RSAConference2019
San Francisco | March 4–8 | Moscone Center

SESSION ID: ASD-W02

Will your application be secure enough when Robots produce code for you?

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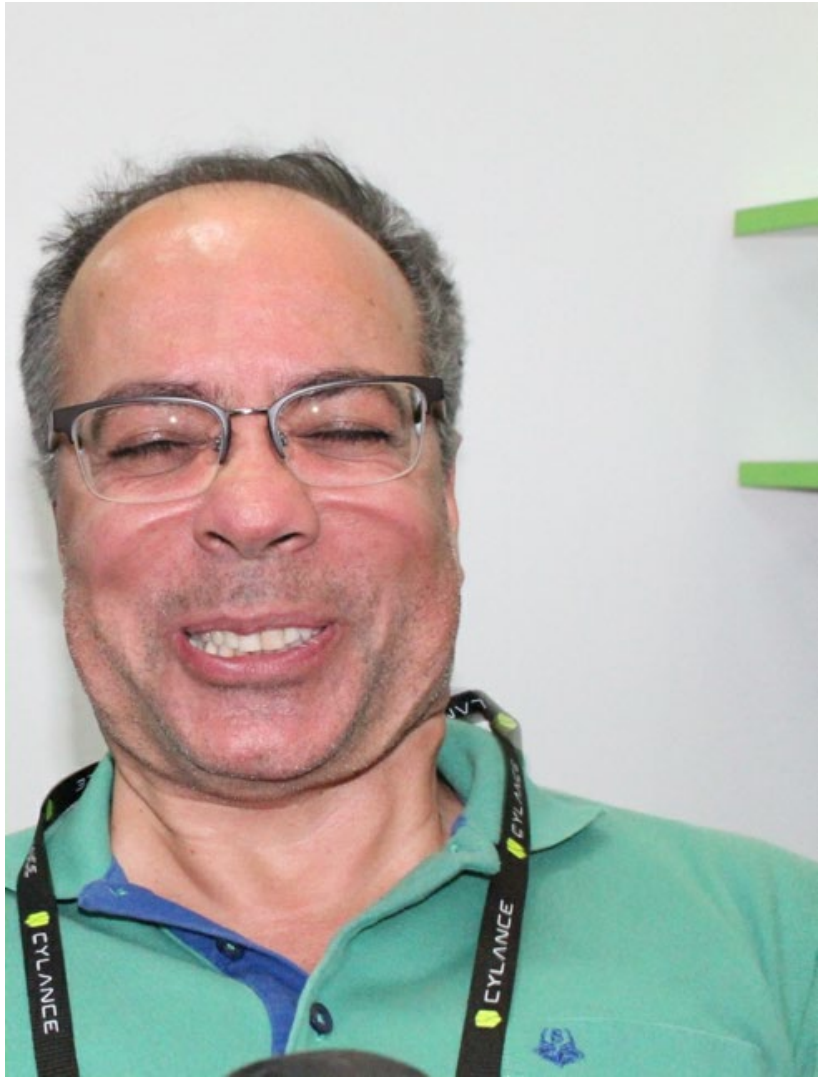
@securelifecycle

With the speed of DevOps…

It is me!
I felt the speed of
DevOps



The future is here
with
DevSecOps

Agenda

- Why matters?
- Current Landscape
- Security Framework: What IA wants?
- The DevSecOps Factory
- Be Ready…

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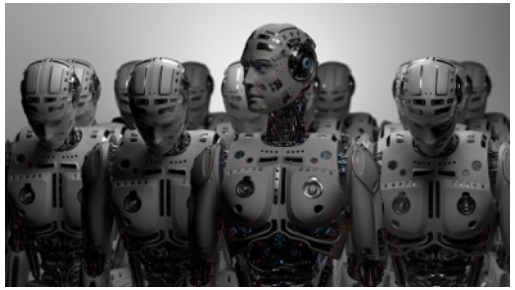
Why Matters?

Automation

- DevOps is everywhere
- Increase of using
  - Automation
  - Open Source libraries
  - Containerization
  - Re-use deployment / IaC scripts

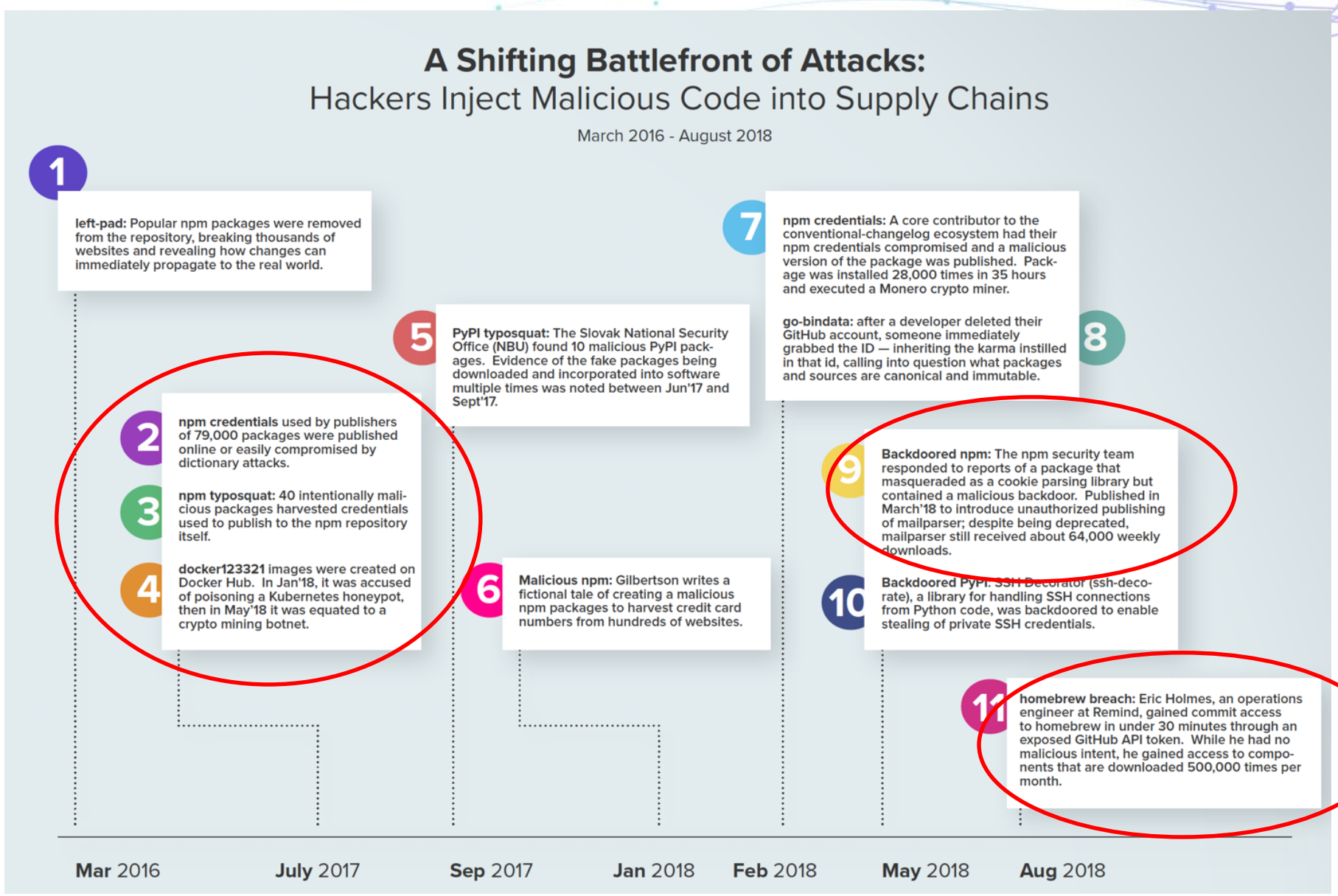
New attack vectors

- Taking advantage of automation
- Open source libraries
- Fast build-deploy
- Containerization
- Complexity and dependencies

