AFSO21 / D&SWS / Tech Development:

High Confidence Technology Transition Planning Through the Use of Stage-Gates (TD-13)

26 Sep 08

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Mr. George Sarmiento, PMP, HQ AFMC/A5S
Overview

- D&SWS – An Air Force Core Process
- Technology Development (TD) Core Sub-Process
  - The Problem – Our Solution
- Introduction to TD-13
  - What are we doing that is new
- Products of the initiative
  - User Guide
  - Automated Tool – TurboTPMM
- Schedule
- Summary/Way Ahead
AFSO21/D&SWS is Part of the Answer

Funding Our Priorities

“We will fund transformation through ... organizational efficiencies, process efficiencies, reduction of legacy systems and manpower while sustaining GWOT and ongoing operations in support of the Joint Fight.”

- Michael W. Wynne, SECAF

The Status Quo is Out

AFSO21

-- The USAF will do less with less
-- Do what is valued by our customers
-- Employ tools and techniques smartly to reduce waste and non-value-added work, to maximize value to the warriors

Develop and Sustain Warfighting Systems (D&SWS)
SECAF / CSAF Approved
Air Force Process Owners

Governing

Plan/Execute Strategic Initiatives
Gen Paul Hester
PACAF/CC
Lt Gen Norman Seip
12AF/CC

Manage Programs and Processes
Lt Gen Craig McKinley
ANG/DIR
Mr. David Tillotson
SAF/XC

Lead Co-Lead

Core
Develop Warfighters
Gen William Looney
AETC/CC
Lt Gen Roger Brady
AF/A1

Develop and Sustain Warfighting Systems
Gen Bruce Carlson
AFMC/CC
Lt Gen Donald Hoffman
SAF/AQ

Deploy
Gen Duncan McNabb
AMC/CC
Mr. Michael Aimone
AF/A4

Conduct Air, Space, Cyber Ops
Gen Kevin Chilton
AFSPC/CC
Lt Gen Howie Chandler
AF/A3/5

Lead Co-Lead

Enabling
Caring for People
Lt Gen John Bradley
AF/RE (AFRC/CC)
Mr. Roger Blanchard
AF/A1

Provide IT Support
Gen William Hobbins
USAFE/CC
Lt Gen Michael Peterson
SAF/XC

Provide Infrastructure
Hon. William Anderson
SAF/IE
Lt Gen Donald Wetekam
AF/A4/7

Manage Financial Resources
Mr. John Vonglis
SAF/FM
Lt Gen Stephen Lorenz
AU/CC

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
D&SWS Sub-Process Teams
(Jun ’08)

Institutionalize Standard Work
*ESC/CA (Ms. Duntz)
SAF/ACE Dir (Mr. DiCicco)
AFMC/IG (Col Moran)

Oversight / Command & Control
*AFMC/A2/5 (BG Wolfenbarger)
AQX Deputy (Mr. Shelton)
SAF/IEL (Ms. Walker)

Technology Development
*AAC/CA (Ms. Stokley)
SAF/AQR (Mr. Jaggers)
AFRL/CC (MG Bedke)

Continuous Capability Planning
*AFMC/A2/5 (Mr. Brown)
HAF/A5R (BG Mueller)
SMC/CV (BG Mashiko)

Lifecycle Management
*ESC/CC (LG Bowlds)
ASC/CA (Ms. Wright)
OC-ALC/CC (MG Reno)

Test and Evaluation
*AFFTC/CA (Mr. Bond)
AFOTEC/CC (MG Sergeant)
AFMC/A3 (BG Lanni)

Supply Chain Operations
*HAF/A4I (Mr. Dunn)
AFMC/A4 (BG Bruno)
AFSPC/A4/7 (Ms. Puckett)

Sourcing
*AFMC/PK (Mr. Gill)
SAF/AQC (Mr. Correll)

* Indicates Lead
TD Charter

TD Initiatives Target 2 Key Problems:
- Immature Technology in Acquisition Programs Leads to Cost Growth and Schedule Slip
- Many Unprioritized Needs Lead to Sub-optimized Investments

Approach

- Implement 3 TD Initiatives to Institutionalize One AF Level Process to Manage Investments in Technologies to Ensure They are Mature for AF Systems
- Provide “Standard Work” In the Technology Development Arena Where It Makes Sense
Three TD Initiatives

3 Initiatives with the goal of institutionalizing one AF level process to manage investments in technologies to ensure they are mature for AF systems

TD-1-12 Improved Technology Maturity Assessments
- Improved, but Separate, Qualitative Maturity Assessments
  - TRA Training
  - MRA Training
- Improved Software TRL descriptions
- A methodology to help identify Technical Risks related to Integration & ‘ilities

