DevSecOps

An Implementation Strategy With a Focus on Cultural Implications

6th Annual COV Information Security Conference
Richmond, Virginia
April 12, 2019

Presenters

Eddie McAndrew
COO
AIS Network
(804) 239-5185

Email:
eddie.mcandrew@aisn.net

Barry Davis
CISSO
Virginia Dept. of Social Services
(804) 726-7153

Email:
barry.davis@dss.virginia.gov

Agenda

- Introduction
- DevOps
- DevSecOps
- DevSecOps Culture
- DevSecOps Process
- DevSecOps Tools
- Summary
- Q&A

What Is DevOps?

DevOps (development and operations) is an enterprise software development approach that leverages agile relationship between development and IT operations. The objective is to drive innovation through high velocity delivery of business applications.

What Is DevOps?

Tools and practices employed to drive high velocity deployment of applications

Key component of value proposition behind going to the cloud

Drives Continuous Integration/Continuous Deployment (CI/CD)

Intended to drive innovation/continuous learning, high-quality applications through flexibility and enhanced competitiveness

Infrastructure as Code

- Defining and managing system configuration through code that can be versioned and tested in advance, to increase the speed of building systems and offering efficiencies at scale.

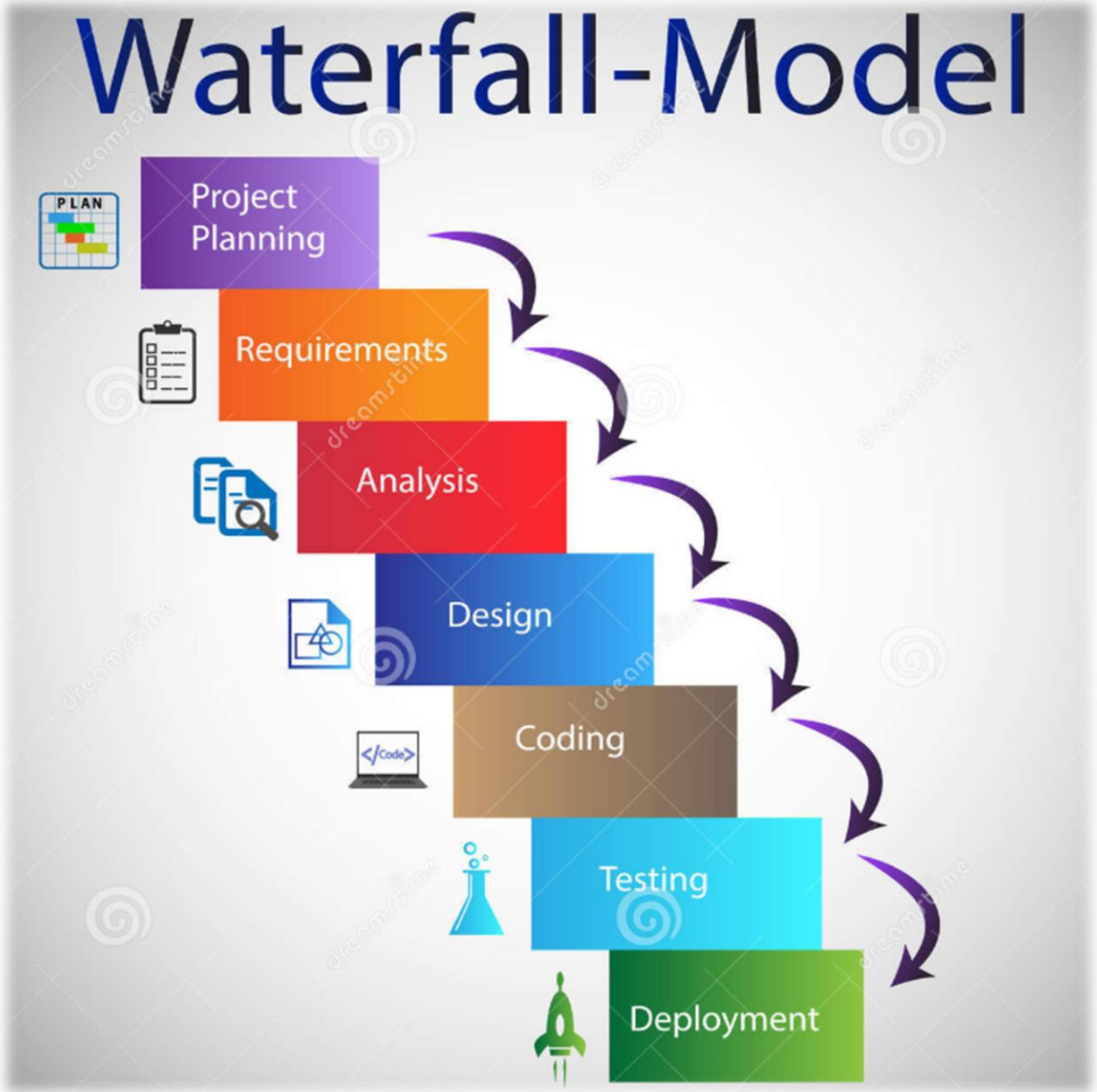
Continuous Delivery

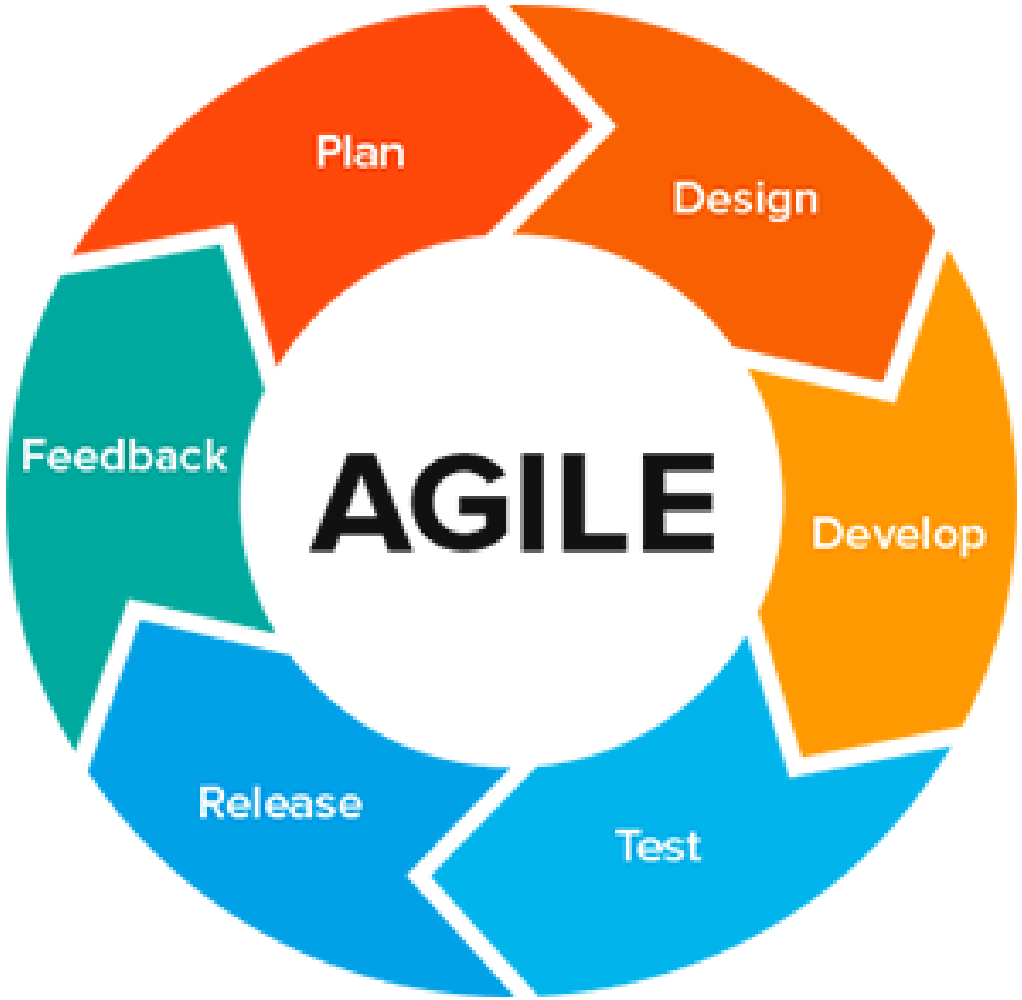
- Using Continuous Integration and test automation to build pipelines from development to test and then to production.