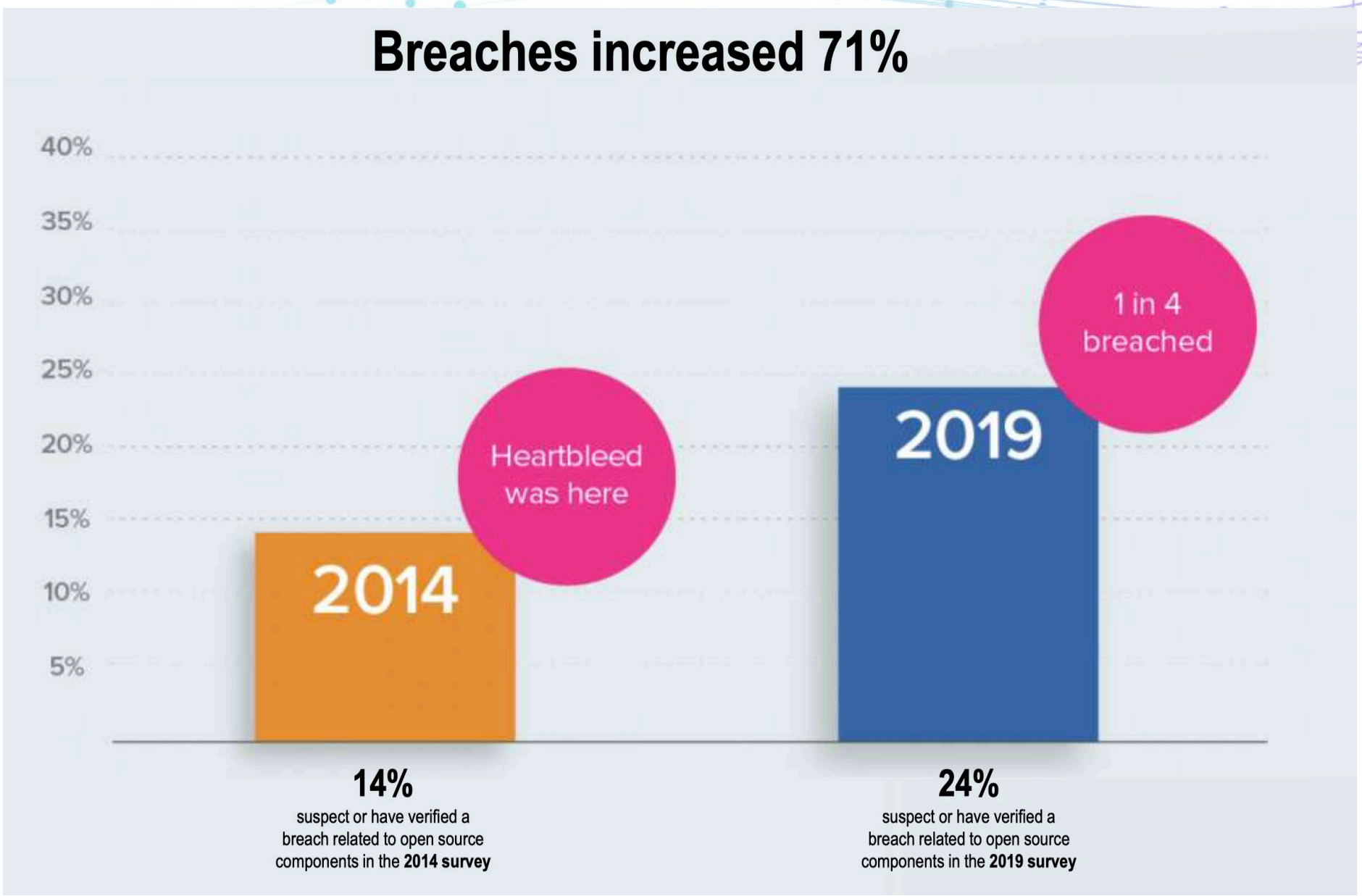


Recap of a few recent data breaches

- Google+ blunder exposed Data from 52.5 million
- Marriott :Data on 500 million guests stolen in 4 year breach
- Compromised NPM packages
- GDPR: 8,000 Data Breach Reports Filed So Far in UKZ



* 2018 State of the Software Supply Chain Report



*DevSecOps Community Survey 2014 and 2019

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Current Landscape

Dev{Sec}Ops

The Foundation: DevOps ?

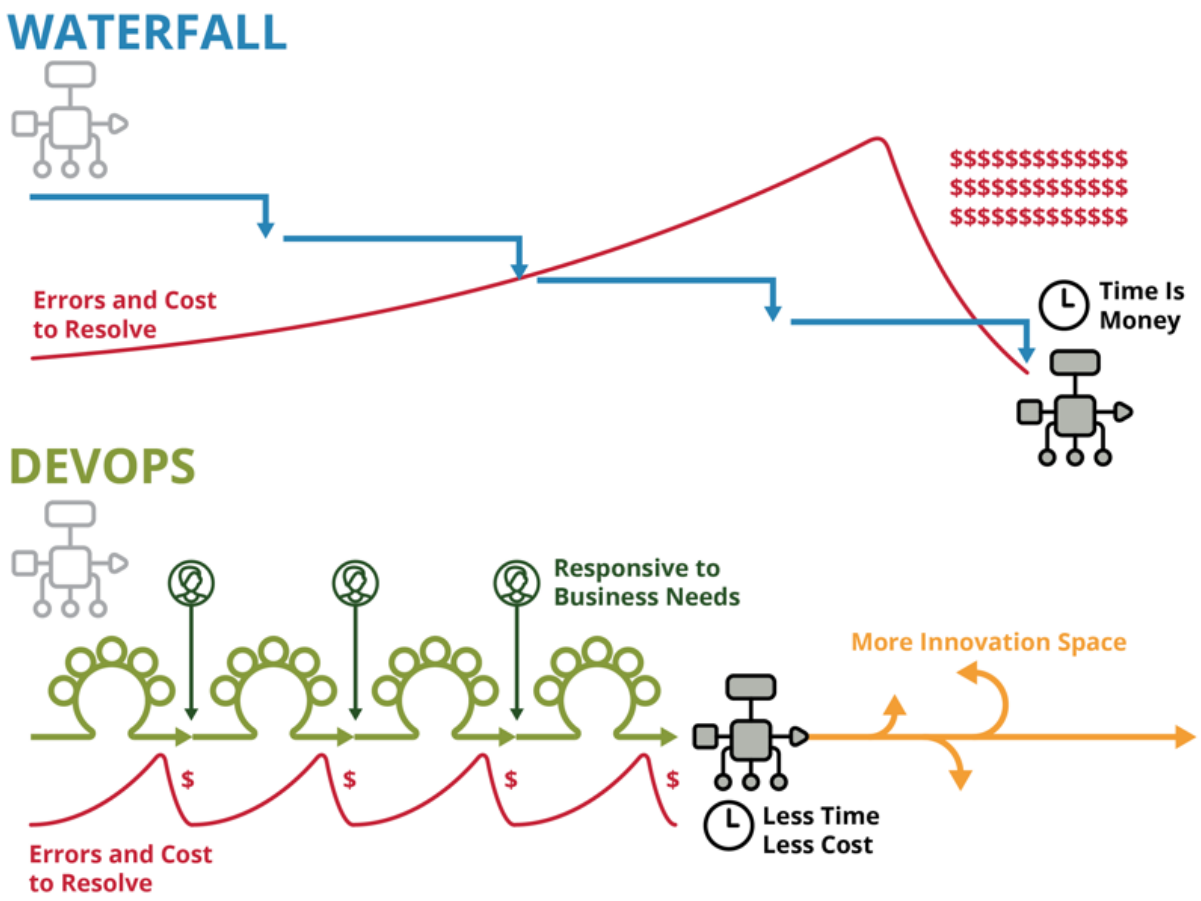
DevOps is a set of principles and practices emphasizing collaboration and communication between software development teams and IT operations staff along with acquirers, suppliers, and other stakeholders in the lifecycle of a software system[1]

Four Fundamental Principles

1. *Collaboration:* between all stakeholders
2. *Infrastructure as code (IaC):* assets are versioned, scripted, and shared
3. *Automation*: deployment, testing, provisioning, any manual or human-error-prone process
4. *Monitoring*: any metric in development or operation that can inform priorities, direction, and policy

[1] IEEE P2675 DevOps Standard for Building Reliable and Secure Systems Including Application Build, Package, and Deployment

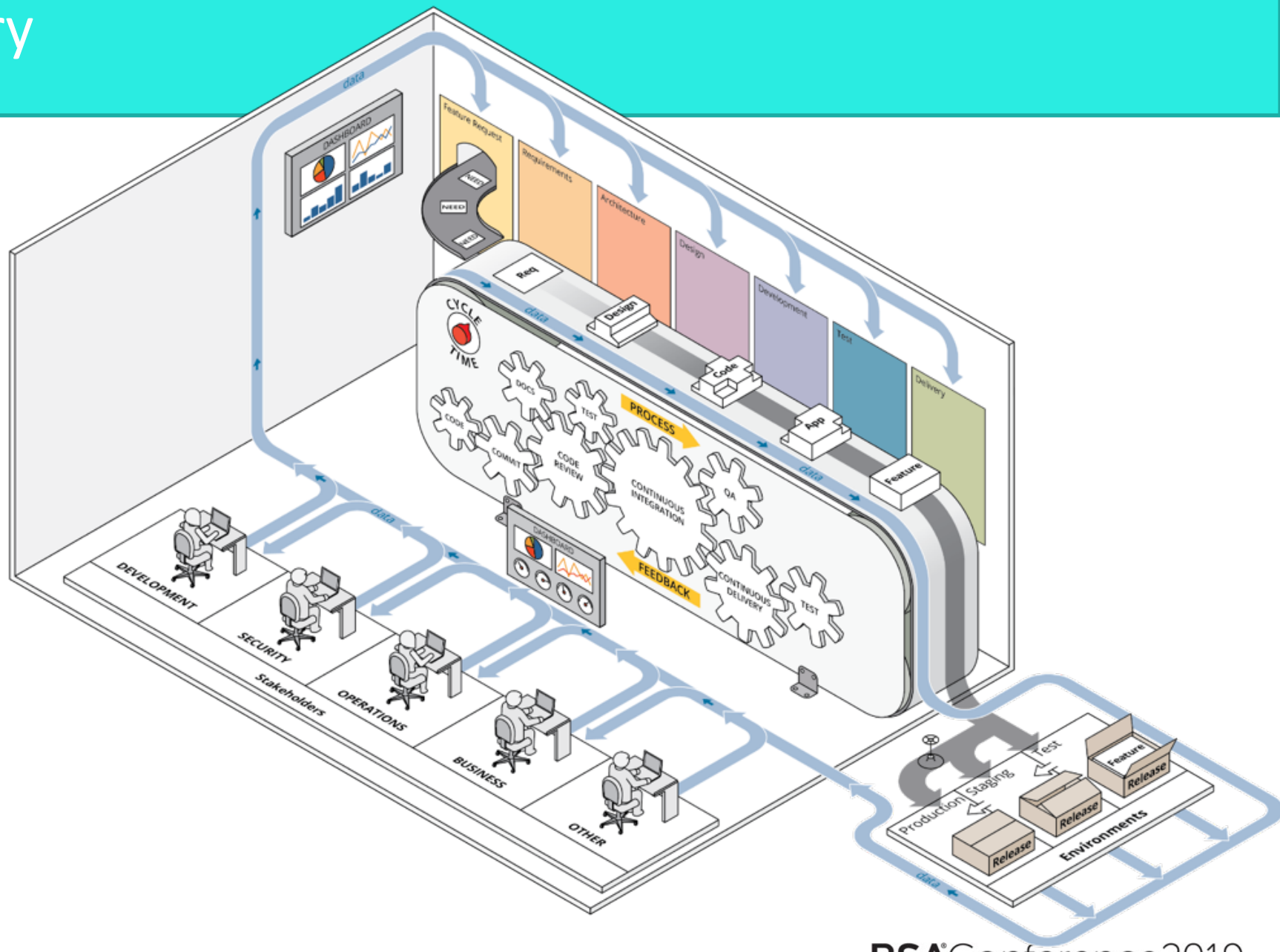
Benefits of DevOps



- Reduced errors during deployment
- Reduced time to deploy and resolve discovered errors
- Repeatable steps
- Continuous availability of pipeline and application
- Increased innovation time
- Responsiveness to business needs
- Traceability throughout the application lifecycle
- Increased stability and quality
- Continuous feedback