TD-1-13 High Confidence Tech Transitions
- Early & complete lifecycle transition planning
  - Formal documentation of IPT’s plan – TDTS
  - “Plan the Flight”
- “Stage-gated” transition of technology
  - Clearly defined entrance/exit Criteria
  - “Fly the Plan”

TD-1-14 Identify and Prioritize Tech Needs
- Focus S&T on highest priority needs
  - Integrate/align existing processes to identify tech needs
  - Develop new process to prioritize short, mid, and far-term needs vice a single “1-n” list
- Game-changing “Tech Push” influencing capability planning
Focus/Goals of TD-13

- Initiative focus on Technology Transition
  - Early and complete life-cycle transition planning
  - Create a common understanding of the technology transition processes to be applied at all life cycle stages

- Initiative Goal – Improve transition success
  - Improved planning will lead to increased probability and speed of the transition and increase confidence of acquisition programs.
  - Key aspect of this process will be making sure the right people are involved earlier in the process for increased collaboration between researcher, acquisition and stakeholders
Tech Transition Best Practice

- Current Best Practice: Transition process Iterative w/in technology readiness phases:
  - Establish a team, formulate a strategy
  - Iterate: develop/gather information, document and coordinate agreement, and commitment / approval

<table>
<thead>
<tr>
<th>Technology Transition</th>
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<tbody>
<tr>
<td>Establish a Team</td>
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<td>Formulate</td>
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<tr>
<td>Develop Information</td>
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<td>Coordinate &amp; Update</td>
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<td>Commit and Approve</td>
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<tr>
<td>Transition</td>
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<tr>
<th>OSD</th>
<th>Accepted Practice</th>
<th>Air Force</th>
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Integrity - Service - Excellence
What are we doing that is new?

- NEW: TD-1-13 provides a formalized process, the mechanism (stage-gate criteria) and detailed activities and milestones necessary to transition from phase to phase.
Stage-Gates are the key!

What is “New” about this initiative:

- Develop a stage-gate process (TRL based / driven)
  - A decision point on whether a project is proceeding as planned and a go, no-go or hold decision is made
  - Phases are: Feasibility, Formulation, Proof of Concept, Breadboard (Lab Env), Brassboard (Relevant Env) and Prototype (Relevant Env) (TRL3-6)

- Entry/Exit Criteria (tech & programmatic) shall be used prior to advancing to the next stage in the transition process. Highlights change in team roles and responsibilities over time.
  - Spiral 1: existing readiness levels (TRLs and MRLs), cost, schedule, performance, early “-ilities” considerations;
  - Spiral 2: additional “-ilities” identified in TD-1-12
Outputs of TD-13

- Users Guide – for developing the strategy for technology development and transition
  - How to build Technology Development and Transition Strategy (TDTS) and required documentation
    - How to execute the stage-gating
    - How to build the entrance/exit criteria
- Automated Tool to facilitate the implementation of the User Guide
Easy to read and understand documentation on the Technology Transition Process Using Stage-Gates

- Part 1 – Description of Stage-Gate Process for Technology Development
- Part 2 – Explains “How to” Navigate the Process

Power of the Process is in Teamwork

- Having the right people on the team at the right time – Chaired by Program Manager and Co-Chaired by Technology Manager

Process will apply to all key advanced programs

- Top 50% of all AFRL 6.3 programs
- High Visibility Programs
- Industry-developed technology programs
Today’s Process

Stovepipe Document Generation: TTP : TDS : LCMP

<table>
<thead>
<tr>
<th>Owner:</th>
<th>AFRL Technology Developer, pre MS-A</th>
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<tbody>
<tr>
<td>Tech Transition Plan (TTP)</td>
<td>Signature Page</td>
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<td>Development Strategy</td>
<td>Participants</td>
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<td>Tech Availability</td>
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<td>Program Objectives</td>
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<td>Target Acq Programs</td>
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<td>Approach</td>
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<td>Products / Payoff</td>
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<td>Risk Analysis</td>
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<td>Exit Criteria / RL</td>
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<td>Acquisition Strategy</td>
<td>Identify Stakeholders</td>
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<td>Capability / Rqmts</td>
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<td>Logistics / Mfg</td>
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<td>Transition Strategy</td>
<td>Integration Plan</td>
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<thead>
<tr>
<th>Owner:</th>
<th>Acquisition PM @ MS-A</th>
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<tbody>
<tr>
<td>Tech Development Strategy (TDS)</td>
<td>(Public Law 107-314, Sec 803)</td>
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<td>Acquisition Approach</td>
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<td>Supporting Rationale</td>
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<td>R&amp;D Strategy</td>
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<td>Performance Goals</td>
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<td>CSP and Spirals</td>
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<td>Describe Tech Demo</td>
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<td>CSP and Exit Criteria</td>
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<td>Develop Test Plan</td>
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<td></td>
<td>Goal / Exit Criteria</td>
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<td>Ensure Maturity Level</td>
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Note: Multiple Spirals may be necessary before user & developer agree the solution is: Affordable, Military Useful and based on mature technology