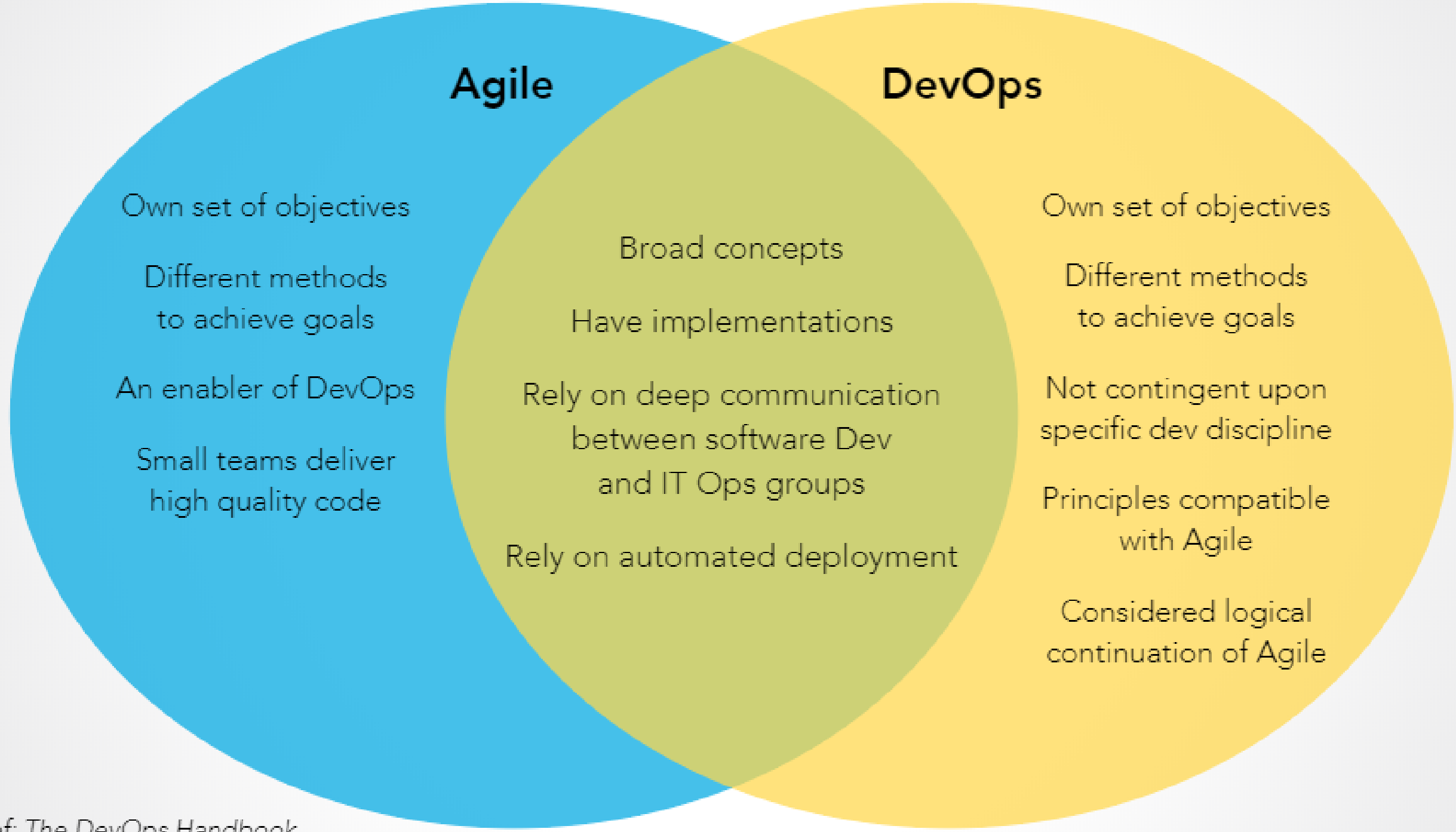
Continuous Monitoring and Measurement

- Creating feedback loops from production back to engineering, collecting metrics and making them visible to everyone to understand how the system is actually used, and using this data to learn and improve.

Ref: ISC2 -DevSecOps – Integrating Security into DevOps


Waterfall-Model
PLAN
Project Planning
Requirements
Analysis
Design
</code>
Coding
Testing
Deployment

