DEVSECOPS ACADEMY
TRANSFORMING DOD'S WORKFORCE: WINNING THE FIGHT WITH DEVSECOPS AND DIGITAL INNOVATION

"WINNING THE FIGHT ANYWHERE – DEMANDS SOFTWARE EVERYWHERE."
SEAN BRADY | LEARNING DIRECTOR, SOFTWARE ACQUISITION

May 9, 2019. Send questions to: Sean.Brady@dau.mil; Defense Acquisition University.

OBJECTIVES

The Why -- Urgency for Change & DevSecOps

- DoD SW Acquisition State of Play and Challenge
- What's Causing this?
- Congressional Software & DevSecOps Initiatives
- Innovation: Winning on the Modern Battlefield

What is DevSecOps?

- What is Agile? DevOps? Shift Left?
- Where's the Sec in DevOps?
- DoD Enterprise Platform
- What Silos Must be Broken?

The How: Case Study -- DevSecOps Success & Value in DoD

DevSecOps Academy Concept

- Growth Mindset: Implementation Skills and Culture
- Partnership and Community of Practice

Theme: *"Integrating Agile into Government*"

PROBLEM STATEMENT AND DOD’S CHALLENGE

*“**Poor acquisition outcomes** are **forfeiting U.S. technology advantages** & depriving the nation of strategic capabilities**…**The acquisition system & **culture must adapt** to the reality that hardware & **software systems** must change on a frequent basis to meet warfighter needs, adapting to the speed of relevance.”* – General James Mattis

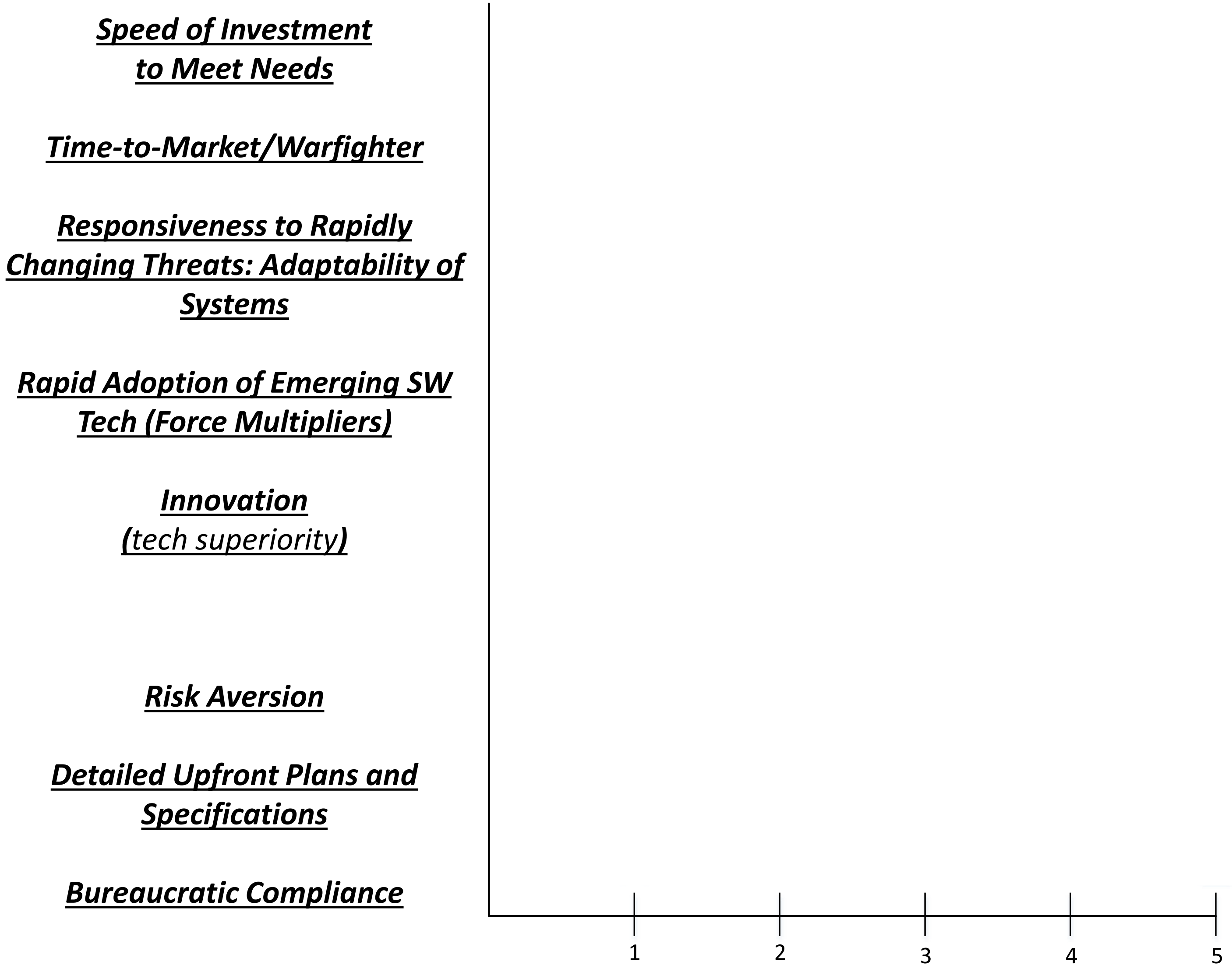
James Mattis, Former Secretary of Defense, established “business reform” as one of three priorities for *“protecting our people and ensuring the survival of our freedoms.”*

This reform is impossible without confronting the software challenge.
“U.S. Troops Should Not Be Sent Into Fair Fights”
General Joseph Dunford, Chairman, Joint Chiefs of Staff

How do we **transform** the workforce, practices, competencies, training and culture within **the world’s largest engineering organization & bureaucracy** (200K+ professionals)…in order to **radically accelerate the adoption of modern software development** practices at **unprecedented-scale**, across the entire DoD?

THE WHY – WHY IS OUR MISSION IMPORTANT TO YOU PERSONALLY

Most Important to Warfighter



Speed of Investment to Meet Needs

Time-to-Market/Warfighter

Responsiveness to Rapidly Changing Threats: Adaptability of Systems

Rapid Adoption of Emerging SW Tech (Force Multipliers)

Innovation *(tech superiority)*

Risk Aversion

Detailed Upfront Plans and Specifications

Bureaucratic Compliance

"**Our adversaries** are acquiring capabilities not previously anticipated and are doing so at a pace that now **challenges U.S. technological superiority.**

The US must have the ability to quickly **respond to adversary advancements** & update our systems accordingly.

Rapid & continuous SW development will be essential to achieving this outcome.

SW development in the **commercial world has undergone significant change** in the last 15 years, while **DoD** has continued to **use techniques developed in the 1970s - 1990s.**

The Department must change."
-2018 DSB on Software

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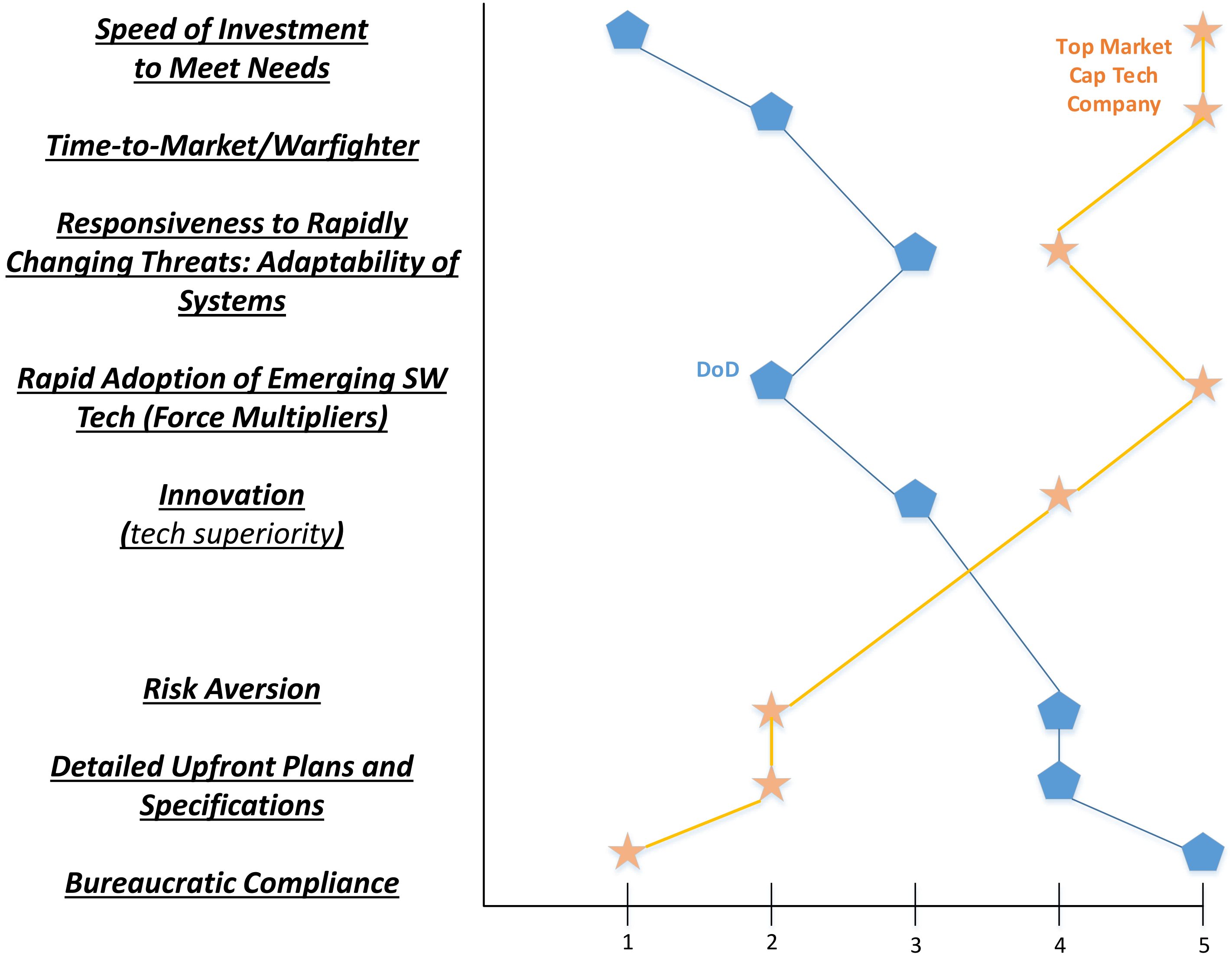

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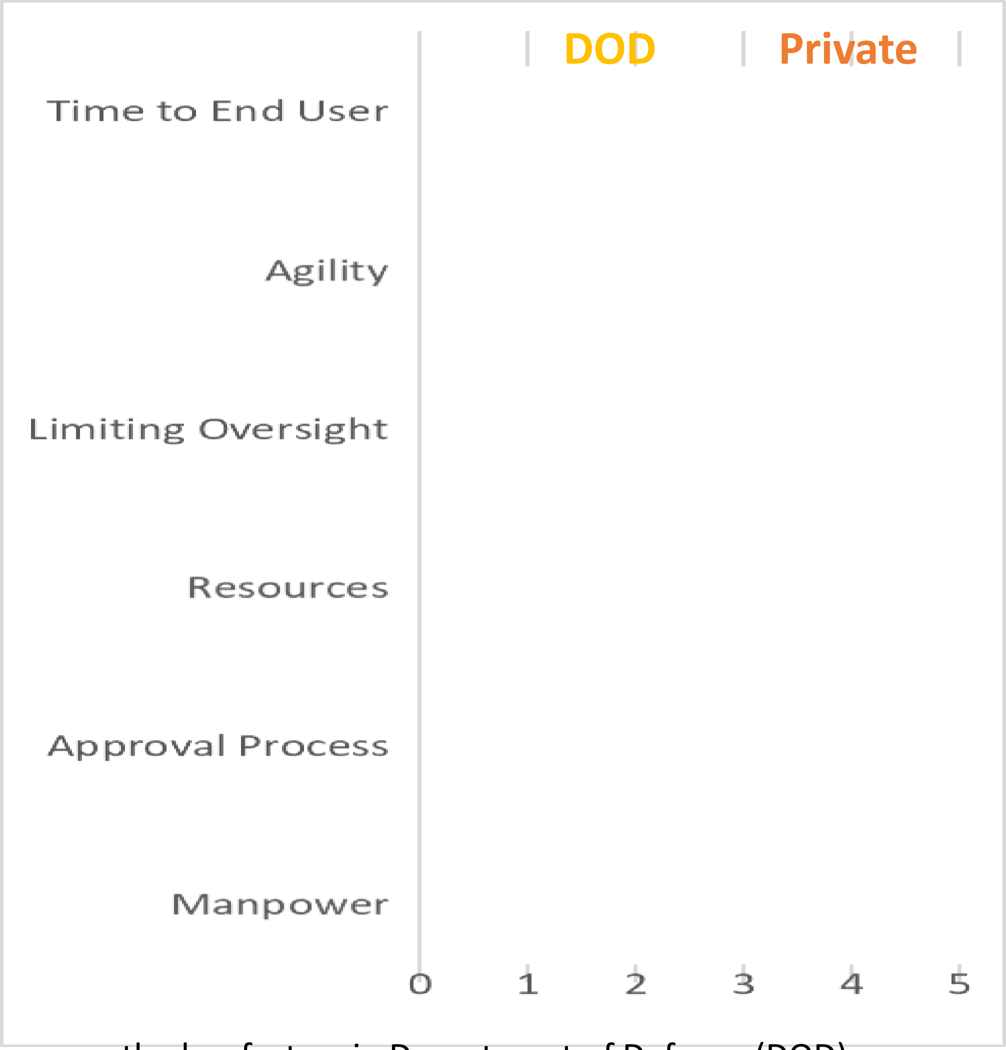
THE WHY – NAVAL SPECIAL WARFARE OPERATOR - GOV ACQUISITION PROCESS ATTRIBUTE MAP

Most important to end user



Least important to end user

“As we reorganize the way we do business **the thread that runs through all of our programs and all that we do is software** and I believe that **we need to catch up with the private sector** and make sure we are using contemporary software development processes,”

The Honorable Ellen Lord,
Under Secretary of Defense,
Acquisition and Sustainment

This attribute map compares the key factors in Department of Defense (DOD)-sponsored and Privately held companies that participate in the Government Acquisition Process. **Rankings based of off effectiveness of attribute with ‘1’ being least conducive to the acquisition process benefiting product to end user and ‘5’ being most beneficial.*

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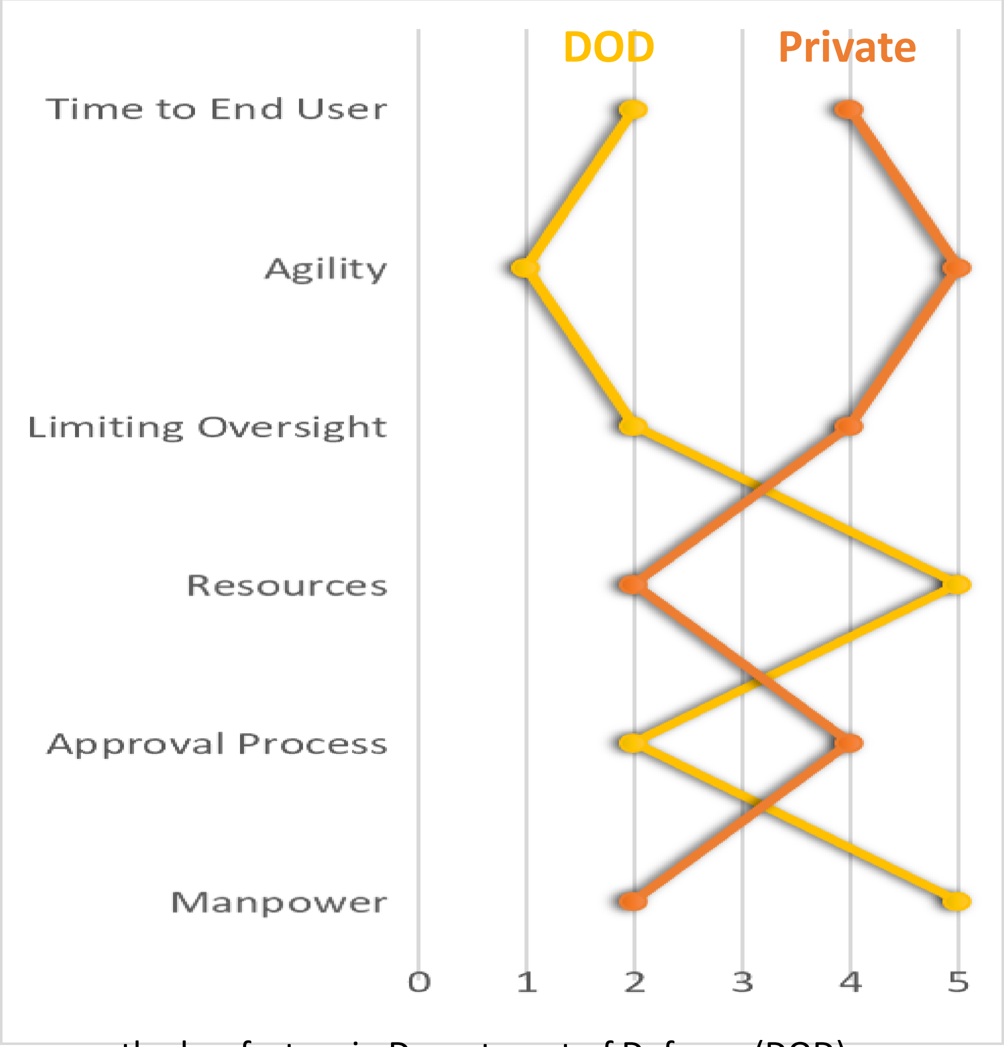

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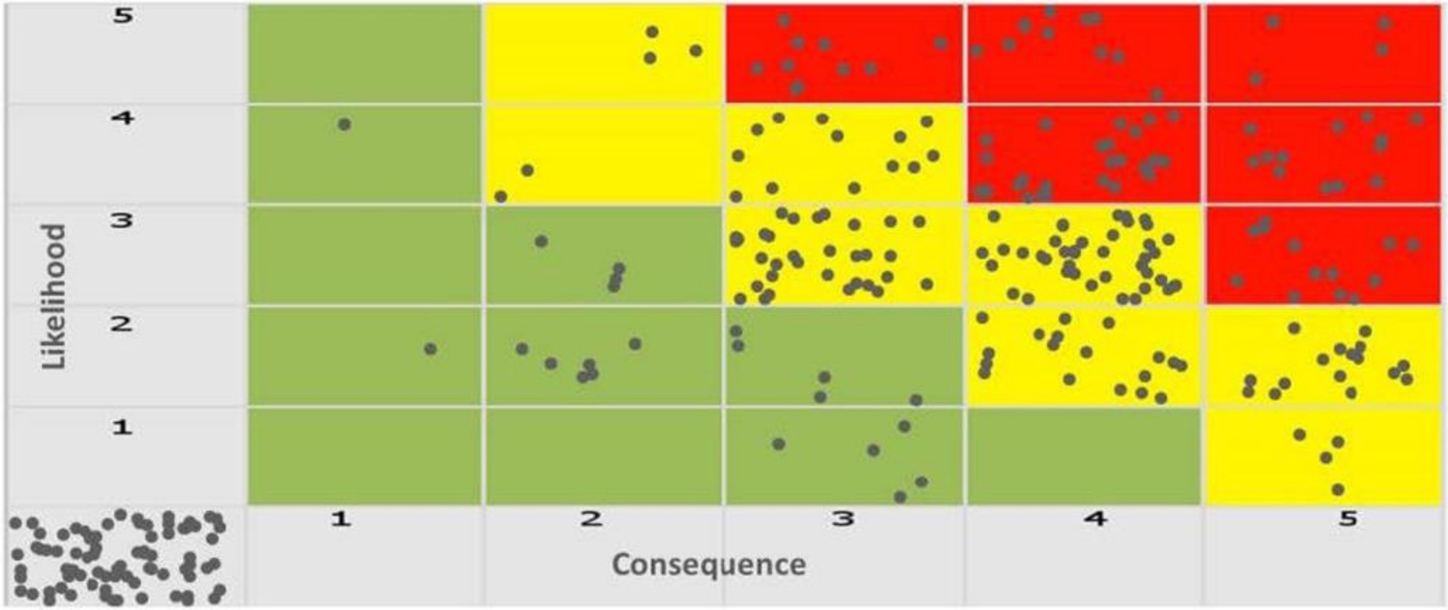
WHAT’S CAUSING THIS?

“Software is assessed among the most frequent and most critical challenges, driving program risk on ~60% of acquisition programs.”

