

Web Hacking Essentials: Applying a hacker's mindset (30th & 31st) (2 days)

EN



Pamela O'Shea
Shea Information Security

Bughunting bootcamp - Discovering 0day (30th & 31st) (2 days)

EN



Eldar Marcussen
DarkMatter

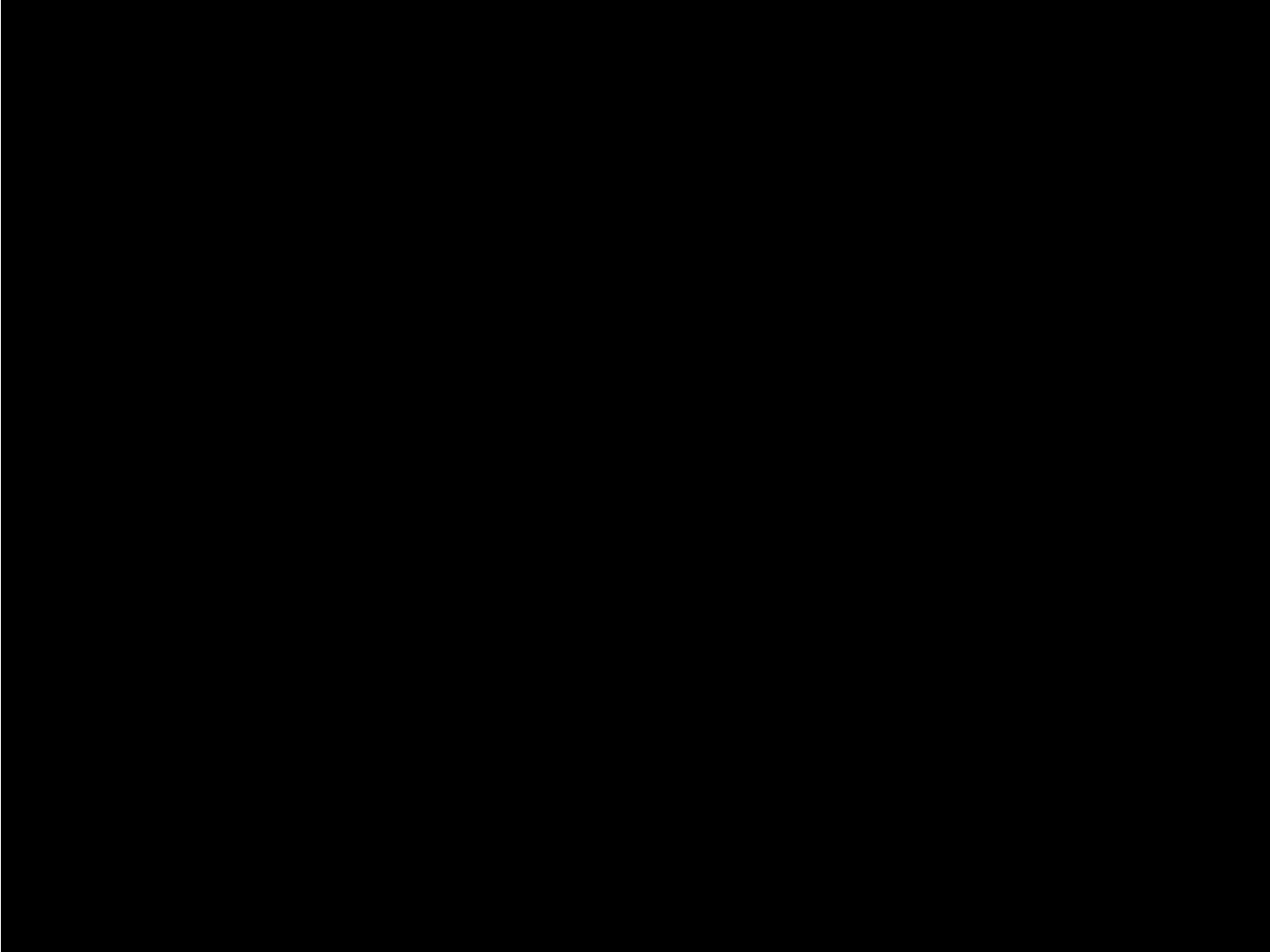
Advanced Whiteboard hacking – Aka hands-on Threat Modeling (30th & 31st) (2 days)

EN



Steven Wierckx
Toreon

In the last 6 months who has felt like
this?





Julian Bright 10:33 AM

@here Doing a bit of a language census, please react with the languages you pushed to production in last 2 weeks.

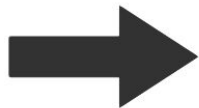


~150 tools, languages, platforms and frameworks

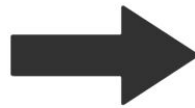
Developer in 2014



Design



Develop



Build

Developer in 2019



Design



Develop



Build



Verify



Deploy



Monitor





Dear Developers,

2019 called and said security is everyone's job...

Soooooooo here is a report with 2000 unvalidated issues for you to fix.

