Headquarters U.S. Air Force

I n t e g r i t y - S e r v i c e - E x c e l l e n c e

US Air Force Engineering Enterprise Update – Responding to SecAF Challenge

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- **Background**

- **AF EE Strategic Plan Summary**

- **NDIA Top SE Issues**

- **Better Buying Power 3.0 (DRAFT)**

- **FY14 Significant Accomplishments**
  - **AF Technical Authority**
  - **Cost Capability Analysis Decision Framework**
  - **AF EE Knowledge Management**
  - **AF EE Competency Taxonomy**

- **FY15 Way Forward**

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- **Problem: The AF Engineering Enterprise does not adequately meet today's life cycle engineering expectations**

- **SECAF Challenge: "Go Fix Engineering"**

- **Challenge addressed:**

AIR FORCE ENGINEERING ENTERPRISE STRATEGIC PLAN 2014 - 2024
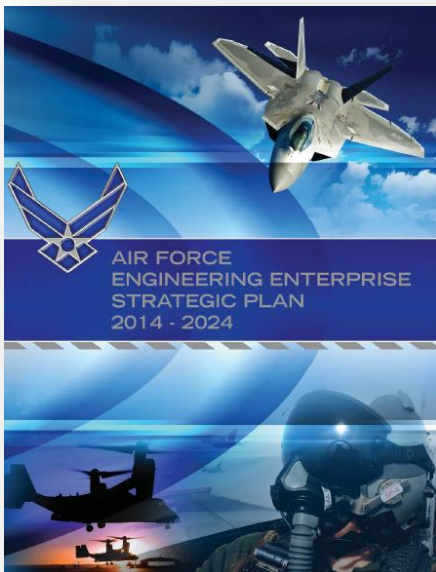
VISION
To be a focused Engineering Enterprise with a culture of discipline and agility that enables warfighter success

MISSION
Provide superior technical expertise to plan, acquire, & sustain dominant warfighting capability through an efficient, effective and innovative Engineering Enterprise.

AF EE Strategic Plan Summary
(Priority Champions)

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❶ Dr. Tom Christian
SAF/AQ
- Standardize Roles & Responsibilities
- Focus EE Policy & Processes

Ms. Susan Thornton ❷
HQ AFMC/EN
- Establish Engineering Decision Framework
- Develop Analytic Foundation
- Effectively Communicate across EE

Priority 1
Refine EE Roles, Responsibilities, & Policy

Priority 2
Enable high-quality decisions & seamless communication

Revitalizing the Engineering Enterprise

Priority 3
Improve Technical Info Management & Standardization

Priority 4
Improve technical workforce and address competency gaps

❸ Mr. Kevin Stamey,
AFLCMC/EN-EZ
- Formalize Technical Info Management
- Develop Specs & Stds Management Plan
- Create AF Knowledge Management Capability

Mr. George Mooney ❹
AFLCMC/EN-EZ
- Develop AF EE Core Competencies
- Refine EE Staffing
- Focus Workforce development

NDIA Top SE Issues
(as per NDIA-paraphrased)

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2006 Issues	#	2010 Issues
①② SE not consistently applied across all phases of the program life cycle.	1	Demands of the warfighter are requiring effective capabilities to be fielded more rapidly ②③
①② Insufficient SE is applied early in the program life cycle.	2	The quantity and quality of Systems Engineering expertise is insufficient. ①④
①②③ Requirements are not always well-managed.	3	SE not consistently applied or properly resourced to enable early system definition. ①②
④ The quantity and quality of systems engineering expertise is insufficient.	4	Technical decision makers do not have the right information & insight at the right time. ①②③
③ Collaborative environments, including SE tools, are inadequate.	5	Lack of technical authority can impact the integrity of developed system. ①②

"Top Systems Engineering Issues in US Defense Industry," NDIA SE Division Task Group Report, September 2010