The DevOps Factory

- Feature to deployment
- Iterative and incremental development
- Automation in every phase of the SDLC
- Continuous feedback
- Metrics and measurement
- Complete engagement with all stakeholders
- Transparency and traceability across the lifecycle

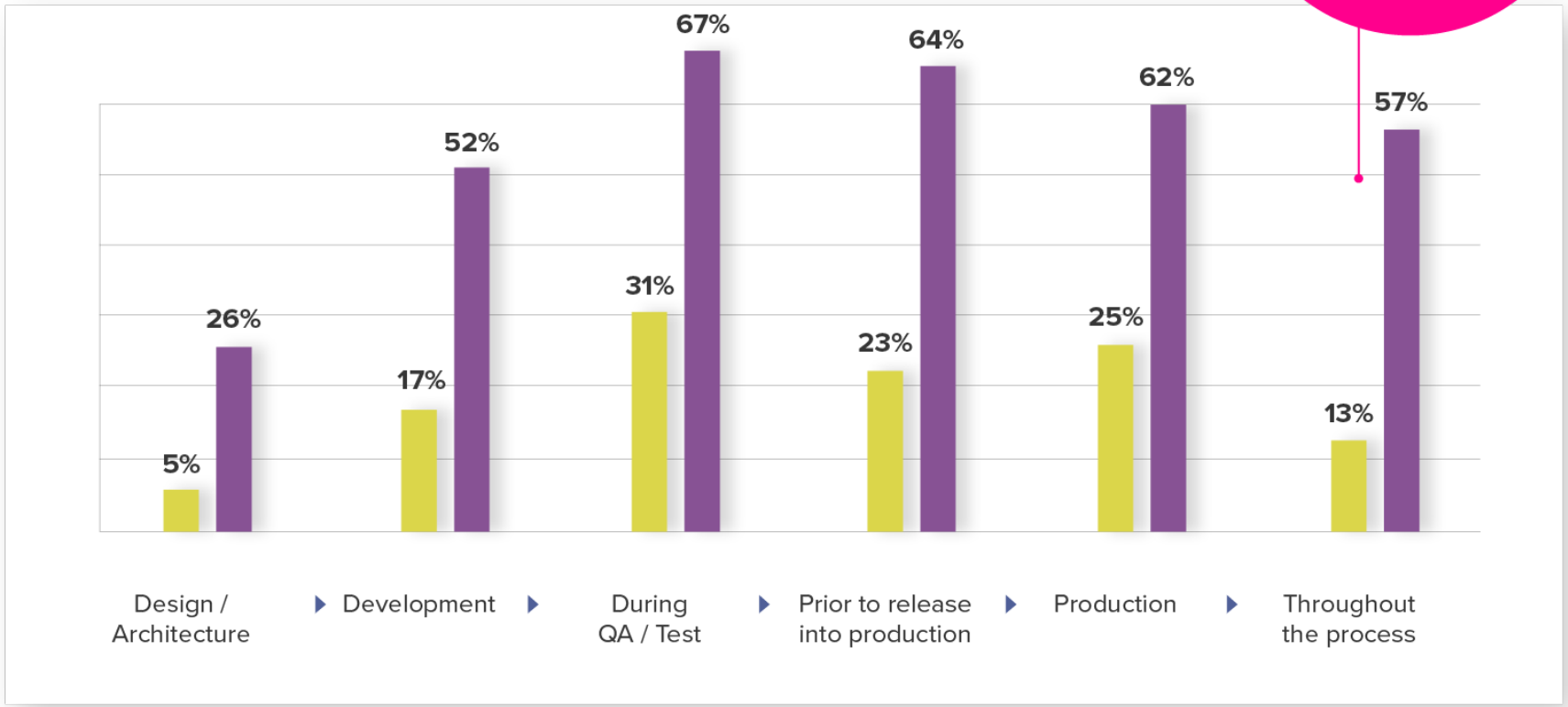


Poll the Audience

- ASD-W02
- Do you have a mature DevOps platform?
  - A. YES
  - B. NO
  - C. Partial
- https://rsa1-live.eventbase.com/polls?event=rsa2019&polls=3857

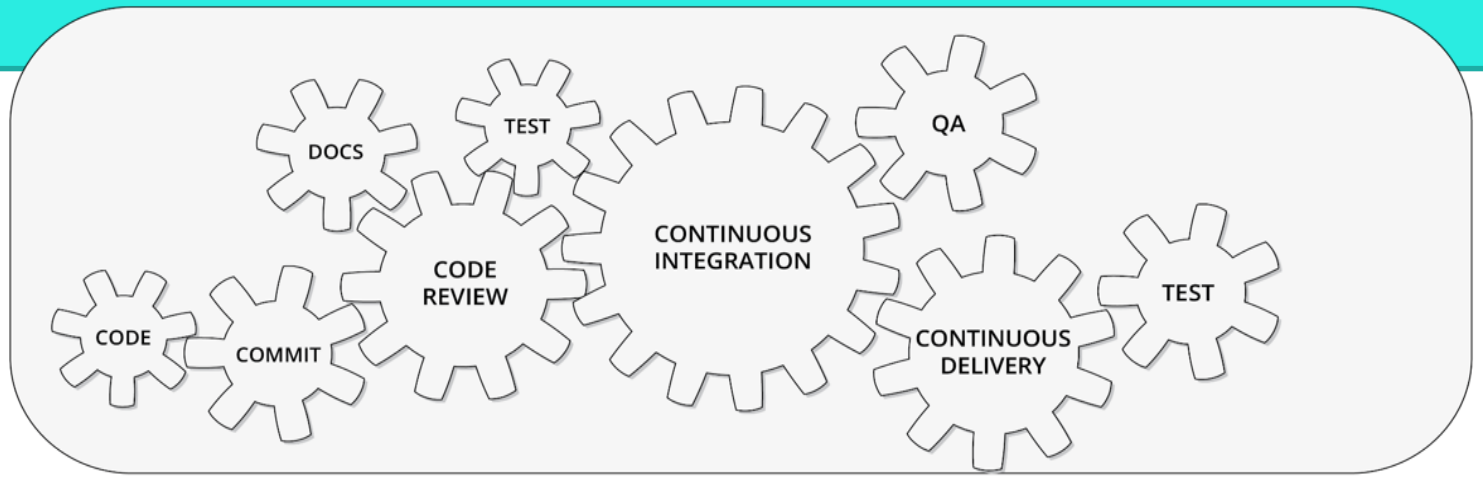
At what point in the development process does your organization perform automated application security analysis?

Mature DevOps practices are 338% more likely to integrate automated security.



Source:
DevSecOps Community Survey 2018

Security Requires Automation with IaC, CI, and CD



- Security requirements and traceability
  - Risk Management Framework: (1) categorize, (2) select controls, (3) implement, (4) assess, (5) authorize, (6) monitor
- Code review and static analysis
- Automated security testing and verification
- Automated dependency vulnerability analysis
- Immutable system, infrastructure (re-)provisioning

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Security Framework: What IA wants?

