D&SWS Technology Development Orientation Brief
for
2008 Technology Maturity Conference
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Overview

- D&SWS – An Air Force Core Process
- Technology Development (TD) Core Sub-Process
  - The Problem – Our Solution
  - How We Birthed the Three Initiatives
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

AF Smart Ops 21

Process Improvement Tools
Lean & Sigma
Theory of Constraints

Enterprise
Analytic Focus on CPM

Process Efficiencies
Measureable improvements in support

CSAF Approved Process Owners

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

Governing

Plan/Execute
- Strategic Initiatives

Manage Programs and Processes

Lead
Gen Paul Hester
PACAF/CC
Lt Gen Norman Seip
12AF/CC

Co-Lead
Lt Gen Craig McKinley
ANG/DIR
Mr. David Tillotson
SAF/XC

Core

Develop and Sustain Warfighting Systems

Deploy

Conduct Air, Space, Cyber Ops

Lead
Gen William Looney
AETC/CC
Lt Gen Roger Brady
AF/A1

Co-Lead
Gen Bruce Carlson
AFMC/CC
Lt Gen Donald Hoffman
SAF/AQ

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

Gen Kevin Chilton
AFSPC/CC
Lt Gen Howie Chandler
AF/A3/5

Enabling

Caring for People

Provide IT Support

Provide Infrastructure

Manage Financial Resources

Lead
Lt Gen John Bradley
AF/RE (AFRC/CC)
Mr. Roger Blanchard
AF/A1

Co-Lead
Gen William Hobbins
USAFE/CC
Lt Gen Michael Peterson
SAF/XC

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

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

Integrity - Service - Excellence
D&SWS Sub-Process Teams
(Jun '08)

- Gen Bruce Carlson
- Lt Gen Don Hoffman
- CPO: MG Marshall Sabol

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/EL (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
TD History
How We Birthed…and How We are Implementing
Our Initiatives

- 6 Dec 06 Design Team Kickoff Meeting
- Large & Diverse Team
- Process-Reengineering Mandate
  - Lean Focus
  - EVSM, SIPOC
  - Diagnosis, Re-design, Transfer of Ownership
- Diagnosis:
  - TD is unwieldy AF process w/many stakeholders & confusion
  - Lean: Value-Added & Non-Value-Added Analysis 😞
  - Root Cause Analysis (5 Whys) 😊
- Re-Design
- Transfer of Ownership to AF Functional Orgs
Process-Reengineering Summary

End-to-end Assessment Complete:

- Significant value-stream analyses and process mapping conducted
- Identified 27 issues / opportunities
- Created “To-Be” state for process redesign
- Multiple process improvement initiatives aligned under 4 Focus Areas
- Measure success against 3 customer-oriented objectives
As-is Process is not well understood; involves many stakeholders; is not conducive to strong and consistent collaboration

16 Issues/Opportunities Identified and Prioritized

Four principal areas to focus:
- Identifying and prioritizing technology investment needs and communicating what we are doing
- More comprehensive and effective technology maturity assessment
- Earlier and more responsive Technology Transition Planning
- Establishing AFRL as the AF’s Trusted Advisor and Honest Broker
Tech Development
As-Is Process: Many Issues

- Too many tactical (and adhoc) engagements with AF customers of S&T
- Local prioritization at best

- Tech maturity assessed once at MS-B
- TRLs necessary but not sufficient measure of tech maturity
- TRLs not universally understood and applied
- TDS (Tech Dev Strategy) often not created

- Capability Planning Community has insufficient knowledge of S&T breakthroughs
- Gov’t has insufficient knowledge of industry IR&D

- Ad hoc engagements with AF customers

- Tech maturation activities viewed as distinct from tech transition activities—big mistake!

- Tech Transition often an afterthought-too late to work the issues

- Urgent Warfighter Needs
“Lean” Was of Limited Value in Identifying the Problems

1.2.1 Develop Understanding Where DoD is Going—Resource Constraint, Policy, Guidance, Political Environment (Centers)

1.2.2 Determine each Center’s Role in Fulfilling Top-Level Strat Decision (i.e., Capability Roadmap) (Centers)

1.2.3 Develop Acquisition/Sustainment Options (COAs) (Centers)

1.2.4 Determine which Programs to Start and Change (ACQ and Sust.) (Centers)

1.2.5 Communicate Need to S&T Community to Feed IRAD and Other Govt Agencies (Centers)

Example

Lean, Value Added vs Non-Value Added Analysis
Root Cause Analysis Helped Us Zero-In on the Real Issues

Why Is Immature Technology getting Into our systems?