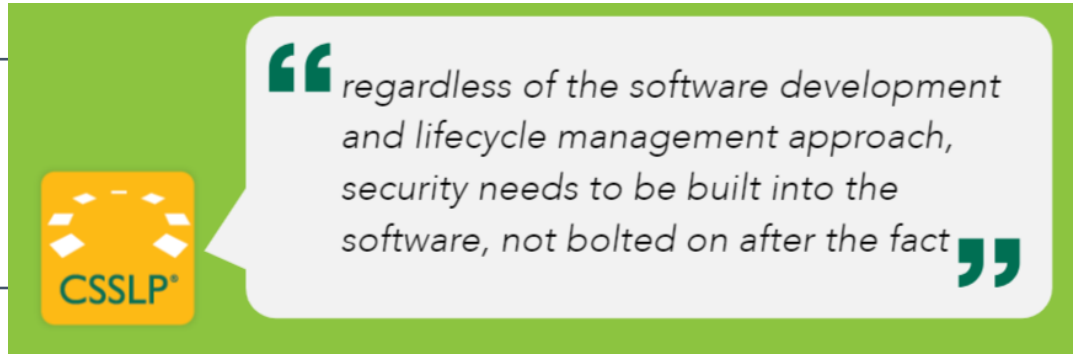

Plan
Design
Develop
Test
Release
Feedback
AGILE



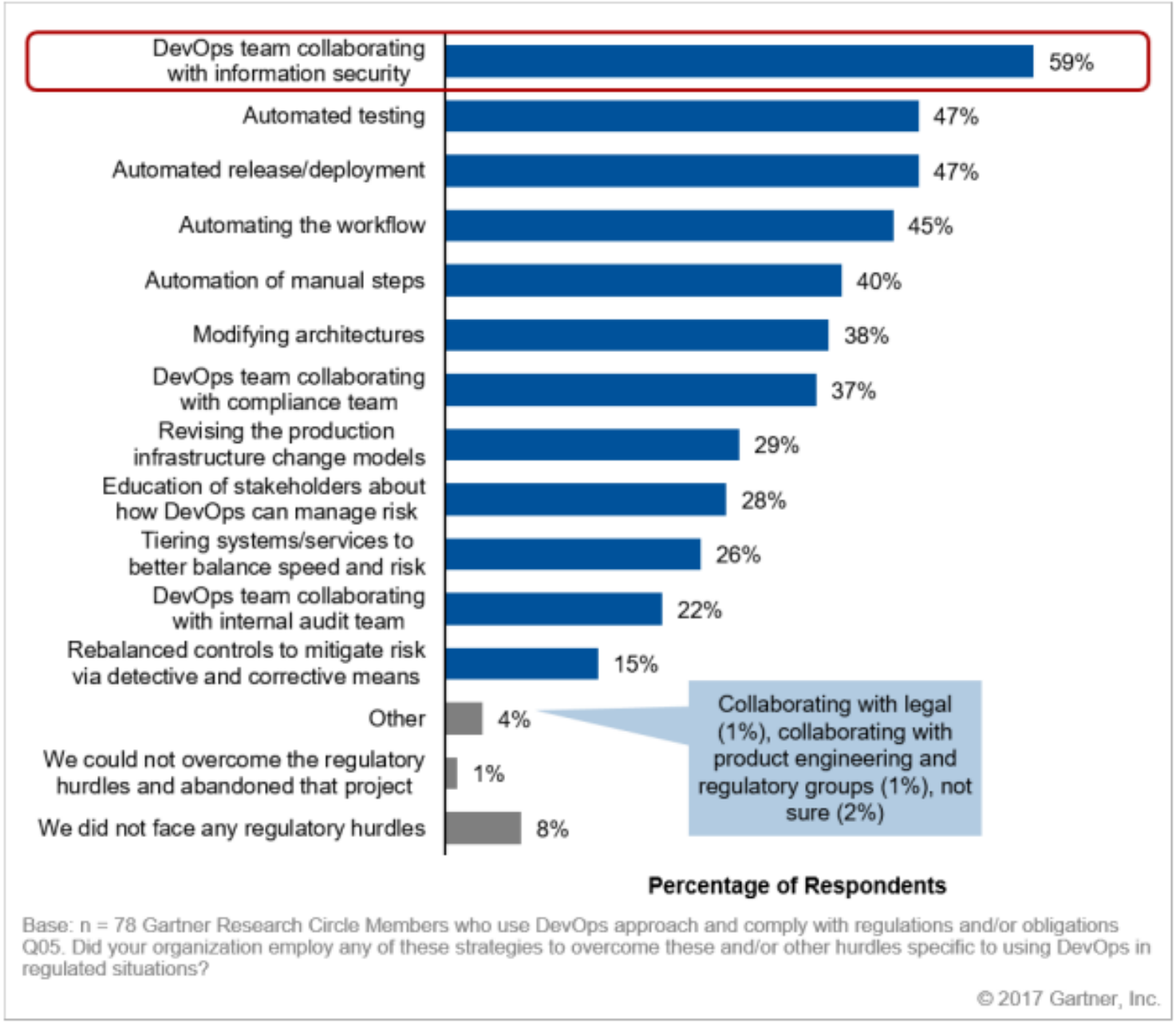
Ref: The DevOps Handbook

DevSecOps the Why & the What…

- **Faster** deployment, **rapid** and **continuous** updates and rollout lead to **what**?
  - More potential vulnerabilities
  - Greater potential risk
    - So to drive speed, flexibility & innovation securely -> **DevSecOps**
- DevSecOps – Bridging Agility & Security
- DevSecOps consists of the tools, frameworks and principles for adapting to a high velocity environment
  - Driving *enabled* innovation, flexibility and competitiveness *securely*…



Hurdles to Using DevOps in Regulated Situations

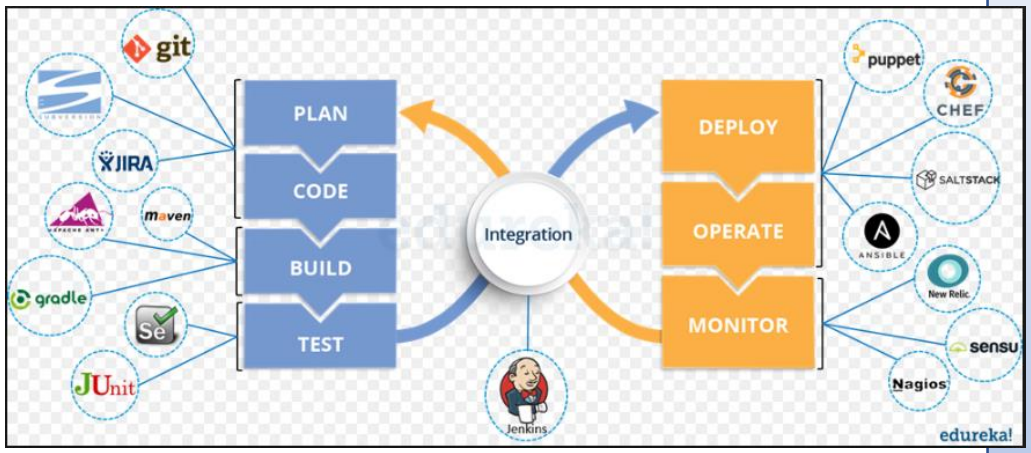


Source: Gartner (October 2017)