Source: Defense Science Board, February 2018 Report



Software not in top program risks

Schedule

Requirements

Process

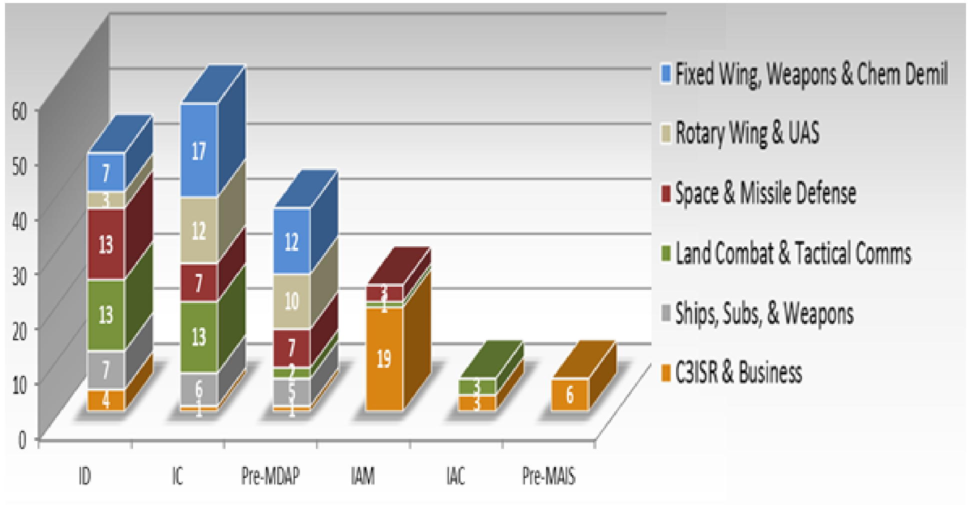
Quality

Integration

Staff

Mgt/Metrics

Schedule, Quality, Requirements and Integration account for the highest SW risks observed



DASD(SE) Oversight 180+ programs $1.7T in acquisition

97% of acquisition funding: cyber-physical weapons

Reference: 18th NDIA SE Conference, Oct 2015, Mr. Sean Brady, Office of the Deputy Assistant Secretary of Defense for Systems Engineering

- Certain application domains (e.g., C4ISR) have an **obvious affinity for rapid deployment cycles (e.g. cloud-native apps)**
- We also must confront **unique needs of weapon system developers** – the **largest portion of the major acquisition** portfolio
  - SW is subsystem with cyber-physical dependencies/interfaces (e.g., fighter jets, ballistic missiles, radars)
  - may be **inherent limit to the fidelity of integration labs** or the **types of continuous end-to-end testing** possible (e.g. flight test; multi-sensor, multi-jet fights; cost-prohibitive live-fire testing).

what’s causing this?
manual build/test/release – key threat to mission

…along with Late Integration and Defect Discovery

DoD has encountered significant late-stage, “big bang” integration characterized by

- long cycle times between deliveries (18-24 months)
- manual, error-prone build times measured in *weeks, months, or even years*

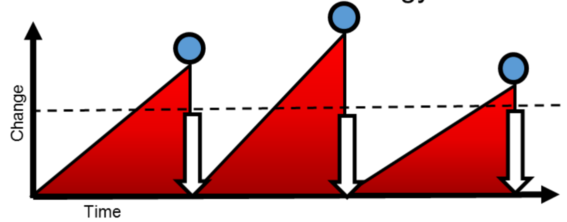
Lack of modern software development practices on today’s complex systems has resulted in integration nightmares.

For example:

- late stage “big bang” integration with manual testing for 5 or more years
- multiple development streams occurring in configuration item (CI) silos
- manual configuration management (CM) and platform configuration
- varying development, integration and production environments
- exceedingly long build cycles and build times (6-12 months to manually deploy and test code in production environment)
- code and unit test cycles occurring in weeks as opposed to hours
- end-to-end, system integration testing occurring in months as opposed to days or hours

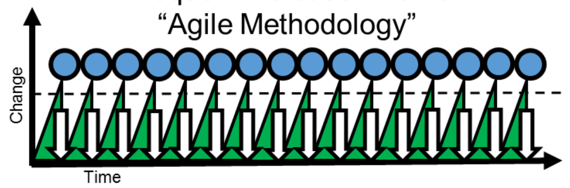
Big Bang versus Continuous Integration

Rare Release Events
“Waterfall Methodology”



- **Infrequent Stakeholder Involvement & Feedback**
- **Monolithic, Big Bang Integration**
- **Slow Response to Change, Higher Risk**

Frequent Release Events
“Agile Methodology”

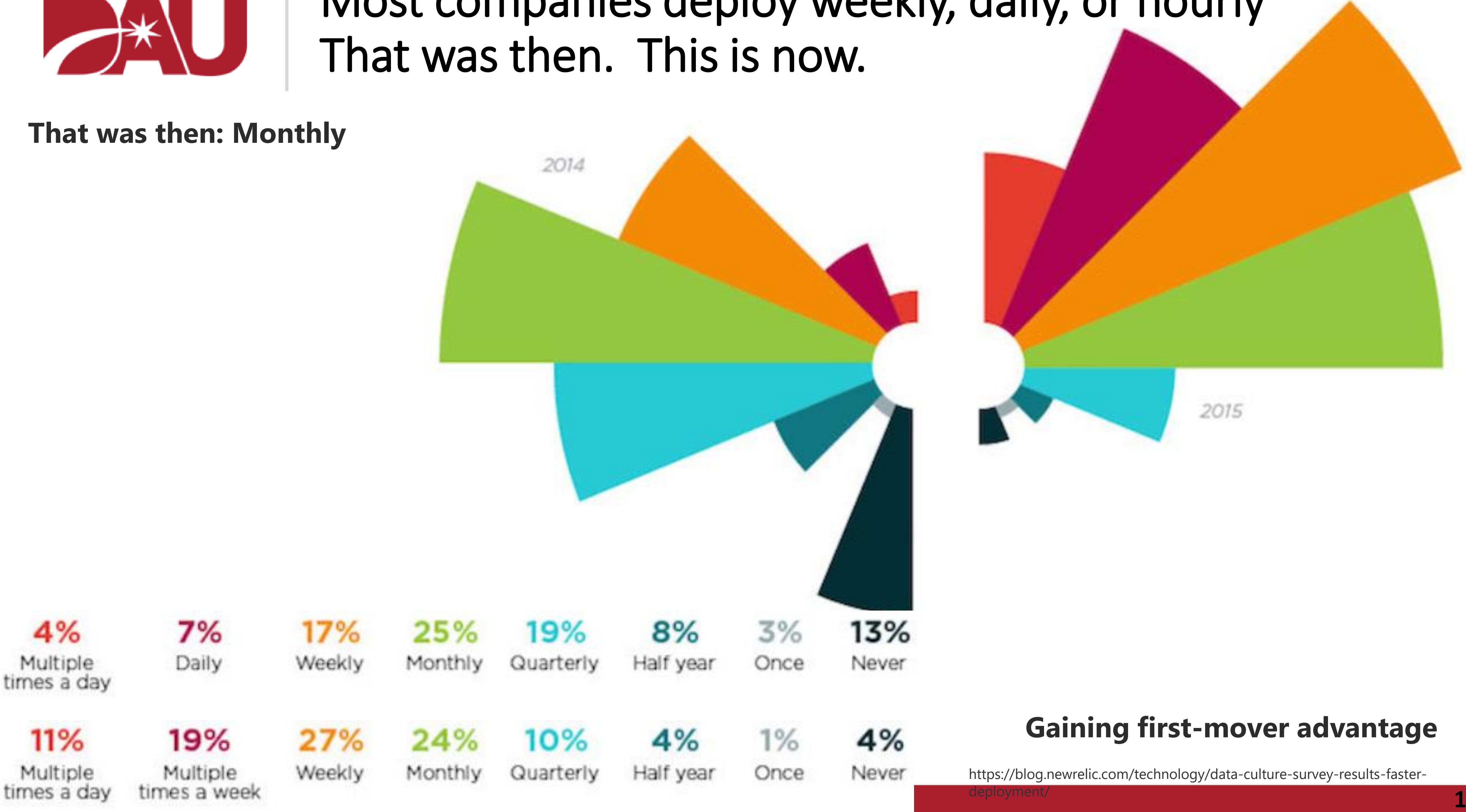


- **Frequent Stakeholder Involvement & Feedback**
- **Continuous Integration**
- **Rapid Response to Change, Less Risk**

Image Credit: Christopher Little

Most companies deploy weekly, daily, or hourly
That was then. This is now.

That was then: Monthly



Gaining first-mover advantage

https://blog.newrelic.com/technology/data-culture-survey-results-faster-deployment/

DIGITAL NATIVES? CONGRESSIONAL MANDATES

FY2018 NDAA

- Sec. 872: Defense Innovation Board analysis of software acquisition regulations.
- Sec 873: Pilot program to use agile or iterative development methods on major programs.
  - One software intensive warfighting system per service and one defense-wide
  - Two to eight Defense Business Systems
- Sec 874: Identify 4-8 SW development activities as pilot programs to use agile methods
- Sec 891: DAU training in support of sections 873/874
  - Mandatory for those involved in Sec 873/874 programs / Offered to other programs by request

FY2019 NDAA

- Sec 868: Implementation of Recommendations of the Final Report of the Defense Science Board Task Force on Software for Defense Systems
  - DSB Report Feb 2018 - seven recommendations
- Sec 869: Implementation of Pilot Program to Use Agile or Iterative Development Methods Requested Under Section 873 of NDAA FY2018
  - Additions to FY18 Sec 873 list -- Community of Practice advising on agile or iterative development

DSB calls for SW factory / DevSecOps / innovation (Lean Startup & Design Thinking) competency

DEPARTMENT OF DEFENSE
DEFENSE SCIENCE BOARD

DESIGN AND ACQUISITION OF SOFTWARE FOR DEFENSE SYSTEMS

February 2018

CLEARED FOR OPEN PUBLICATION
February 14, 2018
DEPARTMENT OF DEFENSE
OFFICE OF PREPUBLICATION AND SECURITY REVIEW

OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING
WASHINGTON, D.C. 20301-3140

FY19 NDAA SEC. 868. IMPLEMENTATION OF RECOMMENDATIONS OF THE FINAL REPORT OF THE DEFENSE SCIENCE BOARD TASK FORCE ON THE DESIGN AND ACQUISITION OF SOFTWARE FOR DEFENSE SYSTEMS.

Not later than 18 months after the date of the enactment of this Act, the Secretary of Defense shall, except as provided under subsection (b), commence implementation of each recommendation submitted as part of the final report

1. Software Factory – A key **evaluation criteria in the source selection process** should be efficacy of the offeror's software factory.

- DoD has limited iterative development expertise – focus on acquisition

2. Continuous Iterative Development – DoD and defense industrial base partners should adopt continuous iterative development best practices.

- **identify approaches and deliver minimum viable product (MVP)**
- establish MVP in its formal acquisition strategy, and arrange for the warfighter to adopt the IOC as an MVP for evaluation and feedback;
- … require all programs entering Milestone B to implement these iterative processes for Acquisition Category (ACAT) I, II, and III programs.

5. **Workforce –**

- Services need to develop workforce competency (prioritize acquisition strategy, source selection)
- **DAU develop curricula to develop SW-informed PMs, sustainers, acquisition specialists**

DIB report to Congress fast approaching (May '19)

DIB | DEFENSE INNOVATION BOARD

SOFTWARE ACQUISITION & PRACTICES (SWAP) - WORKFORCE SUBGROUP / FY18 NDAA - §872

streamlining and improving the efficiency and effectiveness of software acquisition in order to maintain defense technology advantage;

TL; DR Appendix B.

SWAP Report Appendix F. SWAP Working Group Reports (DIB remix)

- Acquisition Strategy
- Appropriations
- Contracts
- Data and Metrics
- Infrastructure
- Modernization/ Sustainment
- Requirements
- Security Certification/Accreditation
- Testing and Evaluation
- Workforce

DIB report to Congress fast approaching (May ’19)

final public report findings

March Report

- **Path Forward 1:** Most importantly, Gov and industry must come together to implement a DevSecOps culture and approach to SW, as used in industry.

- Make use of existing authorities such as OTAs and mid-tier acquisition (Sec 804) to implement a DevSecOps approach to acquisition to greatest extent possible

- Special Experience Identifier for mil & civ acquisition professionals indicating they have necessary experience and training to serve on a software acquisition team. …mandatory requirement to lead any SW procurement

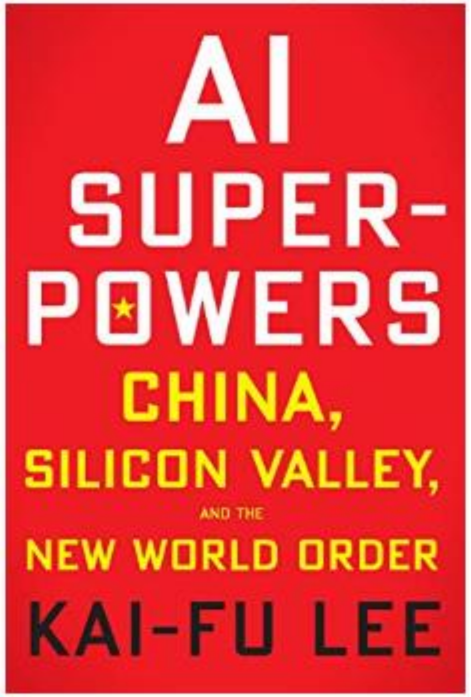
- **A1:** USD(A&S), with SAEs, select programs using DevSecOps to utilize new SW acquisition pathway; develop and implement training at DAU on new SW pathway for all acquisition communities (FM, PM, IT, SE, etc.)

- C2: Leverage existing training; add modern software development content
- C2: Create SW continuing education programs and requirements for CIOs, SAEs, PEOs and PMs
- C3: Create & provide training opportunities via boot camps & rotations to gain hands-on DevSecOps experience

CONFRONTING THE CHALLENGE & URGENCY

- What is DevSecOps?
  - The software integrated tools, services, and standards that enable partners and programs to develop, deploy, and operate applications in a secure, flexible and interoperable fashion.
- Why should I care?
  - Software and cybersecurity pervades **all aspects of DoD's mission (from business systems to weapons systems to Artificial Intelligence to cybersecurity to space)** - establishing DevSecOps capabilities will:
    - Deliver applications rapidly and in a secure manner, increasing the warfighters competitive advantage
    - Bake-in and enforce cybersecurity functions and policy from inception through operations
    - Enhance enterprise visibility of development activities and reduce accreditation timelines
    - Ensure seamless application portability across enterprise, Cloud and disconnected, intermittent and classified environments
    - Drive DoD transformation to Agile and Lean Software Development and Delivery
  - Leveraging industry acquisition best practices combined with centralized contract vehicle for DevSecOps tools and services will **enable rapid prototyping, real-time deployments and scalability**
  - We cannot be left behind: China, Russia and North Korea are already massively implementing DevOps

Nicolas Chaillan - DoD Enterprise DevSecOps Platform (Software Factory) Initiative



AI SUPER-POWERS

CHINA, SILICON VALLEY, AND THE NEW WORLD ORDER

KAI-FU LEE

HOW FAST DO WE NEED TO GO?

Dr. Will Roper, Assistant Secretary of the Air Force for Acquisition, Technology and Logistics: “Software intensive programs are almost all over cost, over schedule.”

These delays come at an increasingly severe price to our Warfighters on the battlefield.

On a modern battlefield and in a future war, Dr. Roper goes on to say **“we could be changing software every day as a necessary factor for winning.”**

INNOVATION & LEARNING

The Smart Machine Age (SMA)

- UVA Darden Ed Hess: **NO. 1 JOB SKILL** needed for SMA: KNOWING how to ITERATIVELY LEARN
- Success determined by ability to fail & adaptively learn
- Hyper-learning & innovation economy: pace of learning & innovation going nonlinear w/ asymptotic complexity

1966 story in *IEEE Spectrum* titled, "Technical Obsolescence,"

- half-life of engineering degree in late 1920's ~35 years;
- a degree from 1960 ~10 years

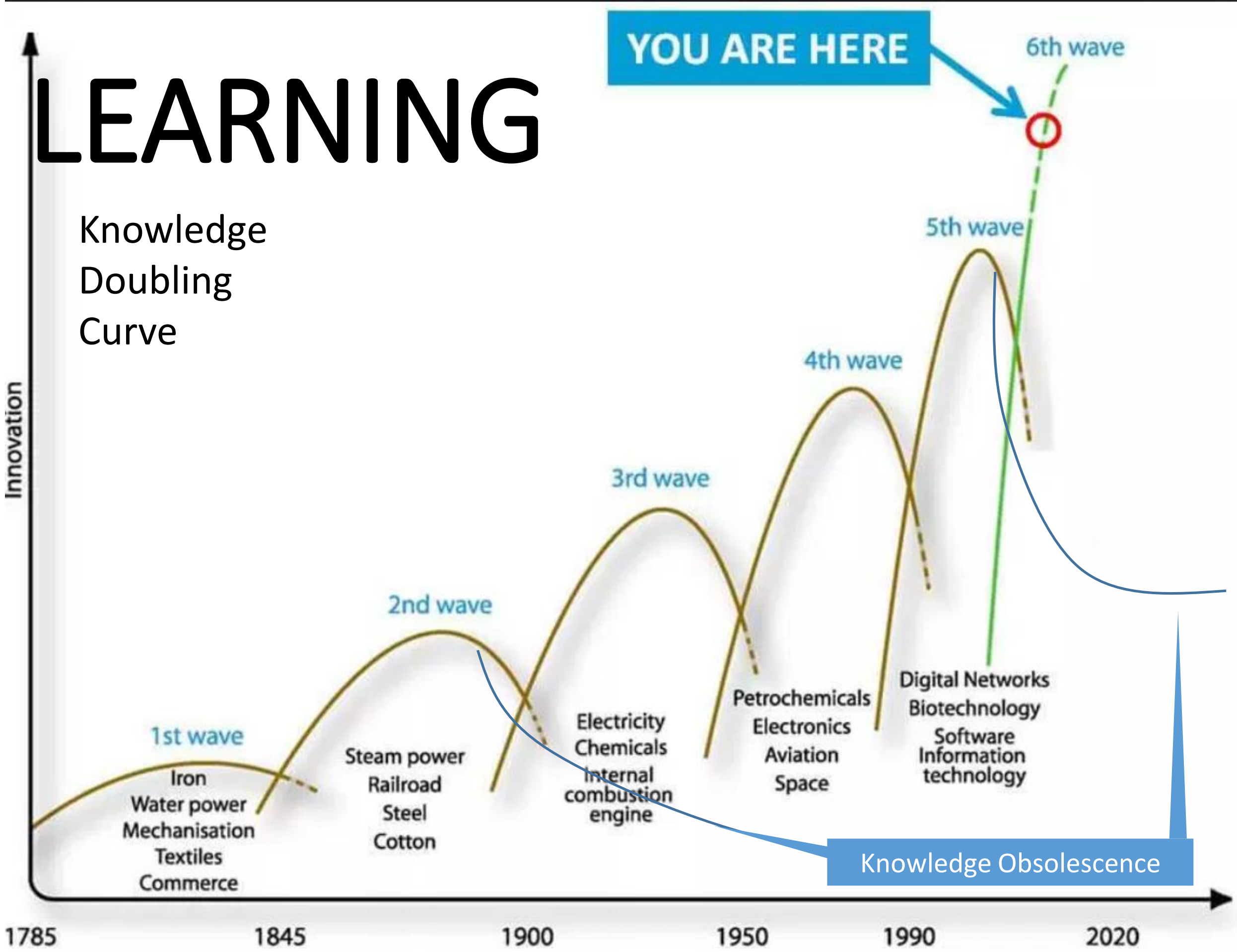
2002, William Wulf, president of the National Academy of Engineering

- "half-life of engineering knowledge… is 7 to **2½ years**."
- more recent estimates: low end of range, especially for those working in IT.

2008: Kruchten conjectured in a paper for *IEEE Software* that

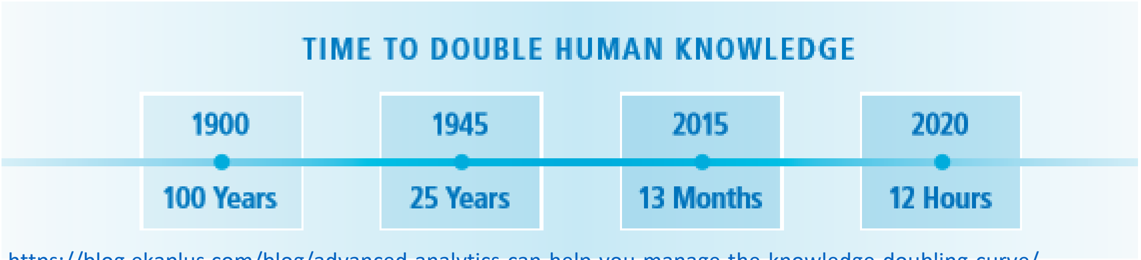
- half-life of software engineering ideas: **~5 years**.

https://spectrum.ieee.org/riskfactor/computing/it/an-engineering-career-only-a-young-persons-game


Knowledge Doubling Curve

Knowledge Obsolescence

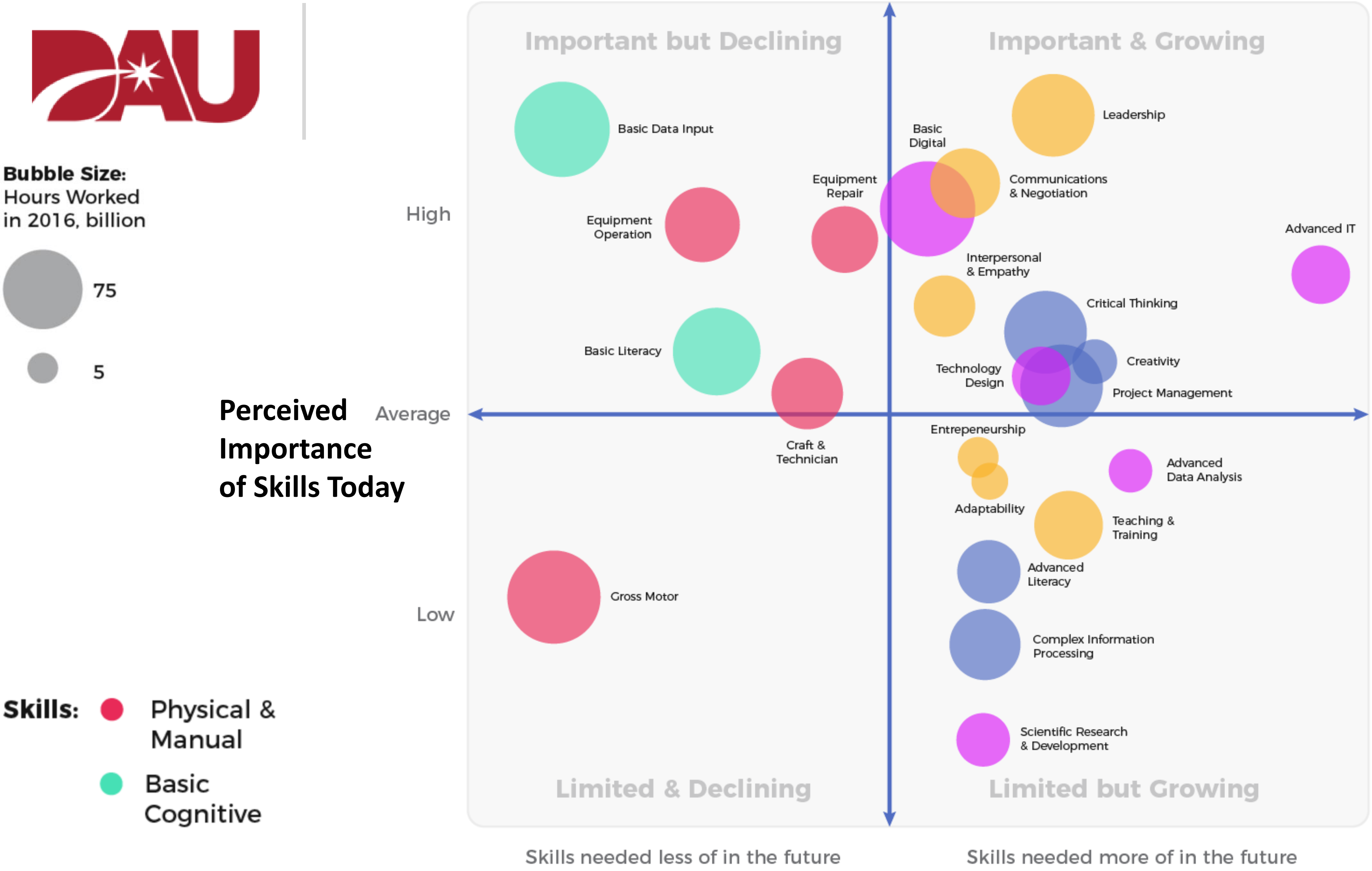
https://learningspy.co.uk/learning/o-brave-new-world-search-21st-century-qualifications


TIME TO DOUBLE HUMAN KNOWLEDGE

1900	1945	2015	2020
100 Years	25 Years	13 Months	12 Hours

https://blog.ekaplus.com/blog/advanced-analytics-can-help-you-manage-the-knowledge-doubling-curve/

What is knowledge shelf-life today?