Integrity - Service - Excellence

Better Buying Power 3.0 DRAFT

Achieving Dominant Capabilities through Technical Excellence and Innovation

Achieve Affordable Programs ① ② ③
- ① Continue to set and enforce affordability caps

Achieve Dominant Capabilities While Controlling Lifecycle Costs ② ③
- • Strengthen and expand "should cost" based cost management
- ① ② Build stronger partnerships between the acquisition, requirements, and intelligence communities
- ② Anticipate and plan for responsive and emerging threats
- • Institutionalize stronger DoD level Long Range R&D Planning

Incentivize Productivity in Industry and Government ① ② ③
- • Align profitability more tightly with Department goals
- ③ Employ appropriate contract types, but increase the use of incentive type contracts
- ③ Expand the superior supplier incentive program across DoD
- ③ Increase effective use of Performance-Based Logistics
- ② ③ Remove barriers to commercial technology utilization
- • Improve the return on investment in DoD laboratories
- • Increase the productivity of IRAD and CR&D

Incentivize Innovation in Industry and Government ②
- ② Increase the use of prototyping and experimentation
- ② Emphasize technology insertion and refresh in program planning
- ② Use Modular Open Systems Architecture to stimulate innovation
- • Increase the return on Small Business Innovation Research (SBIR)
- ② Provide draft technical requirements to industry early and involve industry in funded concept definition to support requirements definition
- ② Provide clear "best value" definitions so industry can propose and DoD can choose wisely

Eliminate Unproductive Processes and Bureaucracy ① ② ③
- ① ② Emphasize Acquisition Executive, Program Executive Officer and Program Manager responsibility, authority, and accountability
- ① ② Reduce cycle times while ensuring sound investments
- ① ② ③ Streamline documentation requirements and staff reviews

Promote Effective Competition ① ②
- • Create and maintain competitive environments
- • Improve technology search and outreach in global markets

Improve Tradecraft in Acquisition of Services ① ② ③
- ② Increase small business participation, including more effective use of market research
- • Strengthen contract management outside the normal acquisition chain
- ① ② Improve requirements definition
- ② ③ Improve the effectiveness and productivity of contracted engineering and technical services

Improve the Professionalism of the Total Acquisition Workforce ① ② ③ ④
- ④ Establish higher standards for key leadership positions
- ④ Establish stronger professional qualification requirements for all acquisition specialties
- ② ④ Strengthen organic engineering capabilities
- ② ④ Ensure the DOD leadership for development programs is technically qualified to manage R&D activities
- ① ② ③ ④ Improve our leaders' ability to understand and mitigate technical risk
- ④ Increase DoD support for Science, Technology, Engineering and Mathematics (STEM) education

Continue Strengthening Our Culture of:
Cost Consciousness, Professionalism, and Technical Excellence

FY 14 Significant Accomplishments
(Concurrent Execution)

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- ① Defined Engineering Enterprise (EE)
- ① Addressed AFI 63-101 from EE perspective (to include IC1 & 2)
- ① **Defined AF Technical Authority***
- ① Identified highest priority interim EE policy gaps in AFI10-601
- ② **Synchronized Cost Capability work within context of EEEC construct***
- ② Staffed Analysis & Assessment CBA
- ② Supported AF ISR Task & Global Horizons
- ③ Updated AF Defense Standardization Program (DSP) policy documents
- ③ Performed AF Standardization Program gap analysis
- ③ **Established initial Engineering Knowledge Management (EKM) capability***
- ③ Launched AF Engineering Resource Center portal
- ③ Published AF Systems Engineering Assessment Model (SEAM) 3.0
- ④ Gathered EE competency taxonomies from all Centers
- ④ **Developing common AF EE competency taxonomy***
- ④ Created local Resource Boards at locations w/ multiple units
- ④ Expanded HQ AFMC/EN Functional Management tenets to SMC

* More detail on next charts

❶ AF Technical Authority

Air Force Technical Authority is responsible for engineering policy, guidance, enterprise structure and processes. Technical Authority provides programs with unbiased, independent overview and support. Technical Authority is implemented through Air Force Chief Engineer, SAF/AQR.

