34th Annual INCOSE international symposium

hybrid event

Dublin, Ireland
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# Engineering Technical Management (ETM) Competencies to Support the MOSA Ecosystem

# MOSA Ecosystem


The Modular Open Systems Approach (MOSA) Ecosystem depends on active involvement by multiple stakeholders across the Department of Defense. (https://www.cto.mil/sea/mosa/)

# ETM WORKFORCE DEVELOPMENT

The ETM workforce has a vital role in developing, fielding, and sustaining high-quality, innovative, affordable, supportable, and effective defense systems and ensuring that DoD products are delivered on time, perform as expected, and are cost-effective.

SE&A ENGINEERING & TECHNICAL MANAGEMENT (ETM) WORKFORCE DEVELOPMENT WORKSHEET

# Workforce Development

## Efforts

- The Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)) has initiated a number of technical workforce development efforts guided by Secretary of Defense priorities.

## Team

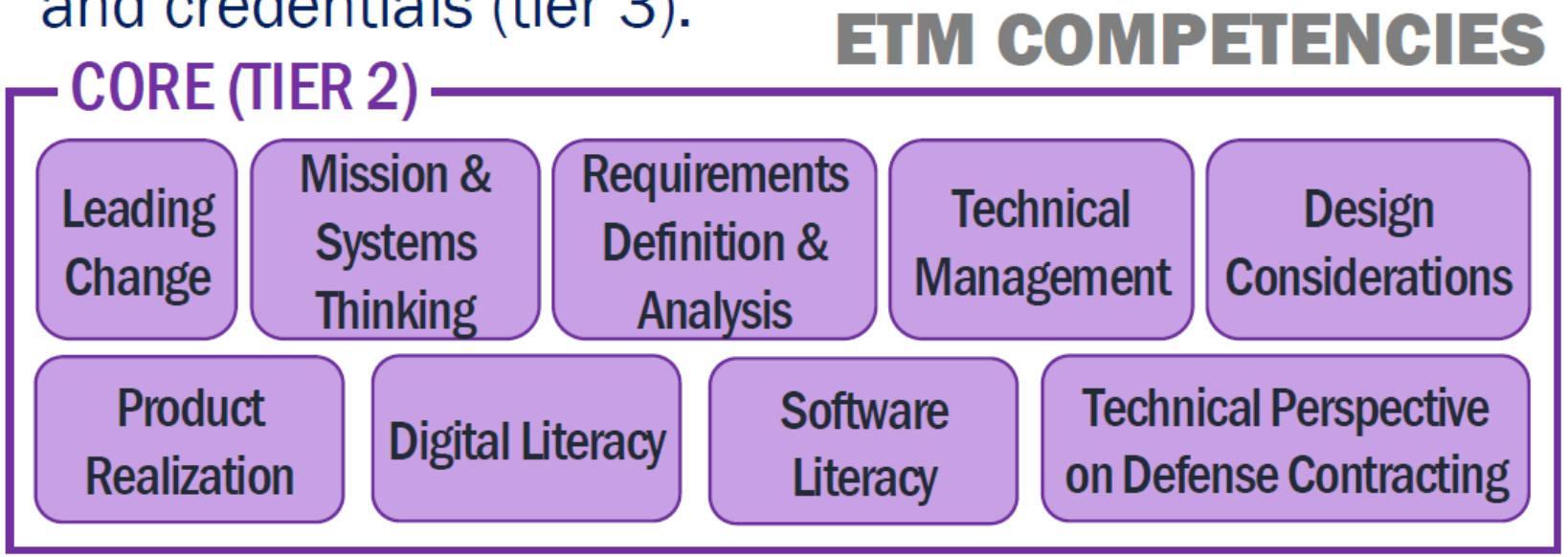
- OUSD(R&E), ETM workforce leaders from across the Department, and the Defense Acquisition University (DAU) collaborated through a Functional Integration Team (FIT) to develop competencies, training, and credentials for the ETM workforce.


**SE&A ENGINEERING & TECHNICAL MANAGEMENT (ETM) WORKFORCE DEVELOPMENT WORKSHEET**

# ETM COMPETENCY MODEL

## ❖ COMPETENCIES

The FIT developed a streamlined competency model to serve as the foundation for ETM training (tier 2) and credentials (tier 3).