Expected Future Skill Need

McKinsey Institute Workforce Skills Executive Survey, March 2018 / RcoketSource

Tech

- Advanced IT
- Basic Digital
- Tech Design
- Data Analytics

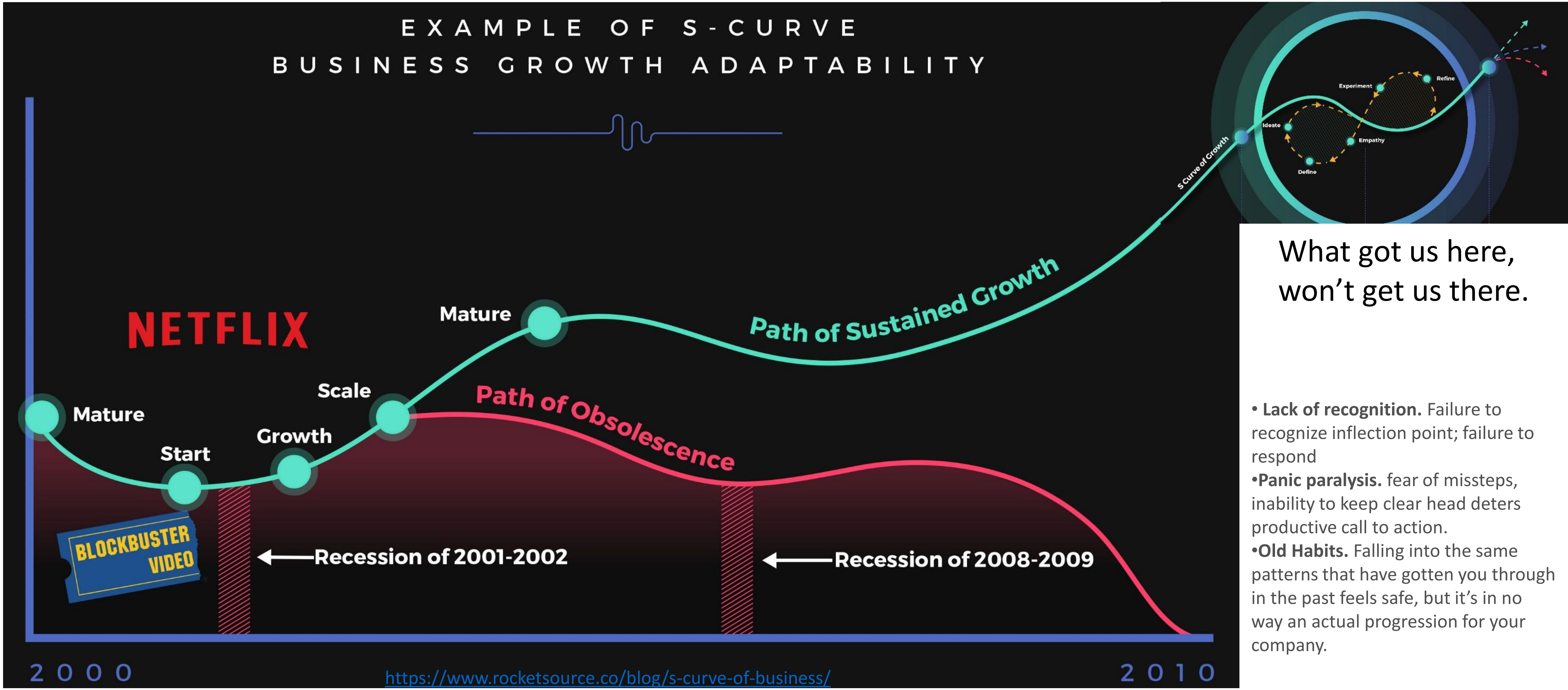
Social/EQ

- Leadership
- Communication
- Interposal
- Empathy
- Adaptability
- Teaching
- Entrepreneurship

Higher Cognitive

- Critical Thinking
- Creativity
- PM

INNOVATION & LEARNING



https://www.rocketsource.co/blog/s-curve-of-business/

What got us here, won't get us there.

- **Lack of recognition.** Failure to recognize inflection point; failure to respond
- **Panic paralysis.** fear of missteps, inability to keep clear head deters productive call to action.
- **Old Habits.** Falling into the same patterns that have gotten you through in the past feels safe, but it's in no way an actual progression for your company.

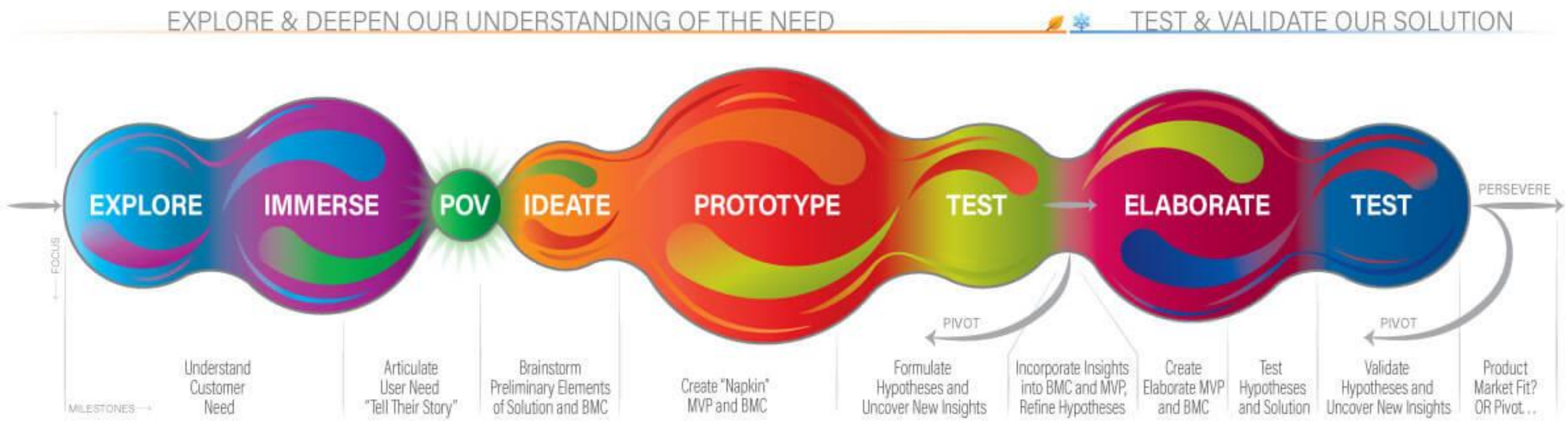
INNOVATION & LEARNING

Digital Talent Cutting-Edge Knowledge Workers Want an Environment Affording:

- **Mastery | Autonomy | Purpose** | entrepreneurialism (creating under extreme uncertainty)
- **Culture of innovation** = collaboration = creating something new
- **Lean Startup** – Build. Measure. Learn. Fail Fast. Fail Cheap. Learn Fast. Pivot / Persevere.
- **Learning:** the scientific method – everything is a hypotheses. A/B testing, hyper improvement processes
- **Design Thinking** – empathy, pain points / insights, ideate, convergent / divergent thinking, experiment, repeat

Stanford University

STARTUP GARAGE INNOVATION PROCESS


EXPLORE & DEEPEN OUR UNDERSTANDING OF THE NEED
TEST & VALIDATE OUR SOLUTION
FOCUS
EXPLORE
IMMERSE
POV
IDEATE
PROTOTYPE
TEST
ELABORATE
TEST
PERSEVERE
PIVOT
PIVOT
MILESTONES
Understand Customer Need
Articulate User Need "Tell Their Story"
Brainstorm Preliminary Elements of Solution and BMC
Create "Napkin" MVP and BMC
Formulate Hypotheses and Uncover New Insights
Incorporate Insights into BMC and MVP, Refine Hypotheses
Create Elaborate MVP and BMC
Test Hypotheses and Solution
Validate Hypotheses and Uncover New Insights
Product Market Fit? OR Pivot...

INNOVATION & LEARNING

Stanford
University

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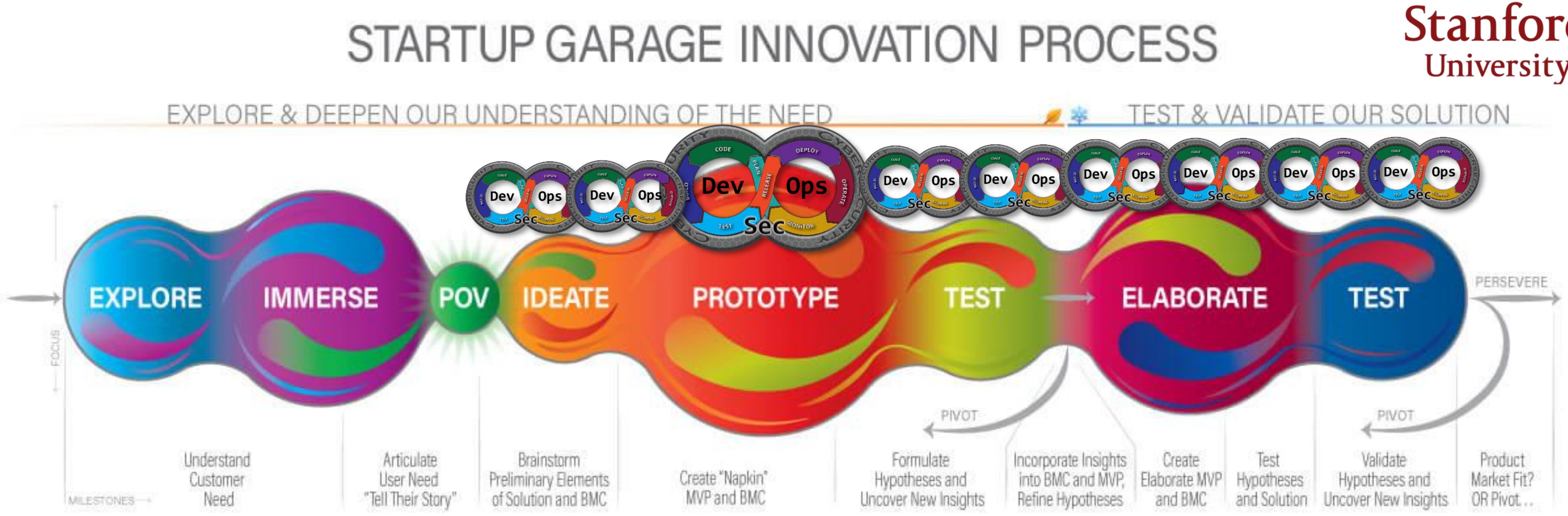
STARTUP GARAGE INNOVATION PROCESS
EXPLORE & DEEPEN OUR UNDERSTANDING OF THE NEED
TEST & VALIDATE OUR SOLUTION
Dev
Ops
Sec
CODE
DEPLOY
PLAN
RELEASE
BUILD
OPERATE
TEST
MONITOR
CYBERSECURITY
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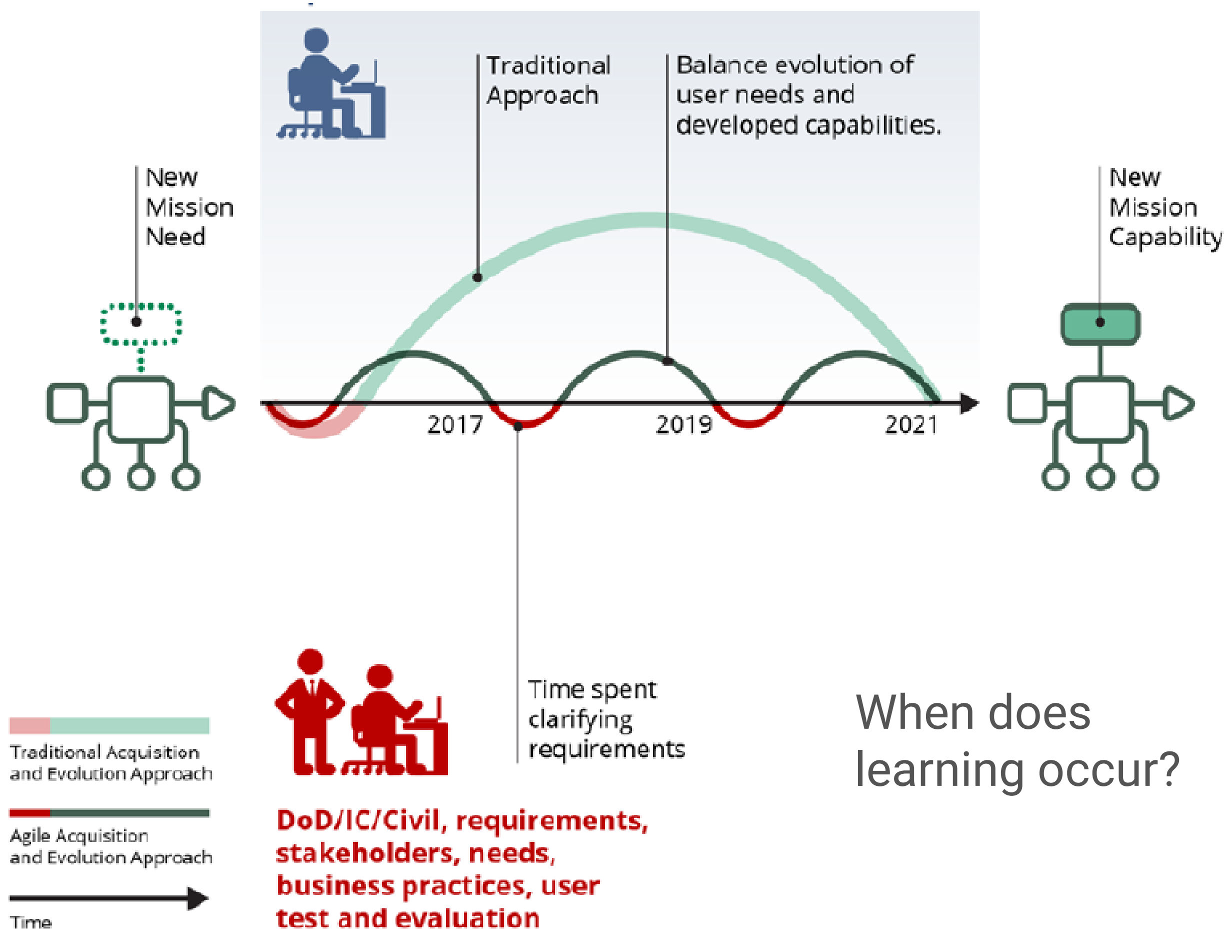
AGILE ACQUISITION

Why are we here?

Deliver performance at the speed of relevance

Streamline rapid, iterative approaches from development to fielding

National Defense Strategy Summary
Jan 2018



New Mission Need
Traditional Approach
Balance evolution of user needs and developed capabilities.
2017
2019
2021
New Mission Capability
Time spent clarifying requirements
Traditional Acquisition and Evolution Approach
Agile Acquisition and Evolution Approach
Time
DoD/IC/Civil, requirements, stakeholders, needs, business practices, user test and evaluation

When does learning occur?

Carnegie Mellon University
Software Engineering Institute

Agile and the DoD: An Executive Introduction
© 2018 Carnegie Mellon University

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<u>2011</u>
"No **plan survives** first contact with the enemy. What **matters is how quickly the leader** is able to **adapt**." – Tim Hartford, <u>Adapt: Why Success Always Starts with Failure</u>

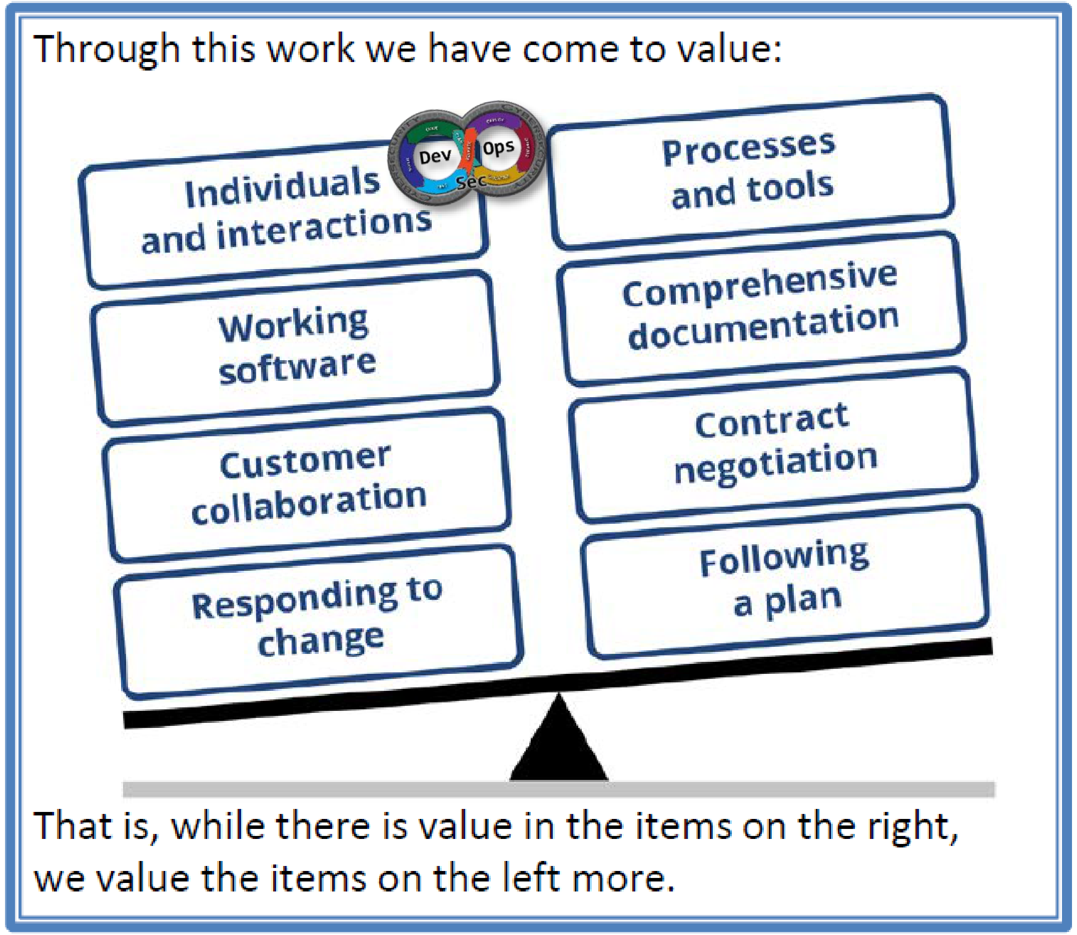
<u>1996</u>
"Everybody has a plan until they get **punched** in the mouth." – Mike Tyson

<u>Mid 20th century</u>
"No plan of operations reaches with any certainty beyond the first encounter with the **enemy's** main force."
– Dwight Eisenhower

<u>500 B.C.</u>
"Those who are victorious plan effectively & change decisively."
– Sun Tzu

AGILE SOFTWARE DEVELOPMENT

Agile Manifesto



Through this work we have come to value:

That is, while there is value in the items on the right, we value the items on the left more.

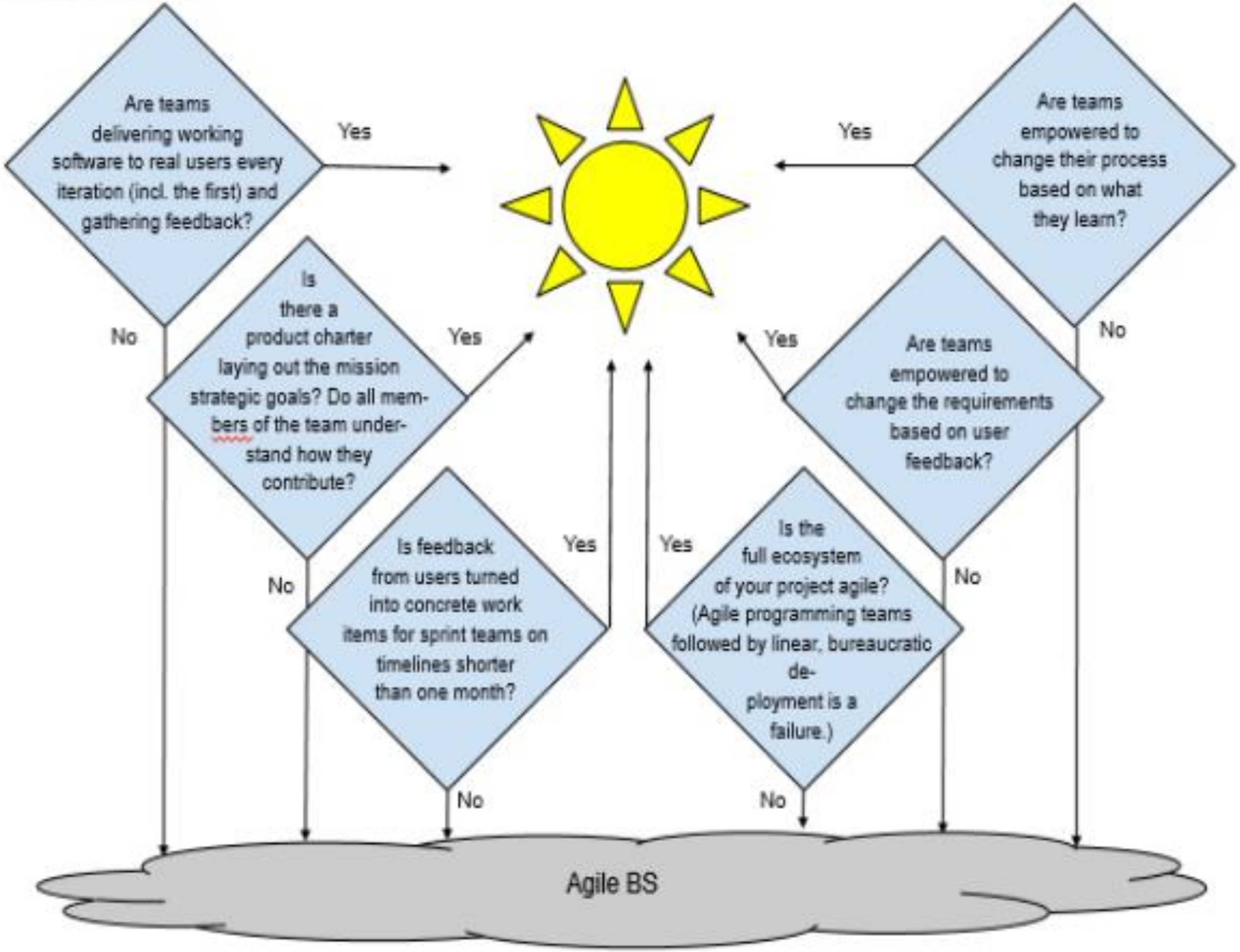
The manifesto is often misinterpreted to mean:

no documentation,
no process, and
no plan!

http://www.agilemanifesto.org/

AGILE BS

Graphical version:



Are teams delivering working software to real users every iteration (incl. the first) and gathering feedback?