- **Accomplishments**
  - **Policy updates completed**
  - **Lines of communication established**
    - **Programs discuss/brief AQR for TRA approval & prior to ASPs, AFRBs & CSBs**
    - **AQ-DOE Roundtable**
  - **Draft Delegation Letter – expectations**
    - **Center ENs & SME support to nine principal program technical reviews**

- **Way ahead**
  - **Implement delegated responsibilities**
  - **Streamline support to OSD PSAs**

HAF MISSION DIRECTIVE 1-10

Technical Authority Memo

AFI 63-101-101/20-101

Technical Delegation Letter

DRAFT

# ❷ Cost Capability Analysis/ Decision Framework

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Cost Capability Analysis is a multi-objective decision analysis using cost and military utility to define trade space between cost and warfighting capabilities to inform affordability decisions.

■ Accomplishments

- **Identified 12 distinct requirements & acquisition decision points across lifecycle**
- **Developed framework list of questions**
- **Briefed AFMC/CC, SAF/AQ, & AFROC**
- **Determined need for early integrated review to synchronize requirements & cost/budget**

■ Way ahead

- **Update requirements & acquisition forum templates for CCA**
- **Obtain AF approval for early review**
- **Develop AF CCA handbook & standardize**

Why an Early Integrated Requirements & Acquisition Review is needed
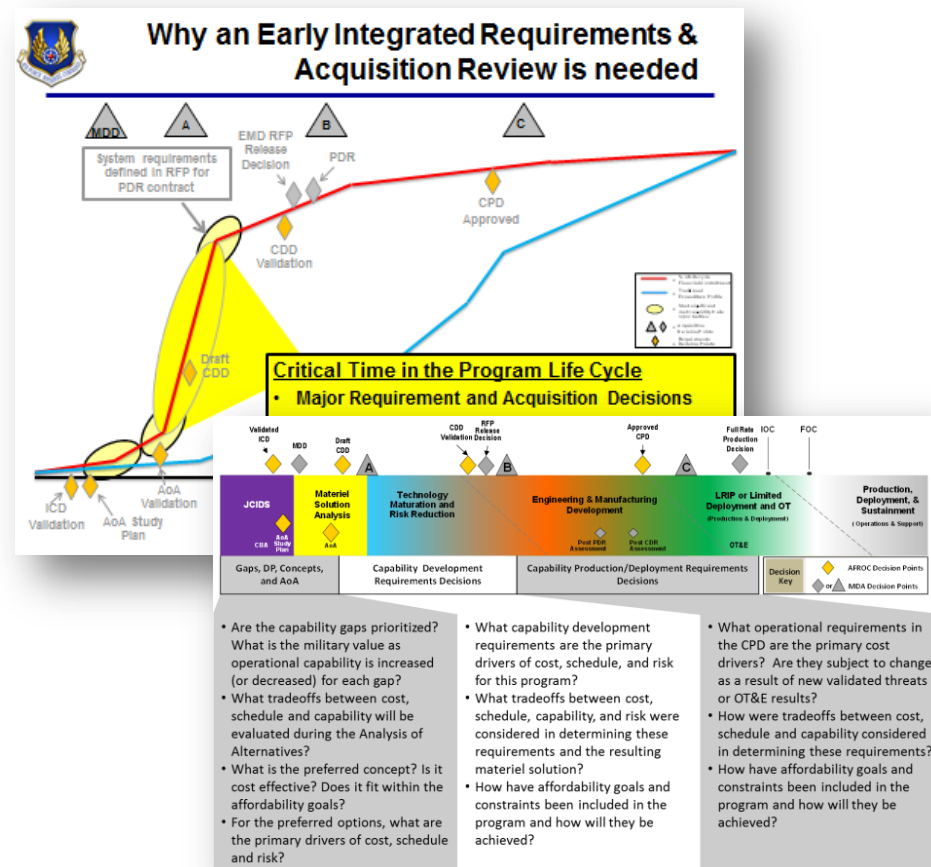
③ AF EE Knowledge Management