Kthxbye



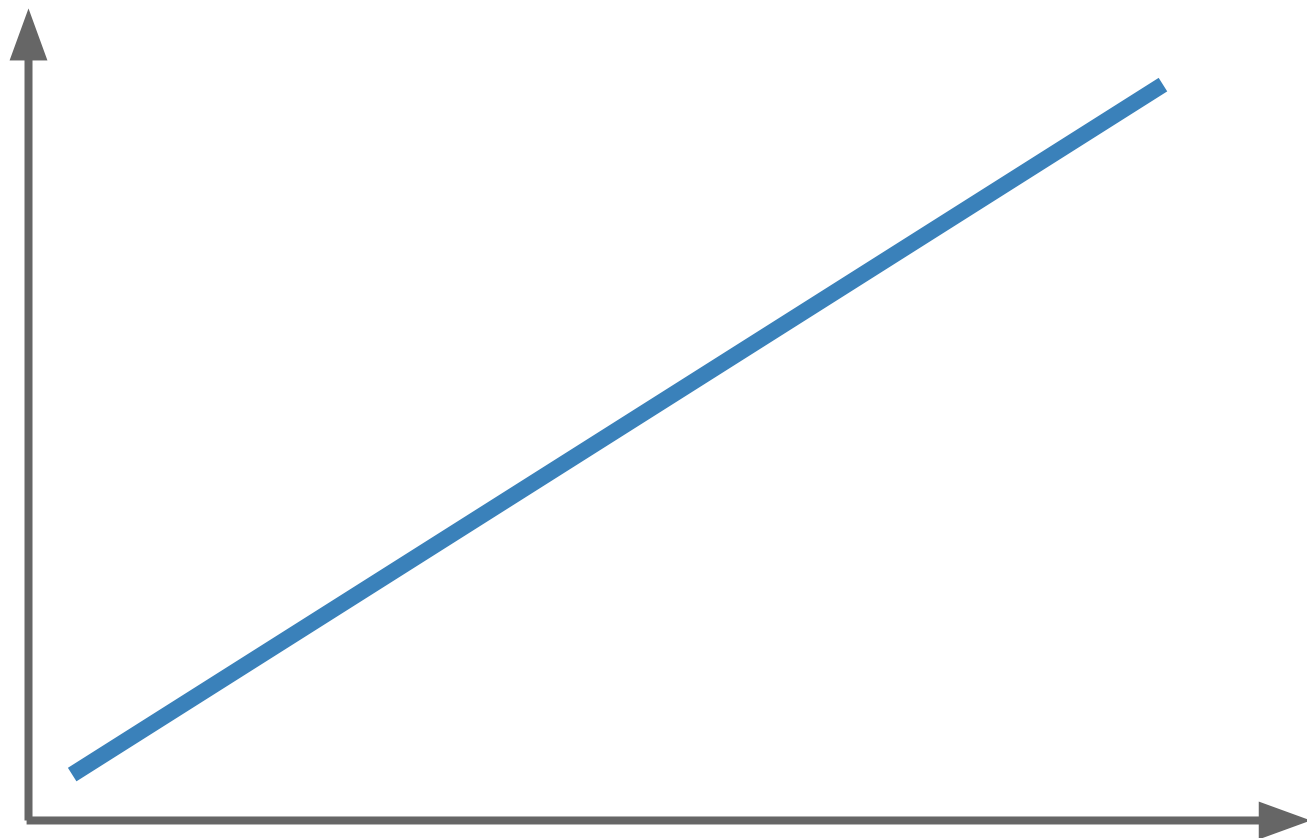
58%

Believe security is an
inhibitor to DevOps
agility.

The logo for the DevSecOps Community Survey 2017 is located on the right side of the image. It features a dark blue rectangular background with a subtle geometric pattern of overlapping shapes. The text "DEVSECOPS" is in a large, white, sans-serif font. Below it, "COMMUNITY" is in a slightly smaller, white, sans-serif font. At the bottom, "SURVEY 2017" is in a white, sans-serif font, with "2017" being smaller and positioned to the right of "SURVEY".

DEVSECOPS
COMMUNITY
SURVEY 2017

No. of data
breaches



No. of security
controls

Source: My brain

Make security
controls easy to
adopt...



Jek Hyde
@HydeNS33k

Follow



Sometimes a hacker's best friend is an employee just trying to do their job more efficiently.



Developer Happiness™

- Easy to adopt controls
- Clear actionable information
- Works with dev flow
- Low disruption
- Real prioritised risks

A journey back in time to the year 2014...



MY
SEEKJOB
SEARCHCAREER
RESOURCESRECRUITER
PROFILESCOMPANY
PROFILESSEEK
HELPFOR
ADVERTISERS

QUICK JOB SEARCH

Location

Work Type

Industry

Select an industry first

Keyword (optional):

GO!

Or you can use our [Full Search](#)

EXECUTIVE JOB SEARCH

Location

Job Function

Keyword (optional):

GO!

SEEK USER LOGIN

Username:

Password:

[Register Now](#) [Forgot your password](#) **GO!**

Copyright SEEK Communications
[Legal Notices](#)



FIRST TIME HERE?

Get started and learn about SEEK's services.



EMAIL ME JOBS

Don't miss the perfect job. Have NEW positions emailed to you.



HIRING STAFF

Recruit your ideal hire by posting a job ad on SEEK.



CREATE RESUME

Use SEEK's easy template to build a professional resume.



SEEK UK

Apply for UK positions or prepare for your UK working holiday.



MY SEEK

Organise your job search with our user friendly tools.



YOUR CAREER

Advice, articles and more things that help.



SEEK VOLUNTEER

Find the perfect volunteer opportunity.

34,938 Jobs Online

SEEK is Australia's leading employment website with thousands of jobs online. If you're hiring, SEEK's recruitment tools can help you identify outstanding candidates fast.

ADVERTISEMENT



Ambitious & intelligent? [Suncorp](#), for an exciting job in Finance, IT, Customer Service or Insurance.



iBook

WIN an iBook laptop.

Register for Job Mail and automatically [enter to win](#) an iBook valued at \$2,795.

Hundreds of UK jobs plus travel tips, visa info and UK agency contacts. [Learn more](#).



HIV/AIDS doesn't discriminate. People do. [Volunteers wanted](#) - World AIDS Day - 1 December.



New improved [Learning Centre](#) - heaps of courses, big discounts!



☒ Remember me[Trouble signing in?](#)[or register](#)[Job Search](#)[\\$150k+ Jobs](#)[Profile](#)[My Activity](#)[Advice & Tips](#)[Employers >](#)

Keywords

Classification

Salary

to

Sub-Classification

Location

Area

[More options](#)

2014

2014

5 years...

