

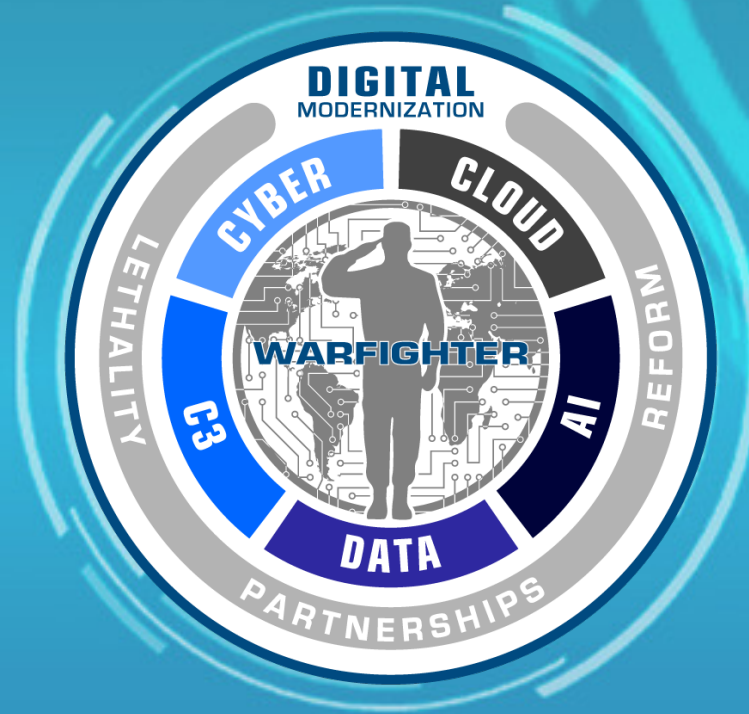
An Overview of the DoD's DevSecOps Reference Design and its Intersection with the Learning Technology Warehouse

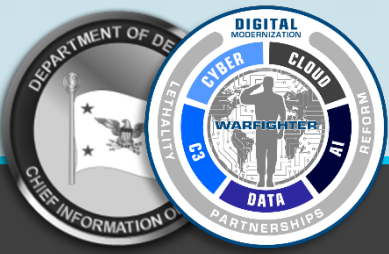
Jason Weiss, DoD
Brent Smith, ADL Initiative (SETA)
Chad Udell, Float



ADL Initiative Webinar

November 17, 2021



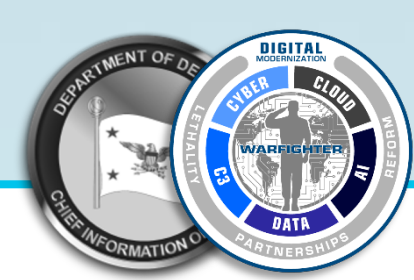


Ability to Fight and Win is Software Dependent

- **New software = new capabilities:** Capabilities of weapons systems and other critical systems are defined by their software
- **Rapidly respond to emerging threats:** Response to emerging threats is increasingly determined by the time required to develop and deploy software to the field
- **Enable innovation:** Modern software practices are critical to effective use of new technologies: cloud computing, artificial intelligence, machine learning, robotics, internet of things
- **Challenge:** The current approach to software development is a leading source of risk to DoD: it takes too long, is too expensive, and exposes warfighters to unacceptable risk
- **Need to accelerate:** Improvements in how we acquire software are happening, but adoption has been limited



Software is a foundational component of the modern military



What is DevSecOps?

DevOps

A change in IT culture, focusing on **rapid IT service delivery** through the adoption of agile, lean practices in the context of a system-oriented approach. DevOps emphasizes people (and culture), and it seeks to improve **collaboration between operations and development** teams. DevOps implementations utilize technology — especially **automation** tools that can leverage an increasingly programmable and dynamic infrastructure from a life cycle perspective. (Gartner IT Glossary)

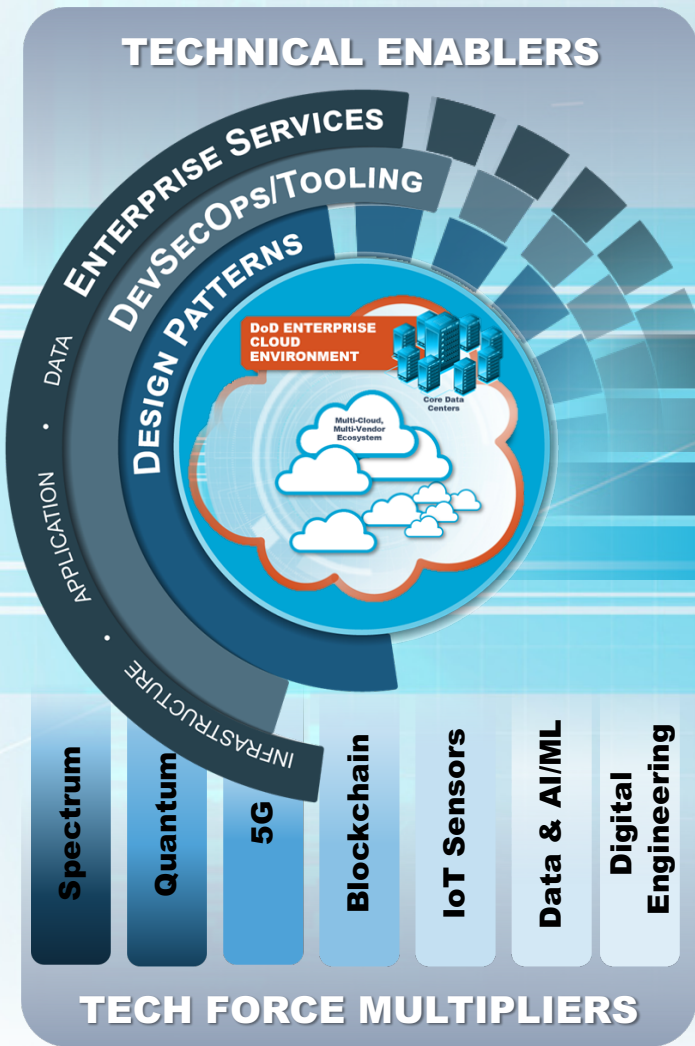
DevSecOps

The **integration of security** into emerging agile IT and DevOps development as **seamlessly and as transparently** as possible. Ideally, this is done without reducing the agility or speed of developers or requiring them to leave their development toolchain environment. (Gartner IT Glossary)



DOD SOFTWARE MODERNIZATION

Resilient Software Capability at the Speed of Relevance



PROCESS TRANSFORMATION



Business Operations

Must enable "shared services economy" for reusable software within DoD

Must drive efficiencies and agility in developing requirements and budgeting for modern software



Acquisition

Must adapt to the unique needs and faster pace of modern software development

Must establish a shared risk and common platform model between DoD and industry



Cyber Survivability

Must automate cyber authorization to keep pace with software delivery

Must stay to the left of threats/incidents by continuously monitoring cyber operations and supply chain risk



Testing

Must integrate testing processes in software pipelines

Must address software function and performance in meeting interoperability and operational test and evaluation criteria

Workforce

Must evolve the workforce to address changes in process and technology triggered by modern software development

Must drive toward a technology-literate workforce and advance technical competencies.