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> *A web enabled engineering knowledge management capability that allows the AF engineering workforce to disseminate, access, and store information while providing a team building and collaboration resource.*

- **Accomplishments**
  - **Established an initial capability**
    - **using mil-Suite and AF SharePoint**
  - **Launched AF Engineering Resource Center**
  - **Establishing customer 'on-line' presence**
    - **ATTLA; AF R&M WG;**
    - **Lead Free Solder WG; AF EKM**
  - **Published AF Systems Engineering Assessment Model (SEAM) 3.0**

- **Way ahead**
  - **Develop EKM training material**
  - **Develop AF SE Tools Inventory site**
  - **Establish and track metrics**

Integrity - Service - Excellence

> **Common template for use across all AF Centers as each creates their respective competency taxonomy. Initial step in managing an AF Technical Competency Taxonomy to increase leadership insight into all workforce strengths, weaknesses, and gaps**

- **Accomplishments**
  - **Developed three-level hierarchy**
  - **Developed a six-level Proficiency Model – mapping to OSD DCAT**

- **Way ahead**
  - **Ensure continued alignment with OSD Strategic Workforce Plan**
  - **Develop Center-Level taxonomies consistent with template**
  - **Characterize EE workforce skills/requirements/gaps**
  - **Data-driven EE workforce decisions**

Domain	Technical Competency	Technical Discipline
Domain 1	Technical Competency 1.1	Technical Discipline 1.1.1
		Technical Discipline 1.1.2
		Technical Discipline 1.1.n
	Technical Competency 1.2	Technical Discipline 1.2.1
	Techn	
Domain 'n'	Techn	
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Proposed AF Proficiency MODEL

Proficiency Levels	Title	Proficiency Level Characteristics
Level 0	Undeclared	No skill level declared for this technical discipline/competency
Level 1	Awareness	• Initial familiarity in specific area; very limited experience • Applies the competency in the simplest situations • Requires extensive guidance
Level 2	Basic	• Applies standard techniques to perform moderately complex tasks • Applies the competency in somewhat difficult situations • Requires frequent guidance
Level 3	Intermediate	• Applies and adapts standard techniques to perform complex tasks • Applies the competency in difficult situations • Requires occasional guidance
Level 4	Advanced	• Independently applies and adapts standard techniques to perform complex tasks • Applies the competency in considerably difficult situations • Requires minimal guidance
Level 5	Expert	• Uses creativity, foresight and mature judgment in anticipating and solving unprecedented problems • Applies competency in exceptionally difficult situations • Serves as a key resource and advises others
Identifier	Prior Basic Prior Intermediate Prior Advanced Prior Expert	Was previously Basic, Intermediate, Advanced or Expert level, but is not currently active in the field

Note: Competency managers will further define the qualifications/requirements.

FY15 Way Forward

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1. **Develop EE policy/process architecture**
1. **Publish description of AF EE Policy Working Group process**
1. **Implement Technical Authority**
2. **Develop plan to incorporate reviews and checklists into policy/processes**
2. **Develop Analysis & Assessment (A&A) governance structure/processes**
2. **Begin development of strategy to close identified A&A gaps**
3. **Document tech information management responsibilities**
3. **Develop a management plan for AF portfolio of specification and standards**
3. **Establish AF Defense Standardization Program Health Metrics**
3. **Post EKM training requirements to AF ERC Training Library**
3. **Develop and release AF ERC Engineering Tools Index**
4. **Establish requirements for proficiency levels for each Center Technical Discipline**
4. **Perform Technical Competency gap analysis**
4. **Develop metrics to assess whether Core Competency Management (CCM) system is achieving goals and meeting requirements**

