Lean Advancement Initiative

Enhancing Systems Engineering Competencies in the Enterprise

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Objective of Presentation

• Communicate the elements of the Engineering Professional Development program for Systems Engineering at Lockheed Martin.
Vision

A comprehensive set of skills and a curriculum that is integrated across disciplines to provide the foundation for engineering professional development and qualification, and enable flexible career paths.

A broad program with multiple components to affect the development of engineers – not just a set of courses
Corporate Technical Learning Council

Role
- Integrates the efforts of all Business Areas and Corporate Organizations involved with technical learning

Function
- Communication and coordination forum
- Promotes teamwork and cooperation

Goals
- Reach more of the workforce
- Improve learning effectiveness
- More effective and motivated workforce
- Higher retention levels
- Greater recruiting discriminators

The CTLC integrates multiple corporate entities previously operating independently on technical learning initiatives
Integration Drivers

- CTLC identified needs and set vision for Engineering Professional Development
  - Need to address eroding technical base and preserve knowledge
- EPD VSM focused on overall strategy for Engineering Professional Development

Objectives
- Same “look and feel”
- Allow identification of common Skills and Training needs
- Promote consistent understanding of concepts, terms, etc.
- Facilitate cost-effective course development via common courses, where applicable
- Framework for common engineering needs along with discipline specific needs

A comprehensive approach to skills integration
Integrated Approach to Address Skills, Training, and Career Path

Innovative Learning Team
- Recommended delivery method(s) for courses

Curriculum Development Teams
- Integrated Curriculum
  - Identifies and defines common courses
  - Includes discipline unique and specialization courses
  - Identifies applicability of courses to disciplines/roles
  - Facilitates greater leverage among disciplines
  - Curriculum includes the following information about each course:
    - Description/abstract
    - Annotated outlines
    - Learning objectives
    - Audience
    - Pre-requisites
    - Level of Course

Course Development Team
- Integrated Curriculum

Career Path Development
- BA/BU Needs & Requirements
- Product & Implementation Plans

BA/BU Interface Team
- Employee interface needs & requirements
- Integrated Skill Set Matrix
  - Single skill architecture
  - Common terminology
  - Column to show application to each discipline/role
  - Allows identification of shared skill requirements

- Integrated Curriculum
  - Single Development/Qualification Guide
    - Single approach
    - Common terminology
    - Appendices for supplemental information for each discipline/role
    - Provides for single communication effort
Engineering Development and Qualification Program (EDQP)

- Framework to develop, verify and recognize the knowledge, experience and capabilities of practicing engineers
  - Establishes common expectation of the specific engineering capabilities
  - Facilitates technical development and career path planning of engineers (including those new to the discipline)
  - Defines capabilities and experiences for use by HR & leaders to develop staffing plans/execute staffing
- Builds on documented skills and curriculum
- Includes multiple stages of development
Key EDQP Concepts

Define Role

Create a Tailorable Framework

Identify L&D Direction

Encourage Individual Responsibility for Development

Provide Enabling Resources

Aligning Individual Career Goals with Business Needs
Key EDQP Elements

Experience/OJT
- Discipline & domain
- Successful demonstration of skills

Training/Education
- Consistent foundation knowledge per curriculum

Coaching
- First receiving coaching
- Later providing coaching

Mentoring
- First as Mentee
- Later as Mentor

Basis of Qual Criteria

Skills Portfolio
(Competencies)

Qualification Stage
Criteria per Role

Assessment

Con-Ops & Review Board

BA/BUs Implement Tailored Program

Sustainment

Acknowledgement of Qualification Rating

A Systematic Personnel Development Approach
EDQP Development Con-ops

1 – Explore Options

2 – Evaluate Self-Assessment

3 – Assess Capabilities

4 – Validate Assessment & Feedback

5 – Create Dev Plan

6 – Perform L&D Activities

Career Development Plan

Individual Assessment

Coach

Employee

Mentor

Leader
EDQP Stages of Acknowledgement

• Candidate
  – Interest in career in the subject discipline, but experience or skill level requirements for qualification not yet met.
  – Application for EDQP of the subject discipline has been accepted.
  – Formalizes career development intent and planning.
  – Pre-requisites achieved per documented requirements (in 270-17).