2019



- < 70 developers
- 1 office building
- Simple software stack
- 1 physical data centre
- ~4 monolith applications
- < 100 git repositories
- ~10 deploy per day

- > 400 developers
- 18 countries
- Complex software stack
- 150+ AWS Cloud accounts
- 100's of microservices
- > 2000 git repositories
- > 100 deploys per day

Restaurant Manager at Twofortythree Morley

Nov 13 to Nov 14 | 1 year

Employment status

Current company industry -

Availability -

Work type FullTime

Current location [REDACTED]

Location found in CV [REDACTED]

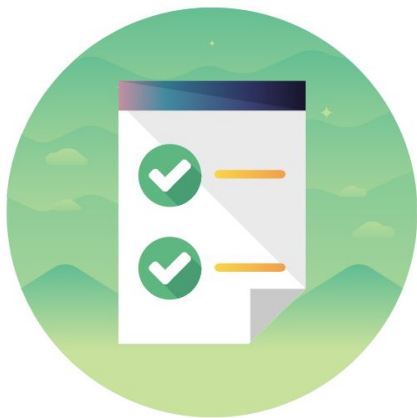
Skills & Qualifications

Highest qualification Not specified

Skills -

Keyword found in CV

wa tax file number [REDACTED] super fund macquarie super member
fund id maq [REDACTED] personal bank account cba complete access
account bsb [REDACTED] acc



Police checks

Order a national police check for employment purposes.



Right to work

Verify Australian work rights as a visa holder or citizen.



Driver Licence

Prove your right to drive with a valid Australian licence.

Shift ~~Left~~ Right?



Fenrir
@semibogan

Following



If you thought .au's largest jobs site,
@seekjobs, was a good place to store
personal CV details, its probably not

SSL Report: seek.com.au (202.58.38.95)

Assessed on: Thu, 10 Sep 2015 23:33:23 UTC | [Clear cache](#)

[Scan Another »](#)

Summary

Overall Rating



Visit our [documentation page](#) for more information, configuration guides, and books. Known issues are documented [here](#).

This server is vulnerable to the POODLE attack against TLS servers. Patching required. Grade set to F. [MORE INFO »](#)

The server does not support Forward Secrecy with the reference browsers. [MORE INFO »](#)

4:55 PM - 10 Sep 2015



Fenrir

@semibogan

A PhD in poor career choices. Dog enthusiast. Tetsujin. Breaker of stuff. Fixer of things. I like cake. Your heart is my piñata. Wickr: smbgn

Tweets
65.3K

Following
357

Followers
5,443

Likes
2,997

Tweets

Tweets & replies

Media

📌 Pinned Tweet



Fenrir @semibogan · 15 Jan 2018

Fuck this mess.

💬 1

↻ 5

❤️ 19



Less than a day later...



Andrew Hatch @Hatchman76 · 11 Sep 2015

Replying to @semibogan

@semibogan Check again :)



Fenrir @semibogan · 11 Sep 2015

@Hatchman76 that's pretty ace. Excellent response!





Fenrir

@semibogan

Following



this should be obvious but don't use
[@seekjobs](#) at work. They don't use SSL,
anything you do can be monitored, thus
risking employment status

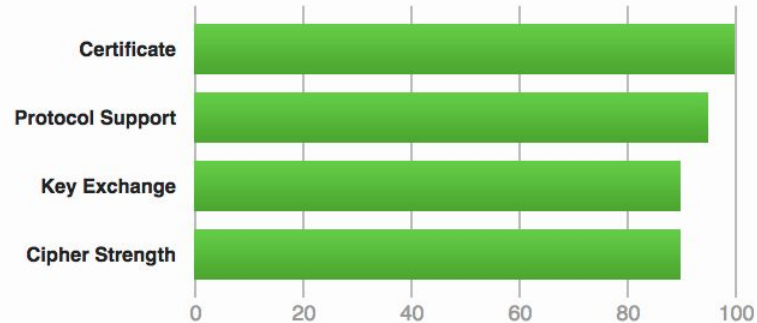
6 months later...



Qualys SSL Report - www.seek.com.au (Feb 2019)

Summary

Overall Rating



Visit our [documentation page](#) for more information, configuration guides, and books. Known issues are documented [here](#).

Renegotiation test has been disabled temporarily due to an Apache httpd 2.4.37 bug. [MORE INFO »](#)

HTTP Strict Transport Security (HSTS) with long duration deployed on this server. [MORE INFO »](#)

DNS Certification Authority Authorization (CAA) Policy found for this domain. [MORE INFO »](#)

OK, a little bit too far right...

What about from random internet people
instead!?



www.openbugbounty.org



openbugbounty

[Bug Bounties](#)

[Top Researchers](#)

[Acknowledgements](#)

[Forum](#)

[About](#)

[Latest](#)

[API](#)

Search



Open Bug Bounty Community helped fix **186,394** vulnerabilities

Report Vulnerability

Submit, help fixing, get kudos.



Start Bug Bounty

Run your bounty program for free.




317,593 coordinated disclosures

186,394 fixed vulnerabilities

372 bug bounties with **810** websites

8,801 researchers, **316** honor badges

Search

Website (URL): 

seek.com.au

Security researcher:

Bugbounty company:

SEARCH

Search Results:

Domain	Researcher	Date	Status	Type
seek.com.au	dim0k	06.03.2016	patched	Cross Site Scripting
seek.com.au	dim0k	04.03.2016	patched	Cross Site Scripting

seek.com.au/jobs/search=Australia'-alert(document.cookie);



DATA CENTRE

SOFTWARE

SECURITY

DEVOPS

BUSINESS

PERSONAL TECH

SCIENCE

EMERGENT TECH

BOOTNOTES

LECTURES



SECURITY



Security

Unearthed emails could be smoking gun for epic GDPR battle against Google, adtech giants



Job Search

\$150k

Security

Attackers exploit SEEK via XSS vulnerability.