RMF, ATO &Compliances requirements

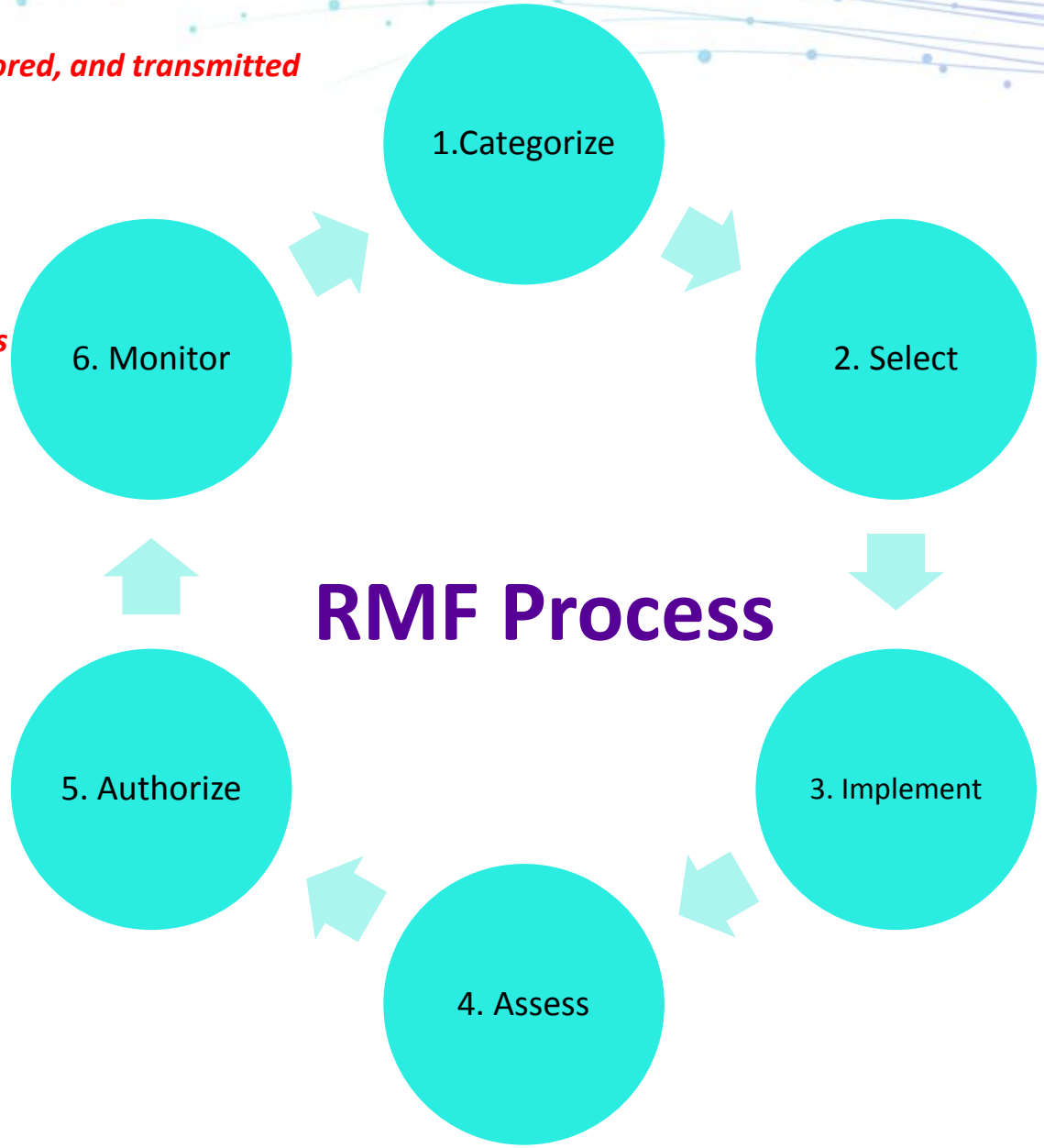
Security Framework

- It is time to build security foundation based on..
  - BSIMM
  - OpenSAMM
  - SANS
  - RMF
  - GDPR
  - SOX
  - Open Security Architecture
  - ….

What is Risk Management Framework (RMF)?

- Information security framework for Authorization to Operate systems
- RMF is a key component of Organization Risk Management
- Explained at NIST Special Publication 800-37
- RMF provides a disciplined and structured process
- Integrates information security and risk management activities into the SDLC

RMF Process



1. Categorize ***:information processed, stored, and transmitted***

2. Select ***organizational assessment of risk and local conditions***.

3. Implement :the controls are employed within the information system and its environment of operation.

4. Assess : controls are implemented correctly,

5. Authorize ***determination*** of ***the risk to organizational operations and assets, individuals, other organizations***

6. Monitor :***ongoing basis including assessing control effectiveness, documenting changes to the system or its environment of operation***,

RMF characteristics – NIST 800-37r2

- Real time risk management through the implementation ***continuous monitoring processes***;
- Encourages the use of ***automation*** to make cost-effective, risk-based decisions
- Integrates information security into ***system development life cycle;***
- Provides ***monitoring*** of security controls, and the authorization of information systems;
- Links ***information system level*** to the ***organization level***
- Establishes ***responsibility*** and ***accountability*** for security controls

Compliance, Legal Requirements

- GDPR: General Data Protection Regulation
- FISMA :Federal Information Security Management
- SOX : Sarbanes–Oxley
- HIPAA : Health Insurance Portability and Accountability
- PCI DSS: Payment Card Industry Data Security Standard
- NIST :National Institute of Standards and Technology,
- and others….

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- SOX : Sarbanes–Oxley
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- PCI DSS: Payment Card Industry Data Security Standard
- NIST :National Institute of Standards and Technology,
- And others….

All requires

Auditing

Traceability

Accountability

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The DevSecOps Factory

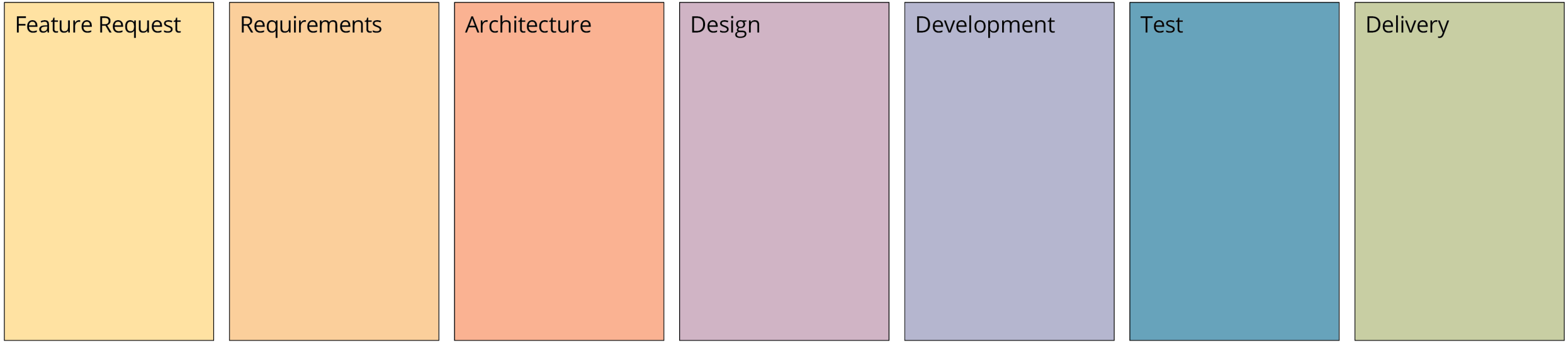
Automation and Security

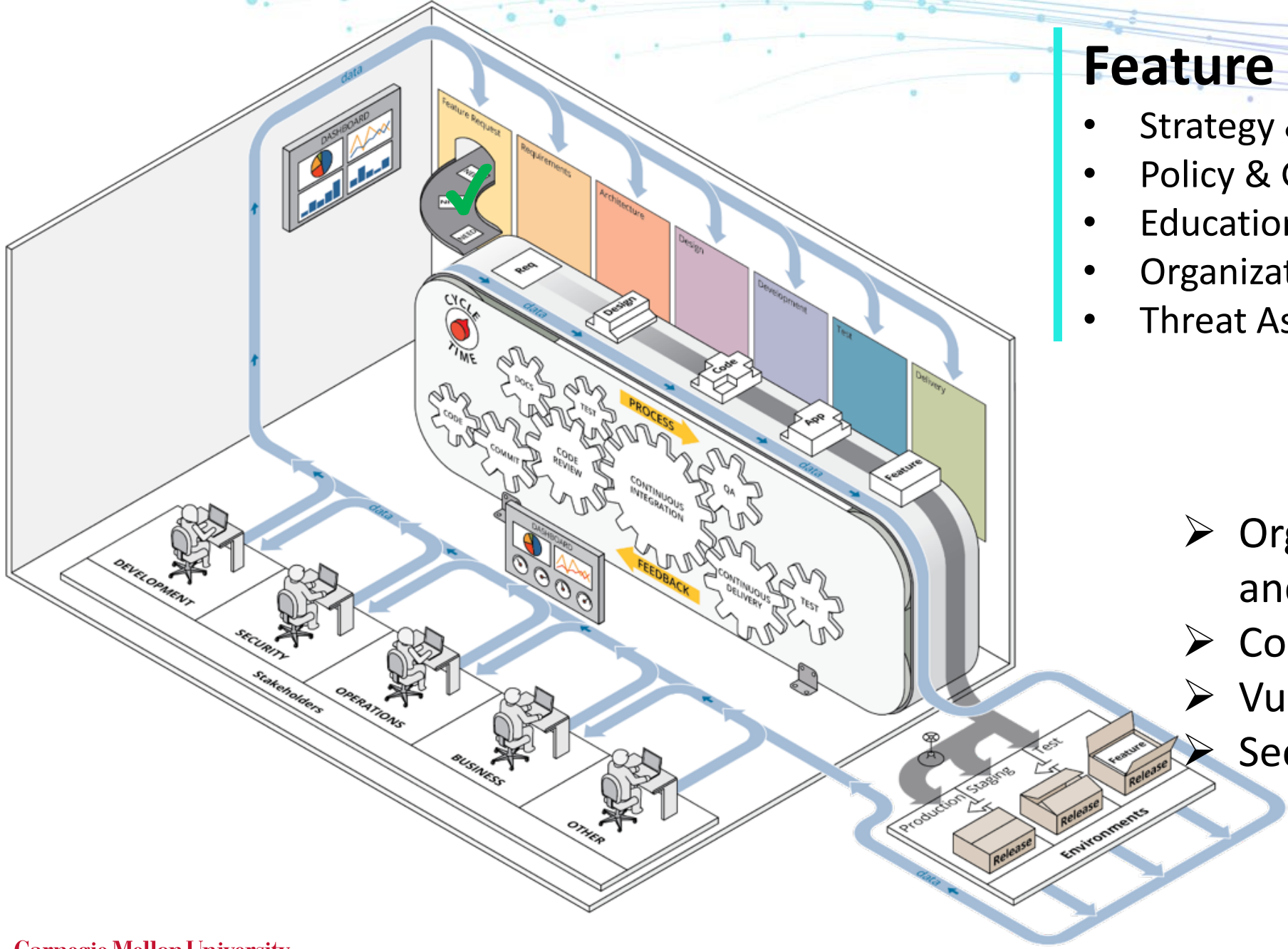
Poll the Audience

- ASD-W02
- Is automation the only way to solve application security?
  - A. YES
  - B. NO
- https://rsa1-live.eventbase.com/polls?event=rsa2019&polls=3858

Secure DevOps is a model on integrating the software development and operational process considering security activities: requirements, design, coding, testing ….