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<thead>
<tr>
<th>Owner:</th>
<th>Acquisition PM @ MS-B</th>
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<tbody>
<tr>
<td>LCMP</td>
<td>Exec Summary</td>
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<td>Mission/Rqmts</td>
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<td>Program Summary</td>
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<td>Program Mgmt</td>
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<td>Business Strategy</td>
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<td>Risk Mgmt</td>
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<td>Cost and Performance Mgmt</td>
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<td>Test Approach</td>
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<td>Product Support Concept</td>
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Note: TDS required at MS-A, but often Milestone not held
To Be Process

- Tech Development & Transition Strategy (TDTS)
  - Replaces the TTP
  - TDS is subset of TDTS required at Milestone A
  - As program progresses – TDTS “Morphs” to LCMP

Owner: Acquisition PM

Tech Development & Transition Strategy (TDTS)
- Replaces TTP, but a gated approach defining depth required at each phase.
- Integrated Strategy (Technology Development and Acquisition)
- Example: As team approaches:
  - MS-A (TRL-4) – Gates/checklist ensures TDS is complete
  - MS-B (TRL-6) – Gates/checklist ensures LCMP is complete

Subset

Tech Development Strategy (TDS)
(Public Law 107-314, Sec 803)
- Acquisition Approach
- R&D Strategy
- Performance Goals
- CSP and Spirals
- Describe Tech Demo
- CSP and Exit Criteria
- Develop Test Plan
- Goal / Exit Criteria
- Ensure Maturity Level

LCMP
- Exec Summary
- Mission/Rqmts
- Program Summary
- Program Mgmt
- Business Strategy
- Risk Mgmt
- Cost and Performance Mgmt
- Test Approach
- Product Support Concept
Automated Tool - TurboTPMM

- TurboTPMM Tool – An application to navigate a database tool that will be the repository of the stage-gates (i.e. checklists) and the documentation required for each TDTS
  - TPMM database developed by Army SMDC
  - TurboTPMM automates the Stage-gate process
  - Easy to use, walks user through the process
  - Turbo-Tax© like software that asks the right questions
  - Ensures application of Systems Engineering principles
  - Contract to Dynetics through Army SMDC

- DAU to join in on Collaboration with TurboTPMM
TurboTPMM – Scope and Requirements

■ Ease of Use
  ■ Develop a Graphical User Interface
  ■ Prove feasibility of automating the process

■ Portfolio Management
  ■ Develop capability to output Readiness data

■ Reporting
  ■ Develop a Reporting Capability

■ Common Language
  ■ Adapt Army to USAF lexicon, templates, events
**Schedule**

**CY 2008**

- **User’s Guide**
  - Incorporate TD-1-12 “RI3”
  - Conduct V&V on ATDs

- **Policy - Identify AF, AFMCI**
  - Interim AFMC Policy Letter
  - Work Updates

- **Tool – Turbo Technology Program Management Model (TPMM) – Spiral 1**
  - Spiral 1 (Storyboard User Interface, Architecture, Code and test)
  - Propose Spiral 2 to T2 Council

- **Training – Familiarization briefing**
  - Mod APDP courses, Ctr training wks
  - Develop Turbo TPMM Training (spiral 2)

**CY 2009**

- **Codify Instructions**
  - Update affected policies

- **TurboTPMM**
  - Enduring Training

**As of: 3 Sep 08**

**Progress**
Summary / Way Ahead

- Modify Stage-Gating tool for AF application
- Finalize User Guide and Gates
- Finalize Communication/Change Management Plan
- Initiate Workforce Development (Training) Plan

For More Information, Questions or Comments:
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Claudia.kropas-hughes@wpafb.af.mil
Questions?
A few words about…
Technology Transition!