Key Elements of DevSecOps

Culture

Process



Technologies

Traditional Security *v.* DevSecOps

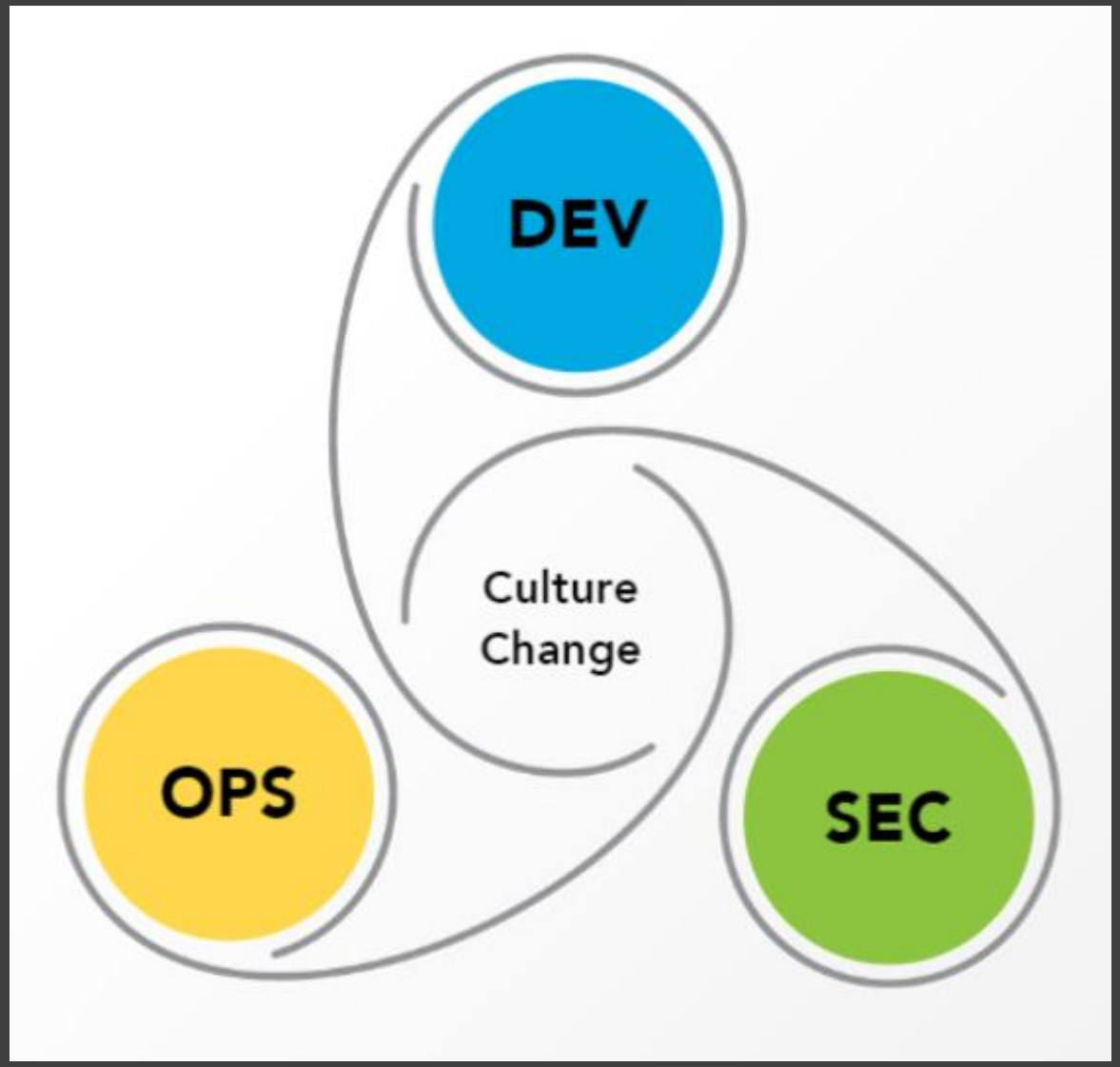
Traditional

In the traditional view of security, operations and engineering must yield to avoid risk. A view might be that of:

- Development
- Security
- Operations

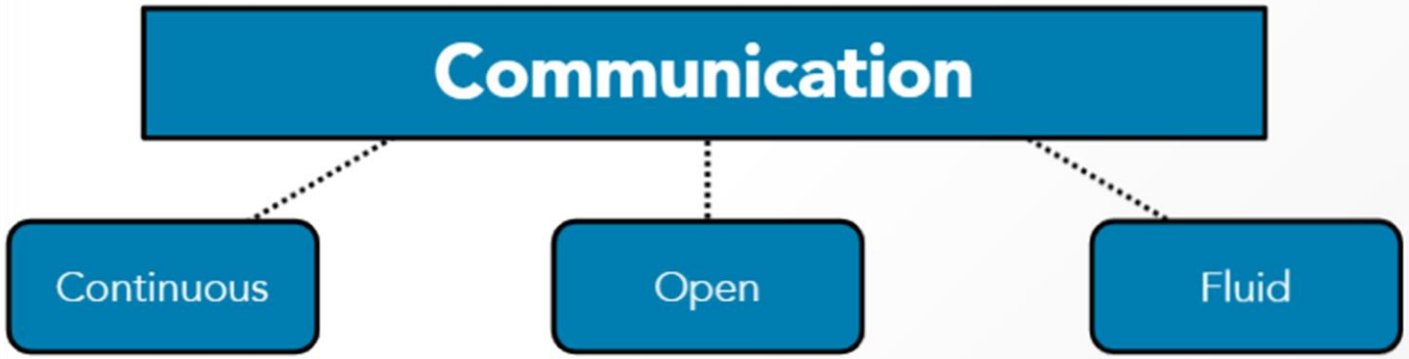
DevSecOps

Security must be communicated as a core value – and as a critical enabler.



Collaboration is key!

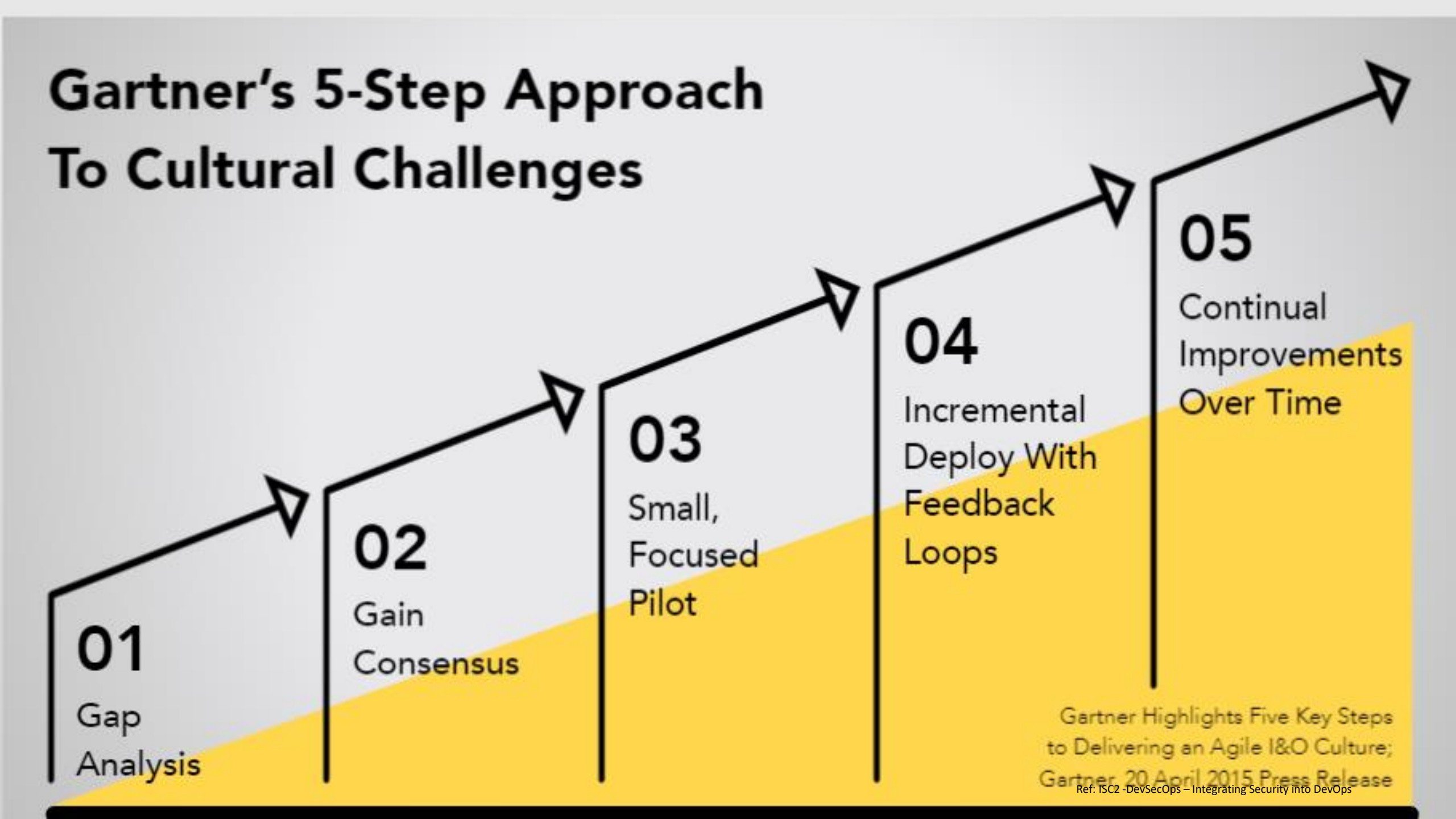
Communication Is Critical to the Cultural Change