# ETM COMPETENCY MODEL (cont.)

**SPECIALTY (TIER 3)**

| | | | |
|---|---|---|---|
| Mission Capability Analysis, Definition, & Characterization | Mission Engineering Approach | Mission Engineering Documentation | Systems Engineering Management |
| Stakeholder Requirements Definition | Requirements Analysis | Implementation | Integration |
| Verification & Validation | Transition | System of Systems / Family of Systems | Architecture Design |
| Cyber Acumen for Engineering | Adversity-Driven Requirements Derivation | Analysis of Adversity & Adverse Effects | Adversity-Driven Design |
| Adversity-Driven Design Realization | Adversity-Driven Test, Evaluation, Verification, & Validation | Technology Portfolio Management | Technology Protection |
| Technology Transition/ Transfer | Software Engineering/ Design | Digital Environment Development | Digital Environment Operations & Support |
| Modeling, Simulation, & Analysis | Software Assurance | DevSecOps | Software Configuration Management |
| Technology & the Industrial Base | Process Capability & Control | Quality Management | Surveillance Activities |
| Manufacturing Planning, Scheduling, & Control | Industrial Workforce Planning | Materials Management | Facilities |

ETM workforce members hold a variety of positions that may include, but are not limited to, Engineer/Chief Engineer, Architect, Software Developer, Specialist (Quality, Reliability, etc.), Production Controller, Researcher/Scientist, Technical Management, and Analyst.

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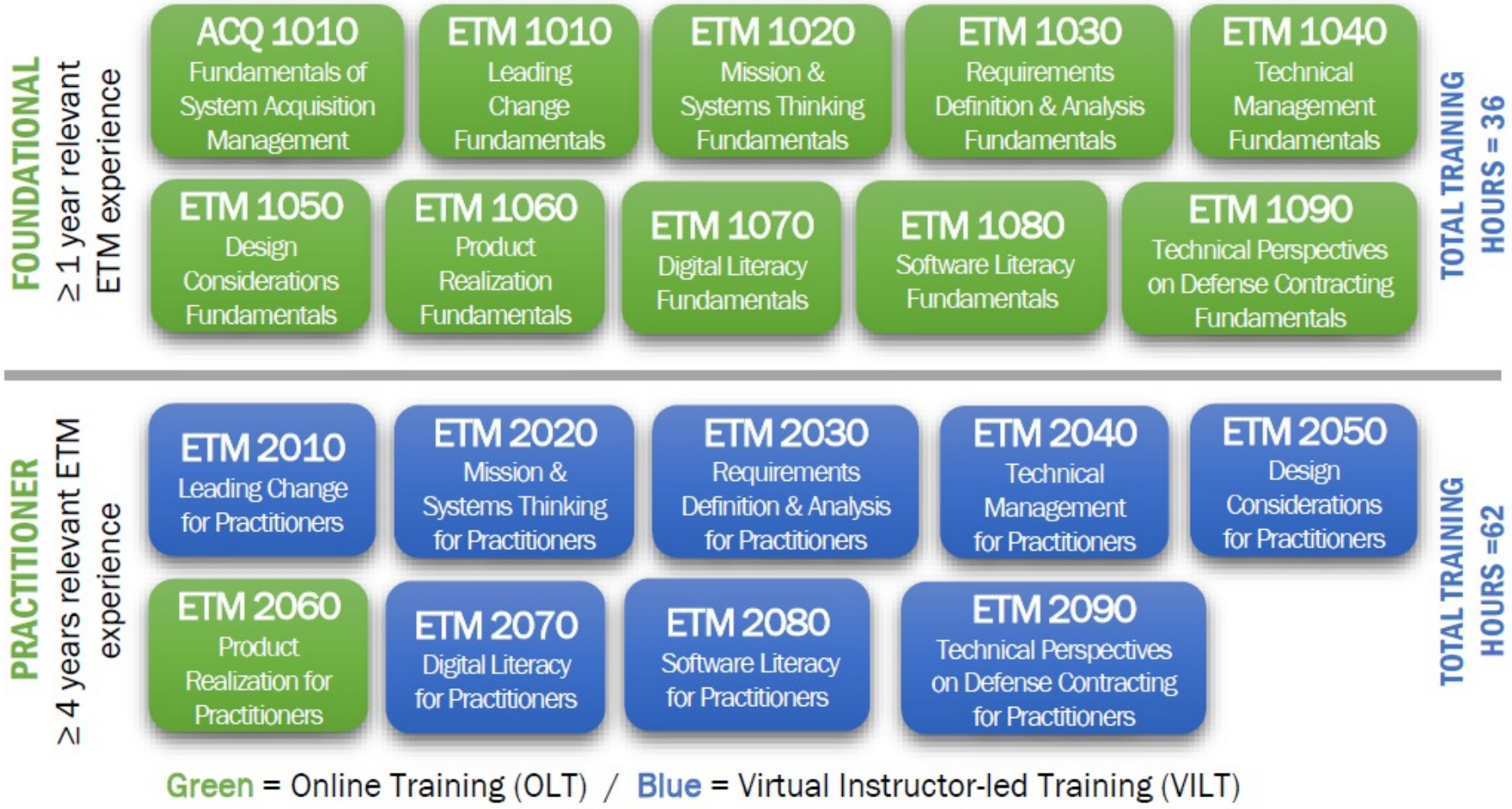
# ETM Training