OUTCOMES



Faster Software to Mission Capabilities



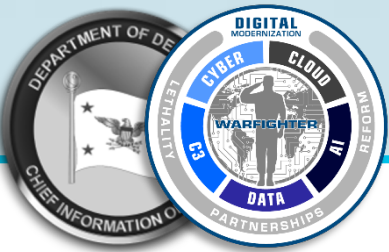
Greater Automation in Business Ops



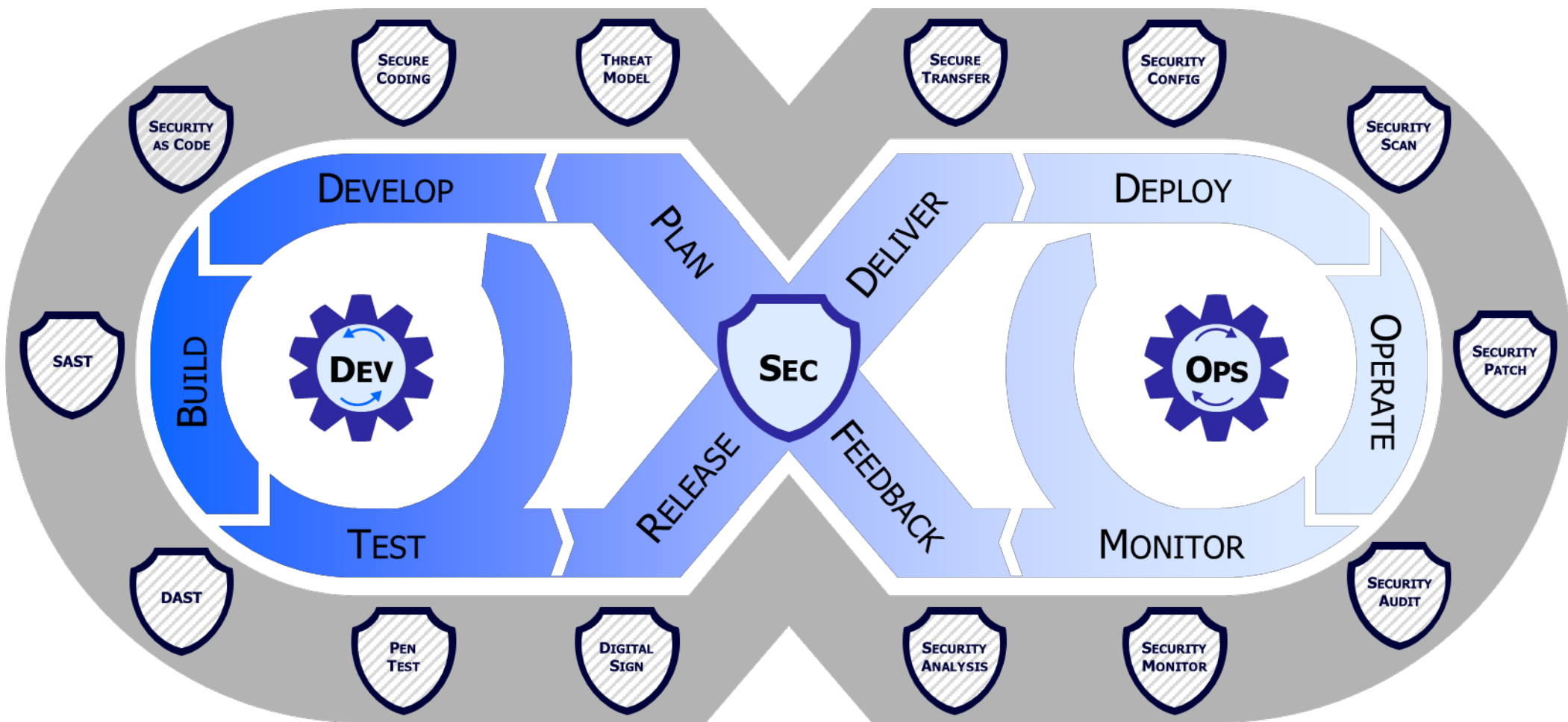
Strengthened Data Advantage

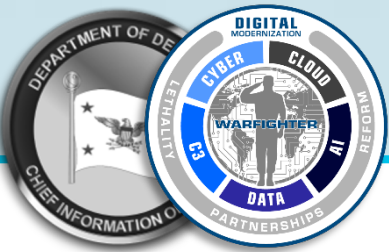


Better Active Cyber Defense

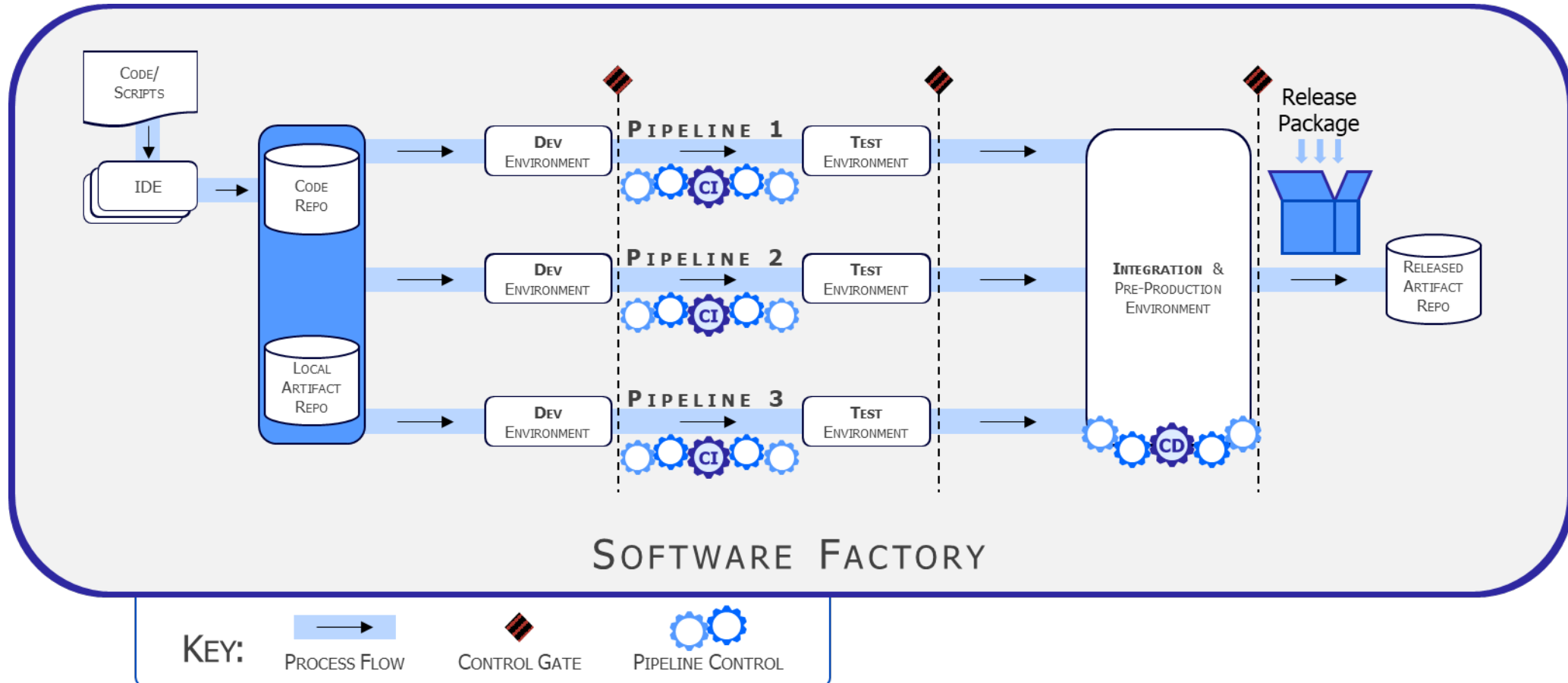
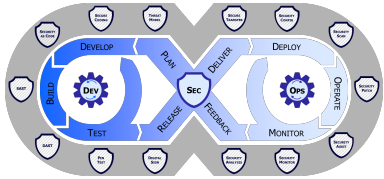