Yes

No

Is there a product charter laying out the mission strategic goals? Do all members of the team understand how they contribute?

Yes

No

Is feedback from users turned into concrete work items for sprint teams on timelines shorter than one month?

Yes

No

Are teams empowered to change their process based on what they learn?

Yes

No

Are teams empowered to change the requirements based on user feedback?

Yes

No

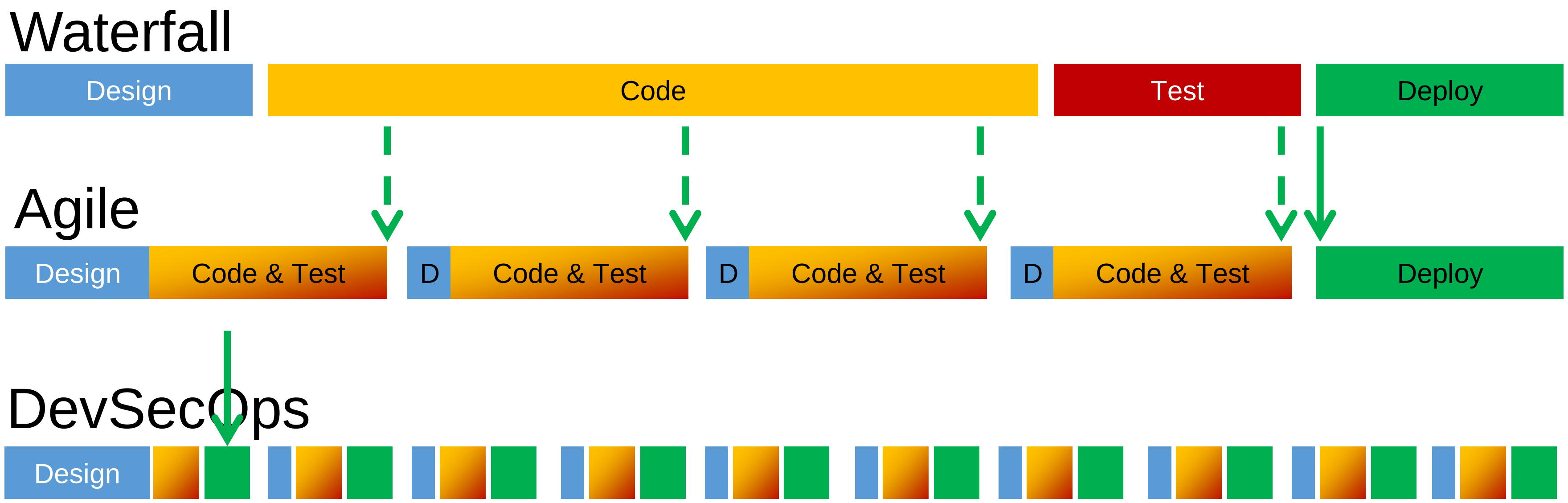
Is the full ecosystem of your project agile? (Agile programming teams followed by linear, bureaucratic de-ployment is a failure.)

Yes

No

Agile BS

CI/CD: AGILE ?VS? DEVSECOPS



Waterfall

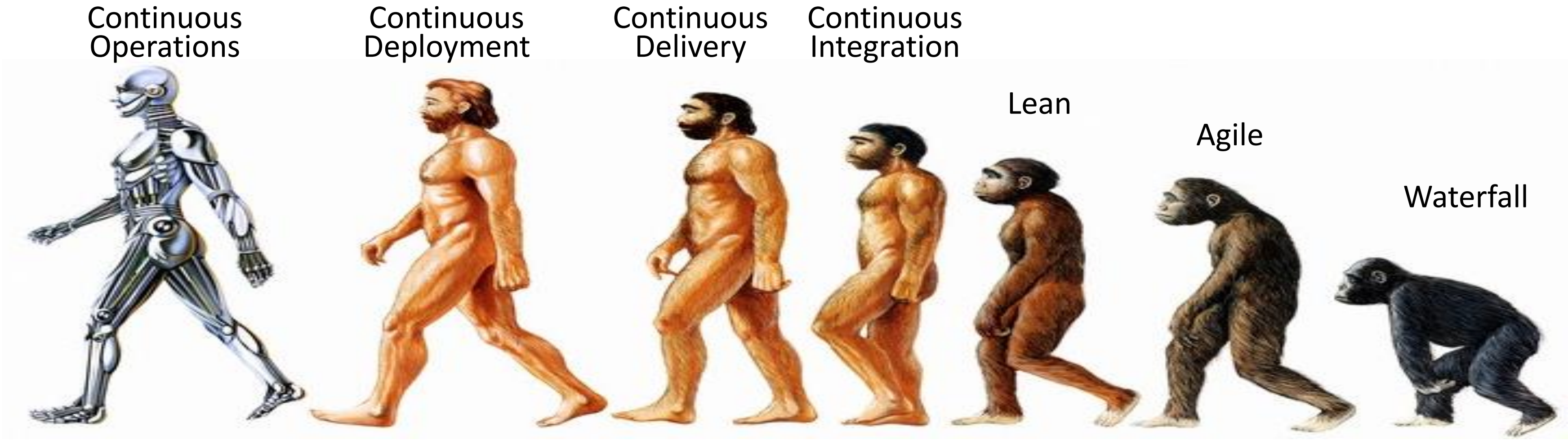
Design | Code | Test | Deploy

Agile

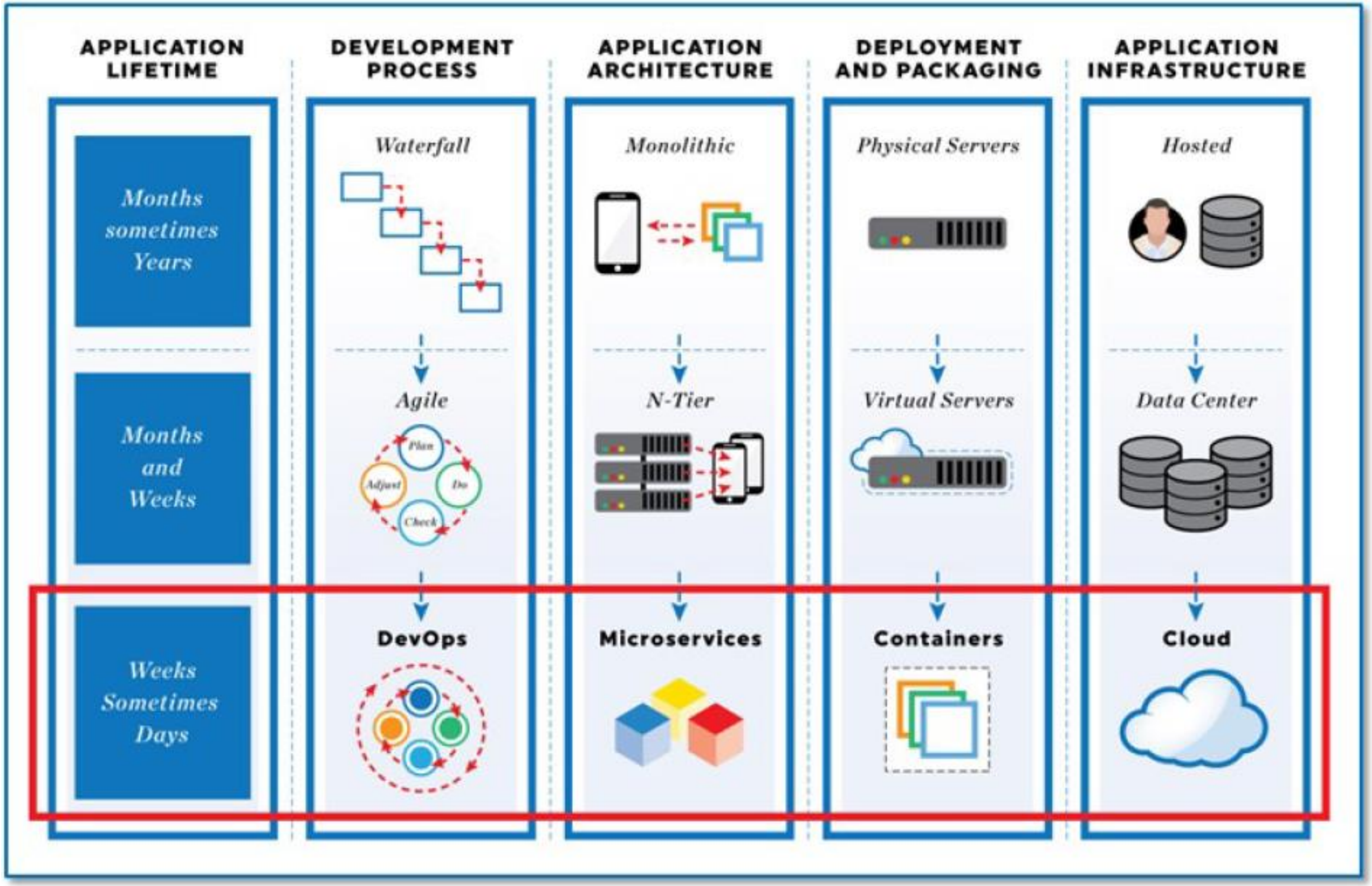
Design | Code & Test | D | Code & Test | D | Code & Test | D | Code & Test | Deploy

DevSecOps

Design



CI / AGILE VS? CD / DEVOPS



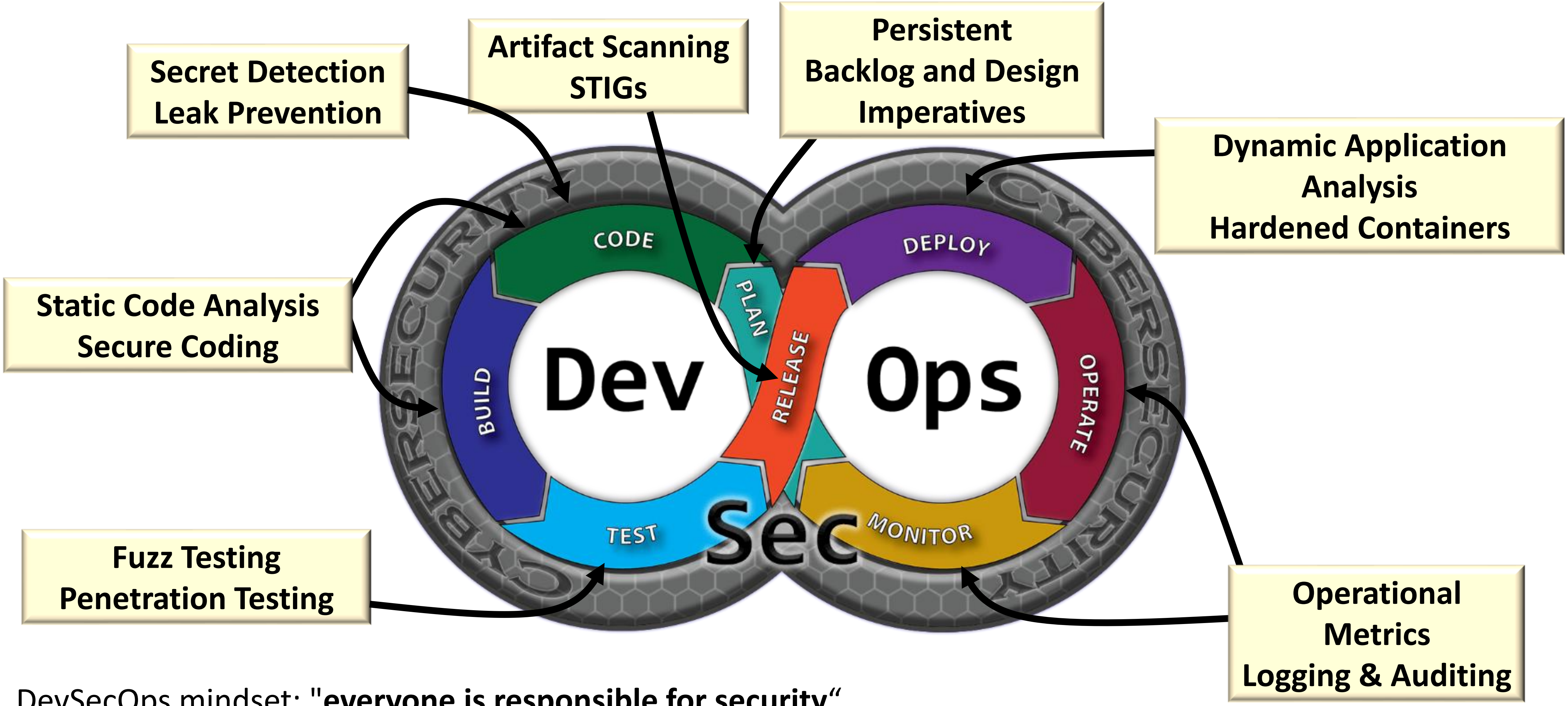
APPLICATION LIFETIME	DEVELOPMENT PROCESS	APPLICATION ARCHITECTURE	DEPLOYMENT AND PACKAGING	APPLICATION INFRASTRUCTURE
Months sometimes Years	*Waterfall*	*Monolithic*	*Physical Servers*	*Hosted*
Months and Weeks	*Agile*	*N-Tier*	*Virtual Servers*	*Data Center*
Weeks Sometimes Days	**DevOps**	**Microservices**	**Containers**	**Cloud**

DevOps shortens the release period

Removes human intervention and handoffs

Improves reliability & **security**

WHERE IS THE SEC IN DEVSECOPS?



Secret Detection
Leak Prevention

Artifact Scanning
STIGs

Persistent
Backlog and Design
Imperatives

Dynamic Application
Analysis
Hardened Containers

Static Code Analysis
Secure Coding

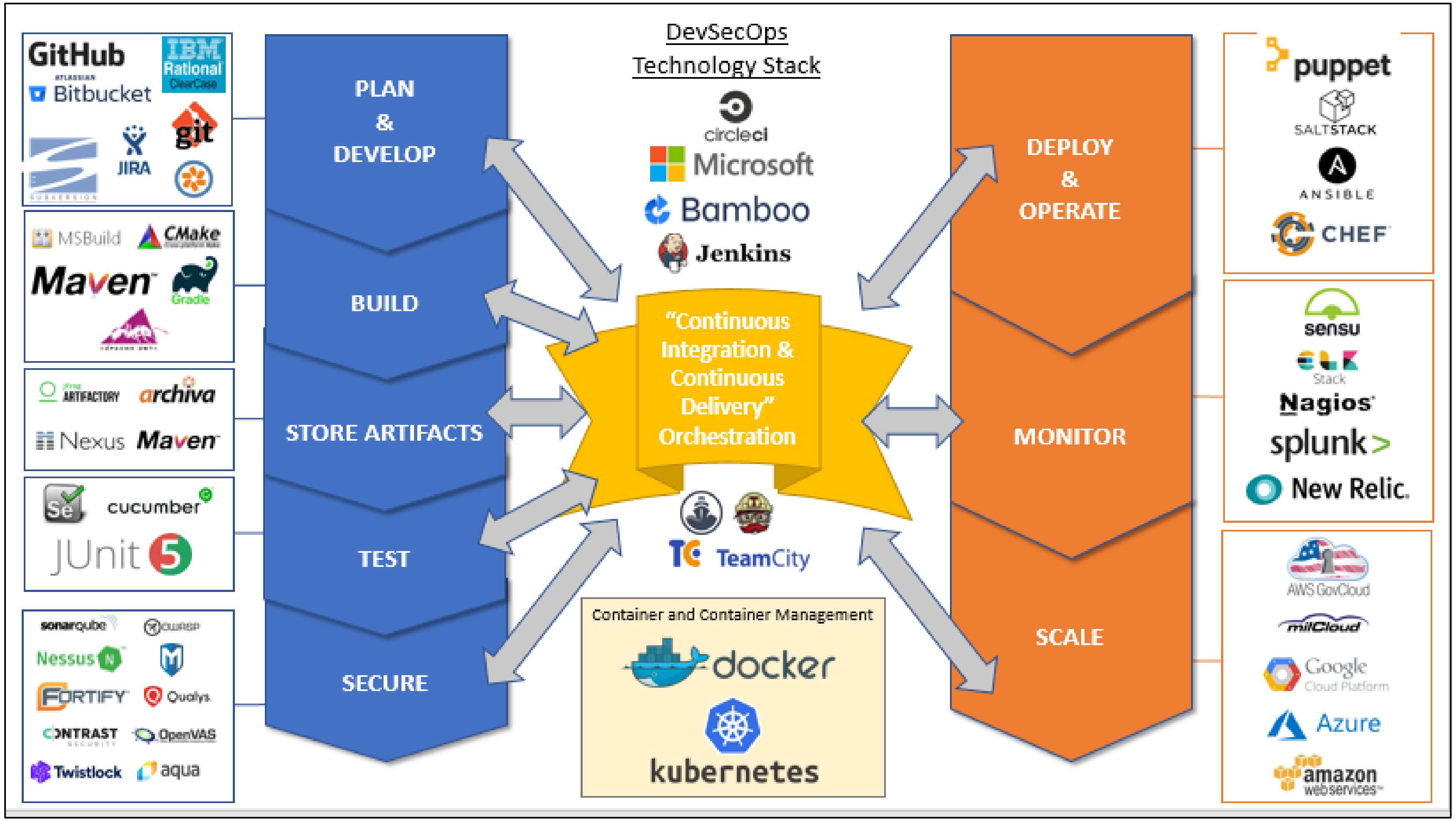
Fuzz Testing
Penetration Testing

Operational
Metrics
Logging & Auditing

DevSecOps mindset: "**everyone is responsible for security**“

DOD ENTERPRISE DEVSECOPS PLATFORM

- Start with clear goals and be positioned to deliver value
- Technical practices: continuous integration, continuous delivery, and automated testing
- Cultural practices: rapidly receive and take action on user feedback; a low-blame environment (in post-mortems)
- Use of available industry-standard tools to accomplish the above
  - 100 containerized products
  - Centrally accredited in containers
  - Bulk licenses
  - Continuous monitoring of the cyberstack (Devsecops
  - DevSecOps engineers
  - (Contract / Repo in work)
  - Open source container management
  - Kill container –every 4 hours
  - Rolling updates – no downtime



DevSecOps Technology Stack

PLAN & DEVELOP

BUILD

STORE ARTIFACTS

TEST

SECURE

"Continuous Integration & Continuous Delivery" Orchestration

Container and Container Management

DEPLOY & OPERATE

MONITOR

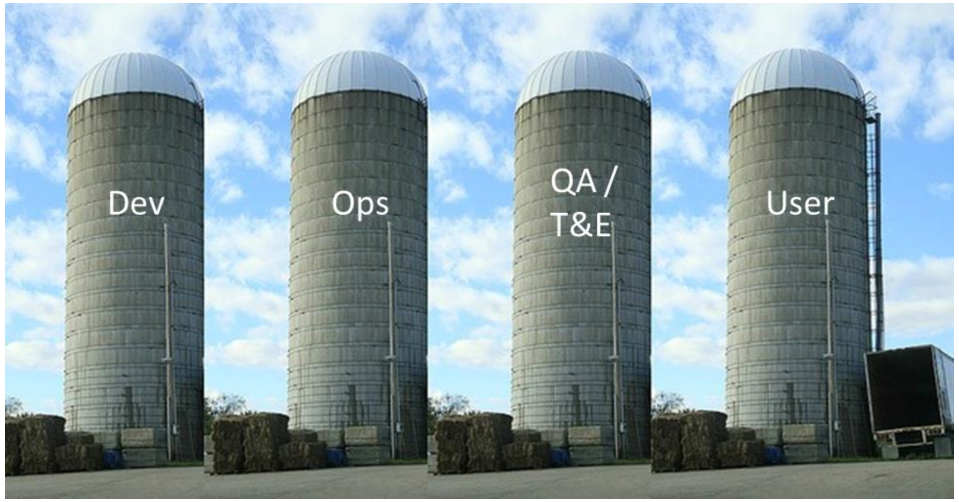
SCALE

Container: build & authorize once, run anywhere (continuous monitoring in production)

OLD WAY: SOFTWARE ENGINEERING VS. OPERATIONS

Software Engineering

Requirements
Design
Coding
Unit Test



Source: Adapted from 2018, Oh No, DevOps is Tough to Implement; Hasan Yasar

Operations

Integration
Infrastructure
Deployment
Help Desk
(Pager Duty)

Conway’s Law: “ How to organize our teams affects how we perform our work”

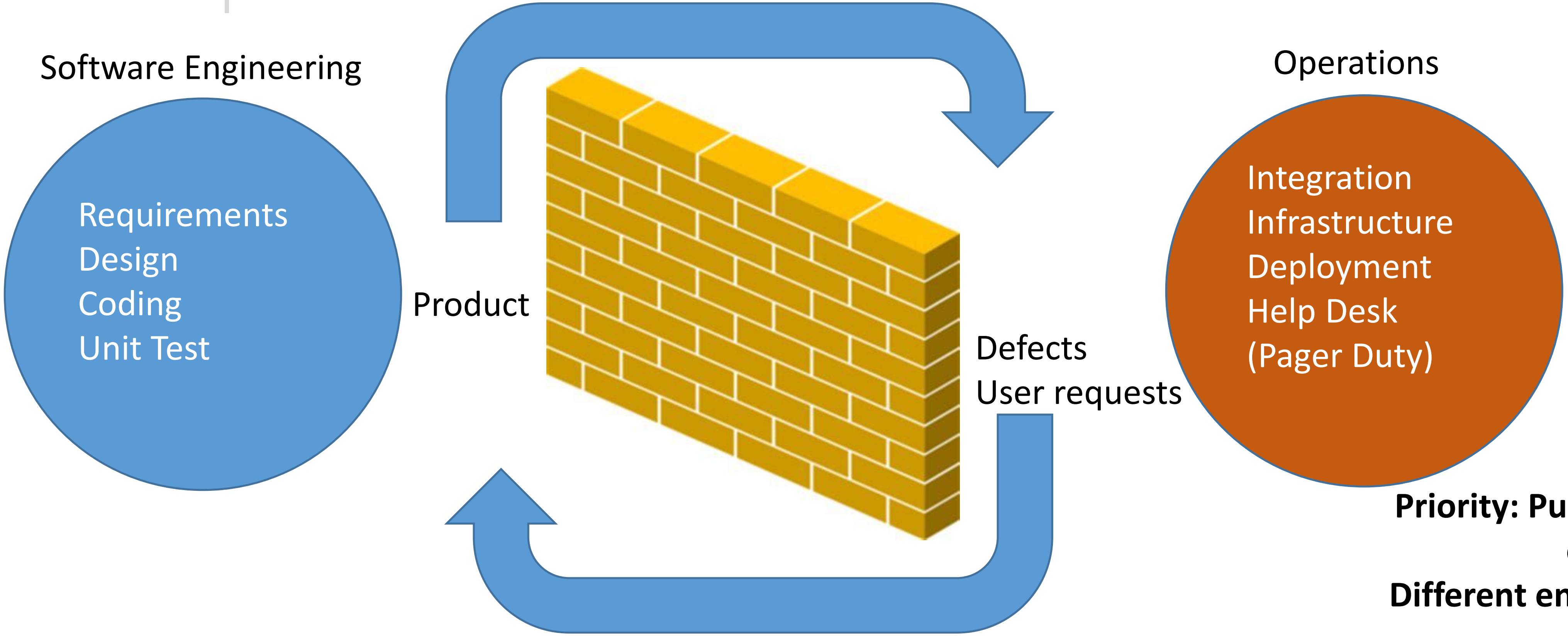
- Share common goals from top to bottom
- Enable business value-oriented team
- Functional team
- Share responsibilities (e.g., security is everyone’s job)
- Keep team size small (Amazon 2 pizza rule)

Why?

