

# ***Headquarters U.S. Air Force***

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*Integrity - Service - Excellence*

## **Systems Engineering and Test & Evaluation Engagement**

**3 March 2010  
Col Shawn Shanley  
SAF/AQR**

**Year of the Air Force  
Family**





# *Common Themes*

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- **Change the way we think about requirements – upfront SE and T&E participation required**
- **Perception test done after the fact, temptation to skip T&E – T&E voice in Development Planning activity Pre-MS A insufficient**
- **Get involved much earlier; address concepts/solutions to ensure requirements unambiguous, testable, feasible, realistic, & measurable**
- **Address not just system under test, but system of systems for effectiveness**
- **Collaboration with acquisition community and processes must be early to influence strategies/plans; don't forget about reliability growth, info assurance, sustainment test needs**
- **Show DP & PMs value T&E can bring “be part of solution” – end of cycle too late; ensure right people/right skills represent T&E**



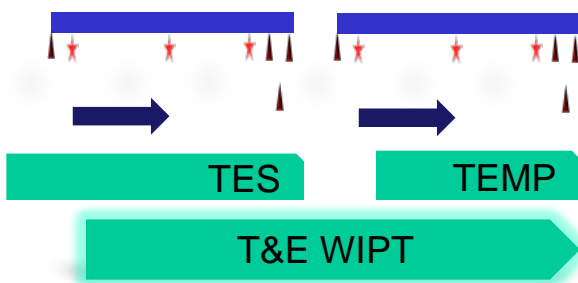
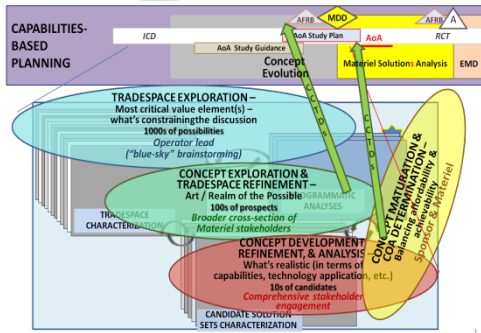
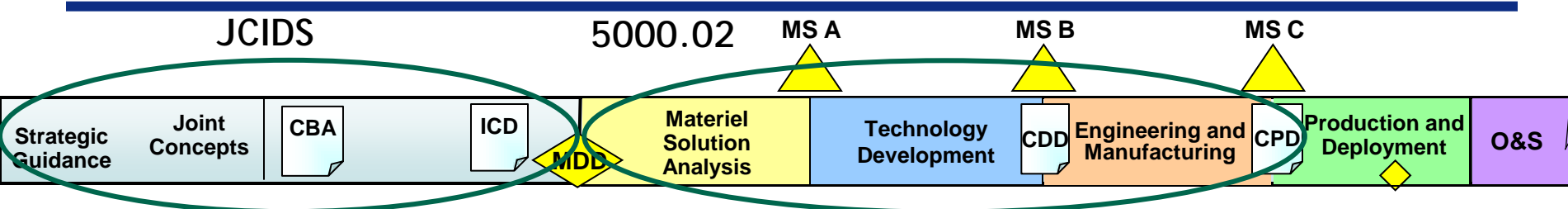
# **Main Theme: “Upfront, Early, & Collaborative” Engagement**

- **WSARA of 2009 mandates D,SE and D,DT&E collaboration**
  - AF response addressed SE & DT&E strengths & weaknesses
- **AF has 2 key initiatives to provide for the influences of these functional disciplines earlier in lifecycle**
  1. **Development Planning (DP) Process**
    - Concept Characterization & Technical Description (CCTD)
  2. **Air Force Program Support Review (AF PSR)**
    - Independent Tech Assessment for MDAP milestone reviews
- **Institutionalizing in policy and directive guidance**
  - Major 62 series (SE) policy and guidance development effort