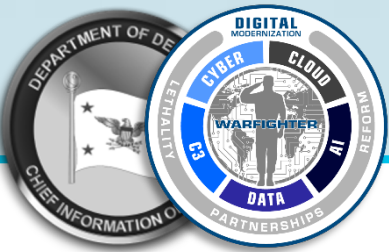
DevSecOps Infinity Diagram



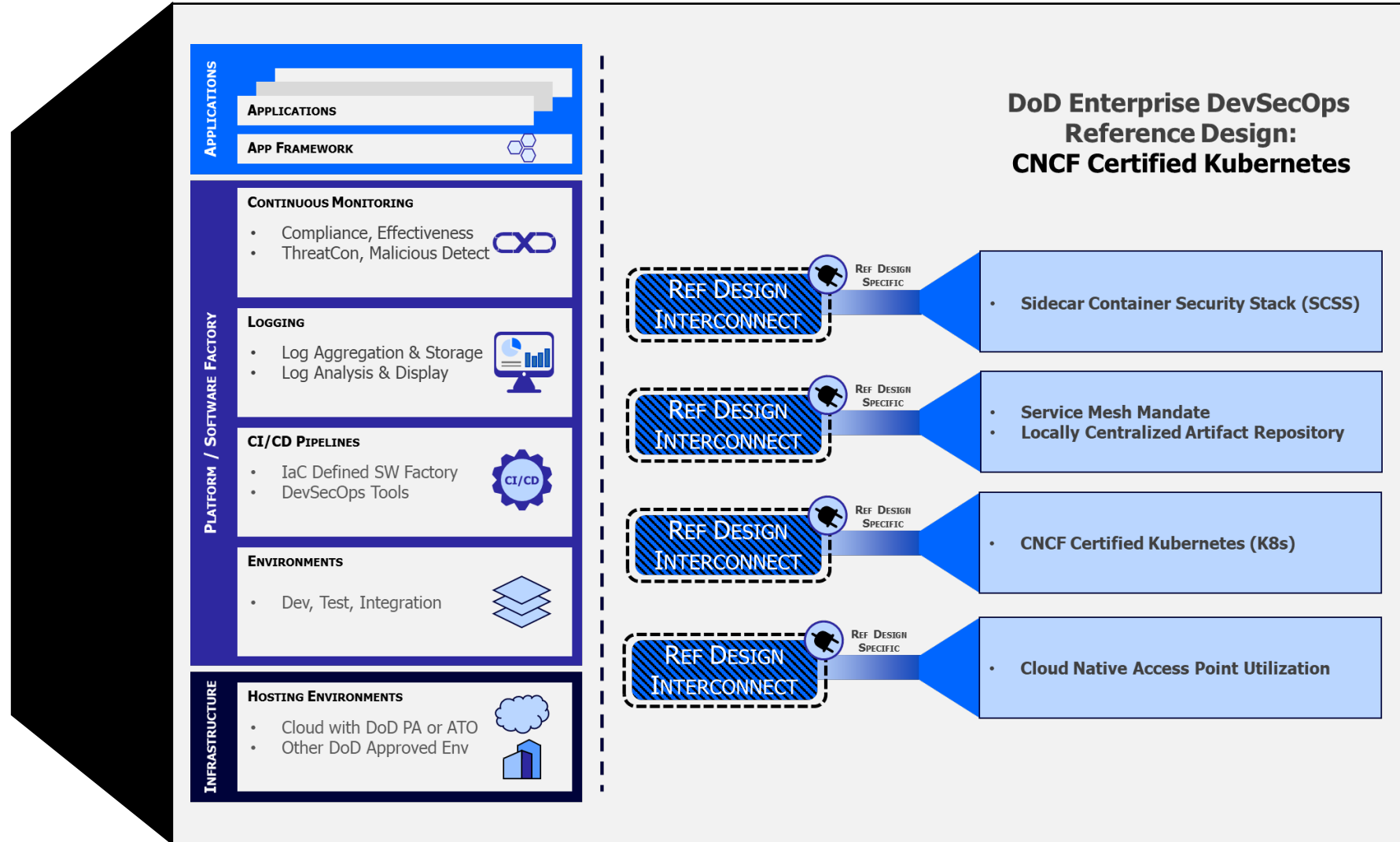
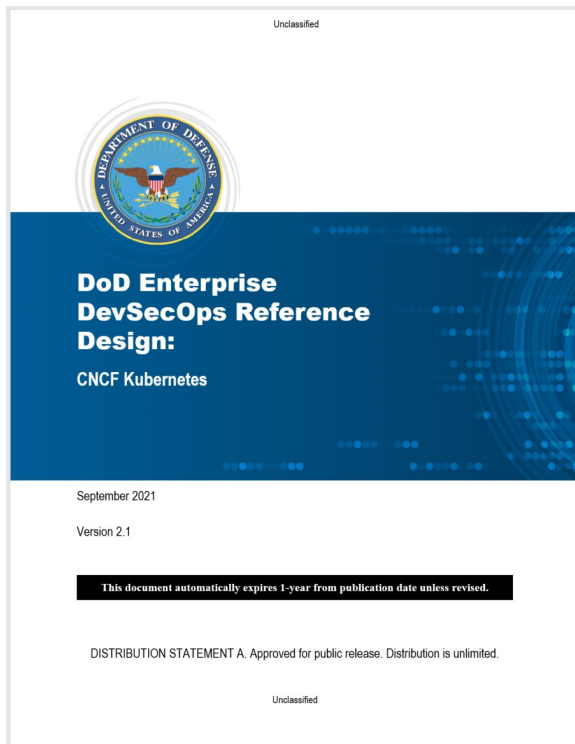


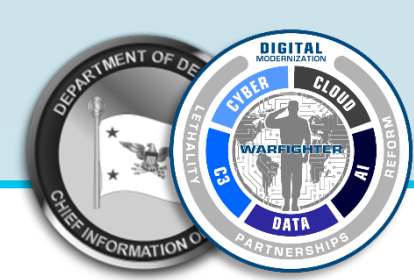
Role of the DevSecOps Software Factory





Zero Trust and Baked-in Cybersecurity





DevSecOps Advances Cybersecurity

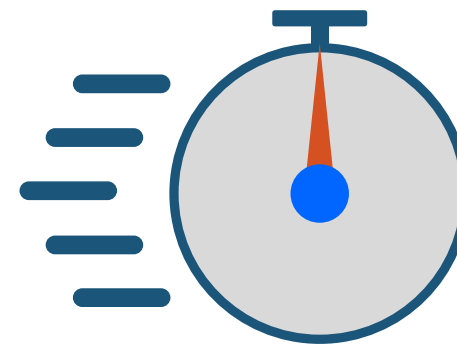
- Defensive Cyber Operations
- Continuous Monitoring
- Secure Software Supply Chain

Security



NOT MUTUALLY EXCLUSIVE!

Speed



DoD Learning Enclave

Putting DoD's DevSecOps Reference Design into Practice

Brent Smith
RD&E Principal
ADL Initiative (SETA)



About the ADL Initiative

PROGRAM:

[Advanced Distributed Learning \(ADL\)](#)

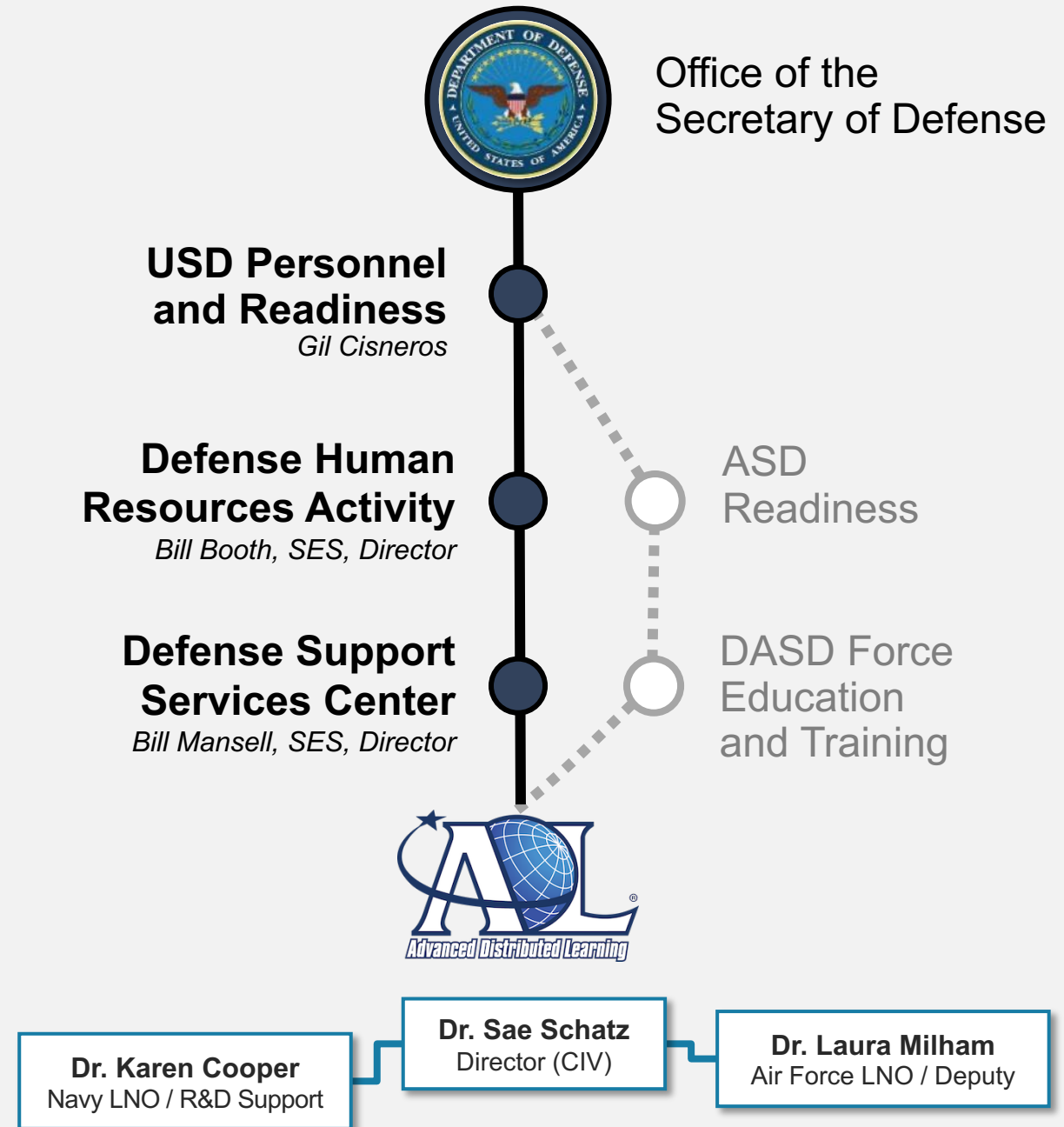
DIRECTOR:

[Sae Schatz, Ph.D.](#) (CIV)

PURPOSE:

Facilitate interoperability and promote best practices for Distributed Learning (DL)...