Support shift left?

Pre-configured for pernicious “Us versus Them” and “not my job” culture that will emerge

SOFTWARE ENGINEERING VS. OPERATIONS



Priority: Push Features or Stability?

Different environment?

STIGS?

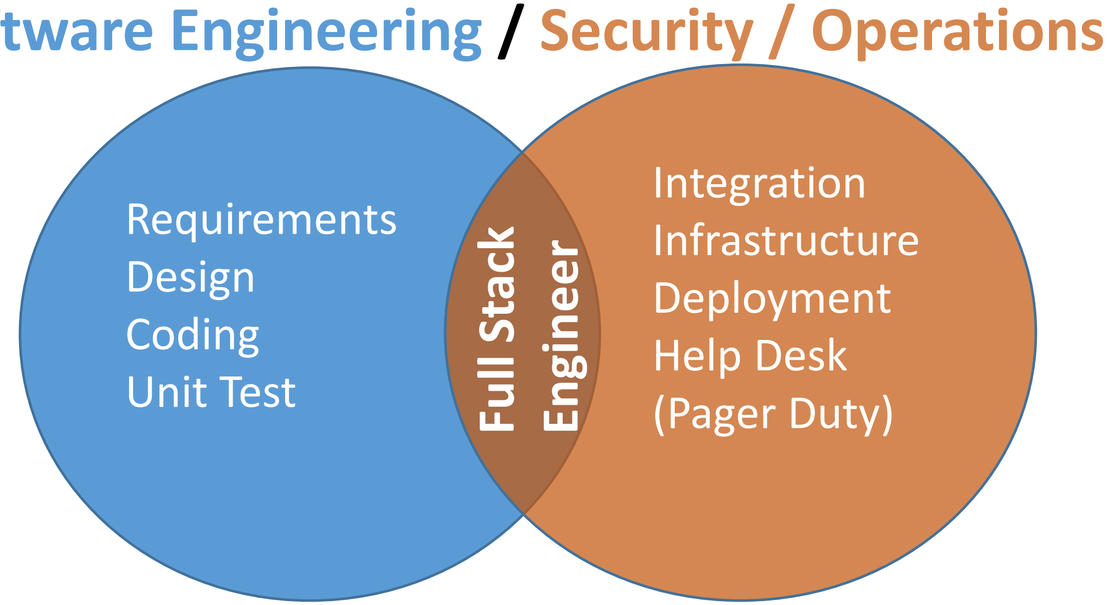
Tech debt?

Cyber debt?

Everyone has a process. Map the process. Make security part of that process mapping. AO understand how automation achieves his ATO requirements.

Typical product workflow where software engineering throws the product over the wall to operations pernicious “Us versus Them” culture can emerge

NEW WAY: SOFTWARE ENGINEERING & OPERATIONS (DEVSECOPS)

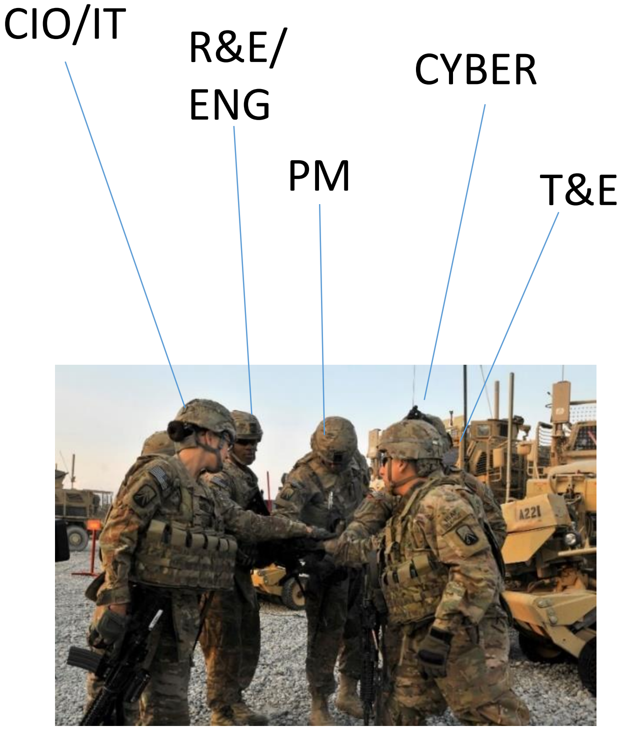


Software Engineering / Security / Operations

Requirements
Design
Coding
Unit Test

Full Stack Engineer

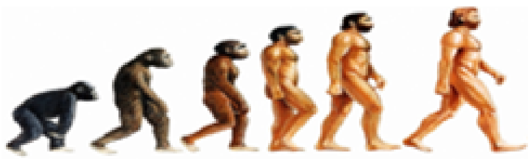
Integration
Infrastructure
Deployment
Help Desk
(Pager Duty)



DoD needs (1) Security and (2) Reliability to enable (3) Increased Velocity→ and rapidly deliver capability to the Warfighter

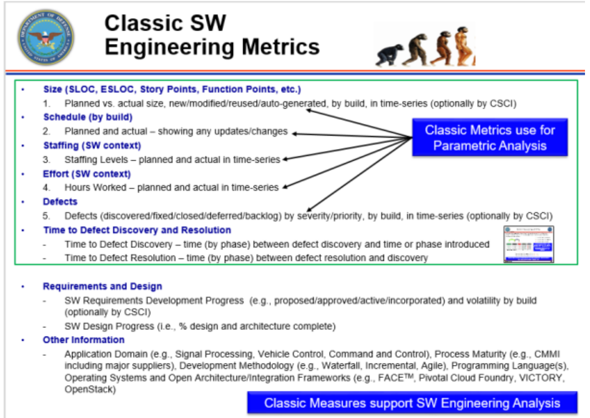
Site Reliability Engineering + Conway's Law = Build together. Deliver together.
Unleash innovation and enable the fight together.

Continuous Integration Metrics



- **Code and Automated Build/Release**
  - Build Automation (% steps automated)
  - Average Builds per Day/week (by pass, fail)
  - Duration per Build (minimum, maximum, average)
- **Development Test**
  - Unit Test Coverage (% automated, % coverage)
  - Static Code Analysis Coverage (% automated, % coverage)
  - Functional Thread Test Coverage (% automated, % coverage)
- **System Integration**
  - Integrated Build Frequency by Pass, Fail (# of deployments per day/week)
  - Integrated Build Recovery (average time between failed deployment and system restored to good state)
  - For Cloud, Enterprise and other Compute-intensive Systems
    - Change Volume, in time-series (deployed story points, ESLOC, etc.)
    - Lead Time, in time-series (time from development to deployment)
- **Cyber Monitoring (security controls & patches)**
  - % of automated logging, monitoring and auditing of cybersecurity controls

Agile and Continuous Integration (CI) are critical to minimize program risk



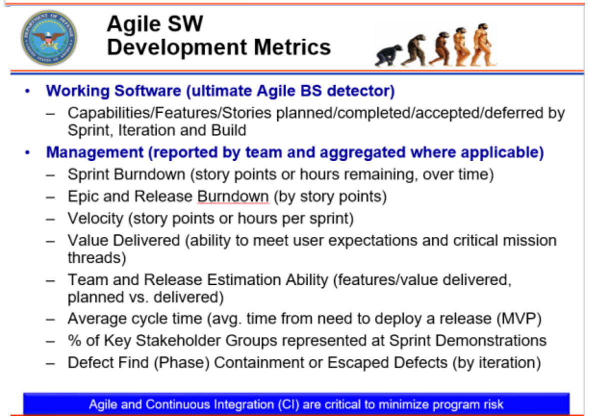
Classic SW Engineering Metrics

- **Size (SLOC, ESLOC, Story Points, Function Points, etc.)**
  1. Planned vs. actual size, new/modified/reused/auto-generated, by build, in time-series (optionally by CSCI)
- **Schedule (by build)**
  2. Planned and actual – showing any updates/changes
- **Staffing (SW context)**
  3. Staffing Levels – planned and actual in time-series
- **Effort (SW context)**
  4. Hours Worked – planned and actual in time-series
- **Defects**
  5. Defects (discovered/fixed/closed/deferred/backlog) by severity/priority, by build, in time-series (optionally by CSCI)
- **Time to Defect Discovery and Resolution**
  - Time to Defect Discovery – time (by phase) between defect discovery and time or phase introduced
  - Time to Defect Resolution – time (by phase) between defect resolution and discovery

Classic Metrics use for Parametric Analysis

- **Requirements and Design**
  - SW Requirements Development Progress (e.g., proposed/approved/active/incorporated) and volatility by build (optionally by CSCI)
  - SW Design Progress (i.e., % design and architecture complete)
- **Other Information**
  - Application Domain (e.g., Signal Processing, Vehicle Control, Command and Control), Process Maturity (e.g., CMMI including major suppliers), Development Methodology (e.g., Waterfall, Incremental, Agile), Programming Language(s), Operating Systems and Open Architecture/Integration Frameworks (e.g., FACE™, Pivotal Cloud Foundry, VICTORY, OpenStack)

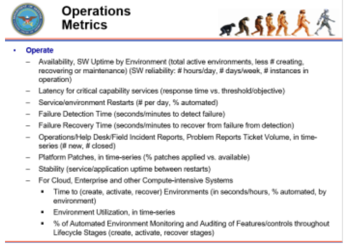
Classic Measures support SW Engineering Analysis



Agile SW Development Metrics

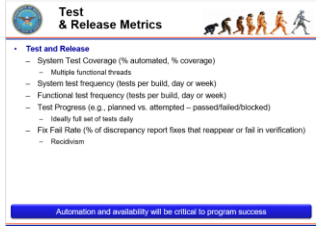
- **Working Software (ultimate Agile BS detector)**
  - Capabilities/Features/Stories planned/completed/accepted/deferred by Sprint, Iteration and Build
- **Management (reported by team and aggregated where applicable)**
  - Sprint Burndown (story points or hours remaining, over time)
  - Epic and Release Burndown (by story points)
  - Velocity (story points or hours per sprint)
  - Value Delivered (ability to meet user expectations and critical mission threads)
  - Team and Release Estimation Ability (features/value delivered, planned vs. delivered)
  - Average cycle time (avg. time from need to deploy a release (MVP)
  - % of Key Stakeholder Groups represented at Sprint Demonstrations
  - Defect Find (Phase) Containment or Escaped Defects (by iteration)

Agile and Continuous Integration (CI) are critical to minimize program risk



Operations Metrics

- **Operate**
  - Availability, SW Uptime by Environment (total active environments, less # creating, recovering or maintenance) (SW reliability: # hours/day, # days/week, # instances in operation)
  - Latency for critical capability services (response time vs. threshold/objective)
  - Service/environment Restarts (# per day, % automated)
  - Failure Detection Time (seconds/minutes to detect failure)
  - Failure Recovery Time (seconds/minutes to recover from failure from detection)
  - Operations/Help Desk/Field Incident Reports, Problem Reports Ticket Volume, in time-series (# new, # closed)
  - Platform Patches, in time-series (% patches applied vs. available)
  - Stability (service/application uptime between restarts)
  - For Cloud, Enterprise and other Compute-intensive Systems
    - Time to (create, activate, recover) Environments (in seconds/hours, % automated, by environment)
    - Environment Utilization, in time-series
    - % of Automated Environment Monitoring and Auditing of Features/controls throughout Lifecycle Stages (create, activate, recover stages)

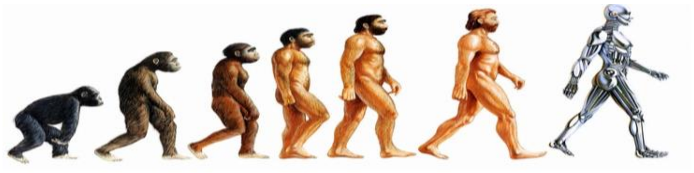


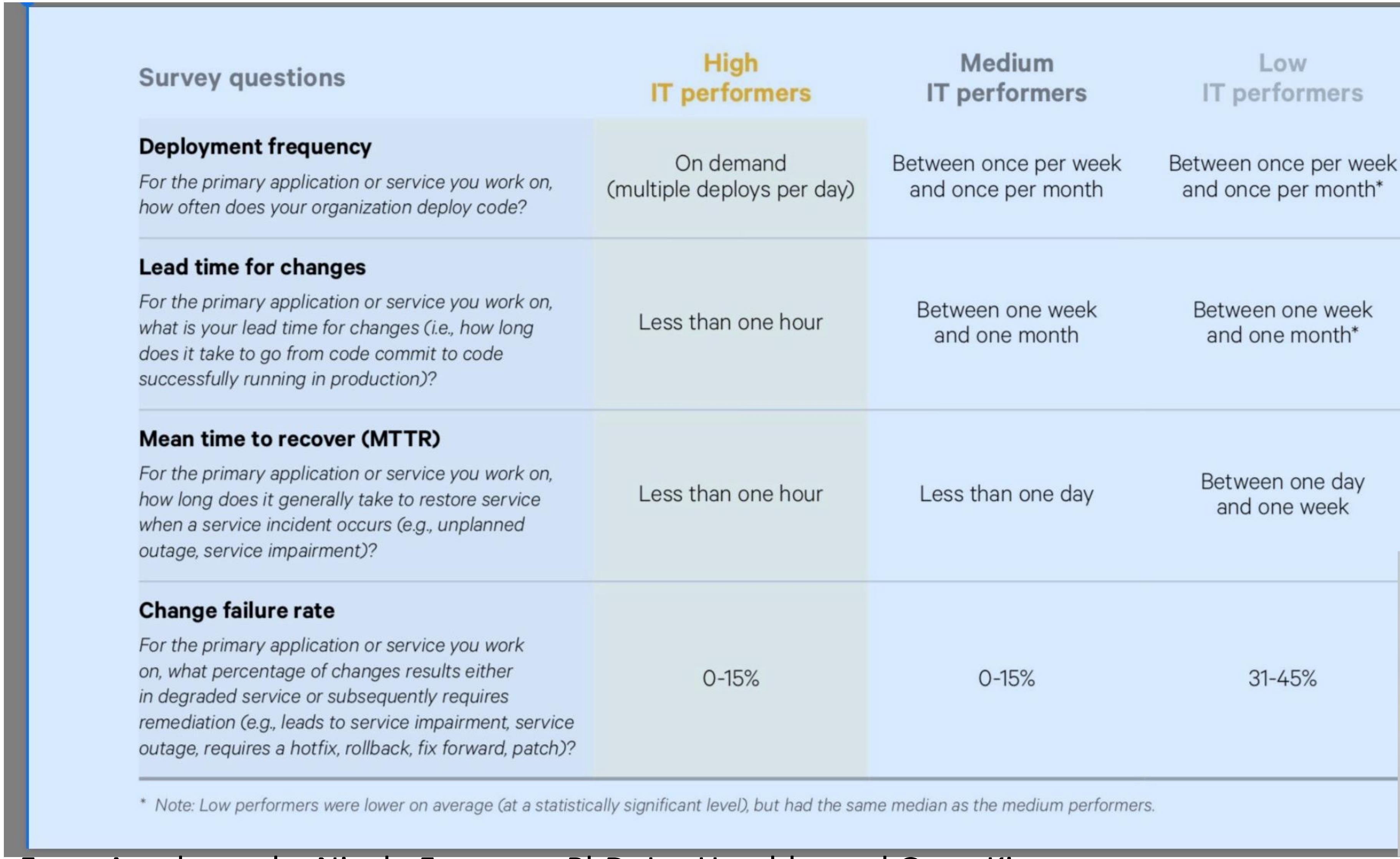
Test & Release Metrics

- **Test and Release**
  - System Test Coverage (% automated, % coverage)
    - Multiple functional threads
  - System test frequency (tests per build, day or week)
  - Functional test frequency (tests per build, day or week)
  - Test Progress (e.g., planned vs. attempted – passed/failed/blocked)
    - Ideally full set of tests daily
  - Fix Fail Rate (% of discrepancy report fixes that reappear or fail in verification)
    - Recidivism

Automation and availability will be critical to program success

DEVOPS METRICS





Survey questions	High IT performers	Medium IT performers	Low IT performers
Deployment frequency *For the primary application or service you work on, how often does your organization deploy code?*	On demand (multiple deploys per day)	Between once per week and once per month	Between once per week and once per month*
Lead time for changes *For the primary application or service you work on, what is your lead time for changes (i.e., how long does it take to go from code commit to code successfully running in production)?*	Less than one hour	Between one week and one month	Between one week and one month*
Mean time to recover (MTTR) *For the primary application or service you work on, how long does it generally take to restore service when a service incident occurs (e.g., unplanned outage, service impairment)?*	Less than one hour	Less than one day	Between one day and one week
Change failure rate *For the primary application or service you work on, what percentage of changes results either in degraded service or subsequently requires remediation (e.g., leads to service impairment, service outage, requires a hotfix, rollback, fix forward, patch)?*	0-15%	0-15%	31-45%

* *Note: Low performers were lower on average (at a statistically significant level), but had the same median as the medium performers.*

+ Cyber Debt

+ Technical Debt

From Accelerate by Nicole Forsgren, PhD, Jez Humble, and Gene Kim

DO LOOP: SOFTWARE IS EATING THE WORLD.
CULTURE EATS OUR SW STRATEGY FOR BREAKFAST.

How long does it take to build a new culture?

What's the fastest way to deter a new culture?

Not a sheer technical challenge!

Building an ecosystem!

Lack of leadership and strategy communication will kill transformation.

Scaling bad Agile will lead to failure.

Start small; attack key pain points; and scale.

HOW FAST CAN I BOLT ON DEVSECOPS?
I GOTTA HAVE MORE DEVSECOPS.

LEADING TRANSFORMATIONS IN A VUCA WORLD –
IN WAR AND DIGITAL PRODUCT DELIVERY

“VUCA environments impede a leader’s ability to *understand, to decide, to communicate and ultimately to* ***act decisively*** *– a* ***prerequisite for effective action in war (and business).***

Only a few leaders were able to fight through all the complexity and uncertainty and chart a way forward for their organizations. They imposed their wills on these most complex environments and succeeded where others didn’t. These were the leaders that made a difference for the mission.” – General George W. Casey, Jr.

“**Transforming large organizations is hard**. In our experience, it has **typically taken five to 10 years to scale a transformation**. However, technology is advancing at a much faster pace than that. **In today’s world, digital transformations need to be substantially accomplished much faster**.” - Edward Hess

“The record of studies on **digital transformation indicate a high failure rate**, with a notable 2013 McKinsey study finding that [70% fail](#).

…the biggest problem is the mind-set. …where most companies go wrong.”