SEEK

Hi Dimtry,

If you find vulnerabilities in the future, please disclosure them to us via

security@seek.com.au

Unfortunately as you publicly disclosed the issues **we cannot offer you any reward as per our policy.**

SEEK Security Team



dim0k

@d1m0ck

Kikboxing, Coding, sHc0ding, dZen

hackerone.com/d1m0ck

Joined February 2012

[Tweet to dim0k](#)

Vulnerability	Reported
XSS	March 2016
HTML Injection	March 2016
XSS	April 2016
XSS	April 2016
XSS	May 2016
XSS	July 2016

Hi Dmitry,

We would like to offer you **\$550 USD**.

Could you please send us your Paypal details?

SEEK Security Team



10 minutes later...

Hello,

Email of my PayPal account is

dmitry.ivasf128@gmail.com

Thanks

d1n0ck

SEEK's Vulnerability Disclosure Policy...



[Sign in](#) or [Register](#) | [Employer site](#)

[Job Search](#)

[\\$150k+ Jobs](#)

[Profile](#)

[Company Reviews](#)

[Career Advice](#)

Reporting Security Vulnerabilities

<https://www.seek.com.au/reporting-security-vulnerabilities/>

SEEK

SEEK is a diverse group of companies that have a unified purpose to help people live more fulfilling and productive working lives and help organisations succeed.

🚩 \$50 – \$10,000 per vulnerability

🐞 Managed by Bugcrowd

[SUBMIT REPORT](#)



<https://bugcrowd.com/seek>

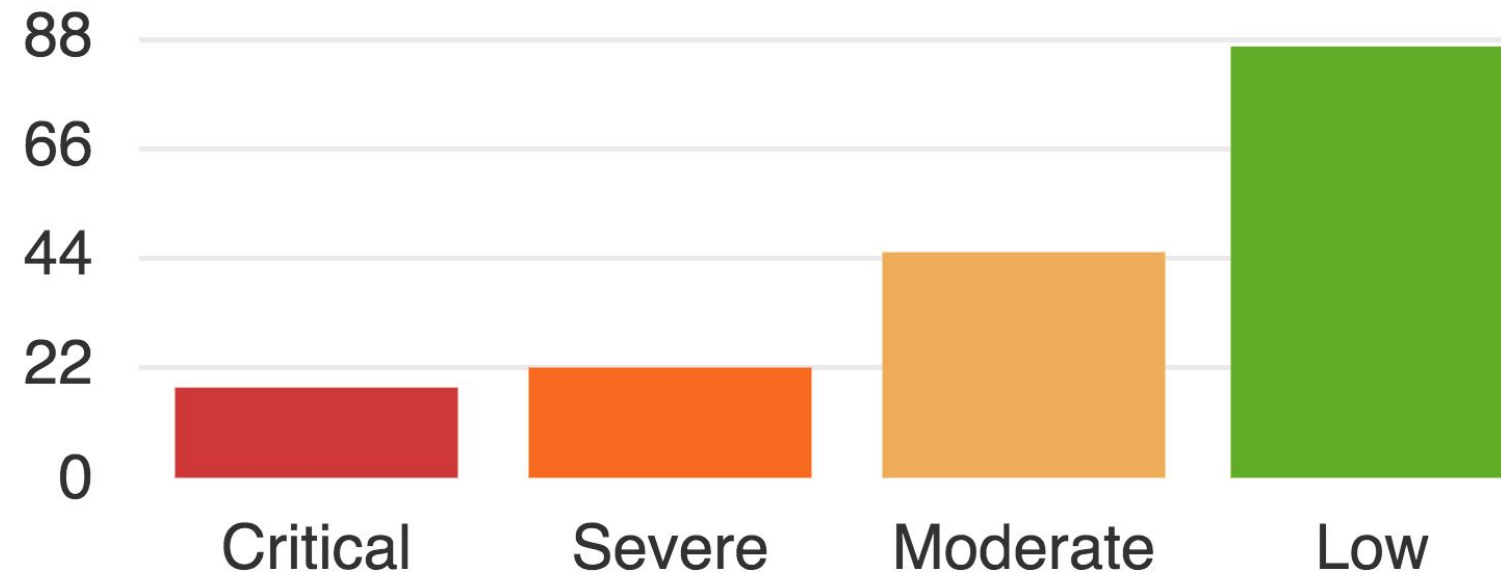
Bug Bounty Program Metrics

(2016 to 2019)

Total
\$136,000
(USD)

Average
\$845

Highest
\$10,000



Part 5 — A Comprehensive Guide to Running a Bug Bounty Program



Julian Berton

Jan 5 · 14 min read

<https://medium.com/@berton.julian>

Just-In-Time Security Education...

54%

Of technology teams
see security pros in
the role of “nag”

The logo for the DEVSECOPS COMMUNITY SURVEY 2017 is located on the right side of the image. It features the text "DEVSECOPS" in a large, bold, white sans-serif font. Below it, "COMMUNITY" is written in a slightly smaller, bold, white sans-serif font. At the bottom, "SURVEY 2017" is written in a white sans-serif font, with "2017" being slightly larger than "SURVEY". The background of the logo is a dark blue rectangle with a subtle pattern of lighter blue geometric shapes, including hexagons and circles. The entire logo is set against a white background.

DEVSECOPS
COMMUNITY
SURVEY 2017



Easy to work with



Reach out proactively



Defend initiatives



Contribute

Champion



Security Culture Goals

Part 3—Tackling Security Culture and Awareness



Julian Berton

Jul 16, 2017 · 10 min read

<https://medium.com/@berton.julian>

JIT Security Education

- Clear guidance around the “why”
- Relevant information only
- How to learn more & get help?
- Only when it's needed



90%

Percentage	Activity
90%	Tech Induction
70%	Just-In-Time
30%	Full Day
5%	Security Champions



Tech Induction

2-hour long introduction to all things SEEK security.

70%



Just-In-Time

Slack notifications, emails, face-to-face interactions, links to checklists, etc.

30%



Full Day

8-hour deep dive into SEEK's common vulnerabilities, practical and in person.