DoDI 1322.26: “The ADL Initiative is the principal steward for researching and facilitating the implementation of DL standards, specifications, and emerging technologies for DoD Components.”

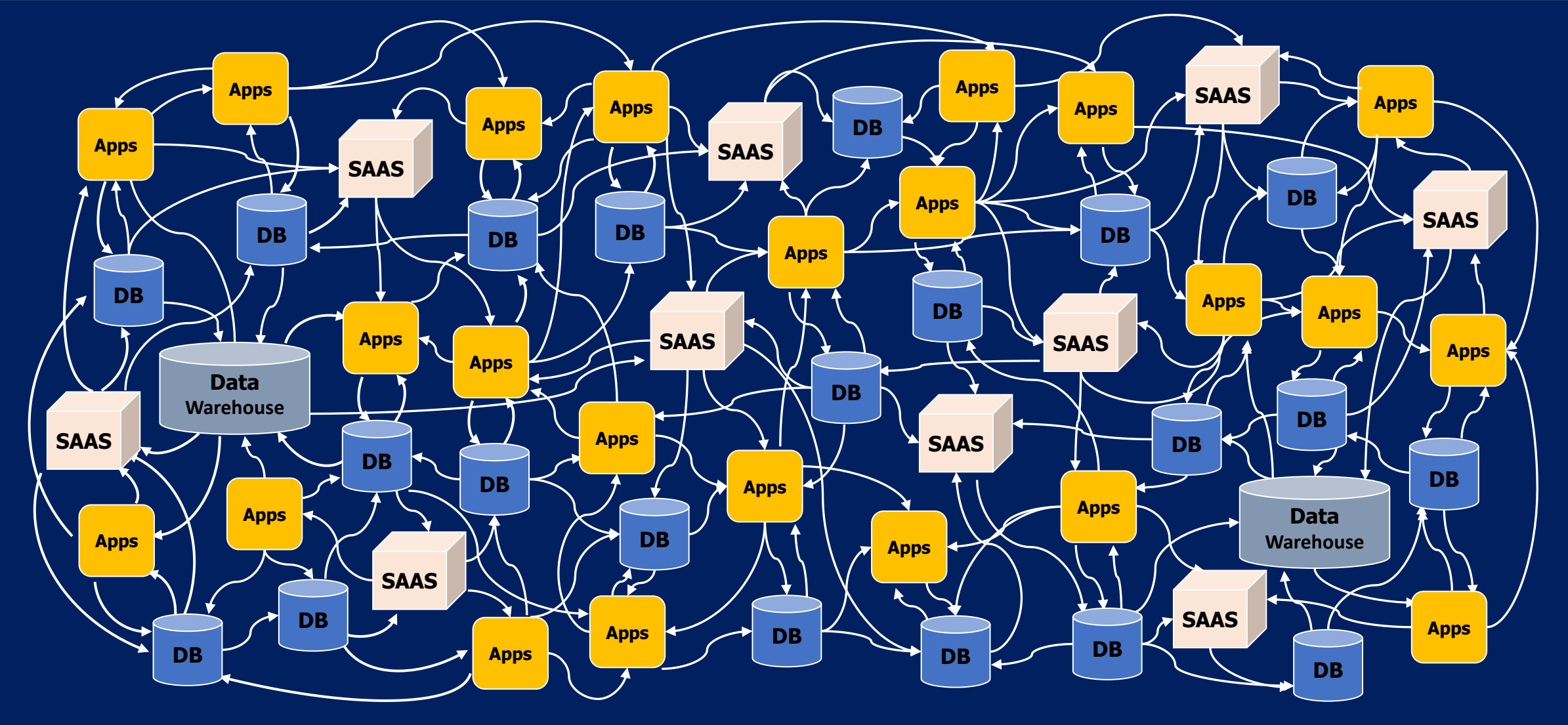




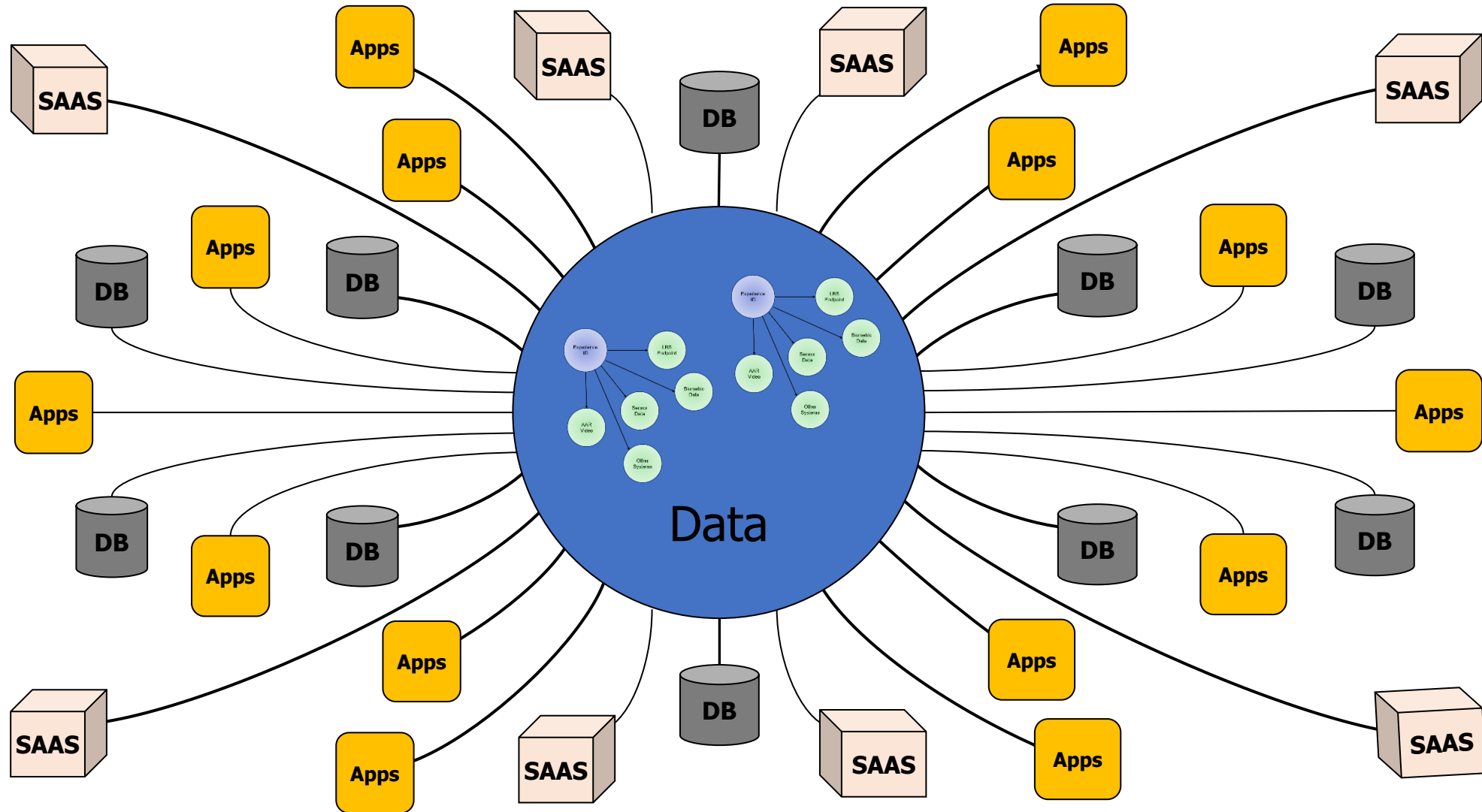
Agenda

1. Overview of Connected DLE Systems
2. DLE Software Factory (It's not just Buzzword Bingo)
3. Moving Forward with the DLE FOC
4. Future Work
 - Conformance Testing
 - Standards Based
 - Learning Technology Warehouse
 - On-demand Accessibility