DevOps Phases – *on each iteration/sprint*





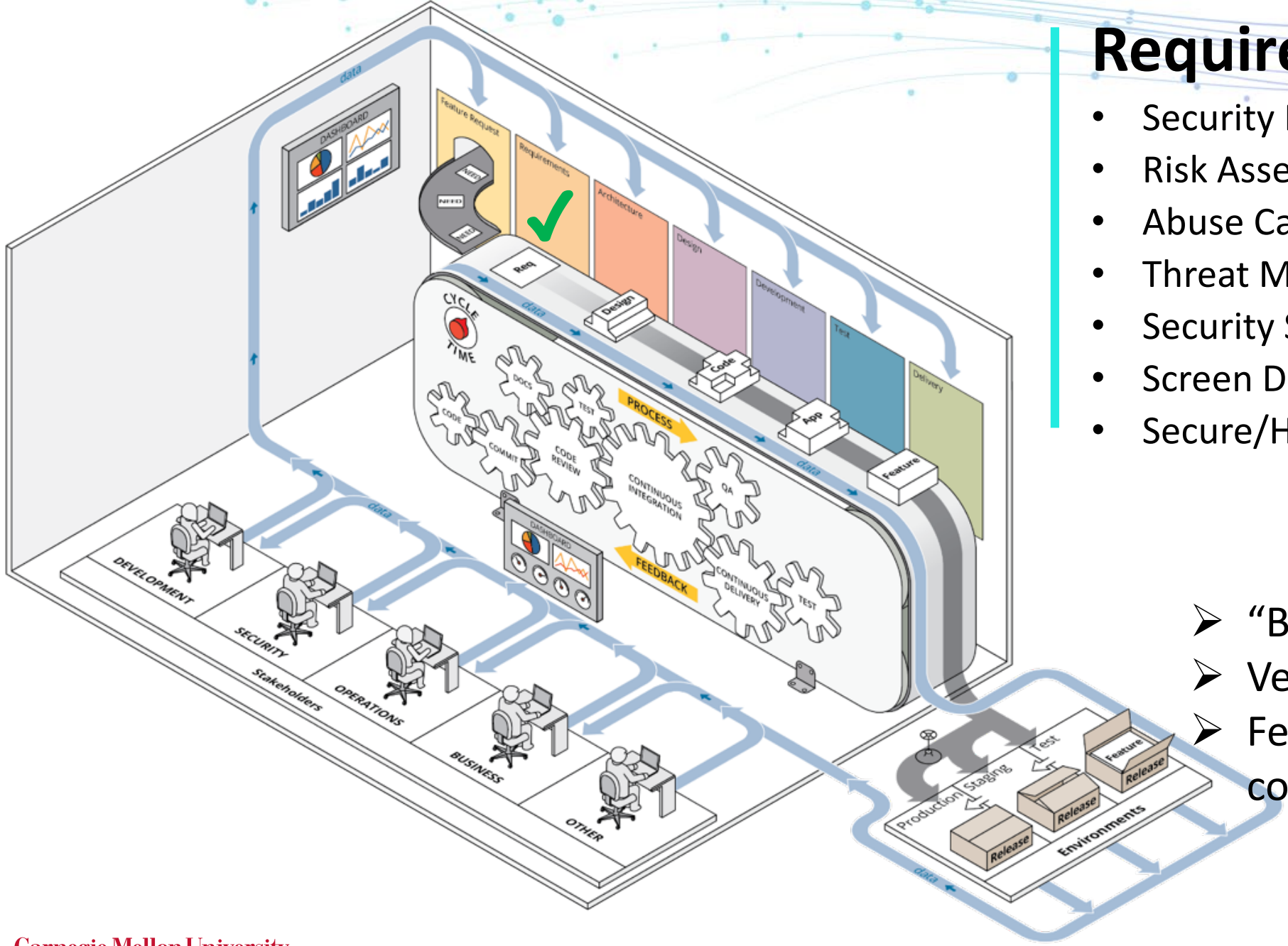
Feature Request

- Strategy & Metrics
- Policy & Governance
- Education & Security Guidance
- Organizational Risk Factors
- Threat Assessment

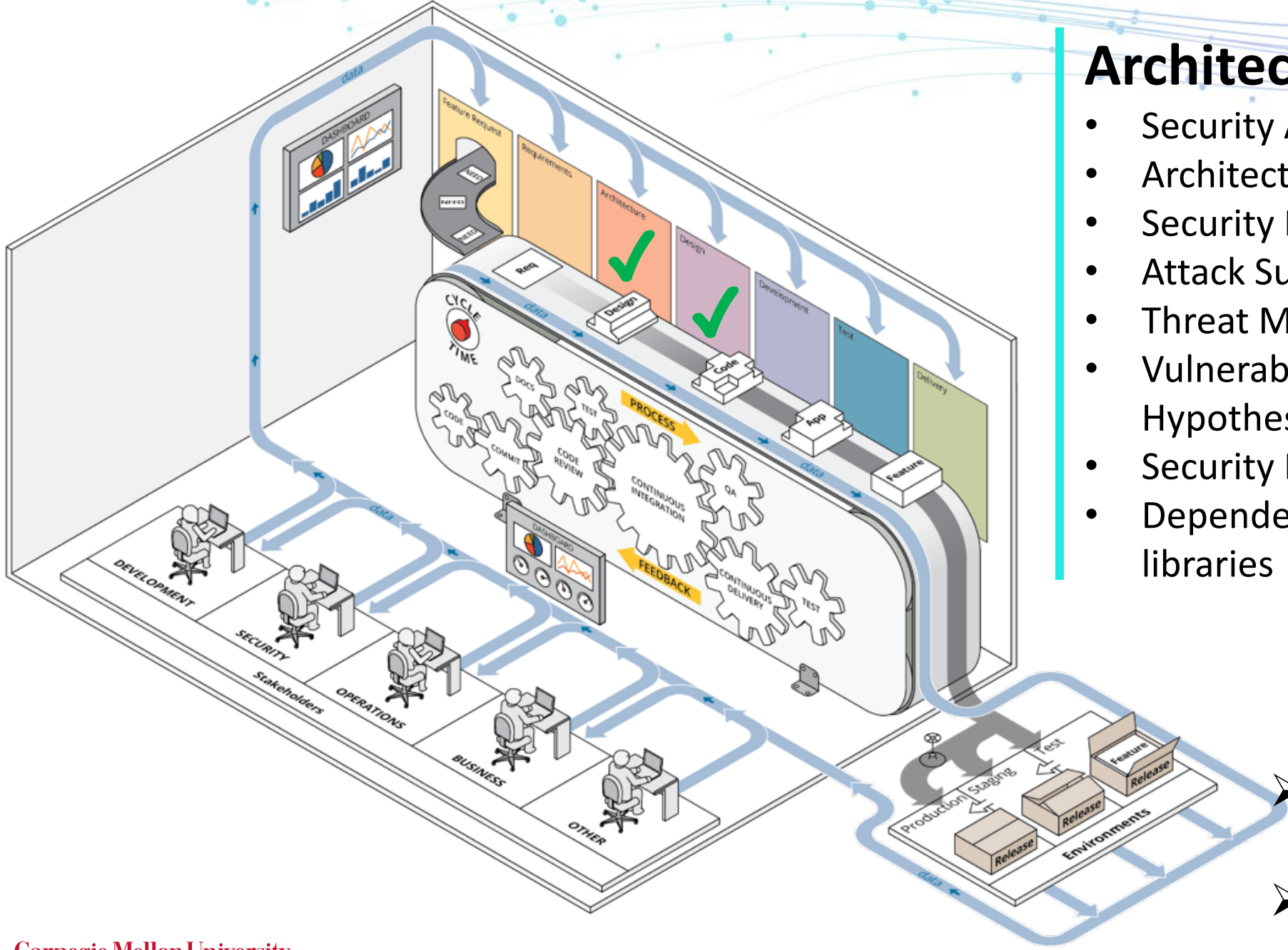
- ➢ Organizational awareness and knowledge
- ➢ Common attack vectors
- ➢ Vulnerability management
- ➢ Security Development Plan

Requirements

- Security Requirements (SFR/SAR)
- Risk Assessment
- Abuse Case Development
- Threat Modelling
- Security Stories
- Screen Development Tools
- Secure/Hardened Environments



- “Baked in” Security Thoughts
- Verify Security Requirements
- Feature based security controls