• Qualified
  – An individual who has met or exceeds the criteria specified for the Qualified Stage in the specific discipline.
  – The minimum common criteria to attain the designation of “Qualified” is documented for each discipline in the appendices of 270-17.
  – The business unit may include additional criteria (e.g., to address domain or business unit specific needs) in their implementation of the program.

• Advanced
  – An individual who has met or exceeds the criteria specified for the Advanced stage in the specific discipline.
  – The minimum common criteria to attain the designation of “Advanced” is documented for each discipline in the appendices of 270-17.
  – The business unit may include additional criteria (e.g., to address domain or business unit specific needs) in their implementation of the program.
Ordered progression through the stages is expected but not required.

Amount of relevant experience for each stage varies by role. Generally, 5-10 years for Qualified stage and an additional 3-5 years for advanced stage.

Existing employees and new hires can be assessed at any point in their career.
Other Information in EDQP

- **EDQP Concept of Operations**
- **Eligibility**
  - Open to all, except where pre-requisites are noted
- **Successful completion of training**
  - Testing is on course-by-course basis per learning objectives
- **Request for Acceptance of Equivalent Learning or Development**
  - No blanket waivers or grandfathering
  - Provide rationale for equivalency with objective evidence
- **Reciprocity**
  - Accepted by receiving BU
  - Employee responsible to obtain domain skills per BU needs
- **Renewal**
  - Business Unit decision
  - Typically 3-5 years with additional learning and experience requirements
Skill Set Matrix

- Documents the skills required for given disciplines or roles
- Includes skill categories, skill sets, skills, sub-skills and appropriate classifications
  - *Skill Category* – High-level grouping of skill sets based on general focus
  - *Skill Set* – A set of skills that are related to a key objective.
  - *Skill* - Aptitude required for the performance of a process or life cycle activity.
  - *Sub-skill* - One of lower level multiple aptitudes required to perform a skill.
- Skill Sets, Skills, and Subskills are defined the discipline team for each skill category

Skills provide the basis for curriculum and development
Common Skill Categories

- **Process**
  - Common skills apply to all disciplines
  - Addresses organizational standard processes, standards, and tools

- **Technical**
  - Focused on the technical engineering processes through the life cycle

- **Application/Domain/Environment (BU Specific)**
  - Skills specific to the business unit domain areas

- **Personal Development**
  - Common set established by CTLC for all disciplines
  - Focused on the interpersonal, communication, efficiency and effectiveness, and team skills

- **Management**
  - Focused on the project management processes through the life cycle
Curriculum Development

- Derived from the skills to provide the educational component of building the skills

Curriculum is based on defined skills; yet flexible manner to allow leveraging technology in a consistent, self-paced to provide common emphasis on e-learning/self-paced to provide consistent training to larger audiences

Courses included in the curriculum are independent of any existing course offerings

- Maintains a mapping of skills to adequate coverage and support trades/impact analysis
- “Notional” course outline used to:
  - Evaluate existing courses (internal and external)
  - Establish requirements for development of new courses
  - Define what needs to be in a course to meet the LMC skill requirements
Course Types

• Essential (Foundation) courses
  – Technical knowledge in a discipline needed for fundamental tasks.

• Enhancement (Supplemental) courses
  – More in-depth technical knowledge needed for more advanced tasks.

• Specialization courses
  – Technical knowledge in required only for specialized assignments in that discipline.

• Inter-discipline courses
  – Address skills in one discipline that are beneficial for successful performance in other disciplines.

• Personal Development courses
  – Address skills that enhance general professional effectiveness.

• Domain/BU Specific courses
  – Defined by the BU to meet unique needs
System Engineer and Architect Development

Chief SE/Arch

The same approach is being developed for SWE & SWA

Advanced SE

LMC SE Development/Qualification Program (In place in many BUs)

SE Skills
SE Curriculum
SE Dev/Qualification Program

Qualified SE

Candidate SE

Candidate SA

Advanced SA

Qualified SA

LMC SA Development/Qualification Program (Piloting)

SA Skills
SA Curriculum
SA Dev/Qualification Program

Career Dev. Plan – based on qualification criteria – update periodically

The same approach is being developed for SWE & SWA

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Continuous Improvement

• Alignment with SE competency models
  – Influence, learn from and align with efforts across industry (e.g., NDIA, UARC, INCOSE)

• Refine/improve over time
  – Monitor changes in technology, customer needs, and advancements in learning approaches
  – Incorporate lessons learned
QUESTIONS?