Current Landscape of Training and Education



Centralized Event Streams / Decentralized Data Products



TLA – Related Resources



Publication
Modernizing Learning: Building the Future Learning Ecosystem
2019; Schatz, S.; Walcutt, J.; ADLnet.gov



Video
Reimagine Education
2021; Schatz, S.; ADLnet.gov



Podcast
The Future Learning Ecosystem with Sae Schatz
2021; Schatz, S.; LeadingLearning.com



Publication
2019 Total Learning Architecture Report
2020; Gordon, J.; Hayden, T.; Johnson, A.; Smith, B.; ADLnet.gov



News
Building the Infrastructure for DoD Digital Learning Modernization
2020; ADLnet.gov



News
DoD Reform Effort Puts Digital Learning Systems at the Forefront
2020; ADLnet.gov



Webinar
ADL-DAU Sandbox: TLA and Competency-Based Learning Demonstration
2021; ADLnet.gov



Project
Total Learning Architecture
2021; ADLnet.gov



Publication
Total Learning Architecture: IDA Report 2020
2020; Barr, A.; Fletcher, J.D.; Morrison, J.; ADLnet.gov



GitHub
ADL Initiative
2021; GitHub.com/adlnet

Enterprise Digital Learning Modernization (EDLM)

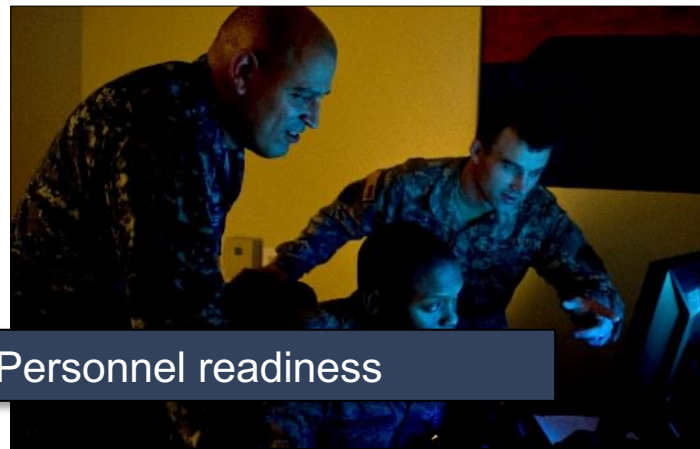
EDLM's Goal: Acquire and deliver DoD digital learning more effectively and cost-efficiently. This requires improvements to (1) acquisition and sustainment processes and (2) modernization.

Why?