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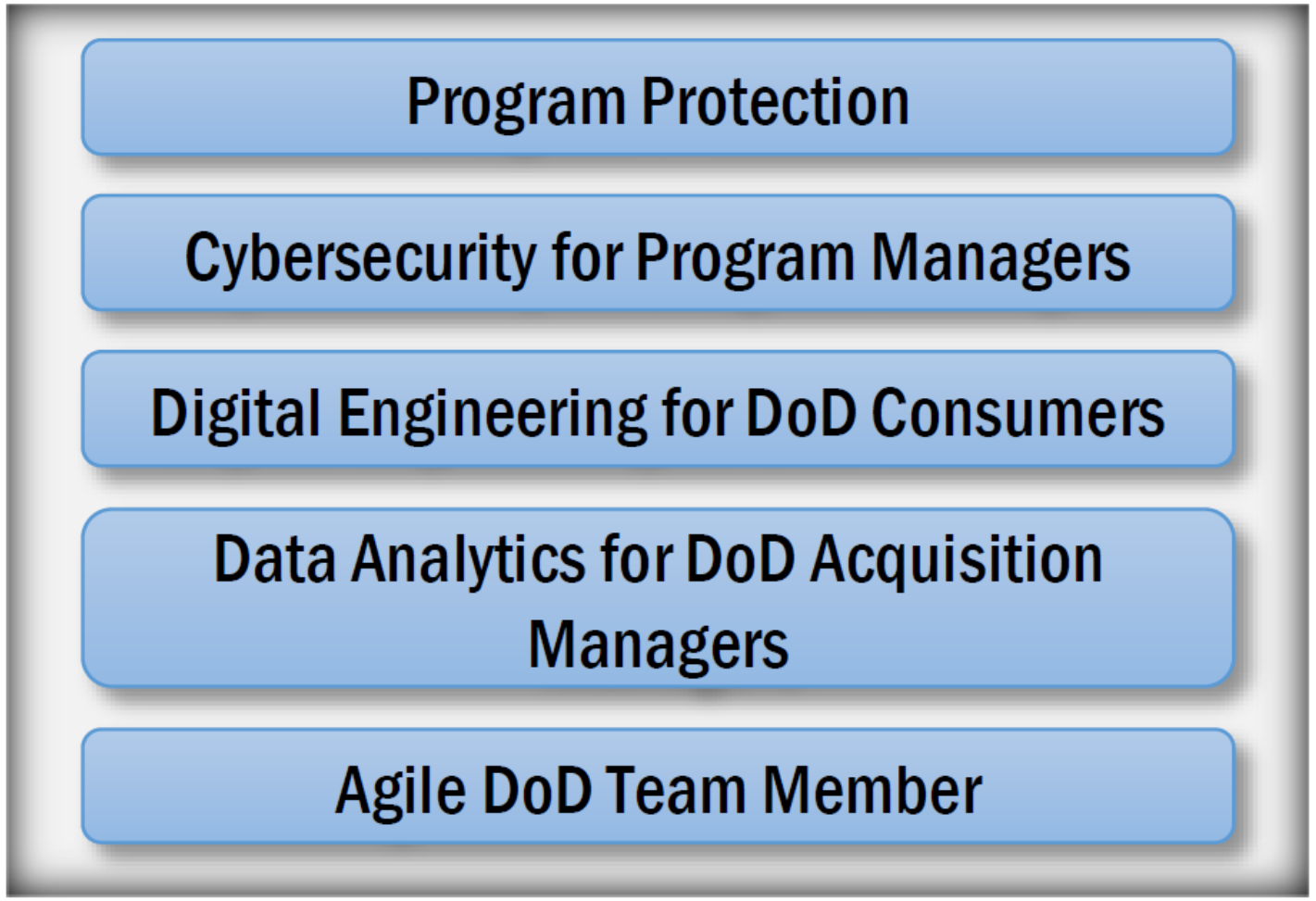