- 1.1.1 Limited definition of maturity
- 1.1.1.1 Does not well include the "ilities" (Testability, Supportability, Maintainability, Producibility, Manufacturability, Scalability)
- Environment for integration
- 1.1.1.2 System TRL (multiple tech) vs. lower level TRL (single technology)
- 1.1.2 TRL criteria not applied to system

- 1.1.1.1 Have not defined or described how to include other criteria into more comprehensive TML
- 1.1.1.2 Info to define criteria is not available
- 1.1.1.3 Early Tech Development shouldn't focus on system aspects

- 1.1.1.2.1 Insufficient communication between S&T Providers/ System Developers/ Sustainers
- 1.1.1.3.1 AF needs freedom – Mature tech outside system constraints

- 1.1.2.1 Insufficient communication between S&T Providers/ System Developers/ Sustainers
- 1.1.2.2 Don't know how to roll up single technology to multiple technology

- 1.1.2.1 TRL criteria not applied to system

- 1.1.1.1.2 Education issue

- 1.1.1.2.1.1 Tech definition should allow assessment at Tech & System Level

- 1.1.1.2.1.2 Don't know how to roll up single technology to multiple technology
Tech Development “To-Be” Process Opportunities for Improvement

- More frequent maturity assessments
- More robust maturity assessments
- Common process/tool for Gov’t & Industry

- Earlier transition planning
  - Combined with tech maturation planning
  - Gated reviews to ensure timely and robust tech development
  - Also enables tech off-ramps to support Acq “Time Certain Capability”

Comprehensive ID & prioritization of tech needs
- Solves the problem of understanding/interpreting AF’s Capability Needs and Program Rqmnts
- Game-changing “tech push” influencing capability planning (and vice versa)

AF-Wide Requirements Database

Tech Maturity Assessment “Calculator”

Transition Planning & Stage-Gating Tool
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
Two Benefits to Solving the “Immature Technology” Problem

1. Reduce Cost Overruns

The ability to more accurately assess the maturity of technology, across dimensions more meaningful to acquisition & sustainment programs promises 2 benefits:

1. Pre-MS-B: More accurate assessment of tech maturity guides more complete tech development and enables more accurate program estimates (RDT&E and Production)
   Result: Reduction in Cost Overruns (cost avoidance)
   - $1B-$3.5B per year with an ROI of 2.6-4.2 (GAO report)

2. Post-MS-B: Targeted tech assessments within on-going programs may offer timely (and previously unknown) tech alternatives
   Result: Reductions in projected [budgeted] costs (cost avoidance)
   - Specific examples available (F-22 AESA with ROI of 76:1, etc.)
Pay Me Now ($) or Pay Me Later ($$)

- It costs money to save money
- It also costs money today to avoid future cost overruns
- TD (and other D&SWS initiatives) are proposing initiatives that will drive additional costs earlier in the development cycle
  - For TD-1-12 & 13, this means additional RDT&E funding to mature technologies more robustly...earlier...so they are MATURE when they get into acquisition programs
Want to Change Behavior? Train the Workforce!

- All three TD initiatives propose new processes/tools that will require workforce training
- Both DAU and AFIT have a critical roles
- TD initiatives will develop required workforce training:
  - **Advanced training** for personnel working, or about to work, the new processes/tools (TD-1-12 Only for TRAs and MRAs)
  - **General Awareness training** appropriately tailored to fit into the many existing DAU and AFIT S&T/ Acquisition/ Sustainment “Familiarization” courses

<table>
<thead>
<tr>
<th>Training Type</th>
<th>Advanced Training</th>
<th>General Awareness Training</th>
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<tbody>
<tr>
<td>Computer-Based</td>
<td>AFIT</td>
<td>DAU &amp; AFIT</td>
</tr>
<tr>
<td>Classroom</td>
<td>AFIT</td>
<td>DAU &amp; AFIT</td>
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Are We Sure Our Process-Improvement Initiatives Will Achieve Desired Affect?

- TD-1-12 and TD-1-13 will participate in D&SWS pathfinders.
  - Five Pre-MS B AF Acquisition Programs Designated as Pathfinders

Seven D&SWS Initiatives to be “Tested”
- LCM-1-7: Time Certain Capability
- LCM-1-8: High Conf Baselines
- LCM-1-9: Life Cycle Affordability Planning
- CCP-1-10: Time-Phased Requirements Development
- TD-1-12: Improved Technology Maturity Assessments
- TD-1-13: High Confidence Technology Transitions
- TE-1-16: T&E Milestone B Support

- New TD processes will be integrated into an existing schedule as expediently and cost-effectively as possible
- However... D&SWS pathfinders will provide limited verification and validation of TD initiatives
  - Will not sufficiently exercise TD’s process improvements
- Additional pilots will be required (Some of AFRL’s 6.3 portfolio)
Summary

- We diagnosed the problem
  - Why/How is Immature Technology Getting into Weapon Systems?
- We proposed solutions - Process-Improvement Initiatives Designed to:
  - More robustly Assess Technology Maturity (TD-1-12)
  - Plan Transition Earlier & Be More Disciplined in Implementing Those Plans (TD-1-13)
  - “Plan the Flight…Fly the Plan!
- Tools, Training, Policy Will Facilitate Implementation
- Getting Ready to “Test our Products”