Ref: ISC2 -DevSecOps – Integrating Security into DevOps


Changing behaviors &
culture is fundamental
to success
Gartner Highlights Five Key Steps to Delivering an Agile
I&O Culture; Gartner, 20 April 2015 Press Release

Gartner's 5-Step Approach To Cultural Challenges



Gartner Highlights Five Key Steps to Delivering an Agile I&O Culture; Gartner, 20 April 2015 Press Release

Ref: ISC2 -DevSecOps – Integrating Security into DevOps

Daily Touchpoints

Wikis, Blogs & Portals

Messaging Apps

Lunch & Learn

> *By 2018, 90 percent of infrastructure and operations organizations attempting to use DevOps without specifically addressing their cultural foundations will fail*

Gartner Highlights Five Key Steps to Delivering an Agile I&O Culture; Gartner, 20 April 2015 Press Release

Security Champions Facilitate a Scalable DevSecOps Program

Acting as the voice of Security

Acting as an on-site advisors

Anticipating potential design or implementation problems

Deciding when to engage the security team

Participating in code reviews and threat modeling

Troubleshooting security bugs

AND MORE!

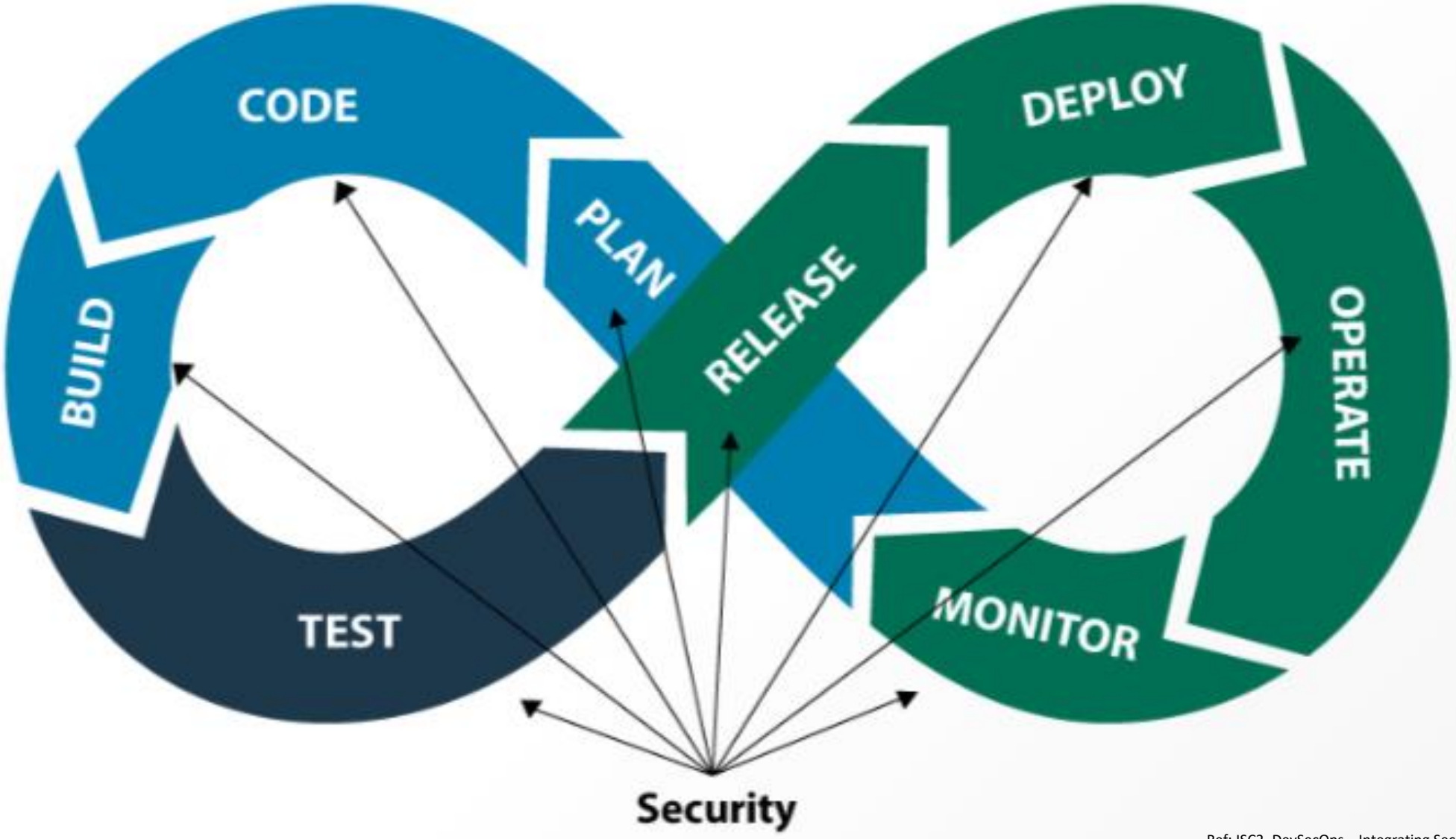
> *Cultural changes come in the form of* ***integrating teams*** *that historically have been disparate around a* ***single vision****. Technical changes come with* ***automating*** *as much of the development, deployment, and operational environment as possible to more rapidly deliver* ***high-quality*** *and* ***highly secure*** *code.*

Ref: DevOpsSec, SecDevOps, DevSecOps: What's in a Name?
https://www.csoonline.com/article/3132078/security/devopssec-secdevops-devsecops-whats-in-a-name.html

DevSecOps & Process

- Cultural change must be support by process change
- Security tools must be tightly integrated throughout the DevOps pipeline
- Processes must:
  - Incorporate continuous monitoring and remediation of security defects
  - Continuously test code throughout the life cycle
  - Incorporate automated testing
  - Support Test Driven Security (TDS)
    - https://freecontent.manning.com/where-security-meets-devops-test-driven-security/
  - Support continuous & open communications
- Continual learning & improvement is key