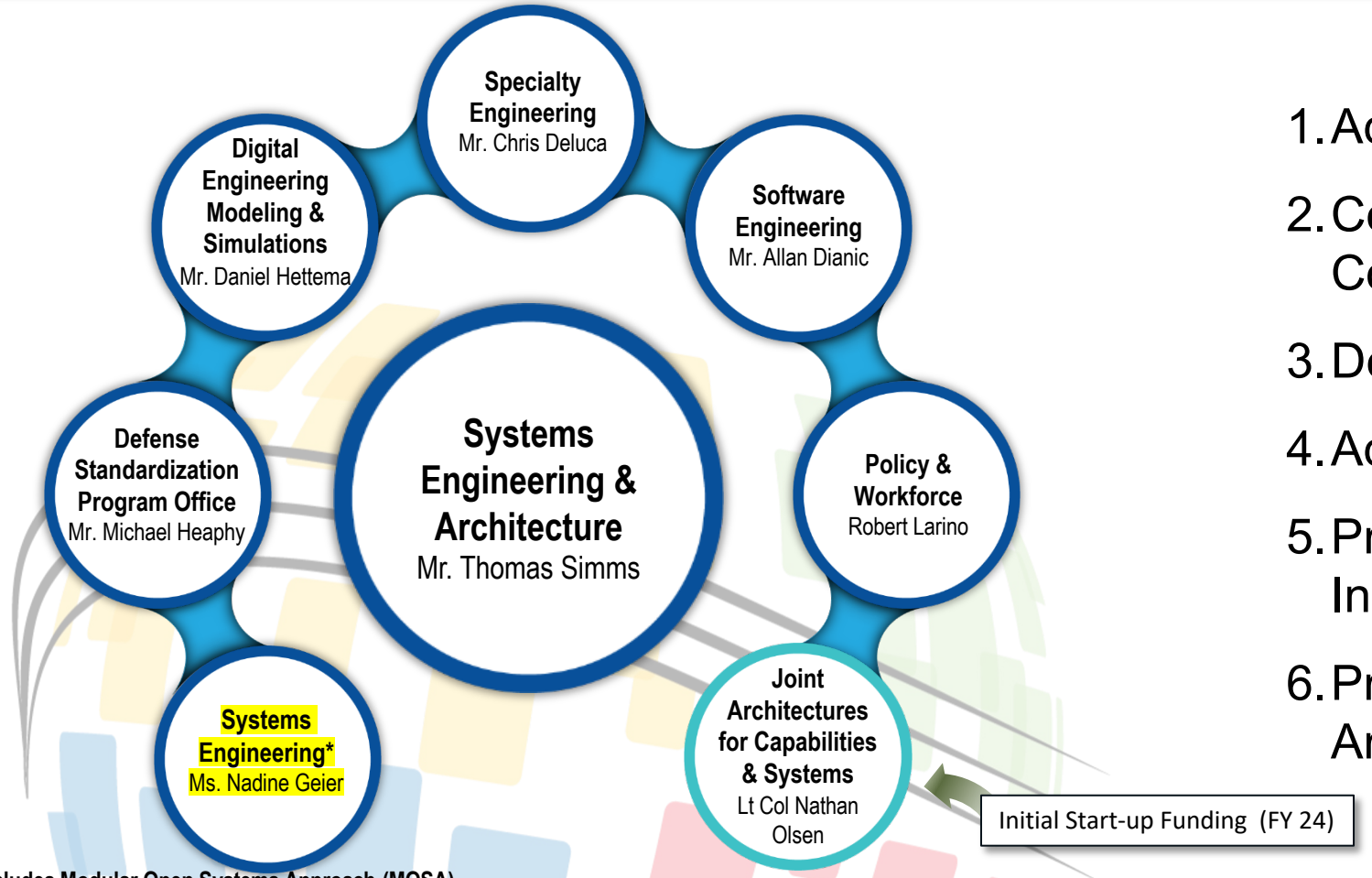
# ETM Credentials