5%



Security Champions

On-going training, external and internal. An extension of the security team.

Part 4 — Delivering an Application Security Training Course



Julian Berton

Jul 16, 2017 · 14 min read

<https://medium.com/@berton.julian>

#bug-bounty-alerts (69 people)



Bugcrowd APP 4:27 PM

pamoshea left a note.

sql injection in events.seek.com.au

Note

Created Jira ticket: <https://seek-jira.atlassian.net/browse/SEC-395>



Bugcrowd APP 12:03 PM

Zac set a reward amount of \$3,000.

sql injection in events.seek.com.au

Researcher

QA6Y0YLQ4RE8LPJ - 93.27%

Priority


P1 - critical

SQL Injection in events.seek.com.au

 Edit  Comment Assign Start Progress Resolve Issue

Type:  Bug

Priority:  Must

Labels:  

Example of how
teams can learn
more

- Description of the issue
- Impact to SEEK
- Likelihood of attack
- Proof of concept
- Metrics and ownership tags

#production-issues (440 people)

Relevance

More Info

Lessons Learnt & Accountability



Zac Sims Feb 7th at 2:31 PM

FYI Over the last week we've had a few "must fix" submissions to our bug bounty program ([#bug-bounty-alerts](#)) about a several vulnerabilities in events.seek.com.au. These vulnerabilities allowed the researcher to access the contact details (name, surname, phone) of hirers who had RSVP'd for SEEK events.

More information here:

- XSS vulns: <https://seek-jira.atlassian.net/browse/SEC-391>
- SQLi: <https://seek-jira.atlassian.net/browse/SEC-395>

[@servicemanagement](#) could we please setup a PIR for this issue? Will be someone from the security team, internal systems (), and marketing (or similar)



1



1



1

Post Incident Review (PIR)

Problem

Mitigating
strategies

What could
we do
differently?

Risks &
Data

What made it
not nearly as
bad as it
could have
been?

ROOT
CAUSE

What are
the positives
?

High
Fives!

Scalable, alignment of technical patterns
and standards...

Via Request For Comments (RFC)

2014

5 years...

2019



- < 70 developers
- 1 office building
- Simple software stack
- 1 physical data centre
- ~4 monolith applications
- < 100 git repositories
- ~10 deploy per day

- > 300 developers
- 18 countries
- Complex software stack
- 150+ AWS Cloud accounts
- 100's of microservices
- > 2000 git repositories
- > 100 deploy per day

Security Change through Feedback



@ Riot

engineering.riotgames.com/news/evolution-security-riot



Mark Hillick

@markofu

@davidrook's fashion advisor 🐼

📍 Los Angeles

🔗 securityleadership.ninja

- RFC process is used for internet standards (OAuth, TLS).
- Not an approval process.

Source Control - GitHub RFC #26

Edit

Merged

brian-captain-cro... merged 26 commits into master from rfc0009 on 12 Jul 2018

Conversation 81

Commits 26

Checks 0

Files changed 1

+98 -0



bertonjulian commented on 2 May 2018 • edited

+ 😊 ...

This Source Control - GitHub RFC is designed to gain consensus and adoption of the guidance within, to help solve the problem described below:

81
Comments

18
Approvers

Reviewers

- lantrix
- tmicheletto
- borhub
- koterpillar
- davidduffett
- abienert
- ashlineIdridge
- danielwhite

Internal SEEK RFC

RFC001 - Public S3 Bucket Tagging Policy

RFC002 - Request Ids

RFC003 - Source Control - GitHub

RFC003 - Source Control - GitHub

Problem Statement

Details

Limitations

Discussion

Exceptions

RFC003 - Source Control - GitHub

Status: ADOPTED

Tags: security, standard, source-code

Owner(s): Security Team, Platform Engineering, Architecture

Scope: All product development

Problem Statement

That's just documentation...

Nobody got time to read all that

#github-alerts - Reactive alerting



GitHub Auditor APP 3:05 PM

WARNING: repository [SEEK-Jobs/indirect-job-apply](#) has been *created* as public by [@mjo](#)



1 reply 3 months ago

November 28th, 2018



GitHub Auditor APP 8:16 AM



GitHub repo [indirect-job-apply](#) has no team admin

A current repo admin should add a team with admin rights cc: [@mjo](#)



8 replies Last reply 3 months ago

Moving Fast and Securing Things

The SDL at Slack and goSDL



Max Feldman

[Follow](#)

Apr 27, 2018 · 11 min read



Use questionnaires and checklists to make it easy for people to make the right decisions...

with regards to the software they build.

Code

☐ Open-Redirection

Do you send users to another url?

☐ Authentication

Does your code authenticate or authorize users, tokens, sessions, or other?

☐ XML

Does your code work with, write or read XML?

☐ Open Source Compliance

Do you intend for this library or project to be open sourced?

☐ Internal Libraries

Concerns the consumption or publication of internal shared libraries

General



General Guidance

☰ ☒ 0/10

Services

☰ ☒ 0/6

Monitoring

☰ ☒ 0/7

+ Add another card

Code



CSRF

☰ ☒ 0/2

Open Source Compliance

☰ ☒ 0/5

XSS

☰ ☒ 0/6

XML

☰ ☒ 0/2

Internal Libraries

☰ ☒ 0/3

Authentication

☰ ☒ 0/4

Third-Party Libraries & Services

☰ ☒ 0/5

Data



General

☰ ☒ 0/5

Object Storage

☰ ☒ 0/5

No SQL Databases

☰ ☒ 0/4

Relational Database

☰ ☒ 0/7

+ Add another card

Service Provider

AWS

☰ ☒ 0/7

Hostworks

☰ ☒ 0/1

+ Add another card



Authentication

in list [Code](#)

LABELS



+



Description

Edit

Does your code authenticate or authorize users, tokens, sessions, or other?