Recommended Reading: "Where Security Meets DevOps: Test Driven Security," https://freecontent.manning.com/where-security-meets-devops-test-driven-security/

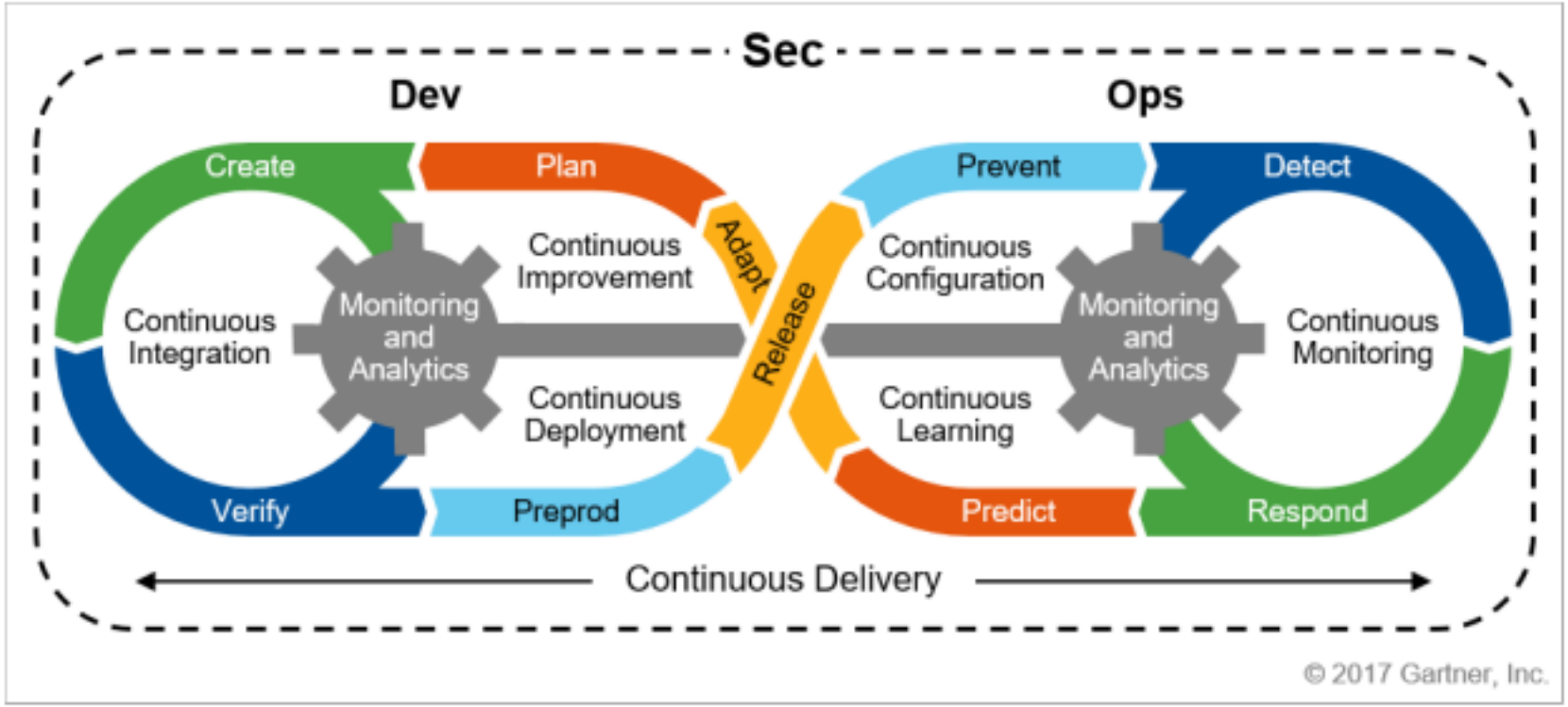


Ref: ISC2 -DevSecOps – Integrating Security into DevOps

Apply security controls in application and infrastructure layers;

Test them continuously

Secure Development as a Continuous Improvement Process



Source: Gartner (October 2017)

Gartner's Ten Things to Get Right....

1

- Adapt your security testing tools and processes to the developers, not the other way around.

2

- Quit trying to eliminate all vulnerabilities during development.

3

- Focus first on identifying and removing the known critical vulnerabilities.

4

- Don't expect to use traditional dynamic or static app security testing without changes.

5

- Train all developers on the basics of secure coding, but don't expect them to become security experts.

6

- Adopt a security champion model and implement a simple security requirements gathering tool.

7

- Eliminate the use of known vulnerable components at the source.

8

- Secure and apply operational discipline to automation scripts.

9

- Implement strong version control on all code and components.

10

- Adopt an immutable infrastructure mindset.