# SE&A Lines of Effort

**SE&A develops and promotes advanced engineering principles, techniques, and practices to improve Joint Warfighting Capabilities.**




*Includes Modular Open Systems Approach (MOSA)

## Lines of Effort

1. Advance the Engineering Practice
2. Connect & Strengthen the Technical Community
3. Develop the Workforce
4. Advance and Manage Standards
5. Provide Technical Expertise for Independent Engineering Assessments
6. Provide System of Systems (SoS) Architectures Guidance

# SE&A Roles and Responsibilities

**SE&A:** Develops and promotes innovative engineering principles and techniques to advance DoD engineering practice. SE&A develops policy, guidance, standards, and best practice resources; manages DoD Standards; facilitates engineering-related communities of practice; and develops the defense engineering workforce by refining competency models and curricula. SE&A applies engineering and risk management expertise to inform decisions and improve system-of-systems architectures to reduce integration risk in mission-enabling systems.

**Policy and Workforce:** Leads policy, guidance, and workforce development initiatives for the DoD engineering and technical workforce.

**Systems Engineering (SE):** Focuses on modernizing SE practice, including using modular open systems approaches to build systems that can be upgraded to incorporate new technology and respond to emerging threats.

**Digital Engineering Modeling & Simulations (DEM&S):** Focuses on digital engineering transformation and implementation, promoting the use of models and simulations across the DoD life cycle.

**Software Engineering (SWE):** Promotes Agile/DevSecOps software practices and cross-organizational collaboration to modernize DoD software capability and expertise.

**Specialty Engineering (SpE):** Focuses on improving delivery of advanced capability to warfighters by modernizing reliability and maintainability, manufacturing and quality, system safety, human systems integration, and value engineering practices.

**Defense Standardization Program Office (DSPO):** Identifies, develops, and provides access to standardization processes and products for the defense community to promote interoperability, reduce cost, and sustain readiness.

**Joint Architectures for Capabilities & Systems (JACS):** Promotes system of systems fielded with speed, fidelity, and adaptability to enable continual evolution of U.S. warfighting dominance.

**Collaborators: OUSD(R&E) offices, the Services, DOT&E, CIO, CDAO, and OUSD(A&S)**

# OUSD (R&E) SE Priorities for FY 2024 & 2025

## Systems Engineering Modernization

- Update SE Guidance to emphasize Agile and modern engineering principles
- Update the SE Contracting Guidebook
- Create digital Systems Engineering Plan (SEP) guidance
- Continue Ontology work to enhance interoperability between MBSE systems data interchange

## Modular Open Systems Approaches

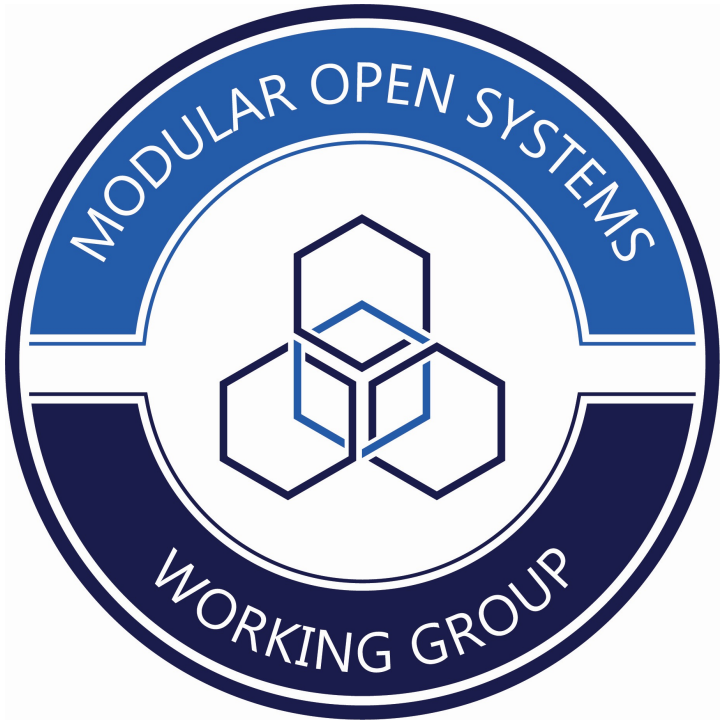
- Lead Modular Open Systems Working Group (MOSWG) and Steering Committee efforts to publish the latest unified and consistent solutions
  - New Standards and Acquisition-focused Tiger Teams
- Publish the MOSA Guidebook.
- Create adoption notices for MOSA High-priority standards and tag other standards as MOSA-enabling in the Assist database.
- Update the SE/MOSA Community of Practice and SE/MOSA Body of Knowledge websites

## Systems Engineering Research - SERC

- Oversee the Systems Engineering Research Center (SERC) consortium's efforts to research systems engineering topics (https://sercuarc.org/)
- Renew the Systems Engineering Research Center (SERC) Contract

# Modular Open Systems Approach (MOSA) Guidebook

- Implementing a MOSA in Department of Defense Programs
  - Definitions/Lexicon
  - Benefits
  - Pillars
    - Enabling Environment
    - Modular Design
    - Designated Interfaces
    - Consensus-based Standards
    - Certifying Conformance
  - Implementation Recommendations
  - Contracting Advice
  - Workforce Development
  - Technical Approach
  - Industry Recommendations



# MOSA Standards and Specifications Repository

**OUSD(R&E) conducted several data calls across the Military Departments to identify and assess standard utilization and MOSA implementation**

- Over 1,000 MOSA-enabling standards, specifications and interfaces are in use across all Military Departments that support MOSA implementation
- The Military Departments identified high priority MOSA-enabling standards and provided justifications for each priority