Authentication

Delete

0%



We are only using Preferred Protocols stated within [RFC018 - Authentication Protocols](#)



We are managing authentication secrets as per [RFC007 - Secrets Management - Securing Sensitive Secrets](#)



We are not logging authentication tokens or secrets ([Draft RFC Runtime Protection and Monitoring](#))

250 concerns too many...

Paved Road

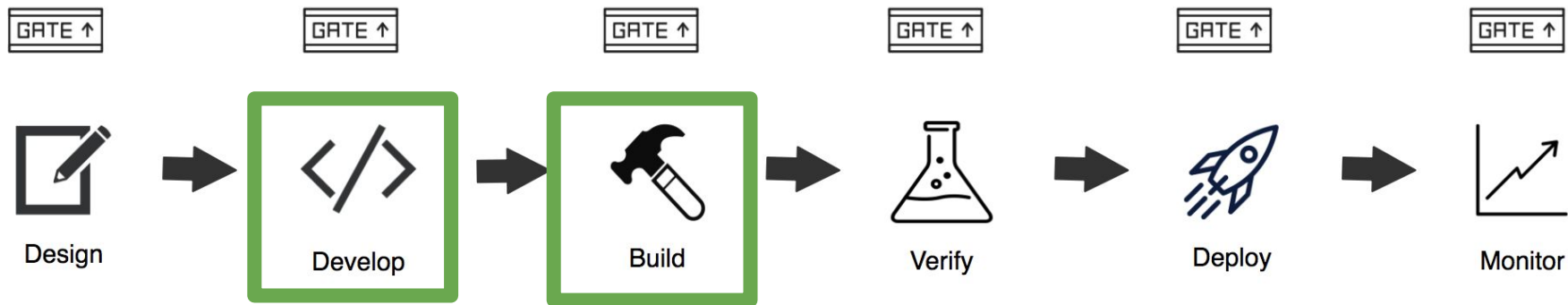
- Common tooling
- Secure-by-default
- Dedicated team
- Developer Happiness

Paved Road (Before)

- Have security log forwarding enabled using auditd.
- Scan for and patch all critical OS issues using AWS Inspector.
- Use a minimal OS image to reduce the overall attack surface.
- Harden your OS images to further reduce the risk of exploitation.

Paved Road (After)

1. Use SEEK Gantry to deploy your services.
2. Use SEEK EBB to deploy your services.
3. Use SEEK's Golden AMI as your OS image.
4. Run SEEK's Hardened Amazon Linux scripts.





Buildkite @ SEEK

Our old build
system....



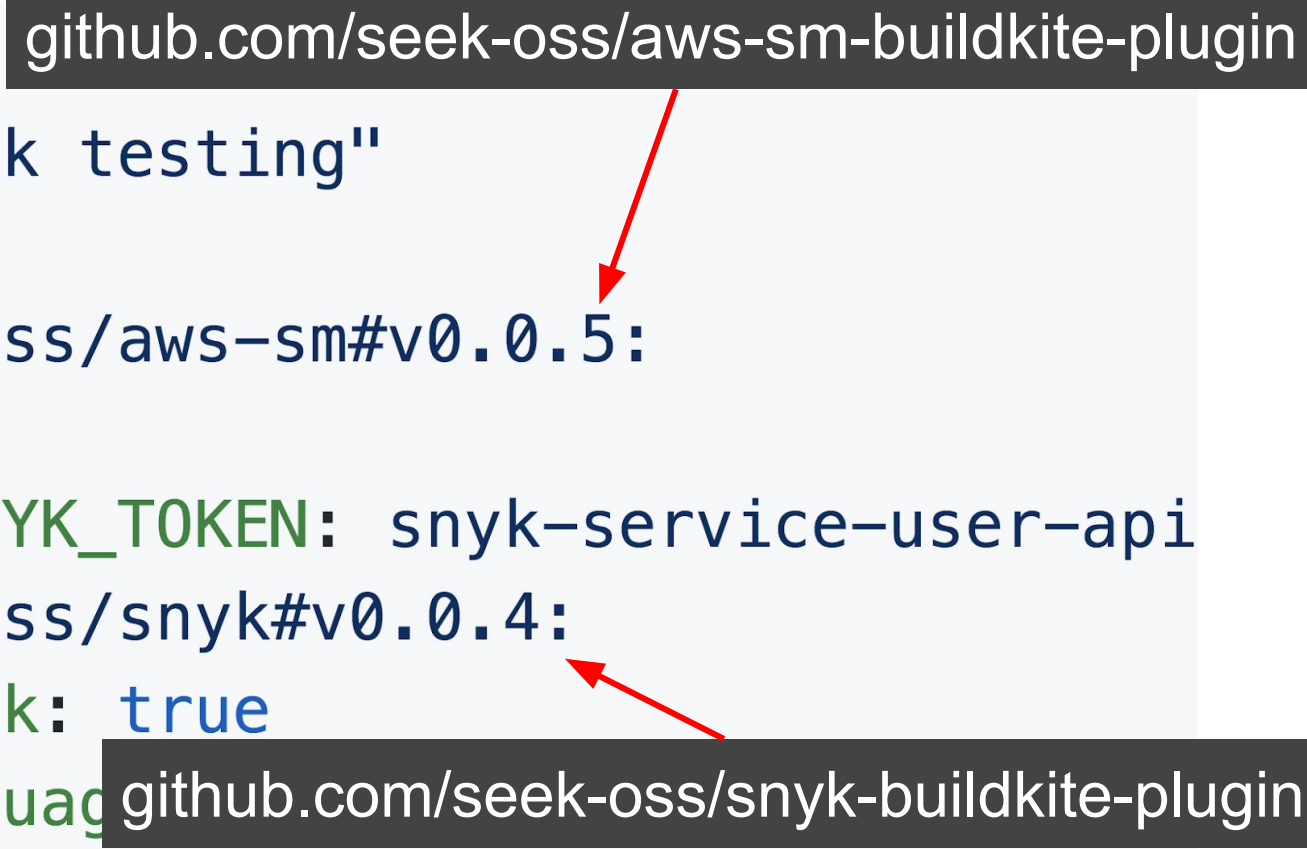
RFC014 - CI/CD Tool Requirements

- Secure Secret Storage
- Key Rotation
- Local Build Agents
- SSO SAML Support
- Audit Logging
- Zero Vendor Trust