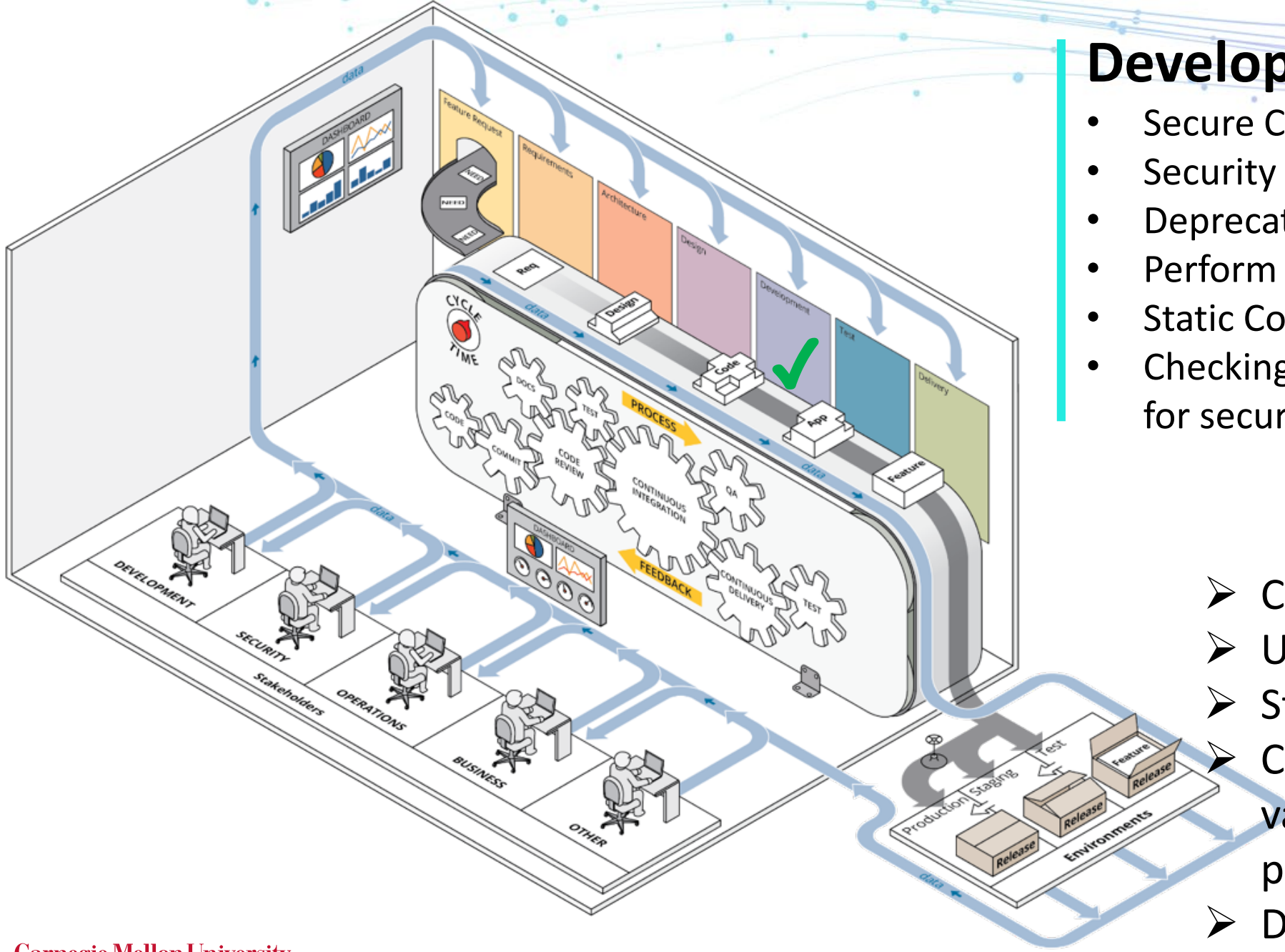


Architecture & Design

- Security Architecture
- Architectural Risk Analysis
- Security Design Requirements
- Attack Surface Analysis
- Threat Modelling
- Vulnerability Analysis and Flow Hypothesis
- Security Design Review
- Dependencies List, Open-source libraries

➢ Verify and Validate Security Design

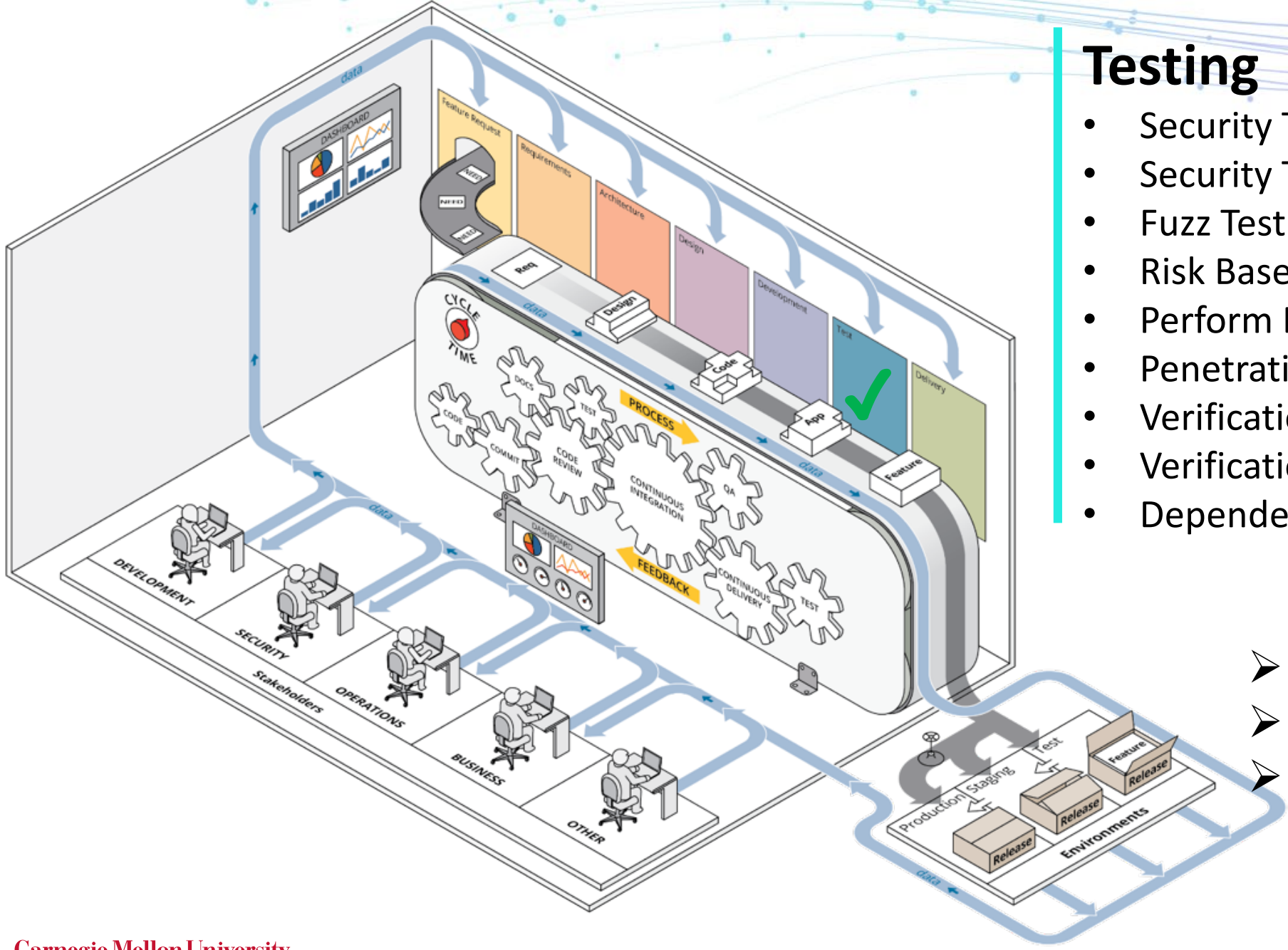
➢ Personnel data- privacy



Development

- Secure Coding Practices
- Security Focused Code Review
- Deprecate Unsafe Functions
- Perform Security Unit Testing
- Static Code Analysis
- Checking of process and procedures for secure coding & traceability

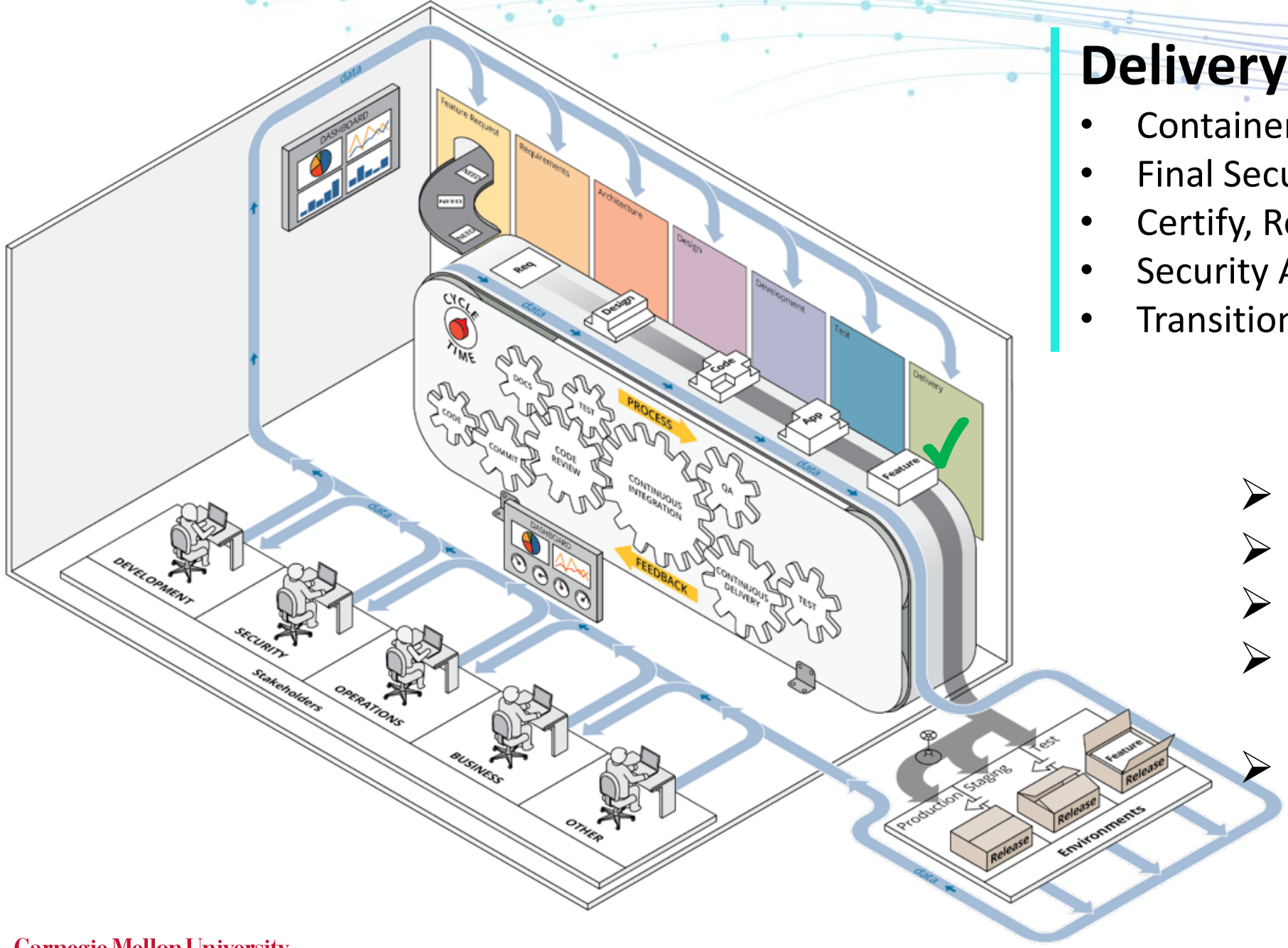
- Code Development Audit
- Unit Testing result
- Static Code Analysis results
- Code verification and validation on security practices
- Design validation