\$485M+ annual spend

Realizes cost and time savings



Personnel readiness

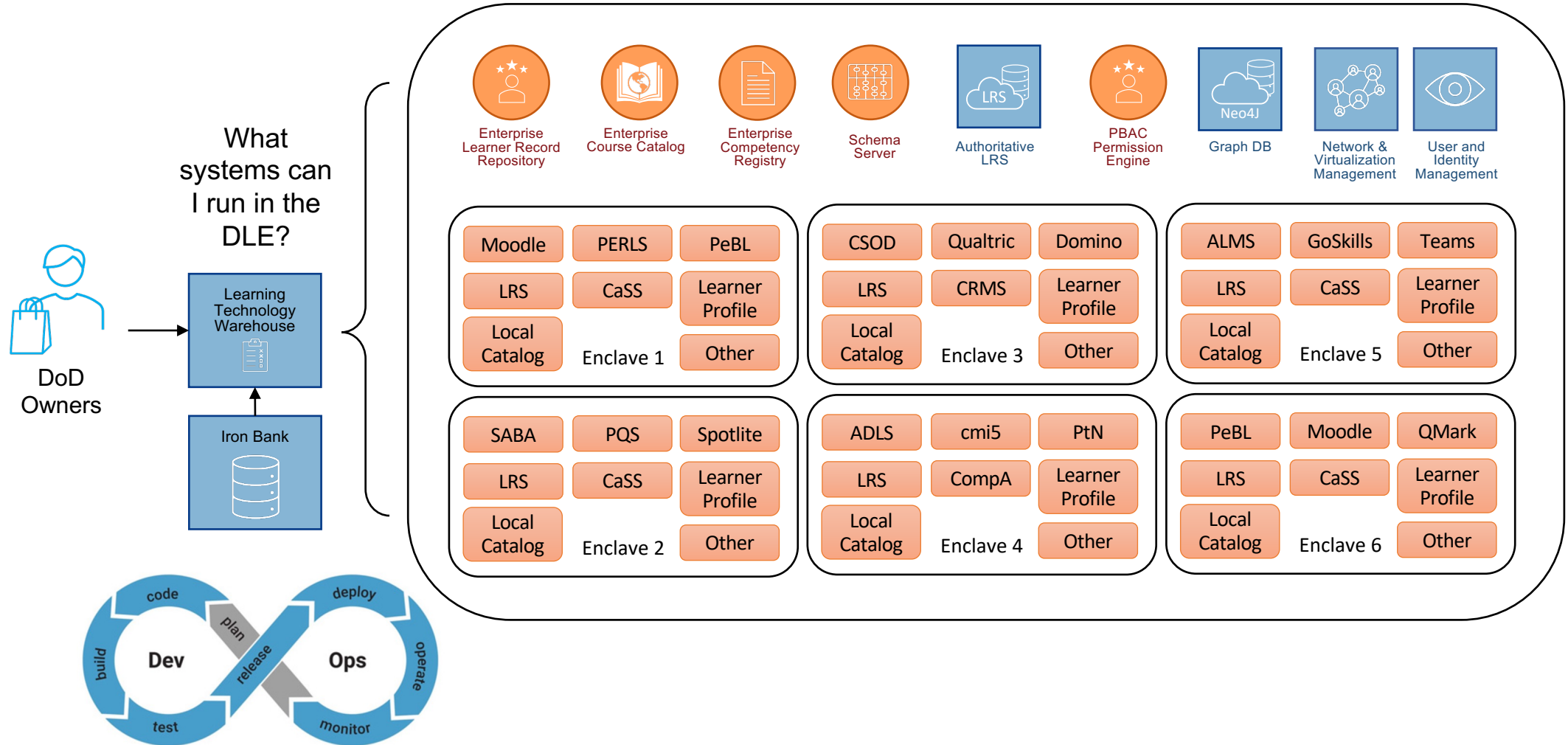
Meets growing operational demands



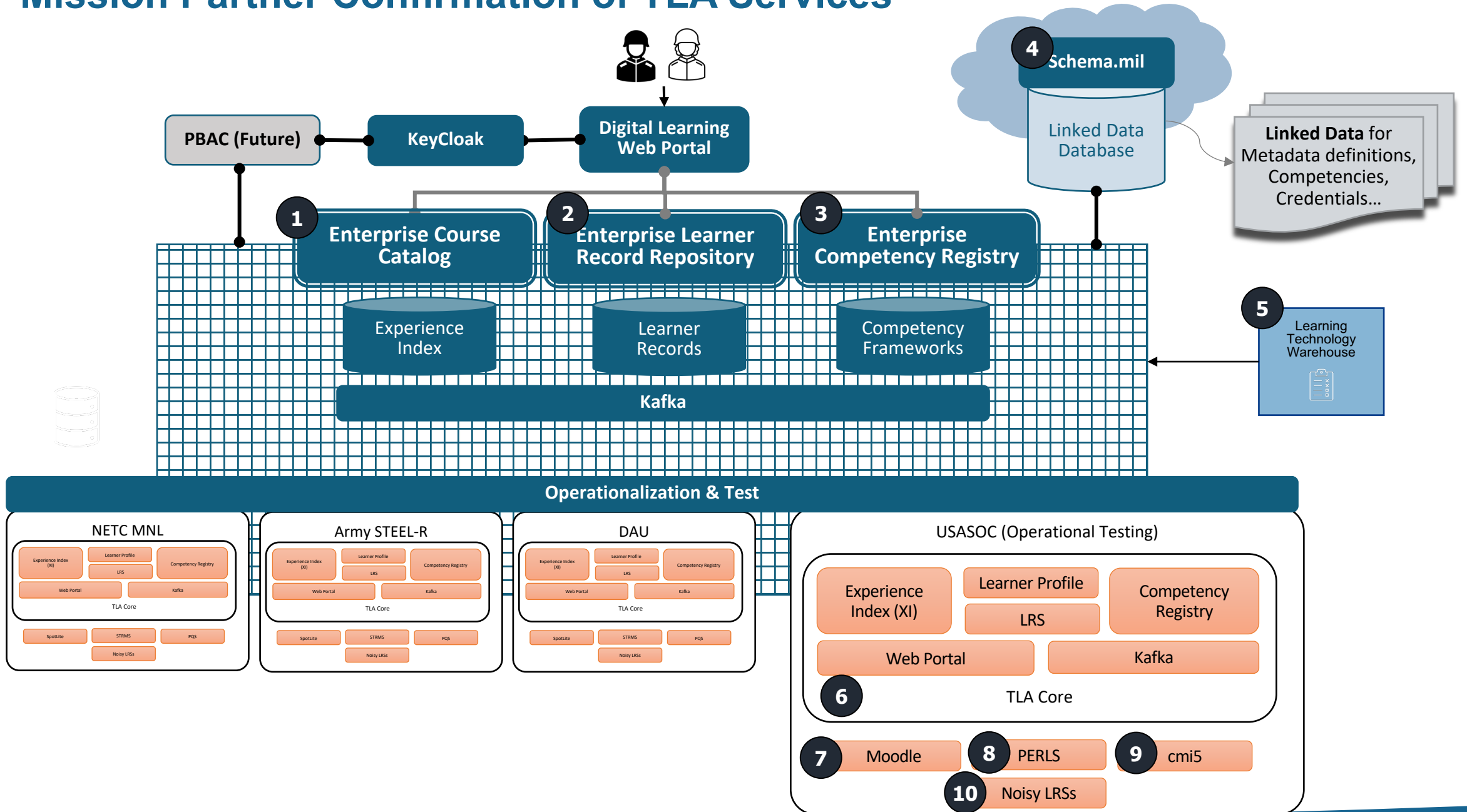
Modernization

Implements policy guidance

DoD Learning Enclave (DLE): Overview of Connected Systems



Mission Partner Confirmation of TLA Services



DoD Learning Enclave (DLE): Systems

Enterprise Systems:

- Enterprise Course Catalog - Deloitte
- Enterprise Learner Record Repository - Deloitte
- Competency and Skills System - ADL
- Linked Data and Schema Server - Deloitte
- Learning Technology Warehouse – Float / PT

Learning Activities:

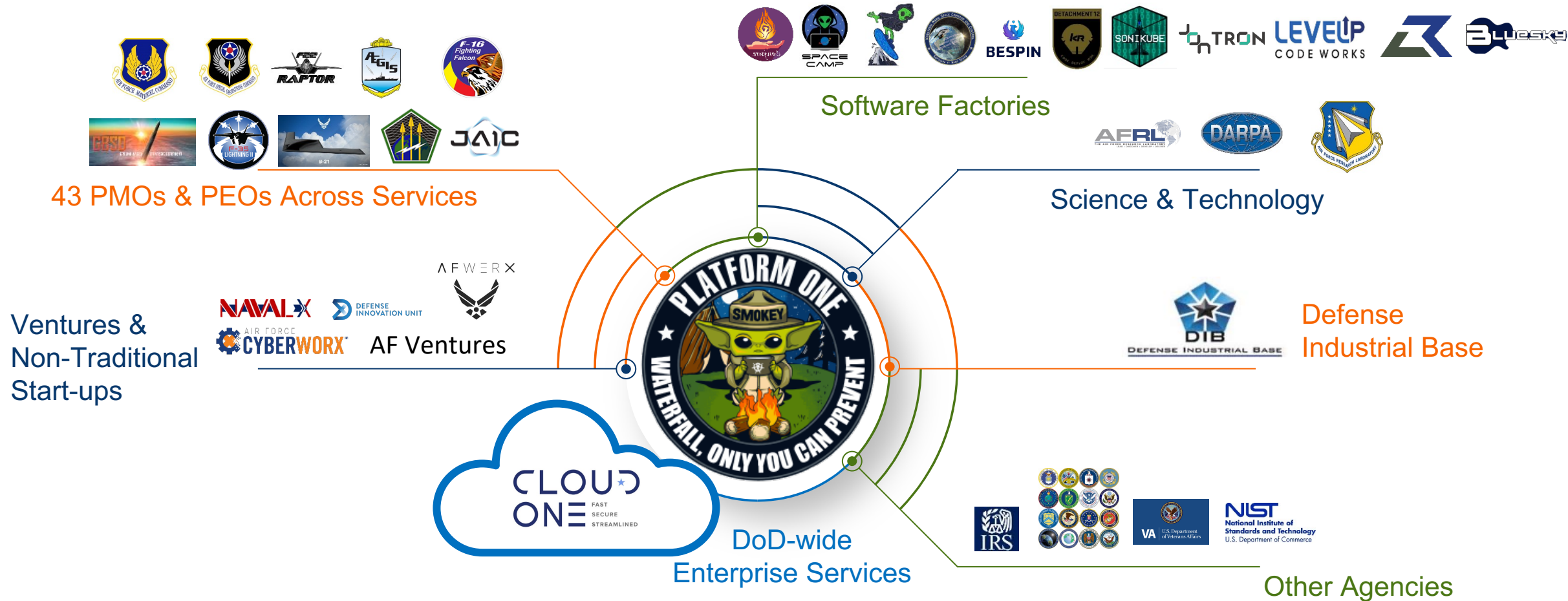
- TLA Core – ADL
- Moodle Course Management System – ADL
- PERLS Microlearning Platform – Float / PT
- Cmi5 Player – ADL
- LRS – ADL

External Systems:

- xAPI Profile Server
- LRS Conformance Test Suite
- Cmi5 Conformance Test Suite
- DataSim