- Build Reporting
- Event Notifications
- Codified Build Pipelines
- Native Docker Builds
- Low Latency Build Start

Pipeline.yml

```
steps:
  - name: "Snyk testing"
    plugins:
      - seek-oss/aws-sm#v0.0.5:
        env:
          SNYK_TOKEN: snyk-service-user-api
      - seek-oss/snyk#v0.0.4:
        block: true
        language: github.com/seek-oss/snyk-buildkite-plugin
        path: package.json
```



Dependency Vulnerability Management



2,290

Repositories

17,890

Packages

6

Package Managers

1,850

PROJECTS

3129

NEW ISSUES

1725

FIXED ISSUES

Integrate with their tools...



Some checks were not successful

[Hide all checks](#)

1 failing and 1 successful checks



security/snyk — 1 vulnerable dependency path

[Details](#)



security/snyk-verify — Verified pull request



This branch has no conflicts with the base branch

Merging can be performed automatically.

Merge pull request



You can also [open this in GitHub Desktop](#) or view [command line instructions](#).

Arbitrary Code Execution

Vulnerable module: nokogiri

Introduced through: slather@2.4.3

Fixable?

 [Fix this vulnerability](#)

Detailed paths and remediation

- Introduced through: project@* › slather@2.4.3 › nokogiri@1.6.8.1

Remediation: [Upgrade](#) to slather@2.4.5.

Overview

`nokogiri` (鋸) is an HTML, XML, SAX, and Reader parser, with the ability to search documents via XPath or CSS3 selectors.

Affected versions of the package are vulnerable to Arbitrary Code Execution or a Denial of Service (memory corruption) via a crafted web site. Nokogiri bundles the `libxslt` library, which is vulnerable in versions below 3.

Denial of Service (DoS) - CVE-2016-4738

libxslt allows remote attackers to execute arbitrary code or cause a denial of service (memory corruption) via a crafted web site.

Arbitrary Code Execution - CVE-2017-5029

The `xsltAddTextString` function in `transform.c` in `libxslt`, lacked a check for integer overflow during a size calculation. This allowed a remote attacker to perform an out of bounds memory write via a crafted HTML page.

Triage

[More about this issue](#)

 [Create a Jira issue](#) [CONFIGURE](#)

 [Ignore](#)

Ignore this issue



Ignore reason

Temporarily ignore

✓ Not vulnerable

Won't fix

More details (optional)

Ignore for

30 Days



Ignore

Lessons Learnt

- Achieving Developer Happiness will involve dev work and ongoing support.
- Chosen tools must have an API.
- Easy to get visibility of the risk, hard to reduce it.
- Need to triage issues, not everything is exploitable.

Scope

Services deployed to production environments or are publicly accessible.

Advice

Triage & remediate all fixable High security vulnerabilities.

A macro view of your software maturity



A word cloud of company names arranged in a circular pattern. The names are of various sizes and colors, including shades of blue, green, brown, and purple. The names are: Sony Mobile, Zephyr Health, LinkedIn, U.S. Bank, Verizon, Experian, Betfair, JPMorgan Chase, Synopsys, NetApp, Adobe, PayPal, Cisco, Symantec, GE, Qualcomm, Citigroup, Splunk, Box, Zendesk, Home Depot, HSBC, Bank of America, Lenovo, Dell, Oracle, Siemens, HPE, Fortify, Epsilon, Veritas, NVIDIA, Autodesk, Capital One, Wells Fargo, City National Bank, and F-Secure.

Sony Mobile Zephyr Health
LinkedIn U.S. Bank
Betfair Experian Verizon
JPMorgan Chase Synopsys NetApp
Adobe PayPal Cisco
Symantec GE Qualcomm Citigroup
Splunk Box Zendesk Home Depot
HSBC Bank of America
Lenovo Dell
Oracle Siemens HPE Fortify
Epsilon Veritas
NVIDIA Autodesk
Capital One Wells Fargo City National Bank
F-Secure