**T&E Influences/Integration with SE are in AF Thrust Areas**



# Early SE and T&E



**Earlier Involvement**

**Development Planning Process**

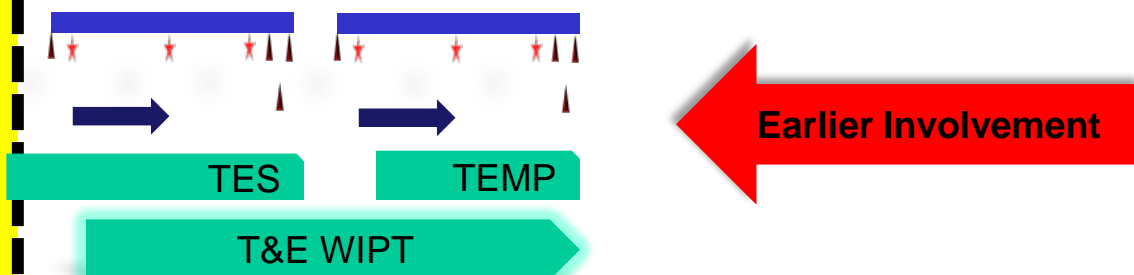
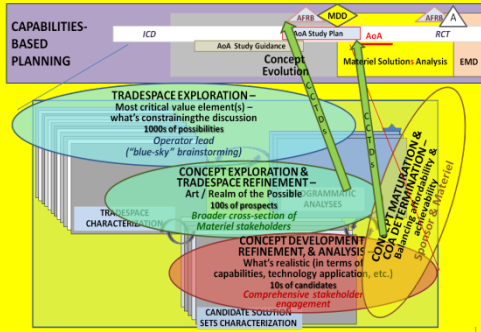
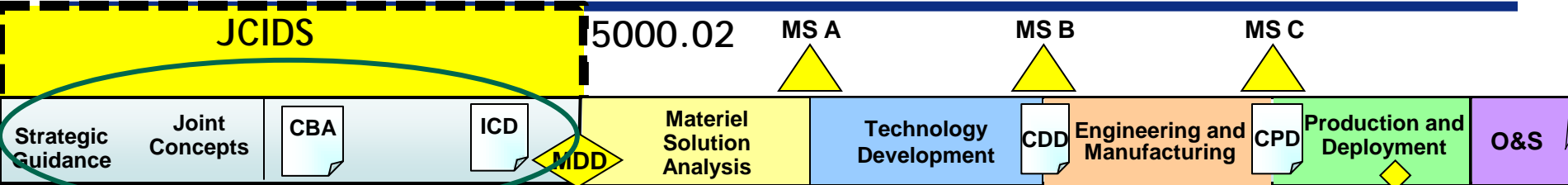
**AF Program Support Review Process (AF PSR)**

- T&E Engagement**
- Concept/Solution selection influence
  - SEP influence
  - TES and TEMP influence
  - T&E risk assessment
  - DT&E execution planning
  - TRL data evaluation

- T&E Engagement**
- T&E consideration during program formulation
  - Assessment of Operational Test Readiness
  - TEMP focus on risk assessment criteria
  - Technology maturity and integration risk
  - Independent DT assessment to MDA
  - TEMP and SEP criteria
  - Integrated Test



# Early SE and T&E in Development Planning



## Development Planning Process

## AF Program Support Review Process (AF PSR)

- ### T&E Engagement
- Concept/Solution selection influence
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# Development Planning SE Process: T&E Engagement