- Common standards: **Software Communication Architecture (SCA), Sensor Open Systems Architecture (SOSA™), Future Airborne Capability Environment (FACE™)**

- High priority standards will be prioritized for **Adoption Notices** in the MOSS** area in the ASSIST database
- Other standards will be **tagged** as MOSA-enabling in the ASSIST database
- The ASSIST database is available across the DoD

* MOSA – Modular Open Systems Approach

** MOSS – Modular Open Specifications and Standards

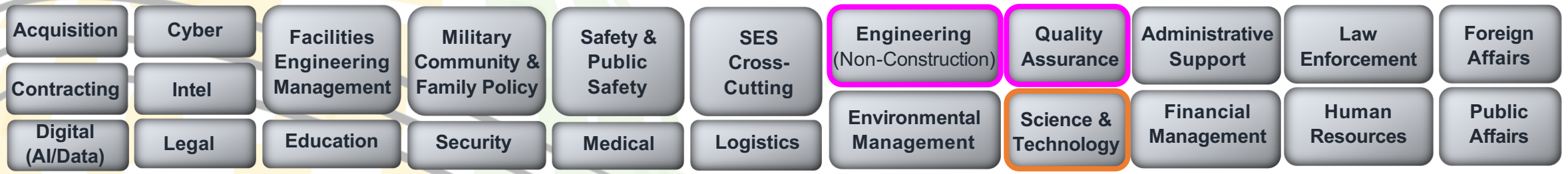
# Defense Acquisition & Civilian Workforces

Advanced competencies and define the education, training, experience, and proficiency standards to develop the technical workforce

- **Functional Area Leader (FAL) for ETM and T&E Acquisition Workforces**


  - Develops certification training and defense acquisition credentials—will be heavily relied upon to ensure a technically competent acquisition workforce

- **OSD Functional Community Manager (OFCM) for ENG(NC) and QA**




  - Leads, coordinates, and monitors strategic workforce planning (e.g., workforce analysis, strategies to reduce and close gaps, etc.)

SE&A

ASD(S&T)|S&T Foundations

*ETM and T&E functional areas cover ~45% (72,460) of Acquisition Workforce (Data Source: OUSD(A&S) Defense Acquisition Workforce Data Mart, Q1 FY2024)*
*ENG(NC) and QA functional communities cover ~12% (97,007) of DoD Workforce (Data Source: ADVANA DoD Functional Community Dashboard, Q1 FY 2024)*

# ETM Functional Area

## FUNCTIONAL AREA

The **Engineering and Technical Management (ETM)** workforce has a vital role in developing, fielding, and sustaining defense systems and ensuring DoD products are delivered on time, perform as expected, and are cost-effective.

The role requires developing and implementing solutions with an integrated technical approach across the total life-cycle to satisfy stakeholder needs and expedite transition of technology to the user, practicing early production planning and systematically examining producibility.

## DAWIA CERTIFICATION (2-tier)

### Foundational
(within 3 years of position assignment)

- Developed a basic understanding of ETM concepts and are developing skills on a routine set of tasks through interactions with skilled workers and on-the-job experiences.
- At a minimum, demonstrated the ability to support and assist in ETM activities while interacting with multiple organizations.

### Practitioner
(within 5 years of position assignment)

- Developed a full understanding of the concepts and basic set of skills to perform ETM activities.
- Gained knowledge and experience within the ETM community by performing routine tasks with limited supervision.
- At a minimum, demonstrated the ability to manage and direct ETM activities while interacting with multiple organizations.

## DEFENSE ACQUISTION CREDENTIALS

- Provide job-specific, specialty, and point-of-need training.
- Allow the workforce to customize their knowledge base throughout their career.
- Are transferable across Components.