…**digital transformation: not an event that happens.**
It’s a journey with a road that never ends.
will continue – potentially indefinitely,
but certainly **for three to five years or longer.**

https://www.forbes.com/sites/peterbendorsamuel/2018/07/18/where-most-companies-go-wrong-in-digital-transformation

CASE STUDY – JIDO (JOINT IMPROVISED-THREAT DEFEAT ORGANIZATION)

2016: expanding **counter-threat mission necessitated an evolving digital transformation** to **respond to the warfighter's** "tactical edge" Latest Time of Value (LTOV) needs **in hours versus days or weeks.**

Solution

- **Reorganized teams:** JIDO integrated its people across engineering & cybersecurity teams.
- **New Culture:** continuous improvement, achieving common focus, and shared priorities.
- **Setup the Pipeline & Shift Left:**
  - On the technology side, JIDO developed a continuous integration / continuous deployment (CI/CD) pipeline and **"shifted security to the left"**
  - JIDO developers and operations engineers deliver fully tested, commit-level increments of new code on a security-hardened, patched, and approved infrastructure enclave.
- **Automation:** when **automating nearly all the security controls associated with the STIG**, JIDO has defined a **risk-managed** software delivery pipeline
  - **Vetting the pipeline & the process** to give confidence, consistency w/ recent test results;
  - **Minimizes manual (months long) human review of every software update** or modification;
  - This process provides a **real-time view of the systems, networks, and vulnerabilities** to the Authorizing Official (AO) while delivering immediate value to operational warfighters.

CASE STUDY – JIDO

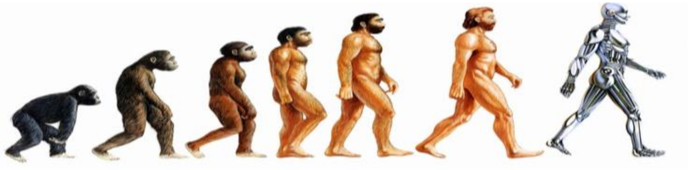
Win Win: Impact goes beyond raw benefit of the shift left (security and testing)

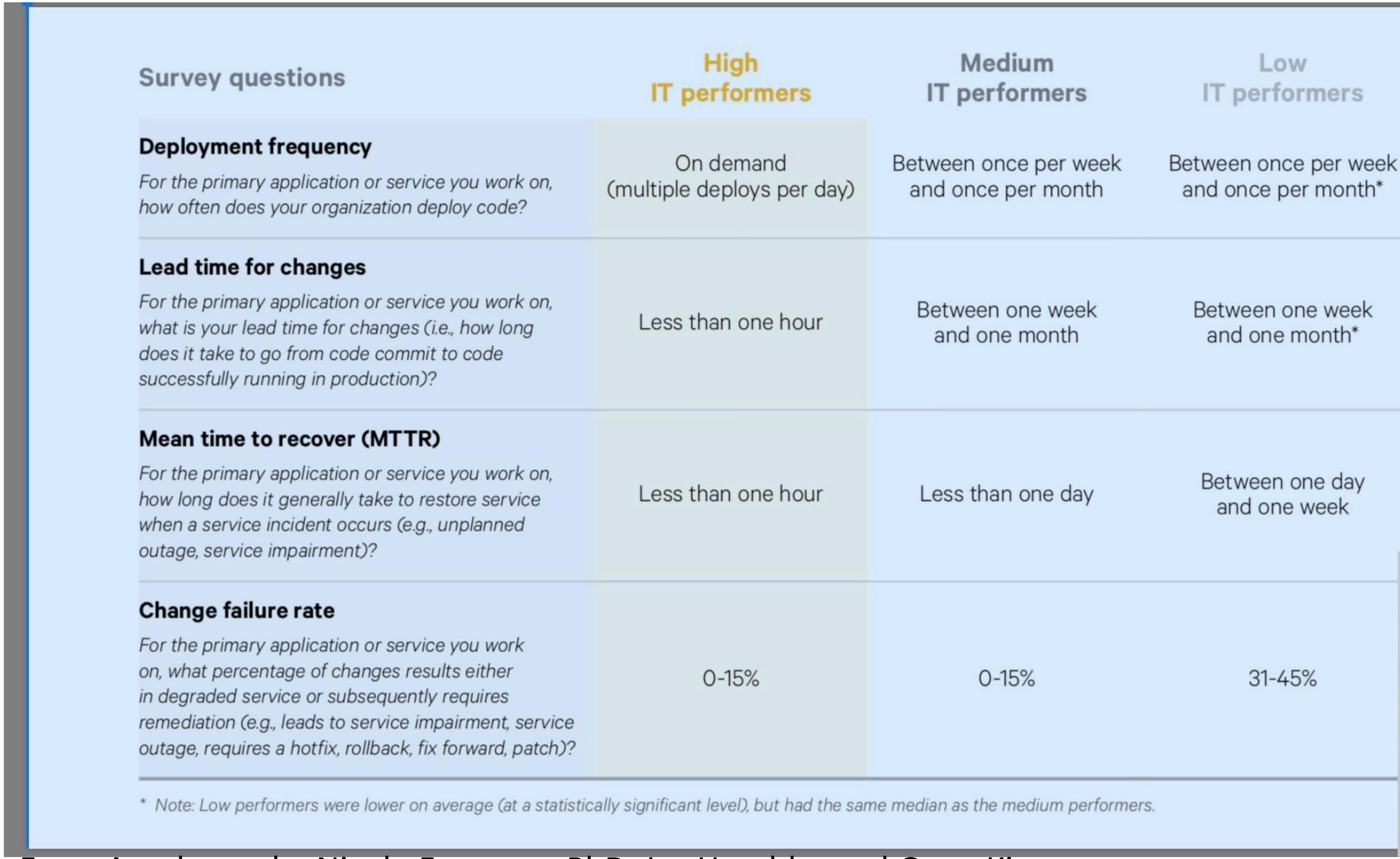
- **Energized, Multidisciplinary teams:** Team synergy increased due composition of varied but complimentary experience, increased interaction between teams, daily forced communication, qualifications, and skills.
  - **Job satisfaction** among participants increased due to visibility of impact.
  - **Shared Focus:** Teams began working in a focused manner sharing communications, common priorities and working towards common goals.

- **Trust: Security not viewed as adversary but as valued cooperative:**
  - An organization will never know the disasters that did not occur.
  - Now, the team has a real time understanding of vulnerabilities in its custom code and a rapid way to respond.
  - Therefore, the **team can patch custom code the same day a vulnerability is observed** where **previously it could take weeks or even months**.
  - The AO also has an improved understanding of technical risks on the network with transparent dashboards verse static reports.

Team of Teams: **Empowered Execution, Common Purpose, Shared Consciousness, Trust**

DEVOPS METRICS





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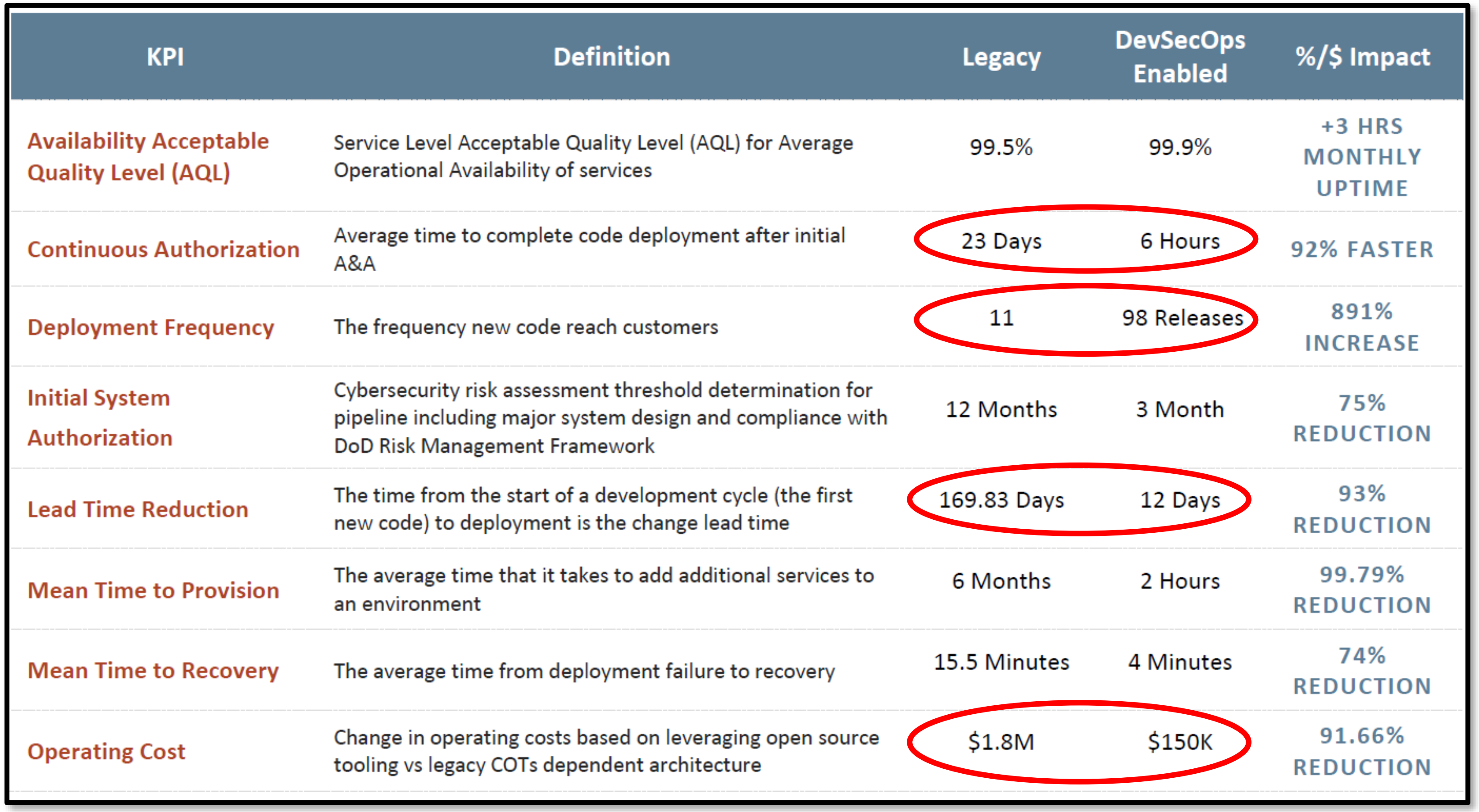
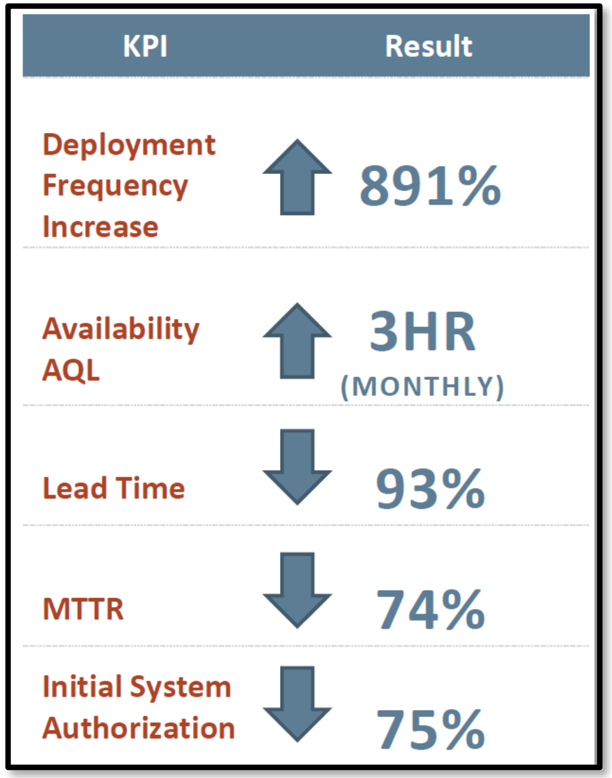
CASE STUDY - JOINT IMPROVISED-THREAT DEFEAT ORGANIZATION (JIDO)

Quantitative Impact

Over a 6-month period, JIDO measured Key Performance Indicator (KPI) impact against pre- and post-DevSecOps enablement:

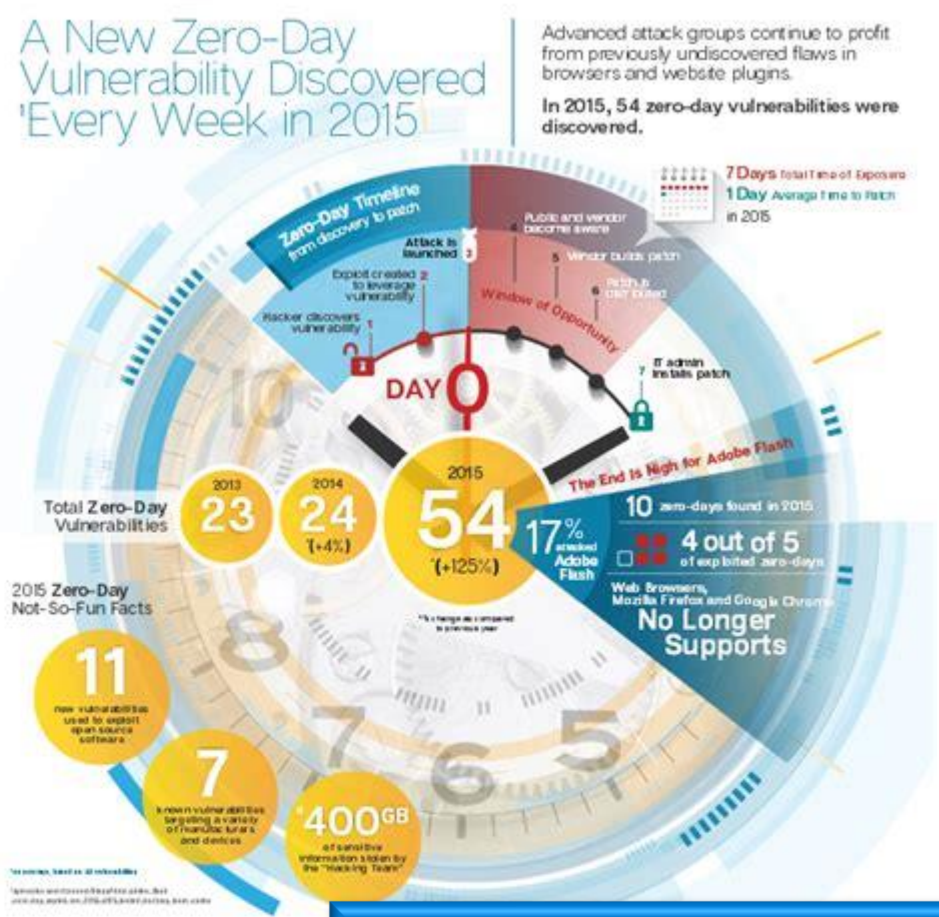


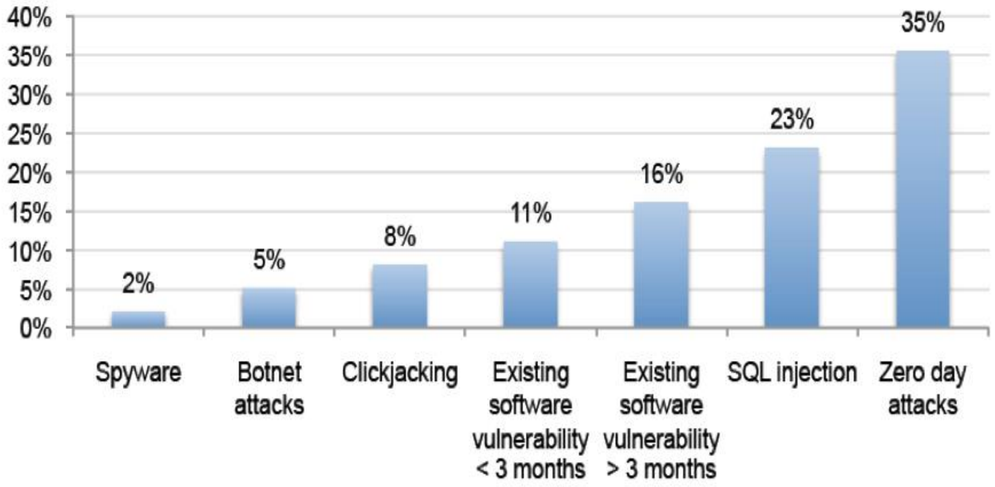
KPI	Definition	Legacy	DevSecOps Enabled	%/$ Impact
Availability Acceptable Quality Level (AQL)	Service Level Acceptable Quality Level (AQL) for Average Operational Availability of services	99.5%	99.9%	+3 HRS MONTHLY UPTIME
Continuous Authorization	Average time to complete code deployment after initial A&A	23 Days	6 Hours	92% FASTER
Deployment Frequency	The frequency new code reach customers	11	98 Releases	891% INCREASE
Initial System Authorization	Cybersecurity risk assessment threshold determination for pipeline including major system design and compliance with DoD Risk Management Framework	12 Months	3 Month	75% REDUCTION
Lead Time Reduction	The time from the start of a development cycle (the first new code) to deployment is the change lead time	169.83 Days	12 Days	93% REDUCTION
Mean Time to Provision	The average time that it takes to add additional services to an environment	6 Months	2 Hours	99.79% REDUCTION
Mean Time to Recovery	The average time from deployment failure to recovery	15.5 Minutes	4 Minutes	74% REDUCTION
Operating Cost	Change in operating costs based on leveraging open source tooling vs legacy COTs dependent architecture	$1.8M	$150K	91.66% REDUCTION



KPI		Result
Deployment Frequency Increase	⬆	891%
Availability AQL	⬆	3HR (MONTHLY)
Lead Time	⬇	93%
MTTR	⬇	74%
Initial System Authorization	⬇	75%

CYBER (ZERO DAY) VULNERABILITIES

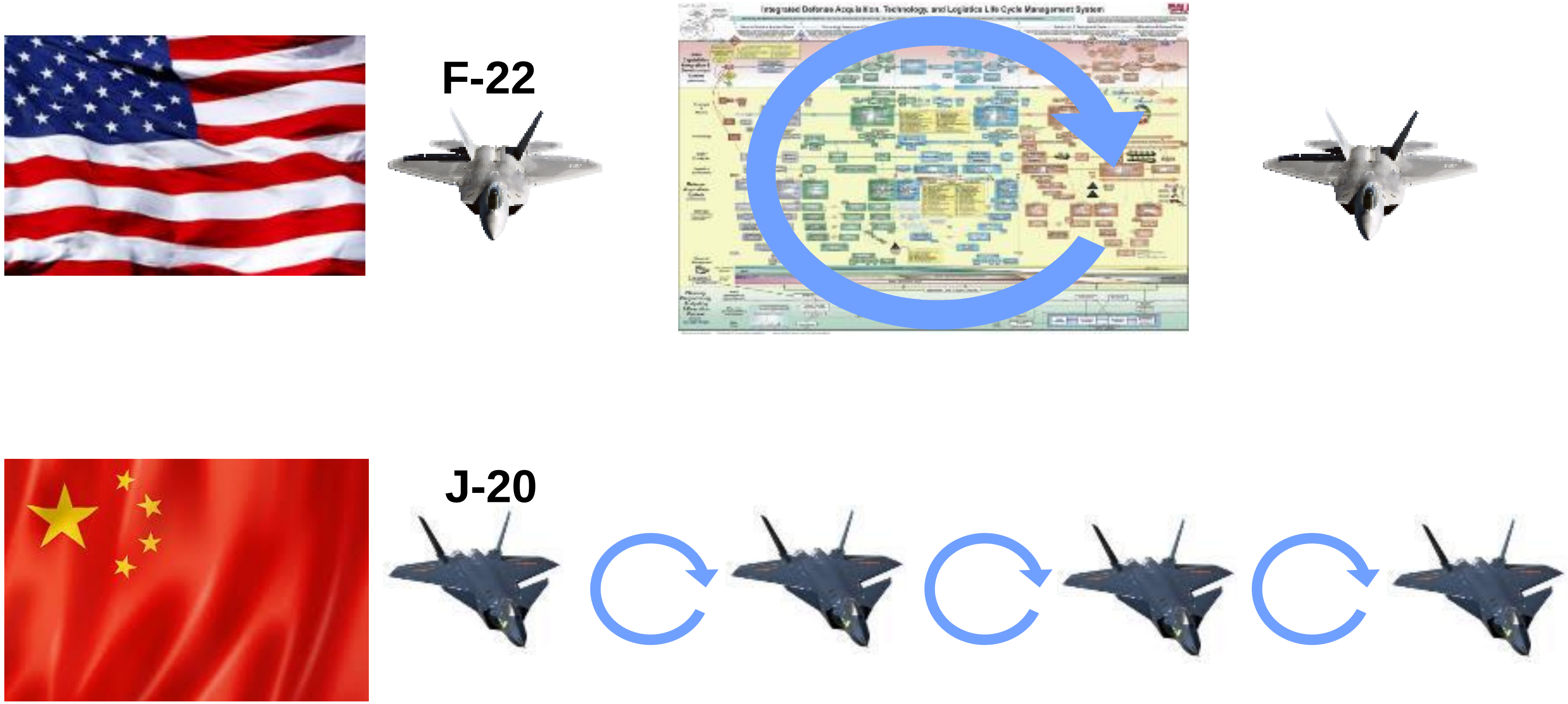

A New Zero-Day Vulnerability Discovered 'Every Week in 2015
Advanced attack groups continue to profit from previously undiscovered flaws in browsers and website plugins.
In 2015, 54 zero-day vulnerabilities were discovered.
7 Days Total Time of Exposure
1 Day Average Time to Patch
in 2015
Zero-Day Timeline
from discovery to patch
1 Hacker discovers vulnerability
2 Exploit created to leverage vulnerability
3 Attack is launched
4 Public and vendor become aware
5 Vendor builds patch
6 Patch is distributed
7 IT admin installs patch
Window of Opportunity
DAY 0
Total Zero-Day Vulnerabilities
2013
23
2014
24
(+4%)
2015
54
(+125%)
*% change as compared to previous year
The End Is Nigh for Adobe Flash
17% attacked Adobe Flash
10 zero-days found in 2015
4 out of 5 of exploited zero-days
Web Browsers, Mozilla Firefox and Google Chrome
No Longer Supports
2015 Zero-Day Not-So-Fun Facts
11
new vulnerabilities used to exploit open source software
7
known vulnerabilities targeting a variety of manufacturers and devices
400GB
of sensitive information stolen by the "Hacking Team"



- The number of vulnerabilities and number of attacks have grown at a near exponential rate
- The time between new vulnerabilities being discovered is dropping to below a week
- The ability to update and test code in days versus weeks is essential to maintaining cybersecurity