116

Activities

12

Practices

4

Domains

Governance

1. Strategy & Metrics (SM)
2. Compliance & Policy (CP)
3. Training (T)

Intelligence

4. Attack Models (AM)
5. Security Features & Design (SFD)
6. Standards & Requirements (SR)

SSDL Touchpoints

7. Architecture Analysis (AA)
8. Code Review (CR)
9. Security Testing (ST)

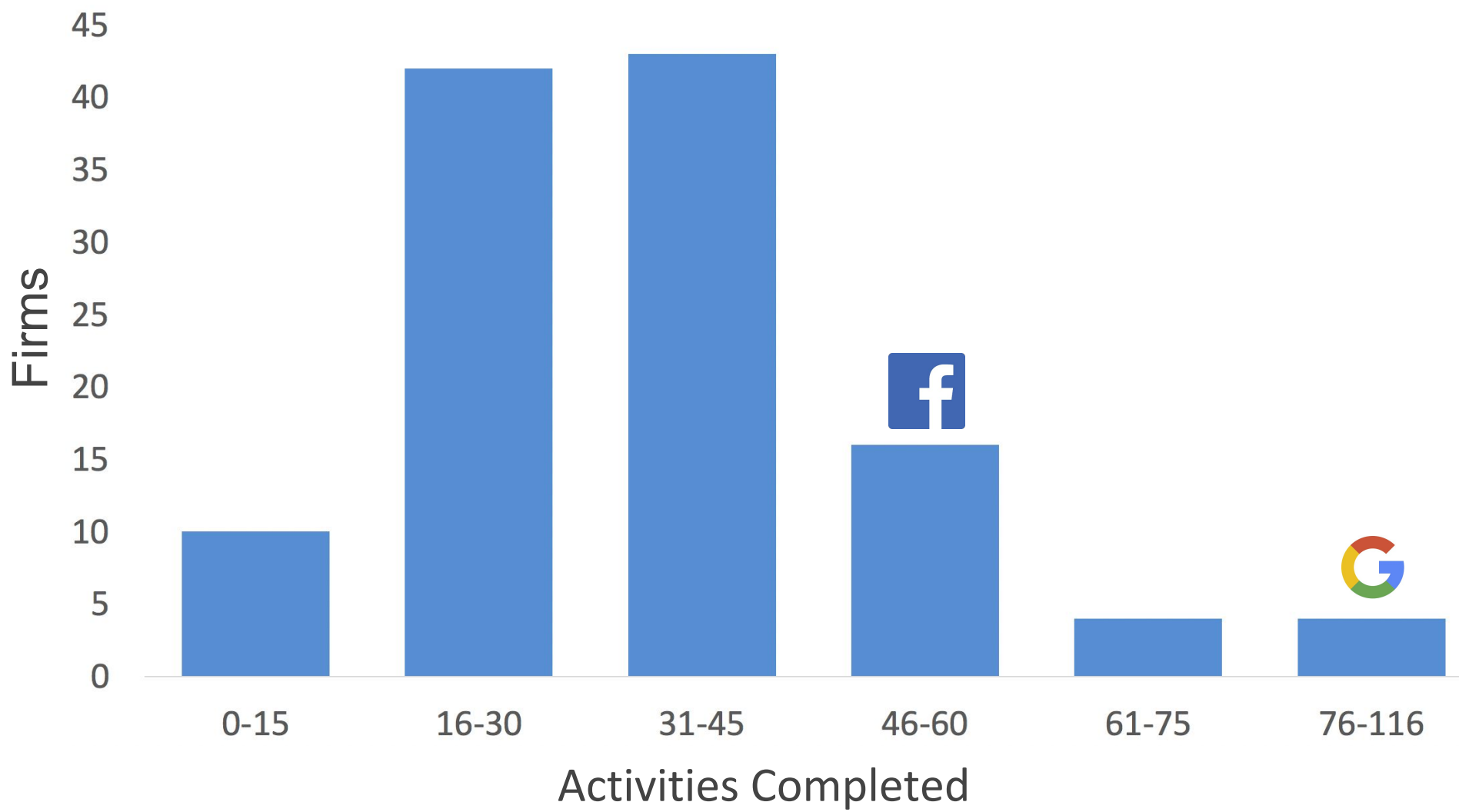
Deployment

10. Penetration Testing (PT)
11. Software Environment (SE)
12. Configuration Management & Vulnerability Management (CMVM)

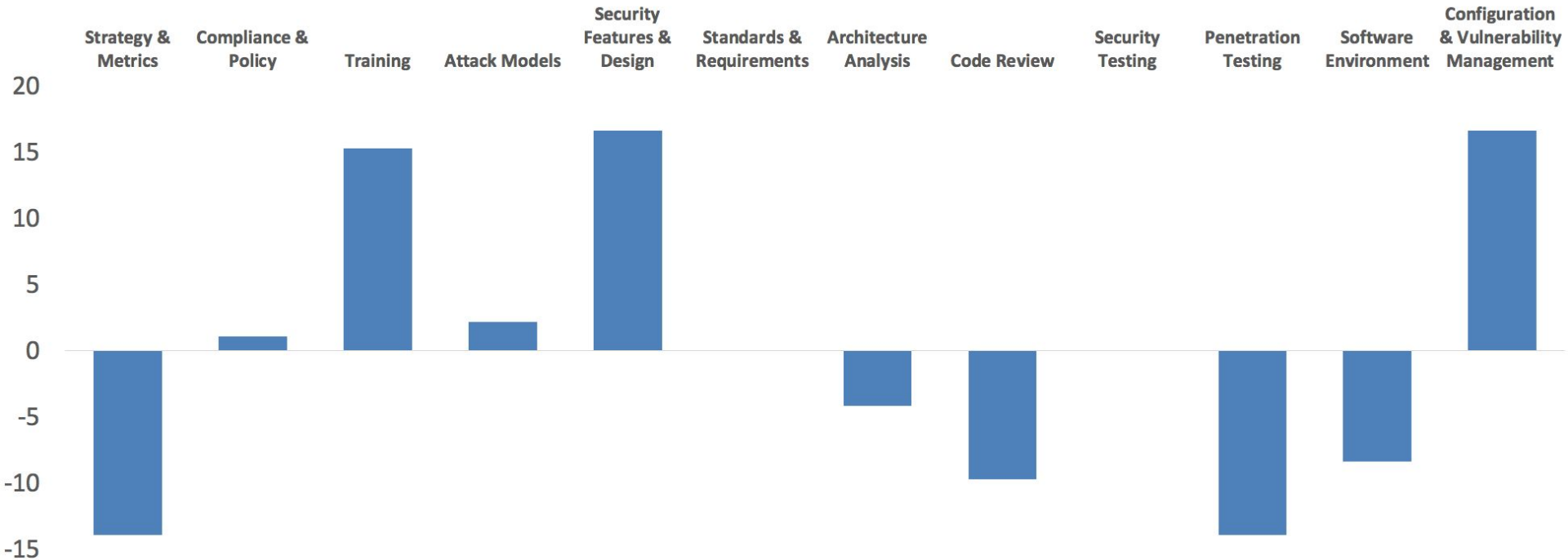
Example Activities

- Educate executives on security.
- Use centralized reporting.
- Track bugs through the fix process.
- Operate a bug bounty program.
- Include security awareness.

Activity	Firms (120)
Black-box security tools into QA processes.	25%
Use automated & manual code review tools.	63%
Identify gate locations and gather artifacts.	84%
Provide awareness training.	88%



Activity Change (%)



Part 2—Building an Application Security Programme



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Questions?

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