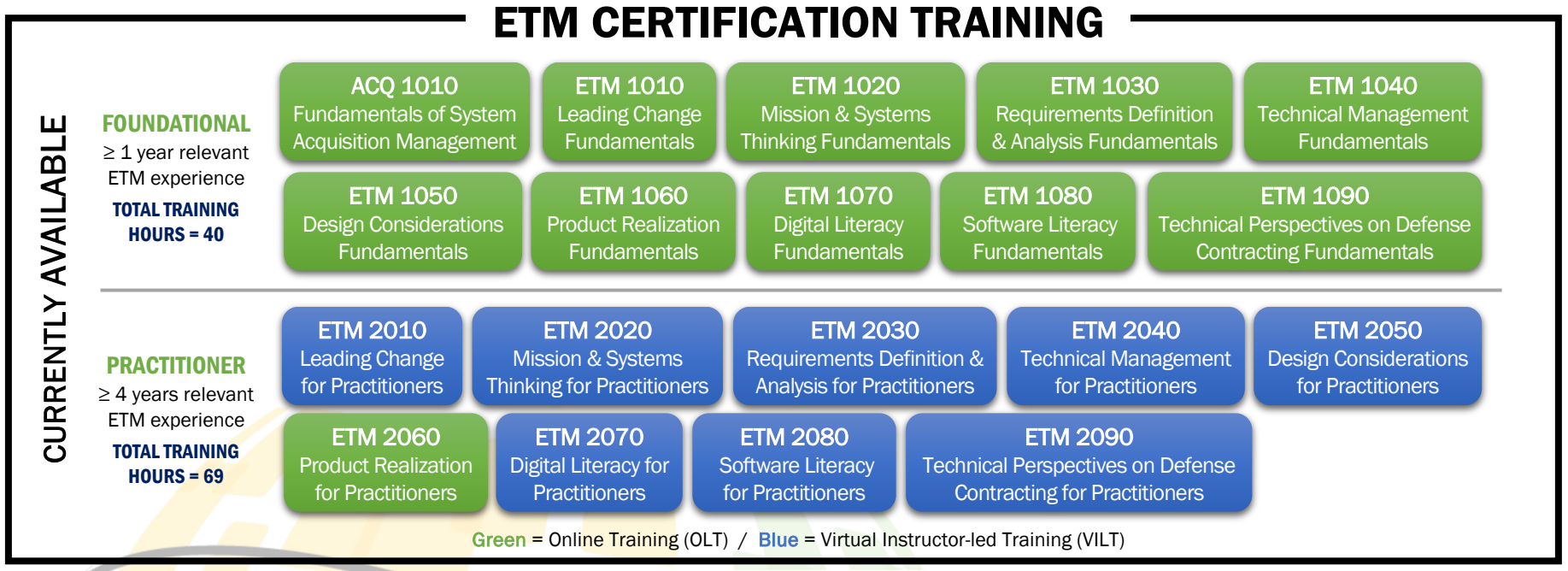
**SPECIALTY LEARNING**
- Learning experiences and credentials, tailored to job performance requirements

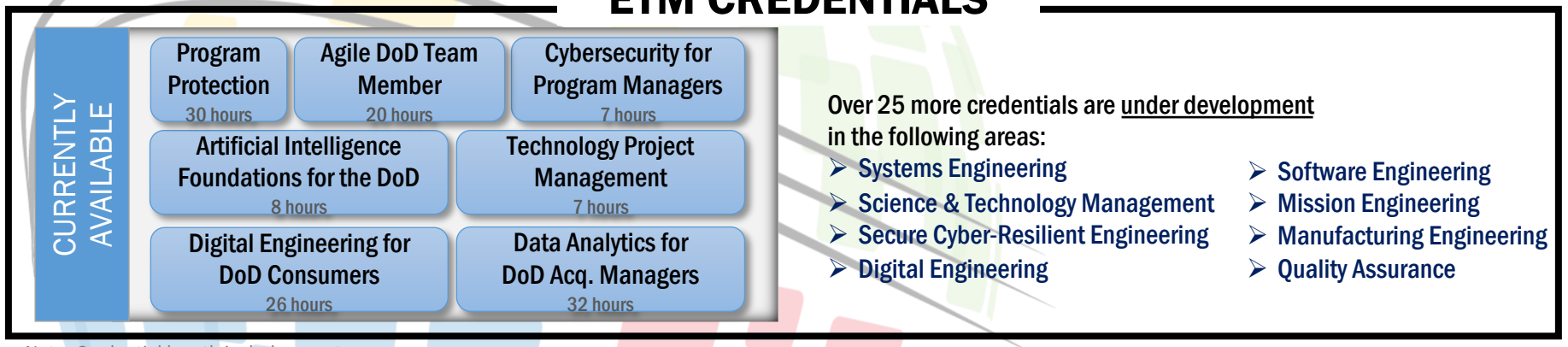
**CURRENCY AND BREADTH**
- Continuous learning for growth and adaptation to dynamic environment
- Learning selected by individual or supervisor
- Powerful tool for change initiatives


Workforce members will:
- ✓ Be competitive for advancement
- ✓ Stay technically competent
- ✓ Dive deeper into specialized and/or cross-functional topics
- ✓ Grow skills for future needs