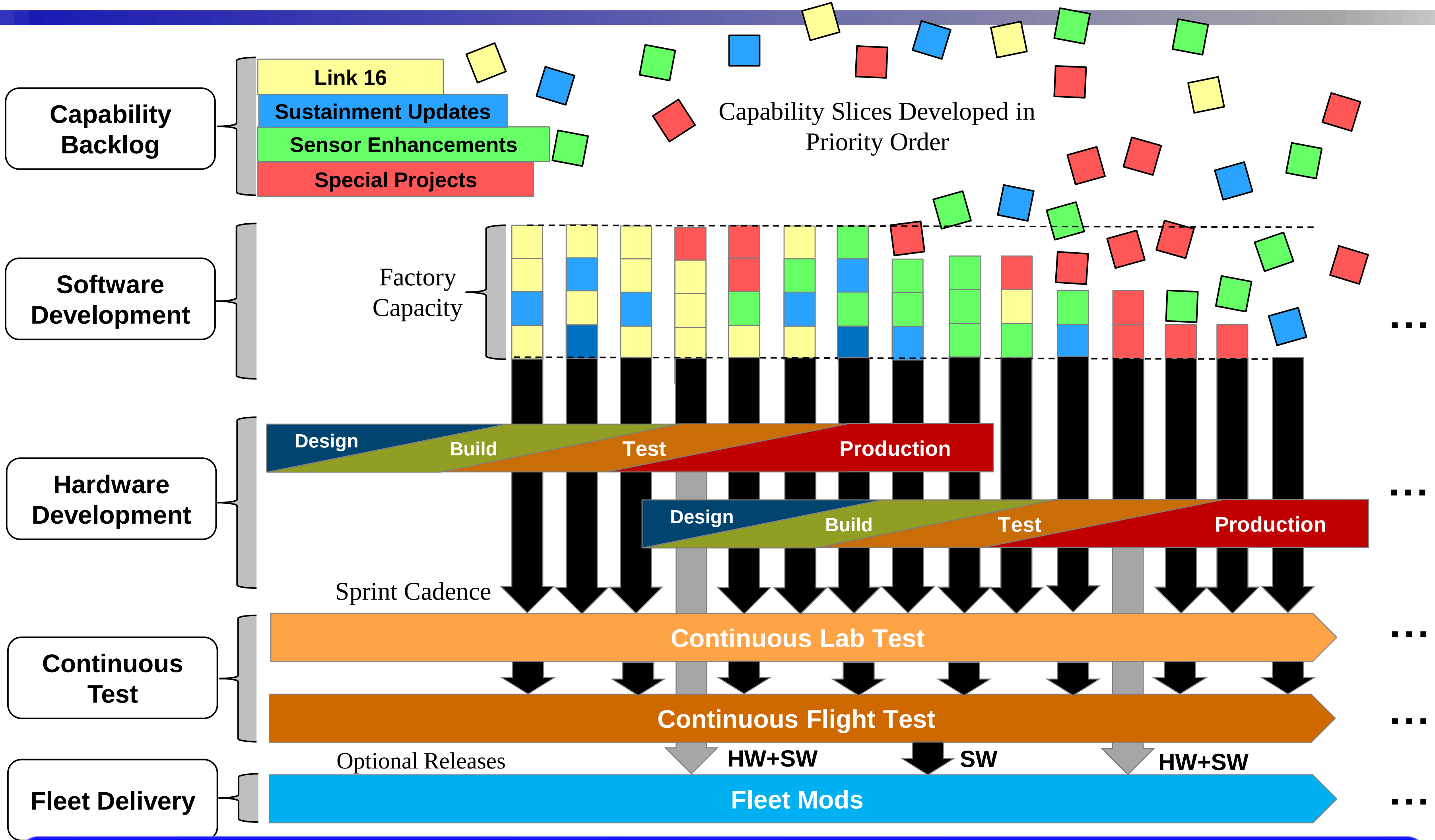
Can we afford to continue the old way of doing business in an age of ever increasing Zero Day vulnerabilities?

Need for New Business Model


F-22
Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System
J-20

Near peers quickly iterating, F-22 requires rapid changes to maintain edge

F-22 Capability Pipeline

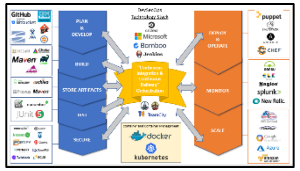


Cannot scope Continuous Integration / Continuous Delivery (CI/CD) model by capabilities which are thinly sliced and overlapping

DISTRIBUTION A. Approved for public release: distribution unlimited. Case Number 88ABW-2018-5116

DEVSECOPS ACADEMY

- THE WHY
- FAMILIARITY
- JUST ENOUGH HANDS-ON
- GROWTH & LEARNING MINDSET


DevSecOps Technology Stack

PLAN & DEVELOP

BUILD

STORE ARTIFACTS

TEST

SECURE

"Continuous Integration & Continuous Delivery" Orchestration

DEPLOY & OPERATE

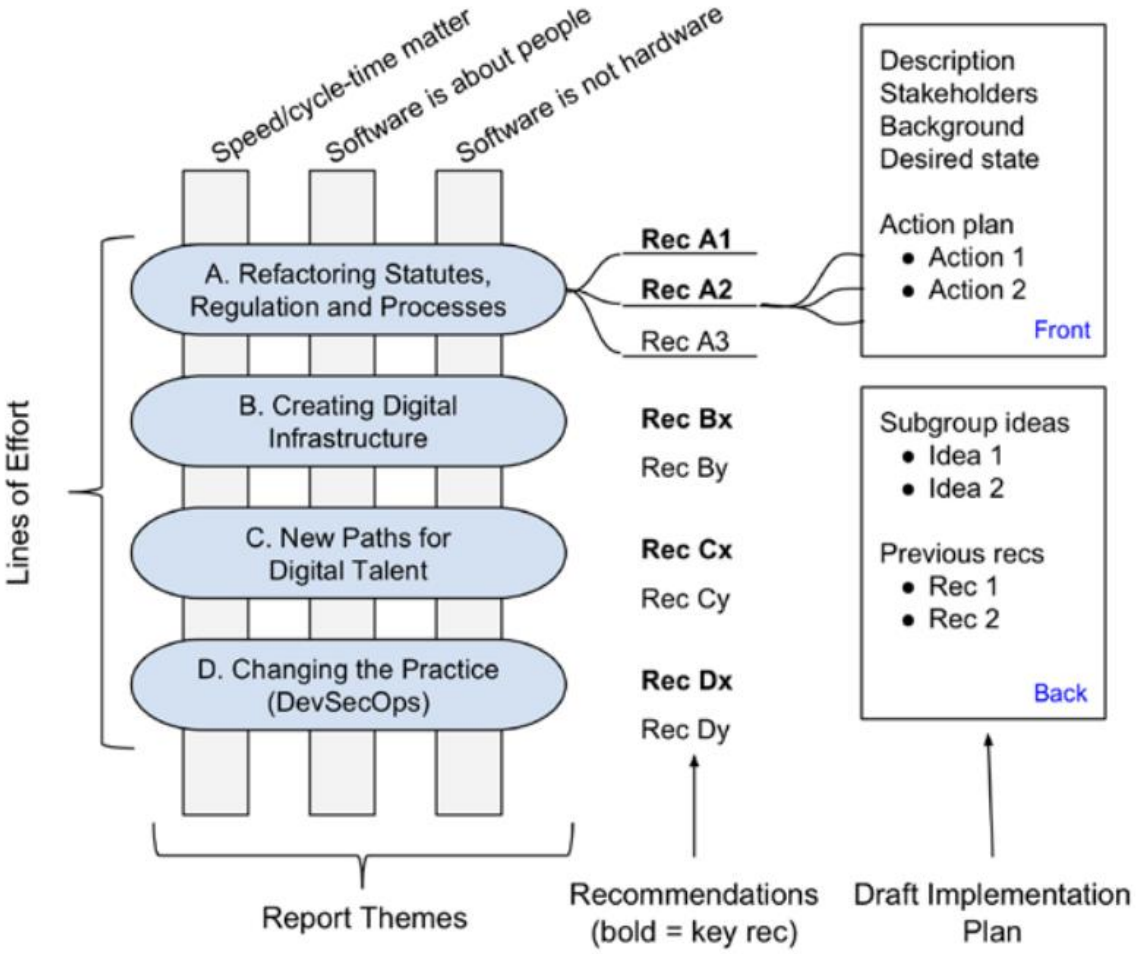
MONITOR

SCALE

Container and container management

Backup

LOE C -- New Paths for Digital Talent



Speed/cycle-time matter

Software is about people

Software is not hardware

Lines of Effort

A. Refactoring Statutes, Regulation and Processes

B. Creating Digital Infrastructure

C. New Paths for Digital Talent

D. Changing the Practice (DevSecOps)

Rec A1

Rec A2

Rec A3

Rec Bx

Rec By

Rec Cx

Rec Cy

Rec Dx

Rec Dy

Description
Stakeholders
Background
Desired state

Action plan
- Action 1
- Action 2

Front

Subgroup ideas
- Idea 1
- Idea 2

Previous recs
- Rec 1
- Rec 2

Back

Report Themes

Recommendations (bold = key rec)

Draft Implementation Plan

LOE A: new acquisition pathways
LOE B: utilizing **digital infrastructure**

LOE C: software development as a high-visibility, high-priority career track and increasing the level of understanding of modern software within the acquisition workforce.
Recommendation C1. Create software development units in each Service consisting of military and civilian personnel who develop and deploy software to the field using DevSecOps practices.
Recommendation C2. E**xpand use of (specialized) training programs for CIOs, SAEs, PEOs, and PMs that provide (hands-on) insight** into **modern software development (e.g., agile, DevOps, DevSecOps)** and the authorities available to enable rapid acquisition of software.
Recommendation C3. Increase the knowledge, expertise, and flexibility in program offices related to modern software development practices to improve the ability of program offices to take advantage of software centric approaches to acquisition.

LOE D: new practices (acquire entire SSE; **DevSecOps**)

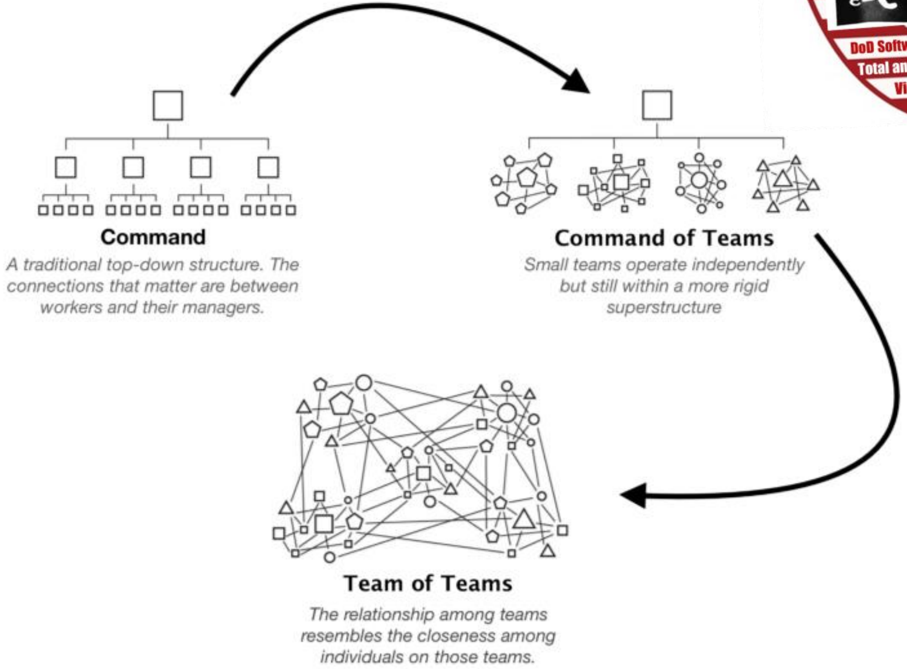
DoD Software Alliance Concept

Accelerate adoption of modern SW delivery in DoD:

- Build a powerful network to maximize DoD/DAU's "enterprise effect."

- Establish the Defense Software Alliance (DSA) at DAU -- cuts across DoD silos.
  - Engagement platform supporting (a) DoD Innovation Lab (b) DoD DevSecOps Academy graduates
- The DSA is **a modern "community of practice"** focused on
  a. its members sharing a *required set of knowledge*
  b. crucially, facilitates engagement / active sharing (e.g. "**Secure Slack**/Rocket.Chat **for DoD**")
  c. gathers pain points / insights / and develops solutions across DoD

- DoD employee gains membership to the DSA network
  - upon understanding knowledge related to modern SW practice – within DoD context.
  - gain full access if they complete modern SW course(s) in multiple DAU tracks
  - **Tracks/paths:** "DoD DevSecOps Leader" or "DoD Agile Leader" // "Agile Contracts Leader" "DoD Cyber Leader " // "DoD SRE Leader" // "DoD Cloud Architect" // "Weapons SW Leader"
- Growth of connections in this network goes quadratic.
- More connections -- more collective problem solving and knowledge sharing.
- Higher the number of "initiated" connections the better the network, outcomes, and feedback to DAU
- The more valuable the network, the more demand for courses/workshops -- and "certifications" – in-turn improving the courses -- **virtuous cycle repeats**
- **DSA connects the entire DoD** -- and to DAU, as the focal point for lessons learned / pain points / best practices
- **DoD's leading DevSecOps innovators** will **set the initial value of the DSA kernel**



Command

A traditional top-down structure. The connections that matter are between workers and their managers.

Command of Teams

Small teams operate independently but still within a more rigid superstructure

Team of Teams

The relationship among teams resembles the closeness among individuals on those teams.

DevSecOps Academy Workshops & Virtual Training Range
Audience: Leadership; PMO Staff

ON GROUNDS DAY 1 WORKSHOP

- **The Why**
  - State of Play in DoD
  - Why do we Need to Change?
- What is DevSecOps?
  - Value Proposition
  - Challenges and Constraints in DoD (Warfighting Domain overviews)
- **Leadership and Management**
  - How and what do we change?
    - Role of Leadership
    - Transformation Strategy and Roadmap
  - Ecosystem and Governance
    - People and Culture (Way of Life, Organizing & Staffing in PMO & KTR)
    - Engagement Strategy
  - Acquisition & Sustainment Strategy (Services? SW Factory?)
  - Contracting for DevSecOps / RFP / Incentives / Data Rights
- **Tech and Implementation**
  - Cybersecurity: RMF and cATO process
  - Solution Architecture and Design
    - Enablers (resilience, availability, modularity)
  - Cloud nexus with DevSecOps
  - Domain & Platform Considerations (DDIL; Safety-Critical; DO-178C)
  - Legacy System Modernization/Strangler Pattern
- **Software Development Process**
  - Lean Startup / Design Thinking (pain points and value stream mapping)
  - Requirements (JCIDS)
  - Shift Left: DT/OT
  - Systems Engineering Technical Reviews (Navigation & Expectations)
  - Metrics & DevSecOps Maturity; DevSecOps BS
- **Special Topics**
  - DoD SevSecOps Enterprise Platform (DSOP)
  - Case Study
  - Day in the Life of a DoD SW Factory

ON GROUNDS DAY 2 - HANDS-ON

- What is DevOps?
- Organizational Needs and linking Business into DevOps
- Secure DevOps
  - DevOps Pipeline Security,
  - Application Security
  - Security activities and automation
- **Communication and Collaboration**
  - Security culture
  - Effective communication amongst all stakeholders.
  - Micro learning culture on security
- **Infrastructure as Code**
  - Environment hardening
  - Compliance check with IaC
  - First step to RMF/ATO
- **Continuous Integration & Testing**
  - Automated Security Testing,
  - Application specific penetrating testing
  - Various Gateways on security testing
- **Continuous Delivery/Deployment**
  - Container Security
  - Microservices, Containers & Orchestration (K8)
  - Authenticity of build and dependencies
  - Secure Deployment pipeline
- **Process Monitoring and Measurement**
  - What are the security metrics
  - Where to collect and how to monitor them
- Workshop Summary and Q/A

ASYNC LEARNING – VIDEO SERIES

DoD DevSecOps Platform: TECH DEEP DIVE

Featuring: Nicolas Chaillan

- CI/CD introduction and stack which includes Kubernetes/Containers best practices
- Container hardening process
- Cybersecurity stack and side car container (3H
- Microservices architecture and best practices
- Strangler pattern

Leading Transformation and Culture - People and Tech Roadmaps

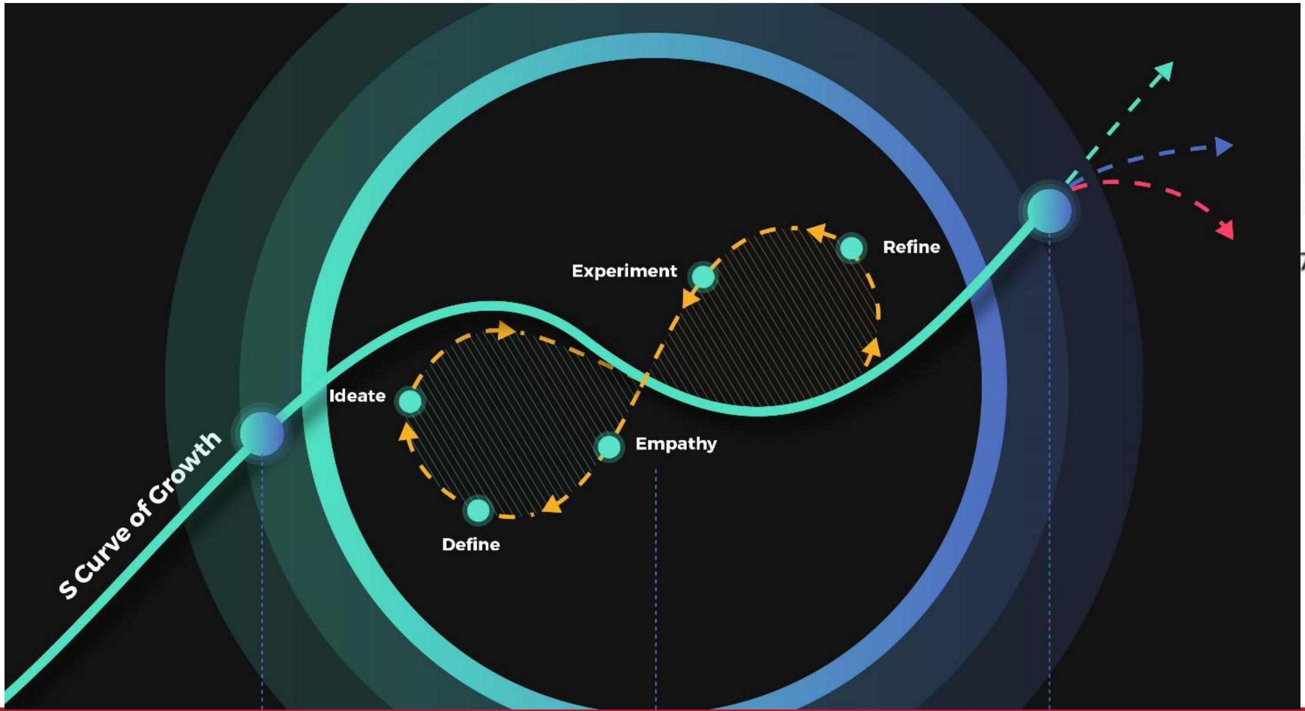
Featuring: Leo Garciga

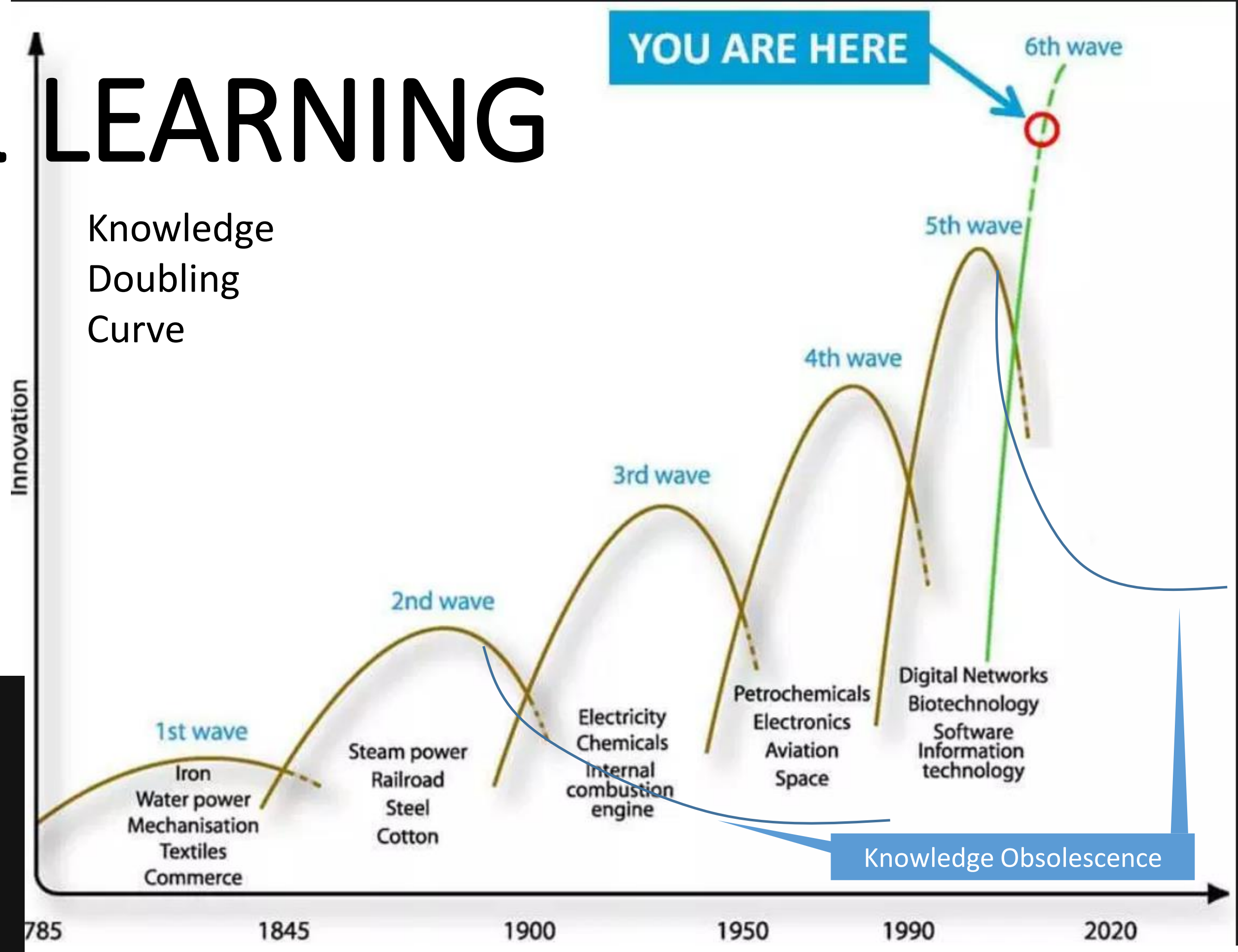
- The Why
- Ecosystem and Goverenance
- Acquisition Strategy
- RMF and CATO