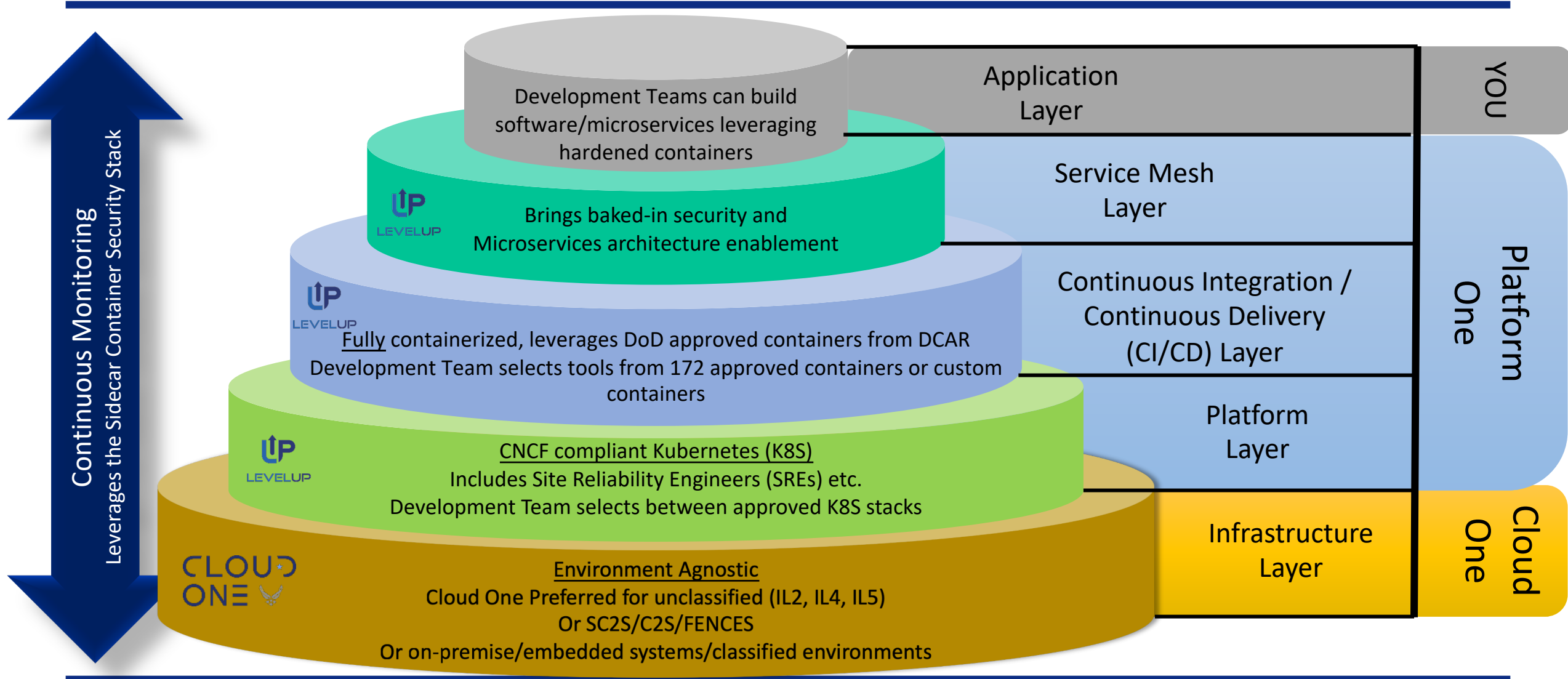


Software Ecosystem Multiple Innovation Hubs – One Platform



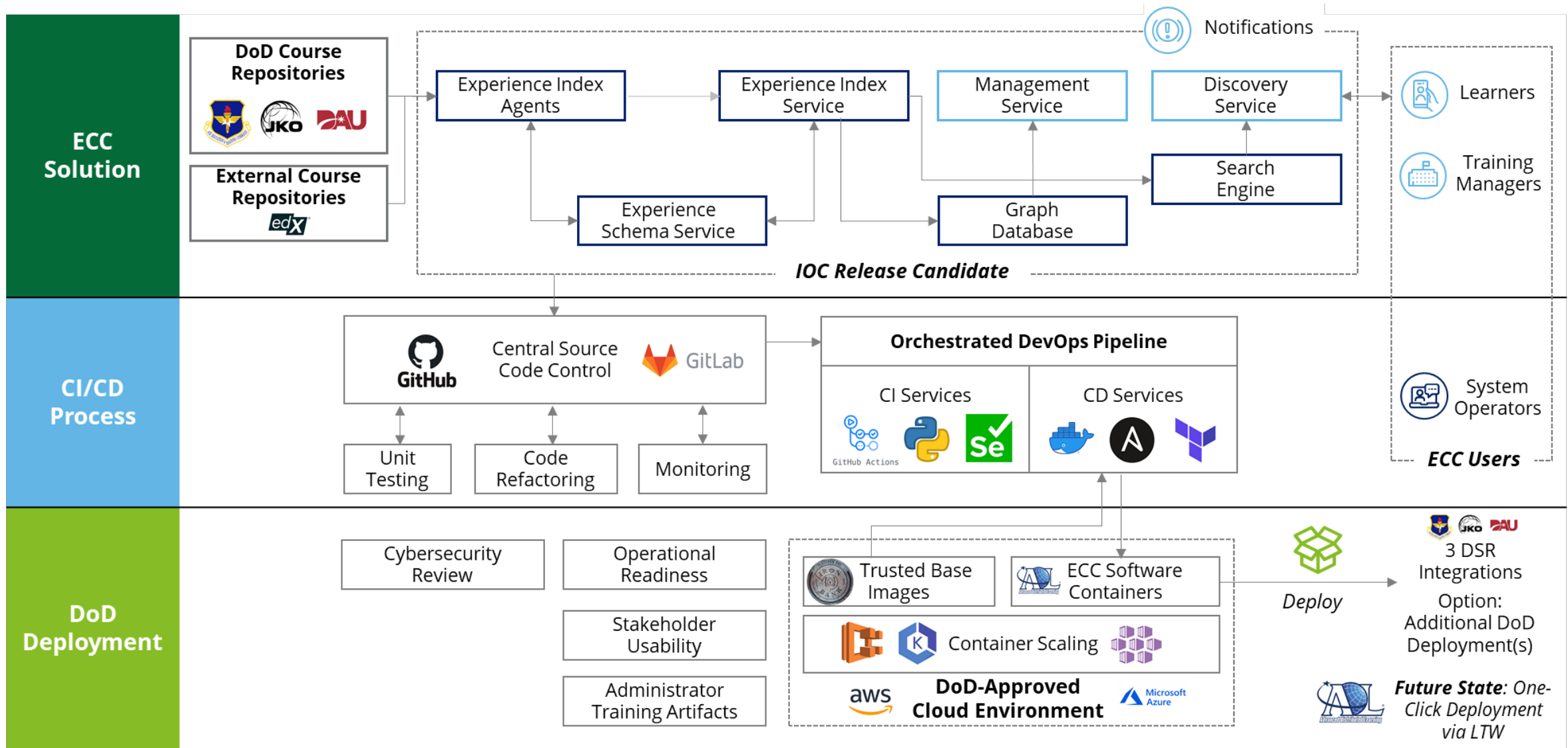


Understanding the DevSecOps Layers



Integrity - Service - Excellence

ECC IOC Summary



DoD Learning Enclave (DLE): Major Tasks

- Onboarding
- Commit Source Code to Platform One GitLab Repo
- Integrate Source Code with Iron Bank Containers
- Container Hardening & Vulnerability Testing
- Refactoring to address any Identified Vulnerabilities
- Container Hardening Approval Process
- Certificate to Field
- Establish Dev and Test in IL2
- Establish Production Environment in IL4

Major Milestones:

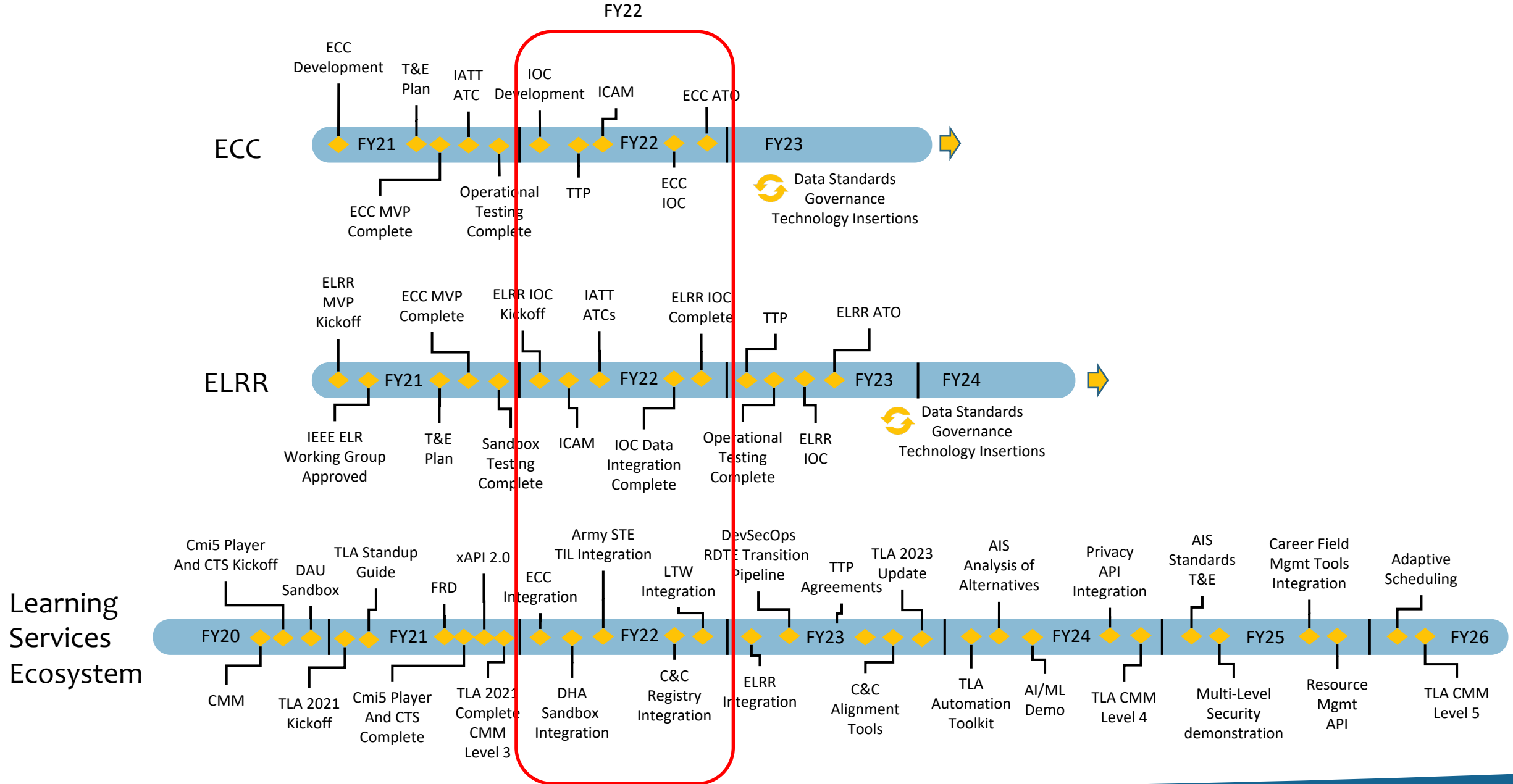
- Onboarding
- IOC software integrated with Iron Bank Containers
- Validated Containers (GitLab CI Pipeline)
- Container Hardening Approval Process Submission
- Approved Certificate to Field
- Deployed Systems