## Capability Planning (DOTMLPF)

## Development Planning (prospective materiel solutions)

MSA

ICD  
DCR

AoA Study  
Guidance

MDD

AoA

User Needs &  
Validated  
Requirements

- JCIDS outputs (if available)
- Capability shortfall
- Others

JROC  
AFROC

JROC  
AFROC

Trade Space  
Characterization

CCTDs

Release  
Approval

Final  
Concepts  
Review

Programmatic  
Analyses

Candidate  
Solution Sets  
Selection

Concept  
Characterization  
Review

Initial  
Concepts  
Review

Candidate Solution Sets  
Characterization



# Concept Characterization & Technical Description (CCTD) Elements

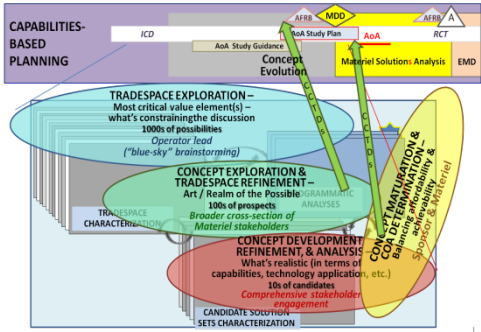
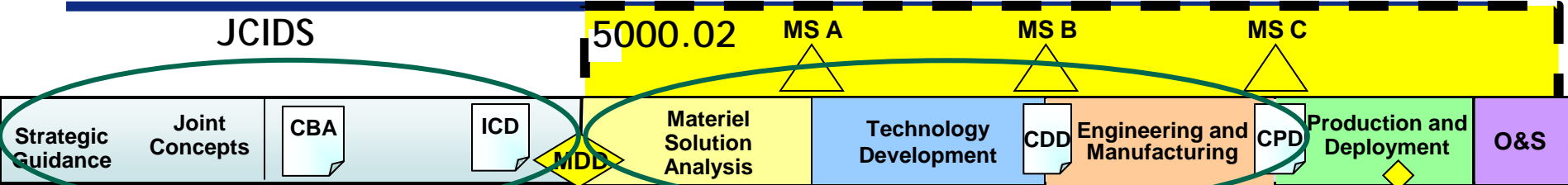
- Mission / Capability Need Statement / CONOPS
- Concept Overview
- Trade Space Definition / Characterization
- Studies, Analyses, Experiments
- Concept Characterization / Design
- Program Characterization
- Risk Assessment
- DOTMLPF Implications
- Conclusions (Capability Description; Traceability to Need Statement)

A diagram showing a light blue cloud with a dark blue outline. Five lightning bolt icons, also in light blue with dark blue outlines, point from the list items 'Studies, Analyses, Experiments', 'Concept Characterization / Design', 'Program Characterization', 'Risk Assessment', and 'DOTMLPF Implications' towards the cloud.

Major opportunities for early T&E program influence



# SE and T&E in AF Program Support Review



## Development Planning Process

## AF Program Support Review Process (AF PSR)

- ### T&E Engagement
- Concept/Solution selection influence
  - SEP influence
  - TES and TEMP influence
  - T&E risk assessment
  - DT&E execution planning
  - TRL data evaluation

- ### T&E Engagement
- T&E consideration during program formulation
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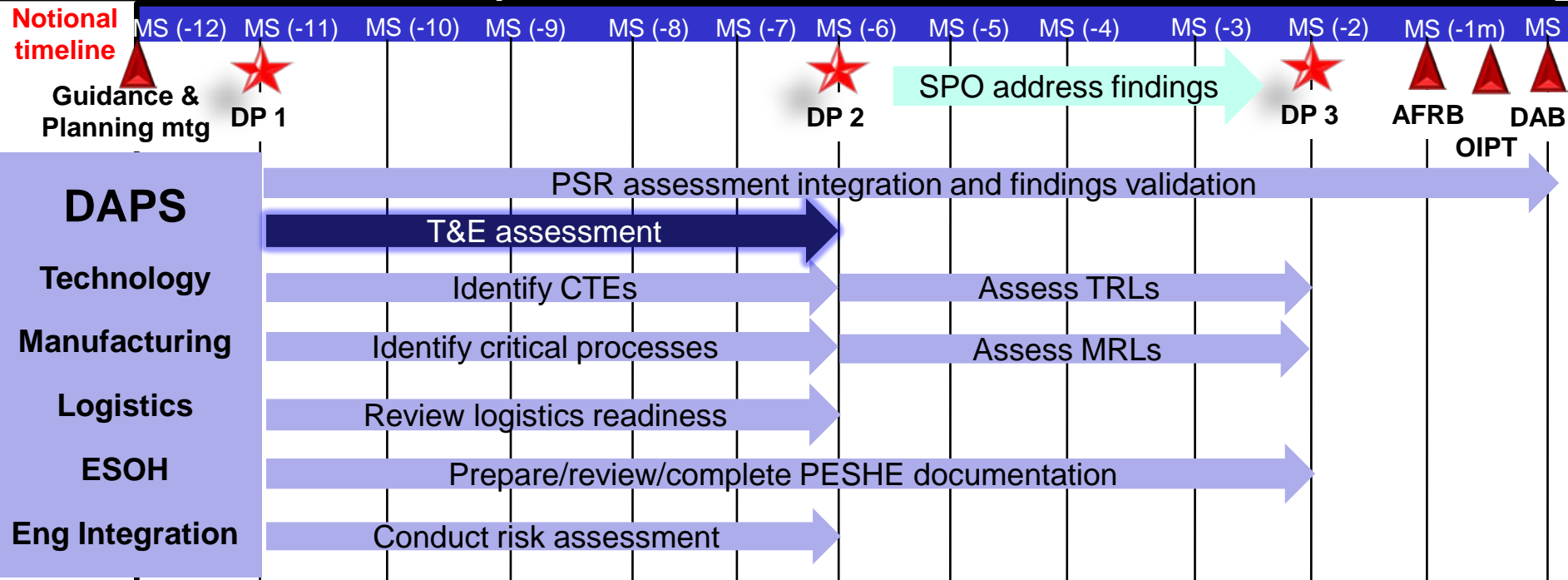