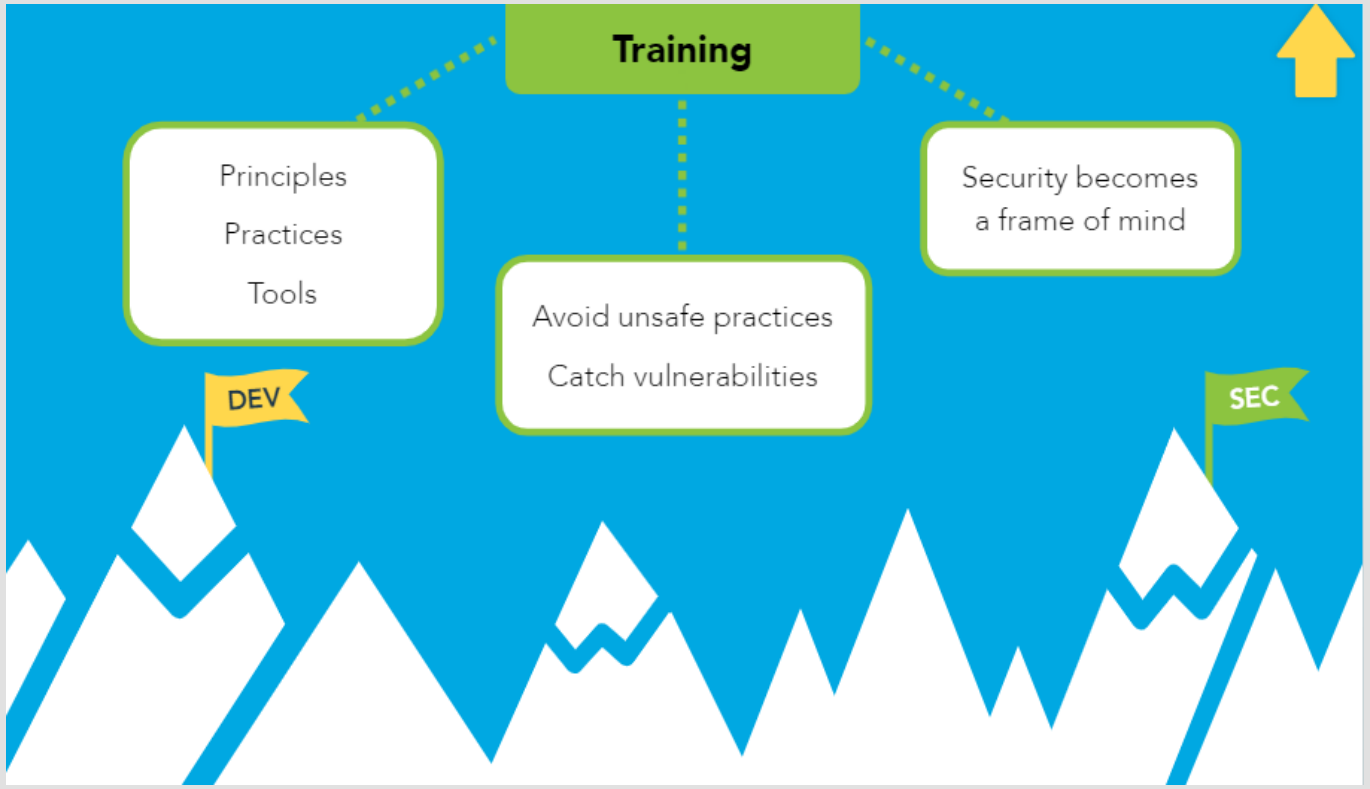
5 Principles for DevSecOps

- Automate security into the process
- Integrate to fail quickly
- No false alarms
- Build security champions
- Keep operational visibility

Information extracted from "5 Principles for Securing DevOps" CA Veracode, 2018

The Security Professional's Role

- Enable developers to find and fix security-related code defects
- Govern the use of open source components
- Implement developer training on secure coding
- Manage and report on application security policy, KPIs and metrics
- Understand the requirements for security testing solutions in a DevSecOps environment
- Create developer security champions



Recommended reading: "The Security Professional's Role in a DevSecOps World," https://info.veracode.com/guide-the-security-professionals-role-in-devops-world.html


DevSecOps
Tools

DevSecOps Tools – The Third Leg of the Stool

Automated testing is key to driving the DevOps pipeline

As noted - Security tools must be tightly integrated throughout the DevOps pipeline

Testing using tools should be metric driven a few key metrics include:

- Availability: Amount of uptime/downtime in a given time period, in accordance with the SLA.
- Change Failure: Percentage of production deployments that failed.
- Change Lead Time: Time between a code commit and production deployment of that code.
- Mean Time to Failure (MTTF): Time that a system is online between outages or failures.
- Mean Time to Recovery (MTTR): Time between a failed production deployment to full restoration of production operations.
- Number of False Positives: The number of mistakenly flagged vulnerabilities for an application.
- ISC2 list in appendix.

DevSecOps Tools Drive the DevOps Pipeline Via Logging

Logging pipeline

Analyze usage

Analyze security incidents

! DevOps teams may not know how to identify security breaches, hacking attempts

Log management tool

Reading & parsing logs

Distinguishing unauthorized activity

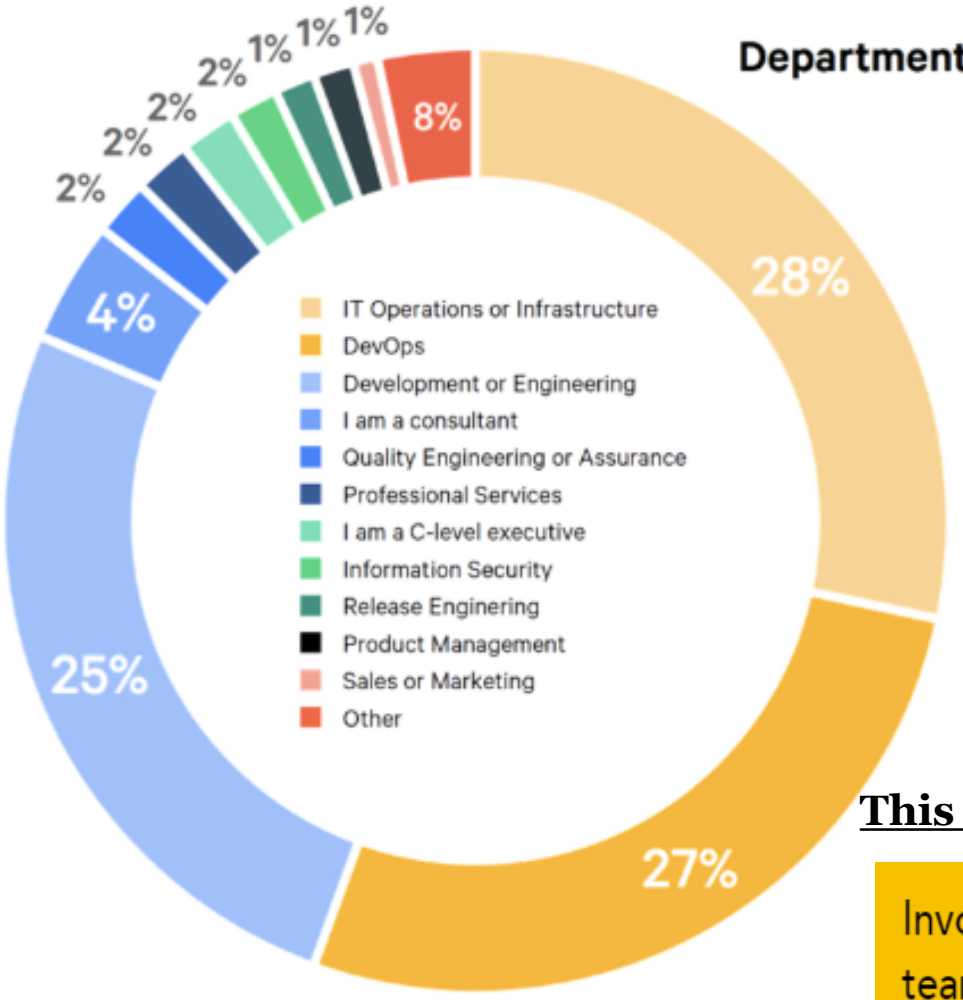
The Case for DevSecOps

2014 — 16% DevOps teams

2017 — 27% DevOps teams

2018 — 29% DevOps teams

High performers spent 50% less time remediating security issues



State of DevOps Report 2018 Presented by Puppet and Splunk (released during the development of this course) indicates 29%

<u>This drives the need to:</u>

Involve security and quality teams in the development process early and often.

A Security Strategy for Implementing DevSecOps

Tools & Frameworks

- ✓ Culture
- ✓ Process
- ✓ Technology

Keys to Successful Implementation

- **Culture** of Collaboration and Contribution
  - Everyone has something to offer
  - Everyone is responsible for security
  - Goal = safely distributing security decisions
- **Process** – signification changes to existing processes
  - Need mechanisms for communications, measurement, reporting
  - Need to establish a group including Security, Development and Operations
    - **This group is responsible for end-to-end security:**
      - **App development**
      - **Implementing changes**
      - **A continuous loop – CI/CD**
- **Tools** – required to automate processes for:
  - Managing code repositories
  - Testing – attacking surface analysis, threat modeling, penn & fuzz testing, *etc.*


Q & A

Thank You

Eddie McAndrew
COO
AIS Network
(804) 779-7754

Email:
eddie.mcandrew@aisn.net

Barry Davis
CISSO
Virginia Dept. of Social Services
(804) 726-7153

Email:
barry.davis@dss.virginia.gov

Appendix 1 – ISC2 DevSecOps KPIs

Key Performance Indicators

***TERMS:** DEFINITION*

Availability: Amount of uptime/downtime in a given time period, in accordance with the SLA.