The Keys to Technology Transition:
- Understanding What You’re Trying to Accomplish
- Establishing a Customer
- Having a Defined Transition Plan & Process
- Constant Communication with our Customer
- Maintaining Discipline (Tough Love)
- $ Money

Do it Early. Do it Often. Finish the Job.
<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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<tbody>
<tr>
<td>2:35-3:20</td>
<td>Breakout Sessions –</td>
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<td>All 5 Sessions Run</td>
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<td>A. Air Force Research Lab – Core Process 3 - Accelerated Technology</td>
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<td>to the Warfighter (Fortress Ballroom)</td>
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<td>- Chair/Briefer: Dr. Alok Das, ST, AFRL Senior Scientist for Design</td>
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<td>Innovation</td>
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<td>B. Develop and Sustain Warfighting Systems (D&amp;SWS) - Improved</td>
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<td>Technology Maturity Assessments (TD-1-12) (Mustang Room)</td>
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<td>- Chair: Maj Gen Tom Owen, AFMC/A4</td>
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<td>- Presenters: Dr. Kyle Yang, MIT/LL</td>
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<td>C. D&amp;SWS - High Confidence Technology Transition (TD-1-13) (Phantom</td>
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<td>- Chair: Maj Gen Curtis Bedke, AFRL/CC</td>
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<td>- Presenter: Dr. Claudia Kropas-Hughes, AFMC/A5S</td>
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<td>D. D&amp;SWS - Identify and Prioritize Technology Needs (TD-1-14) (Sabre</td>
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<td>- Chair: Maj Gen Marshall Sabol, AFMC/A8/9</td>
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<td>- Presenter: Mr. Keith Thompson, AFMC/A5</td>
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<td>E. D&amp;SWS - Continuous Capability Planning (CCP) and Developmental</td>
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<td>Planning (Stealth Room)</td>
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<td>- Chair/Presenter: Mr. Randy Brown, SES, AFMC/A2/5</td>
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Facility Map

Fortress Ballroom

F-86 Sabre

F-4 Phantom

P-51 Mustang

F-117 Stealth

Technology Demos

Ladies Restroom

Men’s Restroom

PACKY’S Restaurant and Sports Lounge
Membership

- Membership
  - Consists of representatives from all Centers and relevant members of Air Staff
  - Chartered by Seniors SAF/AQ, AFRL/CC, AFMC/CC
    - Broad experience base for this approach
  - Culture Change
STAGE GATE #3
DESCRIPTION: This is the first stage-gate in the Technology Development and Transition Strategy process.

EXIT CRITERIA:
1. TRL == 3  MRL == 3
2. The Technology Concept has been proven sufficient to meet the User Need in a Laboratory environment and a Proof of Concept is documented
3. The Technology Development and Transition Strategy (TDTD) is drafted.
4. The Technology Transition Agreement (TTA) documented at “Interest” is drafted.
5. ENTRANCE CRITERIA FOR NEXT PHASE: A Breadboard Laboratory Validation Plan has been developed whose purpose, objectives and scope are adequately described.
TurboTPMM – FY08
Development & Deployment

- Development environment
  - Microsoft® Visual Studio® 2008
  - ASP.NET 3.5 application framework
  - C# programming language
  - Relational Database using MS SQL Server® 2005
  - UML 2.0 Object Modeling using Altova® Umodel®
  - Microsoft® Team Foundation Server (Configuration Mgmt)

- Deployment – FY08
  - Laptop
  - Microsoft® Windows XP Pro or Server 2003
  - Microsoft® IIS Web Server
  - SQL Server Express
  - IE6 Web browser client
  - Microsoft® Office
Integrity - Service - Excellence

Stage-Gates Process Alignment with Acquisition

Stage-Gate Technology Maturity Process

Concept Decision

A

B

C

IOC

FOC

CONCEPT REFINE
MENT

TECHNOLOGY
DEVELOPMENT

SYSTEM DEVELOPMENT & DEMONSTRATION

PRODUCTION & DEPLOYMENT

Concept
Decision

Proof of Concept

Refinement Brassboard

Development Breadboard

Prototype Relevant Environment

Stage-Gate 3

Stage-Gate 4

Stage-Gate 5

Stage-Gate 6

TRL 1-3
Proof Of Concept

TRL 4
Validation in Laboratory Environment

TRL 5
Validation in Relevant Environment

TRL 6
Demo in Relevant Environment

TRL 7
Prototype In Ops Environment

TRL 8
System Qualification

TRL 9
Mission Proven

TRL 10
Lean System Production

MRL 1-3
Mfg Concepts Identified

MRL 4
Mfg Processes Identified

MRL 5
Mfg Processes Developed

MRL 6
Critical Mfg Processes Demo'd

MRL 7
Prototype Mfg System

MRL 8
Process Maturity Demo

MRL 9
Mfg Processes Proven

MRL 10
Lean System Production

Stage-Gate 3

Stage-Gate 4

Stage-Gate 5

Stage-Gate 6