**Supports lifelong learning and point of need training**

# ETM Certification Training and Credentials



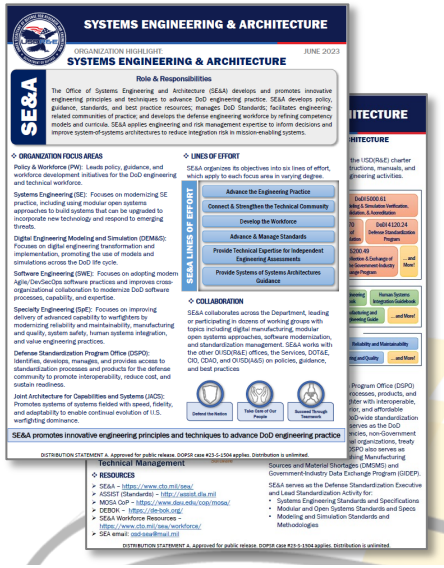




Note: Credential length includes capstone

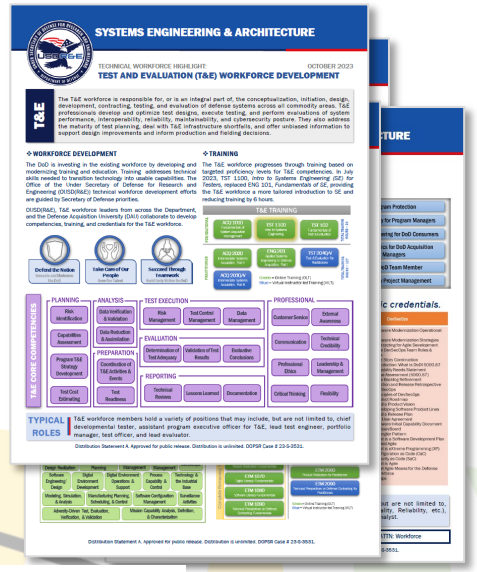
- ~62,900 military and civilian personnel in the ETM workforce.
- ETM training is available to all military and civilian personnel.
- Learning assets for credentials in development are being added weekly – over 80 available!

# Information Sheets

**Systems Engineering & Architecture**

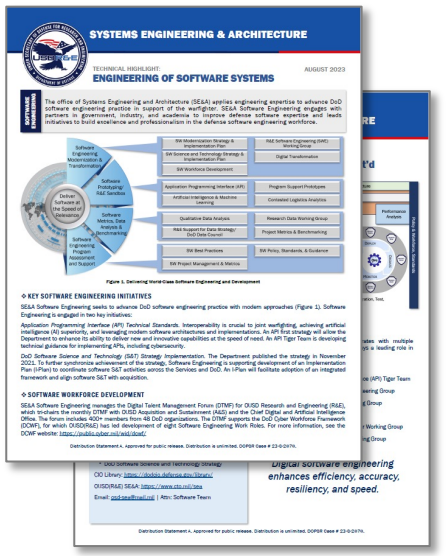



**Workforce Development**




**Engineering of Defense Systems**


**Engineering of Software Systems**




**Application Programming Interface**


***And many more topics, including***:

- *Digital Engineering, Modeling and Simulation*
- *Defense Standardization Program Office*
- *Systems Engineering*
- *Functional Communities*
- *Digital Engineering Instruction*
- *Joint Architectures for Capabilities and Systems*
- *Engineering and Technical Management*
- *Test and Evaluation*
- *Digital Engineering Shift Left*

https://www.cto.mil/sea/info-sheets/

SE&A information sheets provide a summary our major efforts

# MOSA Workforce/Training

- **CLE 019 Modular Open Systems Approach**
  https://www.dau.edu/courses/cle-019
- **DAU Let's Be Modular & Open Webinar Series Media Playlist**
  https://media.dau.edu/playlist/1_8zmclxde
- **Modular Open Systems Approach (MOSA) Awareness and Planning Workshop**
  https://www.dau.edu/courses/wse-027
- **MOSA Learning Asset Playlist**
  https://dau.csod.com/ui/lms-learner-playlist/PlaylistDetails?playlistId=c4ffa7cb-7e78-4400-9c4c-6ec0db2deb94

# Contact

Office of the Under Secretary of Defense for Research and Engineering

osd.r-e.comm@mail.mil

https://www.cto.mil

SE&A – https://www.cto.mil/sea/

DEBOK – https://de-bok.org/

MOSA Community of Practice – https://www.dau.edu/cop/mosa

# For Additional Information


Ms. Nadine Geier
Office of the Under Secretary of Defense
Research and Engineering
nadine.m.geier.civ@mail.mil

Dr. Yvette Rodriguez
yvette.rodriguez@dau.edu

Monique Ofori
monique.f.ofori.ctr@mail.mil


OUSD(R&E) MOSA Information
osd.r-e.comm@mail.mil

Subject: Attn OUSD(R&E) Systems Engineering
https://ac.cto.mil/mosa/

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