Change Failure: Percentage of production deployments that failed.

Change Lead Time: Time between a code commit and production deployment of that code.

Change Volume: Number of user stories deployed in a given time frame.

Customer Issue Resolution Time: Mean time to resolve a customer-reported issue.

Customer Issue Volume: Number of issues reported by customers in a given time period.

Defect Burn Rate: Amount of time to fix vulnerabilities in an application.

Defect Density: The number of bugs identified divided by the codebase of an application.

Deployment Frequency: Number of deployments to production in a given time frame.

Logging Availability: Amount of uptime/downtime of the logging pipeline in a given time period.

Mean Time Between Failures (MTBF): The amount of time that elapses between one failure and the next. Mathematically, this is the sum of MTTF and MTTR, the total time required for a device to fail and that failure to be repaired.

Mean Time to Failure (MTTF): Time that a system is online between outages or failures.

Mean Time to Recovery (MTTR): Time between a failed production deployment to full restoration of production operations.

Number of False Positives: The number of mistakenly flagged vulnerabilities for an application.

Number of Functional/Acceptance Tests: Number of automated functional or acceptance tests for an application.

Number of Passed/Failed Security Tests: Number of automated security tests for an application.

311 | Park Place Blvd., Suite 400 • Clearwater, FL 33579 • United States of America
p: |+727.785.0189 • f: |+727.786.2989 • www.isc2.org

Appendix 2 – ISC2

Security Professional's role

Today, modern application security programs feature centralized governance by security, but testing and fixing are owned by development in an automated fashion throughout the build process. In this approach, security owns setting policies, tracking KPIs, and providing security coaching to developers.

In addition, security is responsible for providing developers with support in integrating scalable tools into their SDLC. Developers own testing applications in their development environment, fixing flaws to pass policy, and continuing to build code.

In this process, security-related defects are just another bug during the build process, and developers have the tools and guidance needed to fix them. At the same time, security can govern the program to make sure KPIs and policies are met.

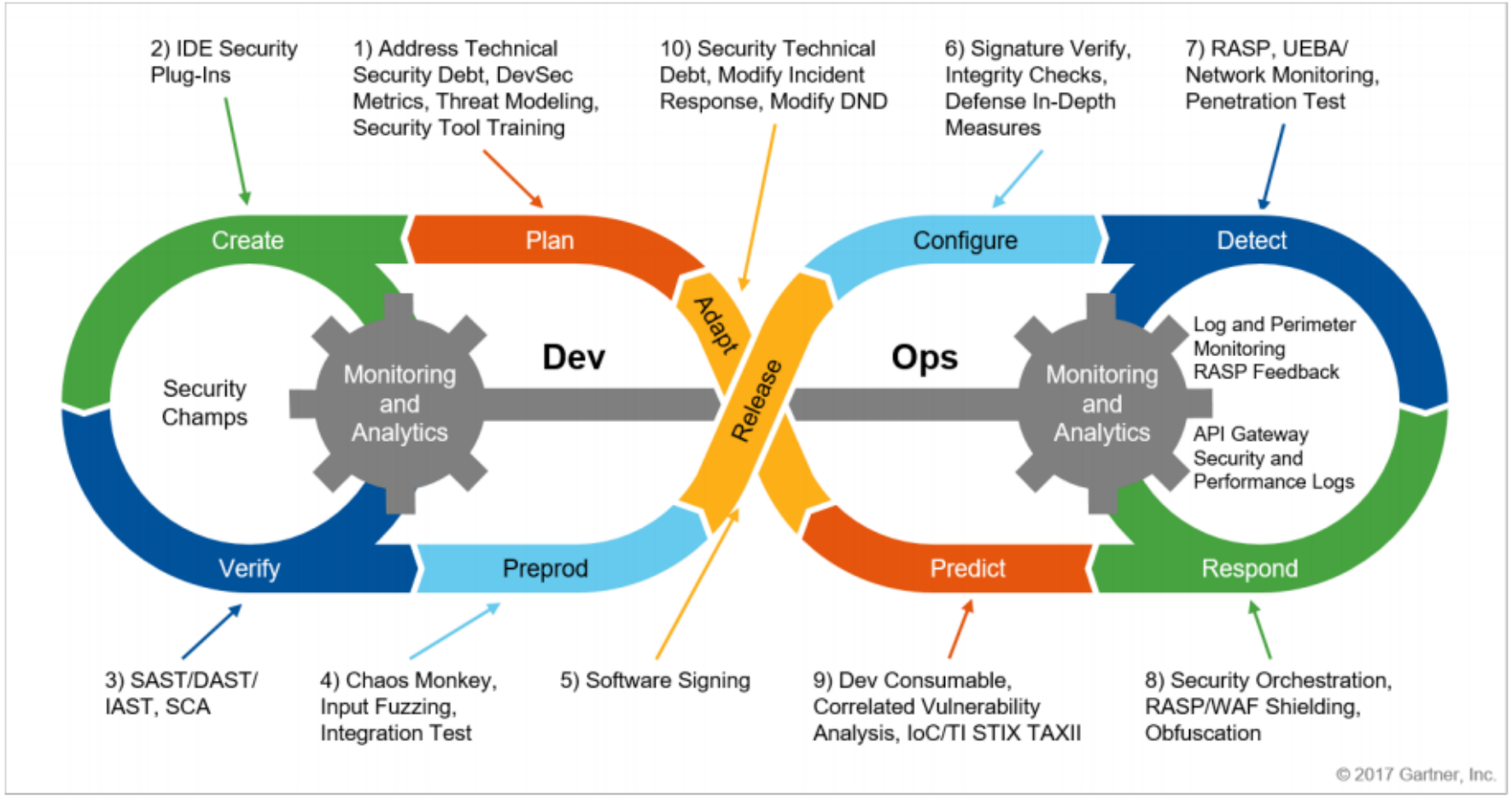
In this realm, security professionals will have new responsibilities and new skill requirements.

	NEW SKILL REQUIREMENTS
Enable developers to find and fix security-related code defects	Ability to provide remediation coaching and guidance on security-related code defects
Govern the use of open source components	Basic understanding of application development and why and how third-party components are used
Implement developer training on secure coding	Understanding of the basics of software development
Manage and report on application security policy, KPIs and metrics	The ability to measure meaningful metrics at each point in the SDLC process
Understand the requirements for security testing solutions in a DevSecOps environment — including the need for immediacy and accuracy of results to avoid impacting the delivery cycle — and enable dev to use these solutions	Basic understanding of application development and why and how third-party components are used
Create developer security champions	Be empathetic and consultative

Ref: VERACODE GUIDE - THE SECURITY PROFESSIONAL'S ROLE in a DevSecOps World

311 Park Place Blvd., Suite 400 • Clearwater, FL 33579 • United States of America
p: +727.785.0189 • f: +727.786.2989 • www.isc2.org

DevSecOps Tooling



Source: Gartner (November 2017)