Partners

INNOVATION & LEARNING

- Automation, DevSecOps, AI and ML: operational efficiencies will be commoditized / table stakes
- Differentiator: Quality of thinking; Ability to ideate, relate & collaborate
- DoD starting place – we have a lot to learn
- Learning and Transformation Inhibitors
  - Fear – room to change and fail
  - Fixed mindset – we've always done it this way




Knowledge Doubling Curve

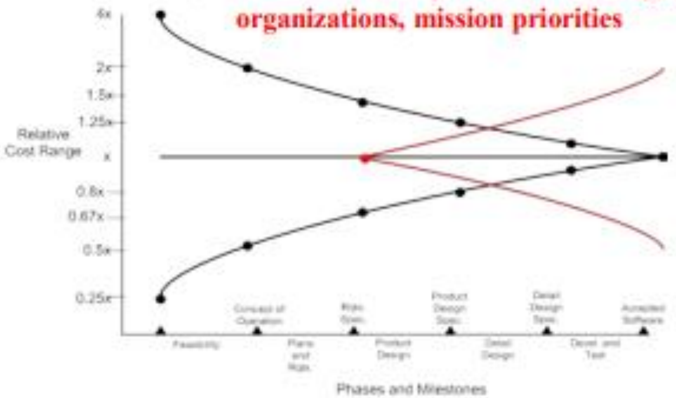
Knowledge Obsolescence

TIME TO DOUBLE HUMAN KNOWLEDGE

1900	1945	2015	2020
100 Years	25 Years	13 Months	12 Hours

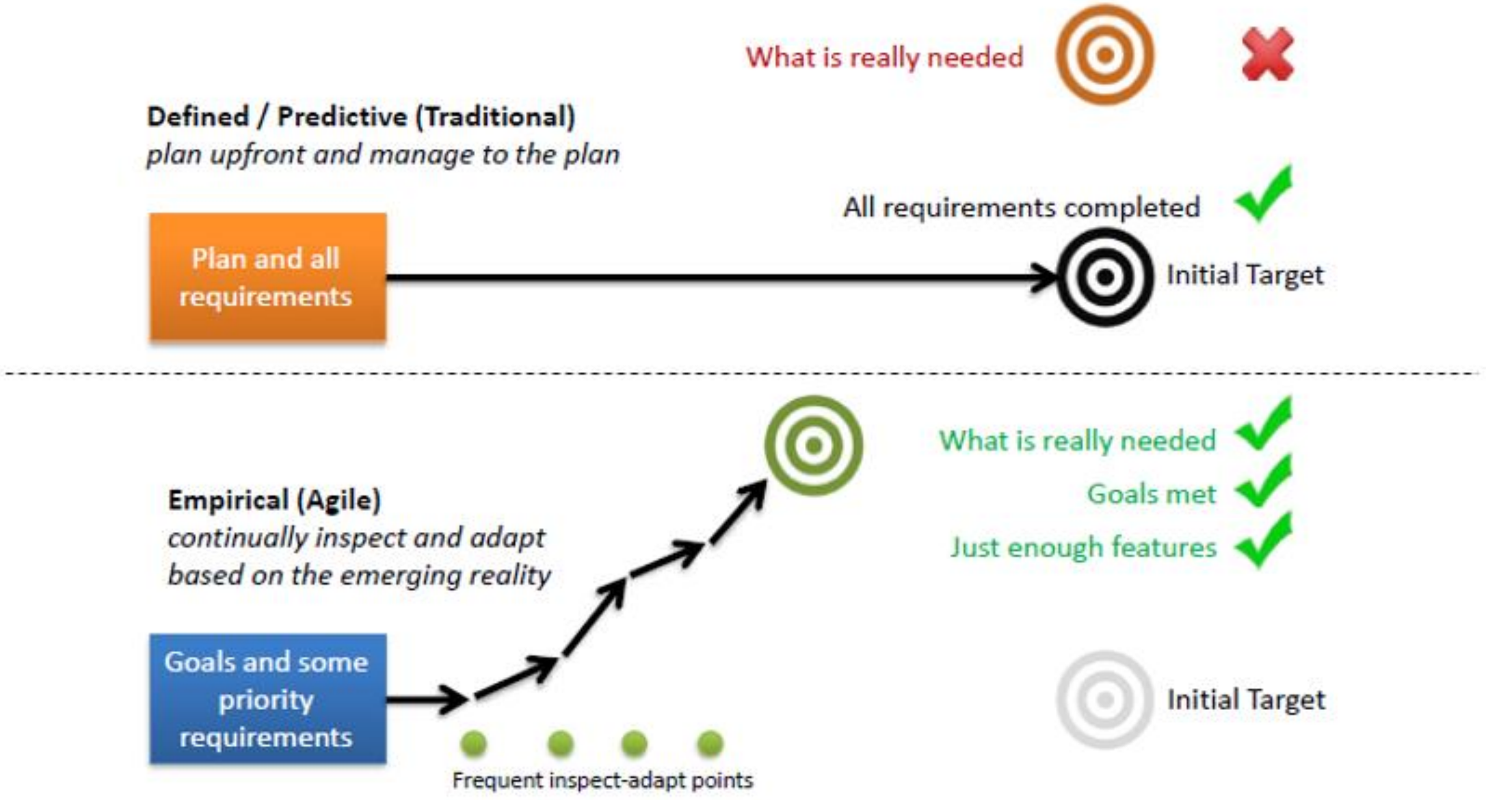
VOLATILE UNCERTAIN WORLD

2nd Cone of Uncertainty



Uncertainties in competition, technology, organizations, mission priorities

Image: Future Challenges for Software Data Collection and Analysis, 2009, USC-CSSE



What is really needed ✗

Defined / Predictive (Traditional)
plan upfront and manage to the plan

All requirements completed ✓

Plan and all requirements

Initial Target

What is really needed ✓

Goals met ✓

Just enough features ✓

Empirical (Agile)
continually inspect and adapt based on the emerging reality

Goals and some priority requirements

Frequent inspect-adapt points

Initial Target

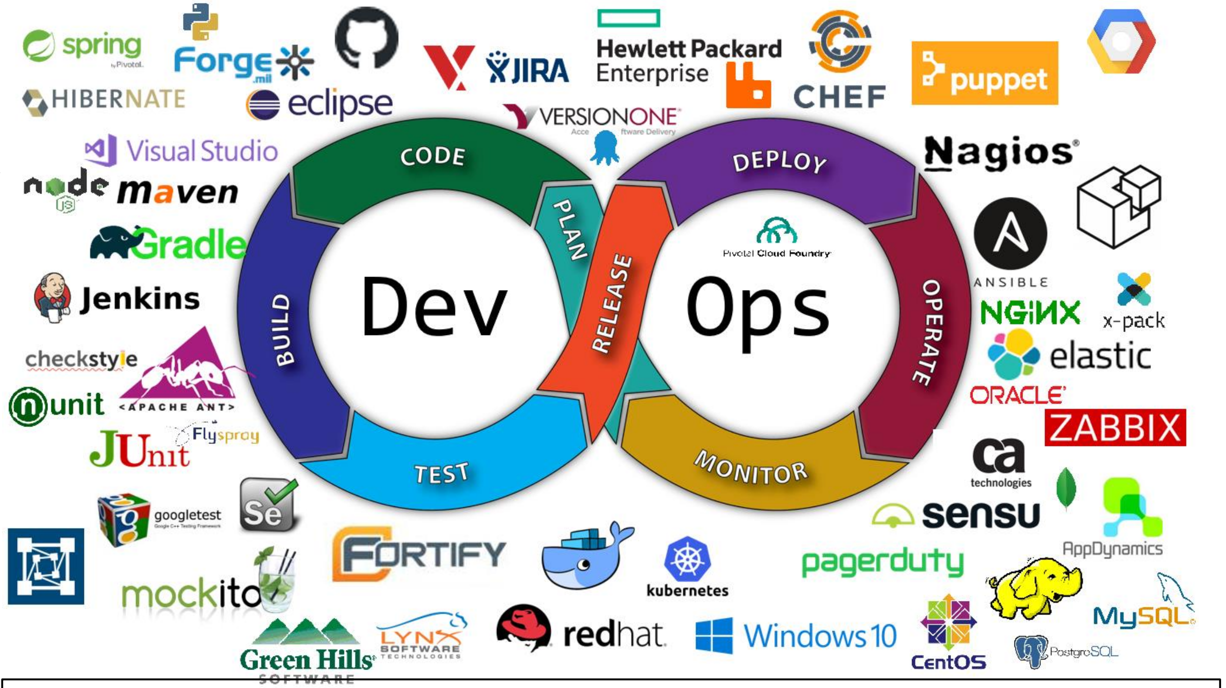
"Simply delivering what was initially required on cost and schedule can lead to failure in achieving our evolving national security mission — the reason defense acquisition exists in the first place."

Honorable Frank Kendall Under Secretary of Defense (AT&L) 2015 Performance of The Defense Acquisition System

DEVOPS

- **DevOps** is a **software engineering culture** and practice that aims at **collaboration & unifying** software development (Dev) and software operation (Ops).
- Main characteristic of the DevOps movement: **strongly advocate automation and monitoring** at all steps of software construction, from integration, testing, releasing to deployment and infrastructure management.

- DevOps aims at shorter development cycles, **increased deployment frequency**, **earlier defect discovery,** and more secure and reliable releases, in close alignment with business objectives.

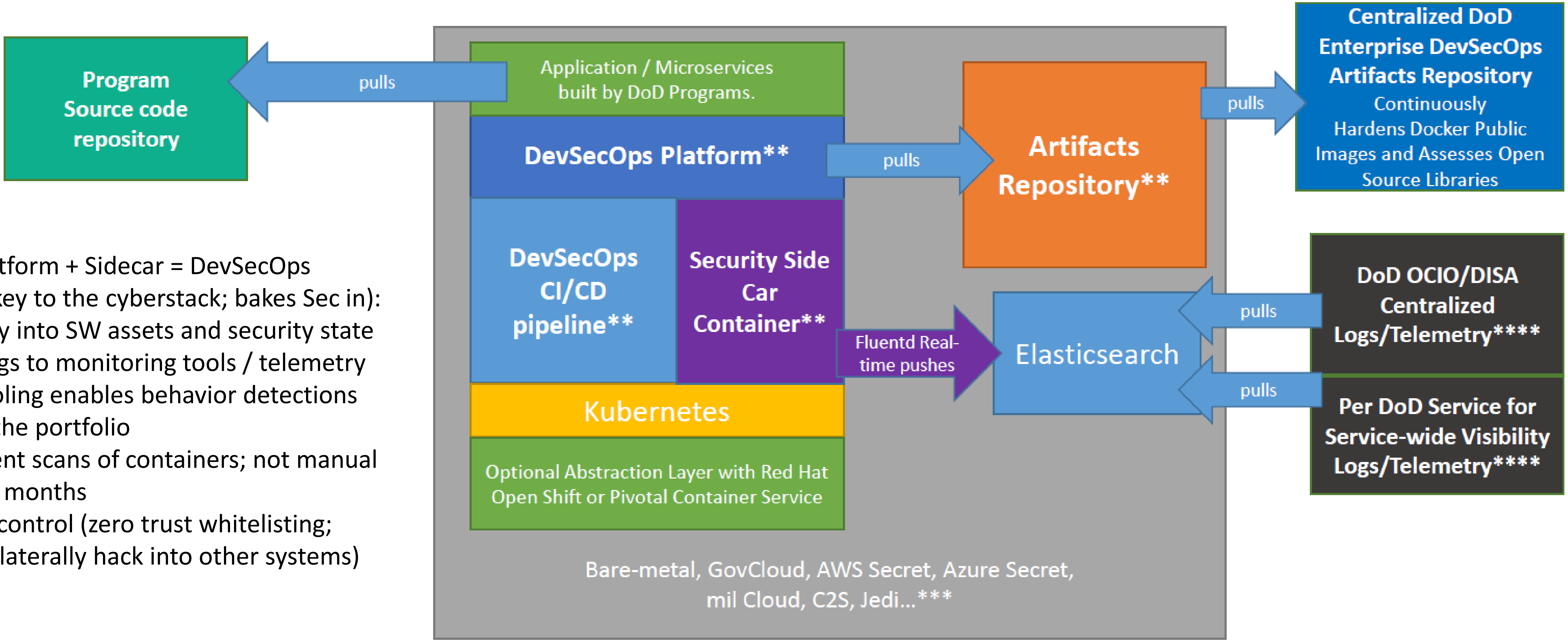


Source: OUSD R&E Systems Engineering, Aggregation of typical DevOps tool stack components found in and around the DoD

DevOps is **NOT ENOUGH**!
DevSecOps is needed to Shift Left w/ the cybersecurity stack built-in to the DevOps pipeline.

WHERE IS THE SEC IN DEVSECOPS?

DevSecOps Proposed Architecture*


Program Source code repository
pulls
Application / Microservices built by DoD Programs.
DevSecOps Platform**
pulls
Artifacts Repository**
pulls
Centralized DoD Enterprise DevSecOps Artifacts Repository
Continuously Hardens Docker Public Images and Assesses Open Source Libraries
DevSecOps CI/CD pipeline**
Security Side Car Container**
Fluentd Real-time pushes
Elasticsearch
pulls
DoD OCIO/DISA Centralized Logs/Telemetry****
pulls
Per DoD Service for Service-wide Visibility Logs/Telemetry****
Kubernetes
Optional Abstraction Layer with Red Hat Open Shift or Pivotal Container Service
Bare-metal, GovCloud, AWS Secret, Azure Secret, mil Cloud, C2S, Jedi…***

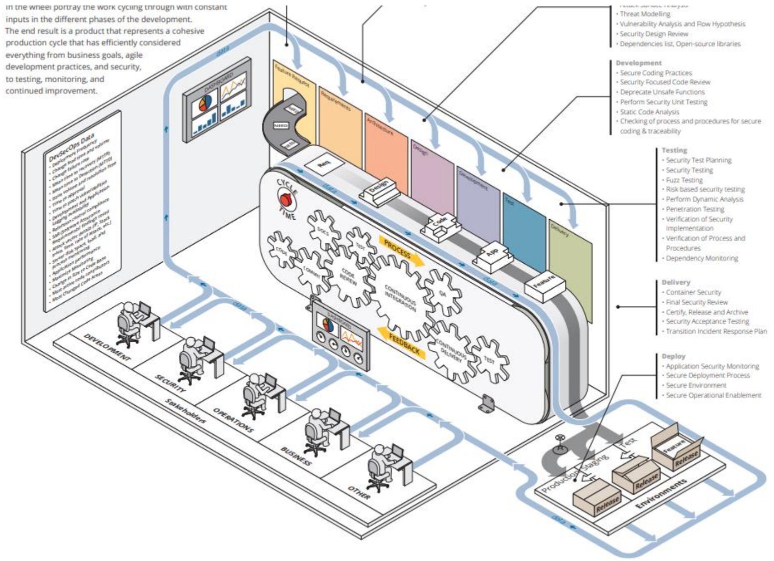
DevOps Platform + Sidecar = DevSecOps (Sidecar is key to the cyberstack; bakes Sec in):

- Visibility into SW assets and security state
- Push logs to monitoring tools / telemetry
- Log pooling enables behavior detections across the portfolio
- Persistent scans of containers; not manual every 6 months
- Access control (zero trust whitelisting; cannot laterally hack into other systems)

HOW? PATH TO IMPLEMENT

- **Contracting for DevSecOps** – Include language within RFP/SOW Sections L&M and Acquisition Strategy
  - Include DevSecOps within ICD/CDD, TPMs/KSAs
- **Staff Organization & Skills** – Evaluate staff organization (e.g., teams) and technical skill levels to ensure sufficiency. Augment as necessary
- **Ecosystem & Governance** – People, processes & technology enabled through collaboration, automation and analysis
- **DAU Training and Workshops** – train the teams that will be implementing.

DevSecOps Academy (Workshop and Consulting)


in the wheel portray the work cycling through with constant inputs in the different phases of the development. The end result is a product that represents a cohesive production cycle that has efficiently considered everything from business goals, agile development practices, and security, to testing, monitoring, and continued improvement.

- Threat Modelling
- Vulnerability Analysis and Flow Hypothesis
- Security Design Review
- Dependencies list, Open-source libraries

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

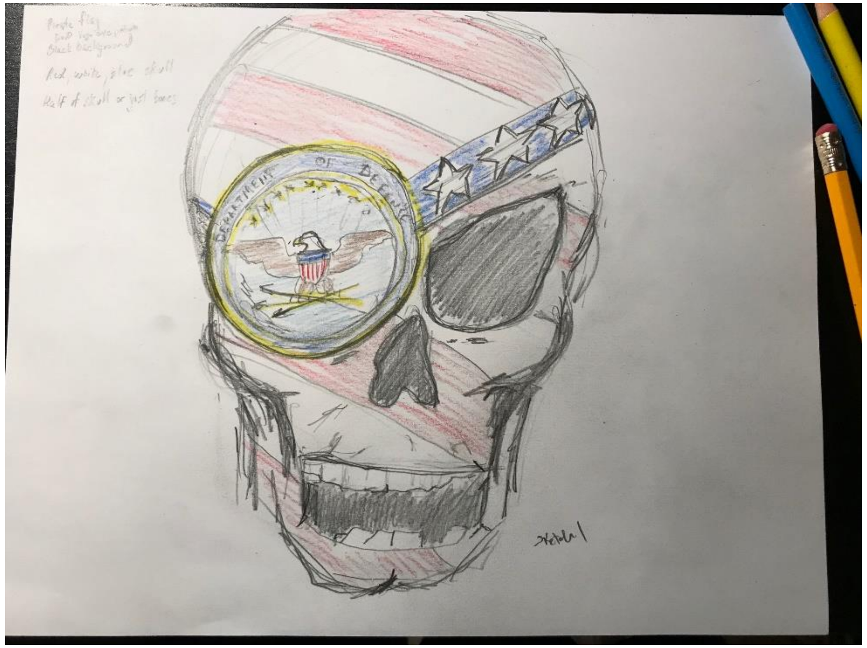
Testing
- Security Test Planning
- Security Testing
- Fuzz Testing
- Risk based security testing
- Perform Dynamic Analysis
- Penetration Testing
- Verification of Security Implementation
- Verification of Process and Procedures
- Dependency Monitoring

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

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

+

DoD Software Alliance



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<u>Network Effect</u> and <u>Virtuous Cycle:</u>

Scaled and Supported DevSecOps Factories Across DoD

Feedback Loops / Leverage Entire DoD SW Talent Pool

DOD INNOVATION LAB // VIRTUAL TRAINING RANGE >> LEARNING FLOW

- (a) [804 boot camp] > (b) [Design Thinking Workshop] > (c) [DevSecOps – Virtual Training Lab]

- …connecting the entire Digital Product Delivery pipeline:

- (a) incubating innovative acquisition strategies & creative compliance (OTA/804) -- e.g., acquiring the SW factory

- (b) prioritizing MVP requirements (Design Thinking) in an entrepreneurial way in the factory

- (c) delivering those prioritized requirements (deploy code) in a modern DevOps pipeline / virtual training range

Elevator Pitch

DoD lacks modern software development competency and practices.

Manual build/release/test has cost the taxpayer billions and is delaying time-to-Warfighter.

DoD already challenged to deliver SW. Demand for SW will only grow.

DoD needs secure, reliable, rapid software delivery.

Algorithmic warfare is the future.

Winning the fight anywhere -- demands software everywhere.

The DoD has embraced Agile (a nearly 20 year old “fad”) as a means to shorten the development cycle and ensure programs deliver the right capabilities to the user.

DevSecOps enhances this to increase reliability of the system, allow changes to be rapidly developed and deployed, and allow security testing and patches/updates in a continuous integration environment with the ability to deploy on demand.

DevSecOps workshop will provide the ability for programs to start there transformation to DevSecOps – and allow the DoD to **deliver capabilities securely, reliably and rapidly to Warfighter in potentially hours instead of months or years.**

BIO

Mr. Sean Brady serves as the Learning Director for Software Acquisition at the Defense Acquisition University. He leads strategy to transform DoD's practices, competencies, training, and workforce—and accelerate the adoption of modern, commercial software development practices across DoD and the DAU curriculum.

Prior to DAU, Mr. Brady served 9 years as the Deputy Director for Software Engineering (SWE), in the Office of the Deputy Assistant Secretary of Defense for Systems Engineering (DASD(SE)), within the Office of the Secretary of Defense (OSD). He led change, provided oversight of 170+ major programs (a $1.7T portfolio), and managed governance of Software Acquisition and Development within DoD. He led SWE oversight on DoD's most complex, highest-visibility defense programs (RD&E > $480M; procurement > $2.79 billion). Mr. Brady is an expert in software parametric statistical analysis and assessing large-scale Agile software development efforts. He informed DoD's senior-decision makers, industry CEOs, and Congress on SWE across Army, Navy, Marine Corps and Air Force programs. His strategic duties include leading policy and guidance development; workforce planning; and outreach to optimize the DoD's SWE capability. He launched DoD's largest acquisition workforce modernization initiative (impacting 200K+ professionals). In addition, he championed OSD's efforts to improve performance measurement practices across DoD and industry.

Prior to his role in the Pentagon, he served in the Army's RDECOM/ARDEC as an Armament Software Engineering Center (ASEC) Special Projects Team Lead and as a Program Manager, Close Combat Systems Project Officer (PO) where he planned and executed high-visibility experimental and rapid fielding programs -- supporting elite special operations and front-line Warfighters. He is the Defense Innovation Board's Software Acquisition workforce co-lead, a member of the Army's Acquisition Corps and has served as a US Delegate to NATO. Mr. Brady holds a Bachelor of Science in Computer and Electrical Engineering from Rutgers University; a Master of Science in Quantitative Software Engineering from Stevens Institute of Technology; is an Executive MBA candidate from the University of Virginia (Class of 2020); and holds a graduate certificate in Entrepreneurship and Innovation from Stanford University.