Testing

- Security Test Planning
- Security Testing
- Fuzz Testing
- Risk Based Security Testing
- Perform Dynamic Analysis
- Penetration Testing
- Verification of Security Implementation
- Verification of Process and Procedures
- Dependency Monitoring

- Test results,
- Data handling varication
- Validation of security features



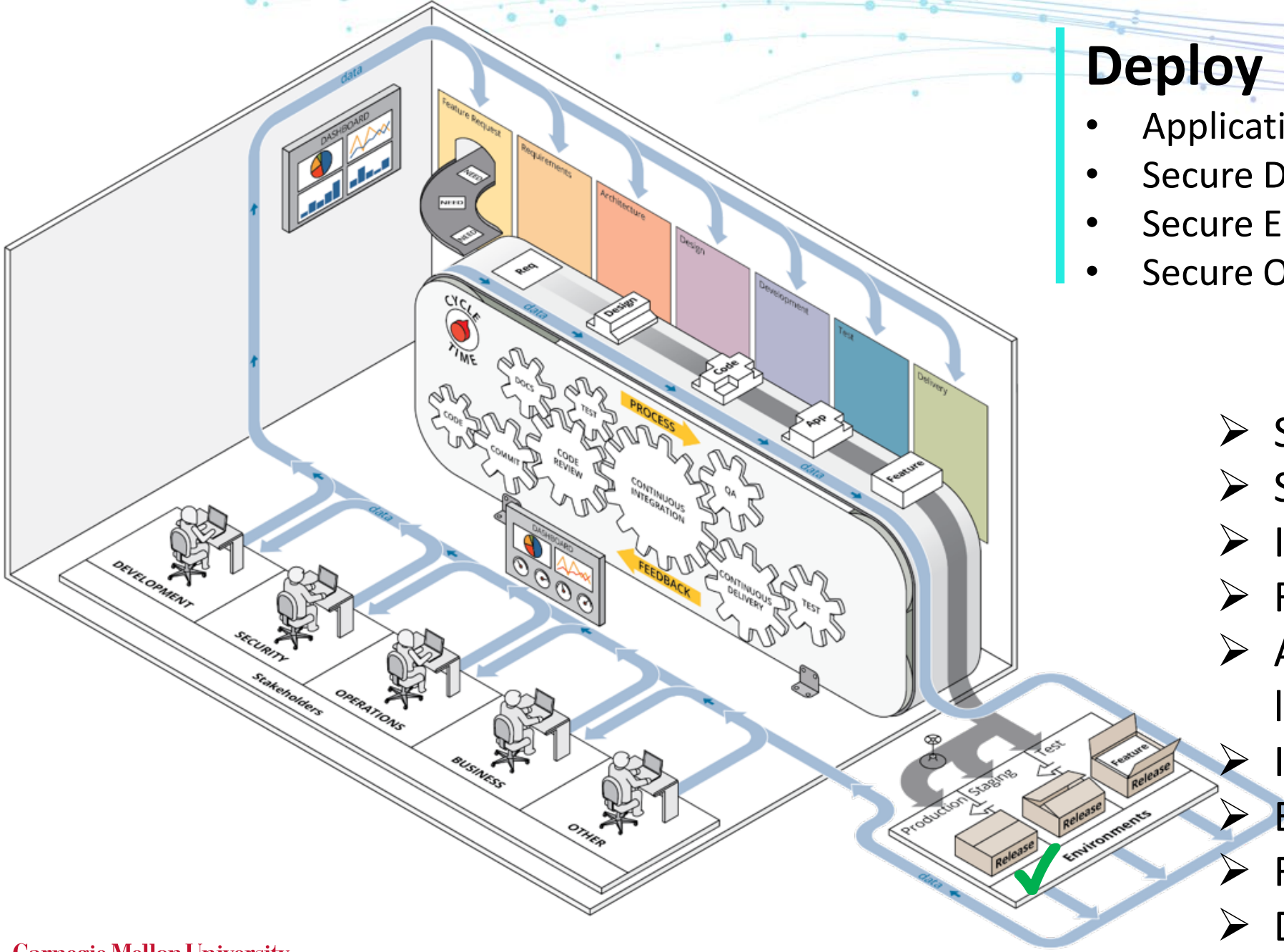
Delivery

- Container Security
- Final Security Review
- Certify, Release and Archive
- Security Acceptance Testing
- Transition Incident Response Plan

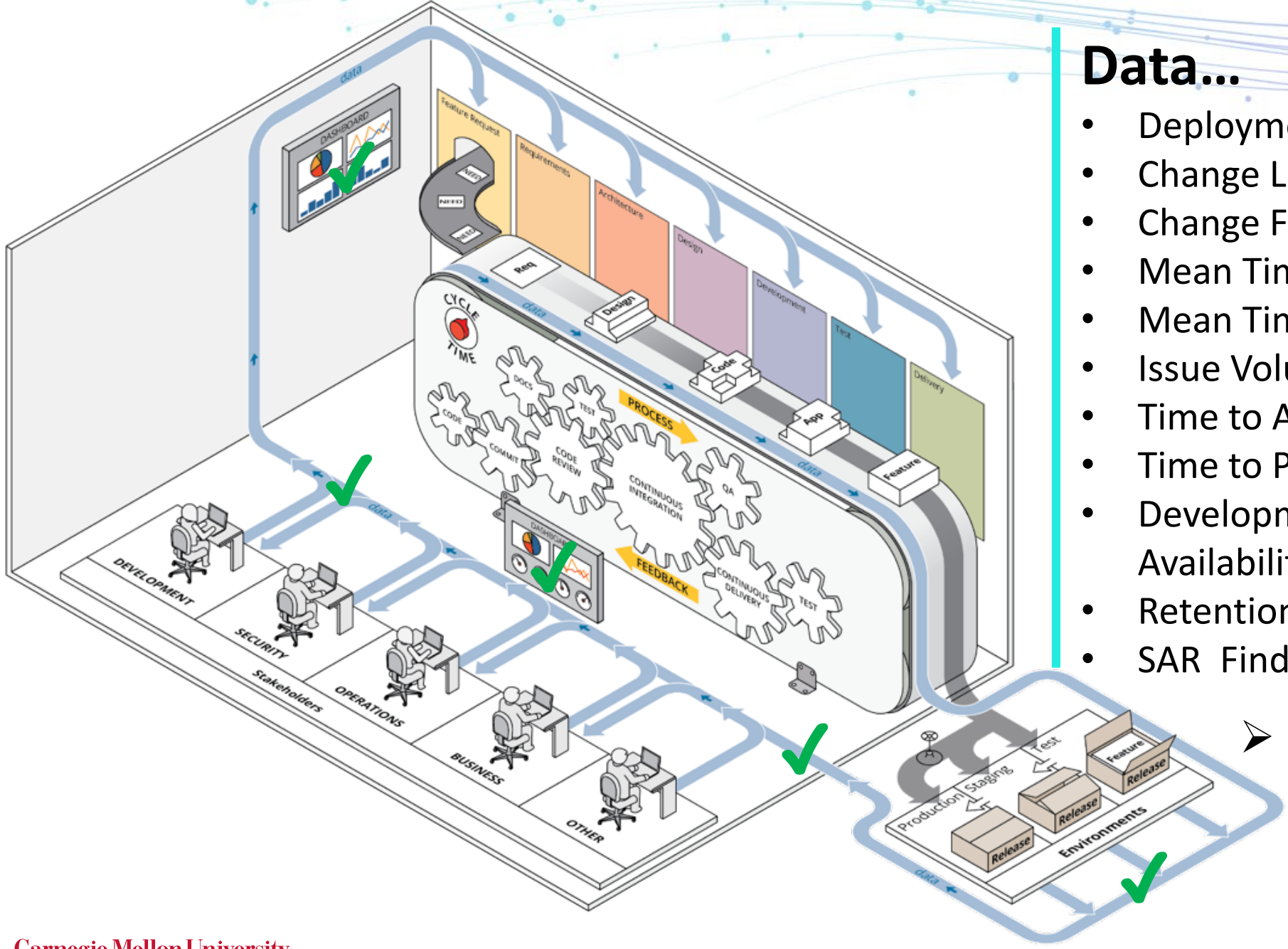
- Pre-approval
- Dependency checks
- Validate incident response
- Audit data access /rights /contents
- Environment verification

Deploy

- Application Security Monitoring
- Secure Deployment Process
- Secure Environment
- Secure Operational Enablement