# Program Support Review

**DP #1—Organize, train, equip**  
 -Mentor/advise program office  
 -TRA: ID independent rw team  
 -Early risk identification  
 -Gain program understanding

**DP #2—Provide early status**  
 -Provide preliminary report to PM  
 -TRA: approve CTEs  
 -Address risks  
 -Cross flow information

**DP #3—Finalize products**  
 -Out brief findings to PM  
 -TRA: approve TRLs  
 -Capture open risks  
 -Complete MS deliverables



**Early technical engagement to seamlessly mentor & advise, and independently assess & capture risks...so PMs can act**



# *Institutionalizing—Policy & Guidance*

## ■ AFPDs

- 61-1 Management of Science and Technology (SAF/AQR) \*
- **62-1 Engineering (SAF/AQR) \***
- 63-1/20-1 Acquisition & Sustainment Life Cycle Management (SAF/AQX)

## ■ AFIs

- 10-601 Operational Capability Requirements (AF/A5R) \*\*
- 61-xx Research and Development (SAF/AQR) \*
- **62-1xx Life Cycle Engineering (SAF/AQR) \***
- 63-101 Acquisition & Sustainment Life Cycle Management (SAF/AQX) \*\*

## ■ Non-directive Guidance

- AFPAM 63-128 Acquisition & Sustainment (SAF/AQX)
- **Early Systems Engineering Guide (SAF/AQRE) \***
- **Development Planning Guide (AFMC/A5C) \***
- **CCTD Guide (SAF/AQRE, AFIT/SY (Center for Systems Engineering)) \***
- **AF PSR Guide (SAF/AQRE, AFMC/EN, Center ENs, SMC/EA)**

Coordinated with 99 Series,  
T&E policy

\* - update or first issuance in CY10  
\*\* - update currently in coordination



- **Resources, resources, resources – People, TDY, Time, Funding?**
- **Discipline and stability in processes developed – will we violate them?**
- **Trend towards quicker/urgent fielding, quick capability delivery – short cuts likely inconsistent with discipline seeking**
- **Will T&E organizations set early engagement as a priority – dedicate seasoned testers to early lifecycle planning phases?**
- **Trade offs between what is enough testing and appropriate cost for programs?**
- **Do services begin to POM for this early T&E engagement, specifically for Pre-MS A activity?**
- **Develop the people, need strategic plan to attract right skills/train workforce we have?**



- **Development Planning (DP) Process & Air Force Program Support Review (AF PSR) Process support “upfront , early, & collaborative” involvement of SE & T&E in acquisition**
- **Properly considered T&E requirements planning & influences on concept/solution selections Pre-MDD & follow on acquisition program development strategies Post-MDD will result in improved program execution & validation**
- **Standardized processes and products are being developed and institutionalized in policy and directive guidance**
  - Major 62 series (SE) policy and guidance development effort
  - Coordinated w/ 99 series (T&E) policy



U.S. AIR FORCE

# Air Force Acquisitions



*Integrity - Service - Excellence*