DLE IOC Implementation – POA&M

DoD Shared Services for Learning Technology	O	N	D	J	F	M	A	M	J	J	A	S
End-user Learning Technologies (LOE1)												
• Learning Management System (Moodle)		◆			◆		◆		★			
• Microlearning app (PERvasive Learning System)			◆				◆		◆			
• cmi5 Player (Added capability to LMS)			◆					◆		◆		
TLA Core (Interoperable Data Services)												
• Total Learning Architecture Core (e.g., Kafka, Data)					◆				◆		◆	
• Schema Server for Linked Data		◆			◆		◆					
• Learning Technology Warehouse			◆				◆		◆			
Enterprise Course Catalog (LOE2)												
• ECC IOC application		◆			◆		◆				★	
Enterprise Learner Record Repository (LOE3)												
• Learning Record Store		◆		◆		◆			★			
• ELRR Prototype Application			◆			◆		◆				
• Competency and Skill System				◆				◆		◆		

DLE IOC CI/CD Milestones. (◆ = other milestones, ◆ = Certificate to Field, ★ = Initial Use)

Maturation Timeline



DLE FOC Considerations for Moving Forward

Defense-wide Reciprocity

- Collaboration with the Cloud Computing Program Office
- Collaboration with DoD CIO (e.g., ICAM, Zero Trust, DevSecOps Reference Design)
- Collaboration with DoD stakeholders – Integrated Program Team

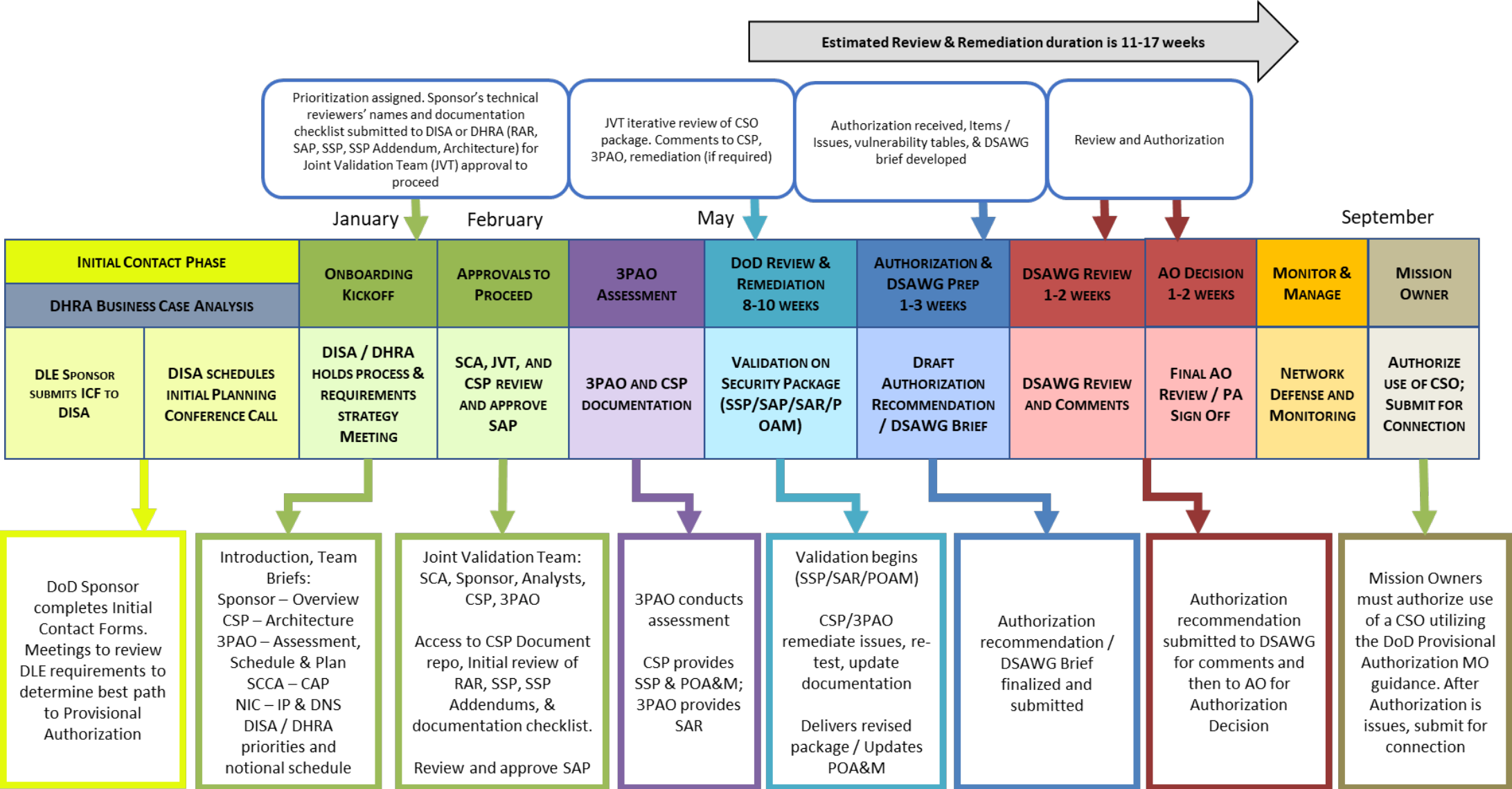
Analysis of Alternatives

- Fast Track ATO, Traditional ATO, Continuous ATO?
- Cloud Agnostic Tools and CSP Native (e.g., Big Bang / DoD Cloud IaC, or a Collection of CI/CD pipelines?)
- What's the best strategy moving forward for DoD?
- Lifecycle Costs / Configuration Control Board / Governance

Leveraging work done on the DLE IOC

- Lessons Learned / Best Practices using **Party Bus** tools, workflows, and methodologies
- Istio Service Mesh / Sidecar Container Security Stack
- Iron Bank is a Defense-wide resource
- Tailor the DevSecOps Pipeline based on DLE and Authorizing Official Requirements
- Creating a Culture – This isn't about the Tech as much as its about the Mindset of our People

DLE FOC Implementation



Support Reuse through the Learning Technology Warehouse

The screenshot displays the Learning Technology Warehouse interface. At the top left is the logo and name 'Learning Technology Warehouse'. A search bar and 'My account' link are at the top right. A left sidebar contains navigation links: Products (selected), Featured, Editorial, FAQ, and Research. The main content area lists six products, each with an icon, title, subtitle, and description. A right sidebar shows 'Categories' (All categories, Competency Management, Data Tracking and Analytics, EHRI reporting, eLearning, Health, Learning, Military, Mobile Learning, Simulation, Training) and 'Sort by' options (Alphabetical: A-Z, Last updated).

Product Name	Subtitle	Description
Competency and Skills System (CaSS)	<i>Competencies, evidence of attainment, assertion validation</i>	CaSS is open-source xAPI-native software that includes services, applications, and interfaces for organizations to define, store, manage, share, and access competencies.
PALMs Authoring Tools	<i>Perceptual, adaptive learning</i>	System for creating uniquely effective training modules that combine research-driven perceptual learning and adaptive learning techniques
PeBL	<i>Personalized learning, cross-platform, mobile-friendly</i>	Developing learning experiences that are personalized, collaborative, trackable, accessible, cross-platform, and mobile-friendly
PERLS	<i>Mobile, self-regulated e-learning</i>	The PERvasive Learning Systems (PERLS) is a web and a mobile learning system that guides and mentors learners through learning and training recommendations from a self-regulated micro-learning model.
USALearning Learning Management System (LMS)	<i>eLearning, Training, and EHRI reporting</i>	The full service, government-to-government, license-free learning management software-as-a-service solution.
USALearning Learning Record Store (USALRS)	<i>Learning analytics and visualizations</i>	USALRS is an xAPI-Conformant LRS for storing and retrieving xAPI statements. It includes powerful graphing and reporting tools to help you visualize your data and detect trends.

- Defense-wide Product Catalog of Authorized, Conformant, and Compliant systems for use in the DLR or by DoD stakeholders in their own environments
- Conformance Testing based on TLA standards (IEEE – LTSC).
- Product Paged tie into DevSecOps pipeline and DLE operational dashboards to provide usage statistics to potential users.
- Automatically deploy demonstration capabilities / Rapidly deploy operational systems at time of need
- Scripts, widgets, and utilities to help migrate or interface with legacy systems

Learning Technology Warehouse Demo



Questions and Discussion