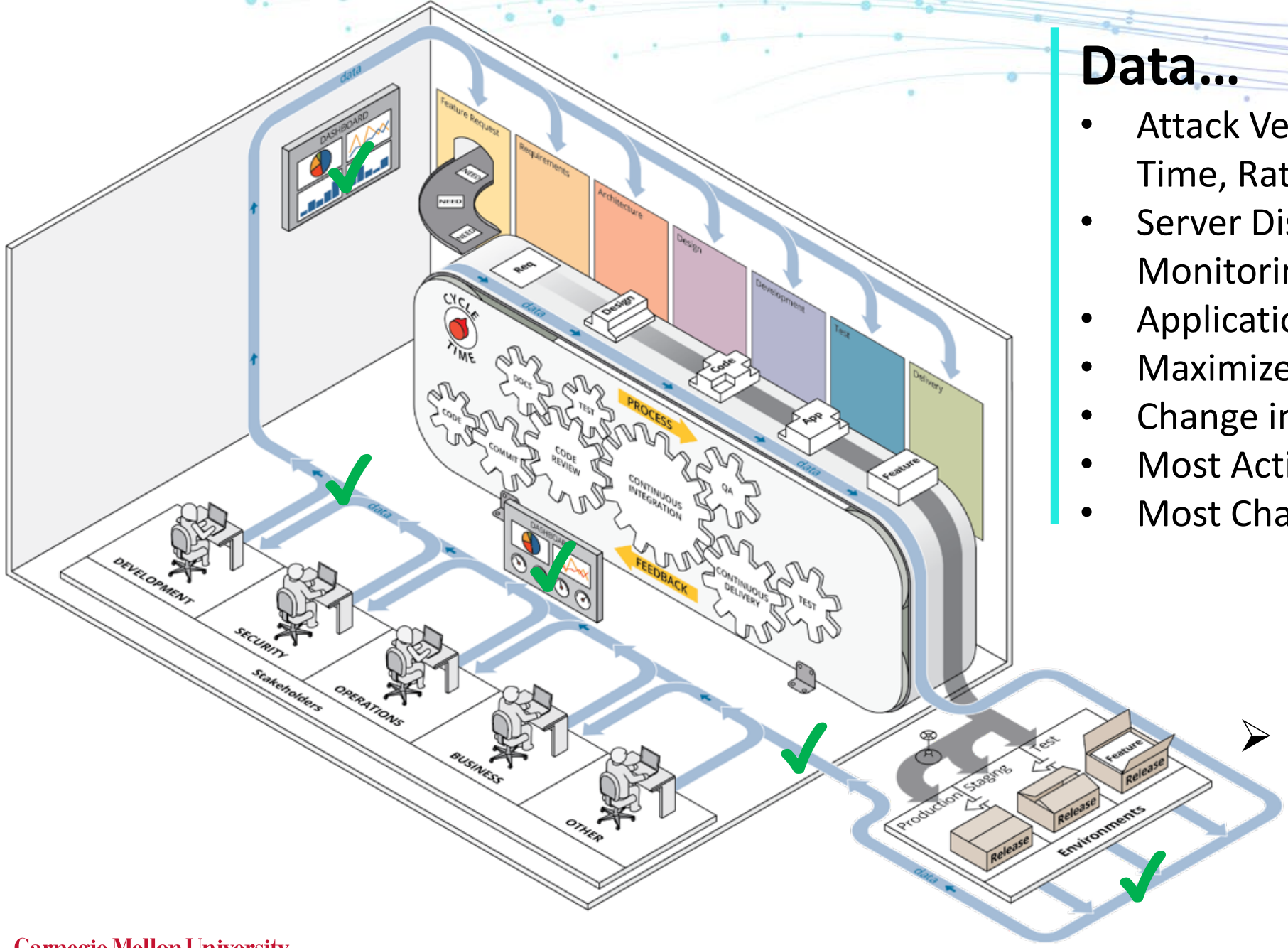
- Security Dashboard
- Security Status
- Incident Response
- Rollback capabilities
- Application /Environments logs
- IDS/IPS logs
- Environment monitoring
- Resource usage
- Data handling process



Data…

- Deployment Frequency
- Change Lead Time and Volume
- Change Failure Rate
- Mean Time To Recovery (MTTR)
- Mean Time to Detection (MTTD)
- Issue Volume and Resolution Time
- Time to Approval
- Time to Patch Vulnerabilities
- Development and Application Logging Availability
- Retention Control Compliance
- SAR Findings

➢ Continuous Monitoring to feed **Continuous Security**



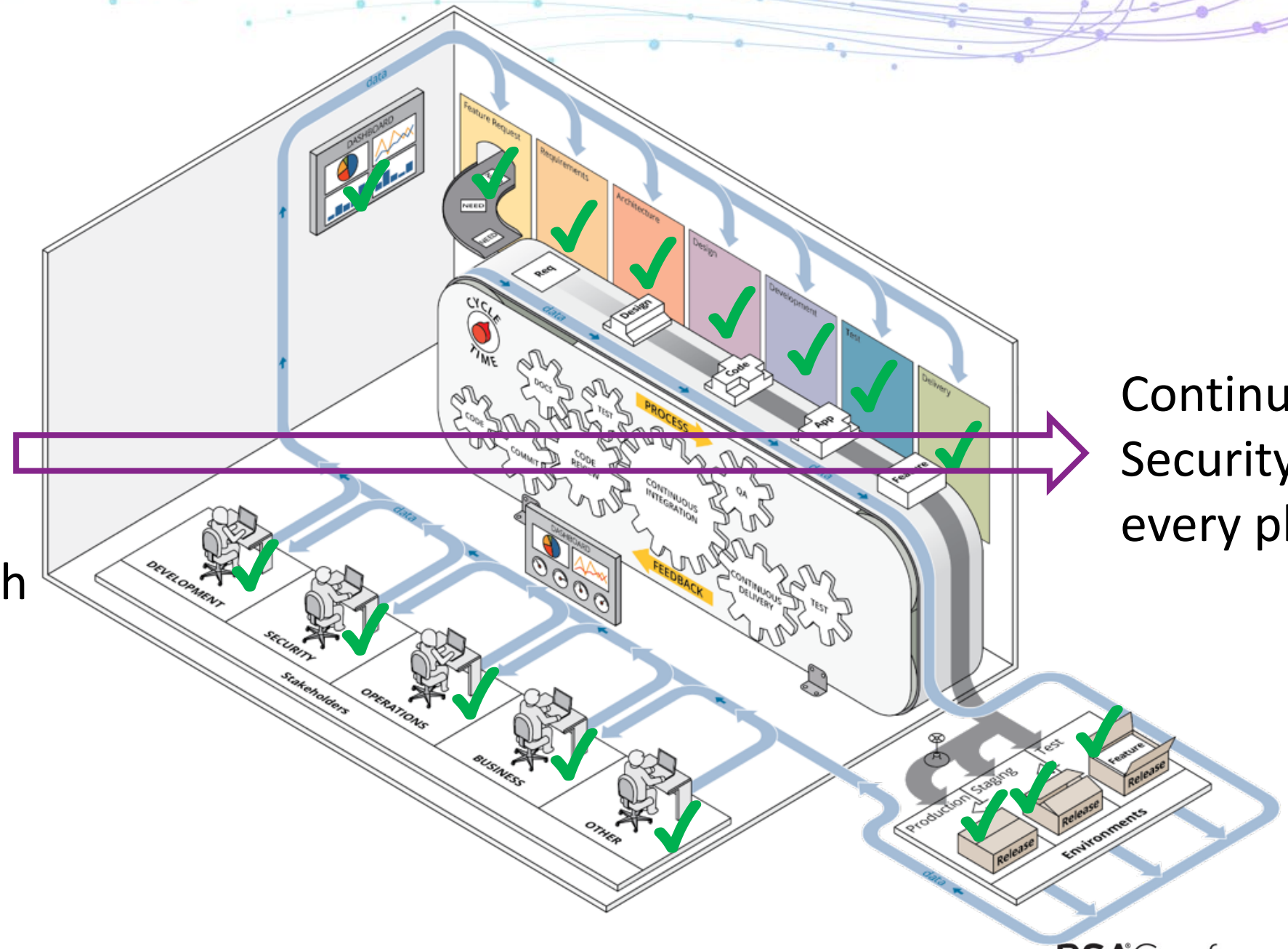
Data…

- Attack Vector Details (IP, Stack Trace, Time, Rate of Attack, etc)
- Server Disk Space, Load and Process Monitoring
- Application Performance
- Maximize Monitoring
- Change in Size to Code Base
- Most Active Code Contributors
- Most Changed Code Areas

➢ Continuous Monitoring to feed **Continuous Security**

Be Ready..

Security from inception to deployment and improvement with every delivery



Continuous Security on every phases

Poll the Audience

- ASD-W02
- Do you believe that we will have a more secure system with DevSecOps?
  - A. YES
  - B. No
- https://rsa1-live.eventbase.com/polls?event=rsa2019&polls=3859

Apply What You Have Learned Today

- Next week you should:
  - Start to communicate with all stakeholders
  - Inventory any automation process/scripts/code etc..
  - Understand your organization security framework/compliances
  - Build DevSecOps pipeline
- In the first three months following this presentation you should:
  - Build a transparent and visible collaboration platform
  - Analyze automation process
  - Insert Security controls as part of CI/CD
- Within six months you should:
  - Apply secure automation process across the DevSecOps pipeline
  - Build visible common dashboard
  - Automate security controls on each possible phases of system lifecycle.

For more information…

Go DevOps!

sei.cmu.edu/go/devops

DevOps Blog
insights.sei.cmu.edu/devops

Webinar
sei.cmu.edu/publications/webinars

Podcast
sei.cmu.edu/publications/podcasts

SLS team GitHub Projects

- Once Click DevOps deployment
  github.com/SLS-ALL/devops-microcosm
- Sample app with DevOps Process
  github.com/SLS-ALL/flask_api_sample
- Tagged checkpoints
  - v0.1.0: base Flask project
  - v0.2.0: Vagrant development configuration
  - v0.3.0: Test environment and Fabric deployment
  - v0.4.0: Upstart services, external configuration files
  - v0.5.0: Production environment
- On YouTube:
  https://youtu.be/5nQlJ-FWA5A

Any Questions?

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