QUESTIONS

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- **Text: During the 16th Annual NDIA Systems Engineering Conference Chief Systems Engineers Panel, Dr. Thomas Christian, Associate Deputy Assistant Secretary of the Air Force for Science, Technology & Engineering, announced an Air Force (AF) strategic effort being undertaken to revitalize the AF Engineering Enterprise (EE). The AF EE Revitalization effort was initiated at the direction of AF senior engineering leadership from SAF/AQ, HQ AFMC, and HQ AFSPC in response to the SecAF's charge to improve the execution of engineering responsibilities within the AF. This presentation will lay out the problem, as presented by SecAF and highlighted in many of the "Top Systems Engineering Issues in DoD and Defense Industry" (ref. NDIA reports from 2003, 2006, & 2010). The presentation will demonstrate how the effort has focused on addressing the major challenges of a fast-changing warfighting environment amid today's fiscal realities by charting a course for the EE to better serve AF programs. To do this, the presentation will review the Air Force Engineering Enterprise Strategic Plan for 2014-2024 signed by the SecAF and CSAF, May 2014. This review will include discussion related to the newly established AF EE vision, mission, improvement initiative priorities, planning model, and governance structure. The engineering and technical management staff across the AF is already engaged in making the EE vision a reality. The presentation will conclude with a summary of early successes, current status, and the way forward towards addressing the priorities laid out in the strategic plan.**

- **ADDITIONAL INFORMATION**
  - **Conference Session Targeted: Systems Engineering Effectiveness**
  - **Time Block Requested: 30 min (20 min Presentation plus 10 min Q&A)**
  - **Related Conference Sessions: Best Practices and Standardization, SE Workforce Development, Education & Training, Continued Implications of Weapon Systems Acquisition Reform Act of 2009, and Early Development Planning**

- **(PRESENTER) Ms. Susan J. Thornton**, a member of the Senior Executive Service, is Director of Engineering and Technical Management, Headquarters Air Force Materiel Command, Wright-Patterson Air Force Base, Ohio. Ms. Thornton is the Senior Technical Advisor to the Commander in support of the command's mission to deliver war-winning technology, acquisition, test and sustainment expeditionary capabilities to the warfighter. She leads the development and implementation of engineering policies and practices spanning science and technology, research, development, test and evaluation, sustainment focused on achieving fleet operational safety, suitability and effectiveness. Ms. Thornton also directs development of new initiatives designed to improve the recruitment and career management of the command's 12,000 military and civilian scientists and engineers.

- **Mr. Darrell K. Phillipson**, GS-15, is the Chief of Systems Engineering, Air Force Material Command, responsible for developing and implementing systems engineering policies, processes, tools and training to enable effective and efficient life-cycle management. He is also responsible to develop and support MAJCOM-level Defense Standardization Program (DSP) policies, procedures, and staffing to support the timely and efficient management of technical requirements and associated verification techniques used by DoD/AF programs.

- **Colonel Fred P. Baier** is the Chief, Engineering Management Division, Office of the Deputy Assistant Secretary of the Air Force (Science, Technology and Engineering), responsible for supporting the Service Acquisition Executive and advising the Deputy Assistant Secretary (Science, Technology and Engineering), SAF/AQR, on all Air Force engineering policy, plans and workforce matters. He also directs technology assessments of major acquisition programs.

- **Mr. Nick K. Awwad**, GG-15, is the Chief of Systems Engineering, Space and Missile Systems Center, Air Force Space Command, responsible to the SMC Commander for the quality of all systems engineering, test and evaluation, and technical activities for military space and missile programs. He provides the Center Commander, Program Offices, Program Executive Officers and external customers with systems engineering support for military and civilian space and missile engineers executing $8 billion annually.

- **Dr. Thomas F. Christian**, a member of the Senior Executive Service, is the Associate Deputy Assistant Secretary of the Air Force (Science, Technology and Engineering), responsible for assisting the DAS(ST&E) in development and formulation of Air Force Science, Technology, and Engineering strategy and policy spanning systems engineering; environmental safety and occupational health; industrial preparedness; and functional management of more than 14,000 military and civilian scientists and engineers.

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