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# **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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# Overview

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- **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



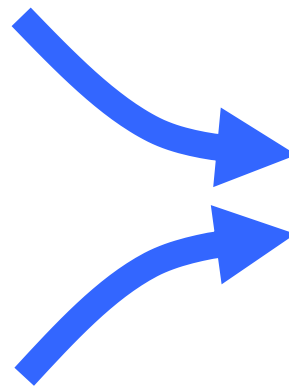
## Funding Our Priorities

"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."

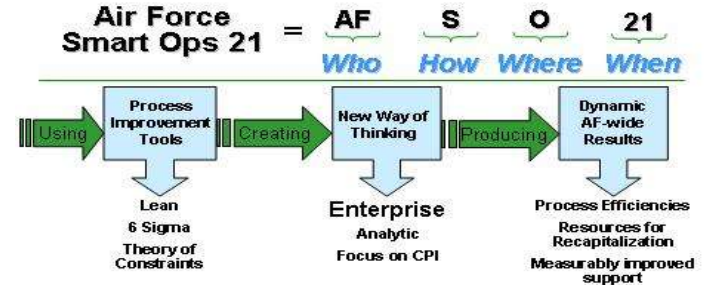
- Michael W. Wynne, SECAF



Integrity - Service - Excellence



## AF Smart Ops 21



Integrity - Service - Excellence

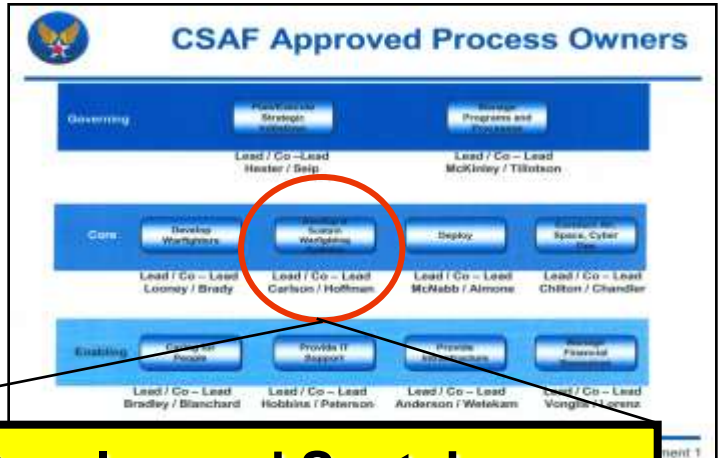


## The Status Quo is Out

### 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

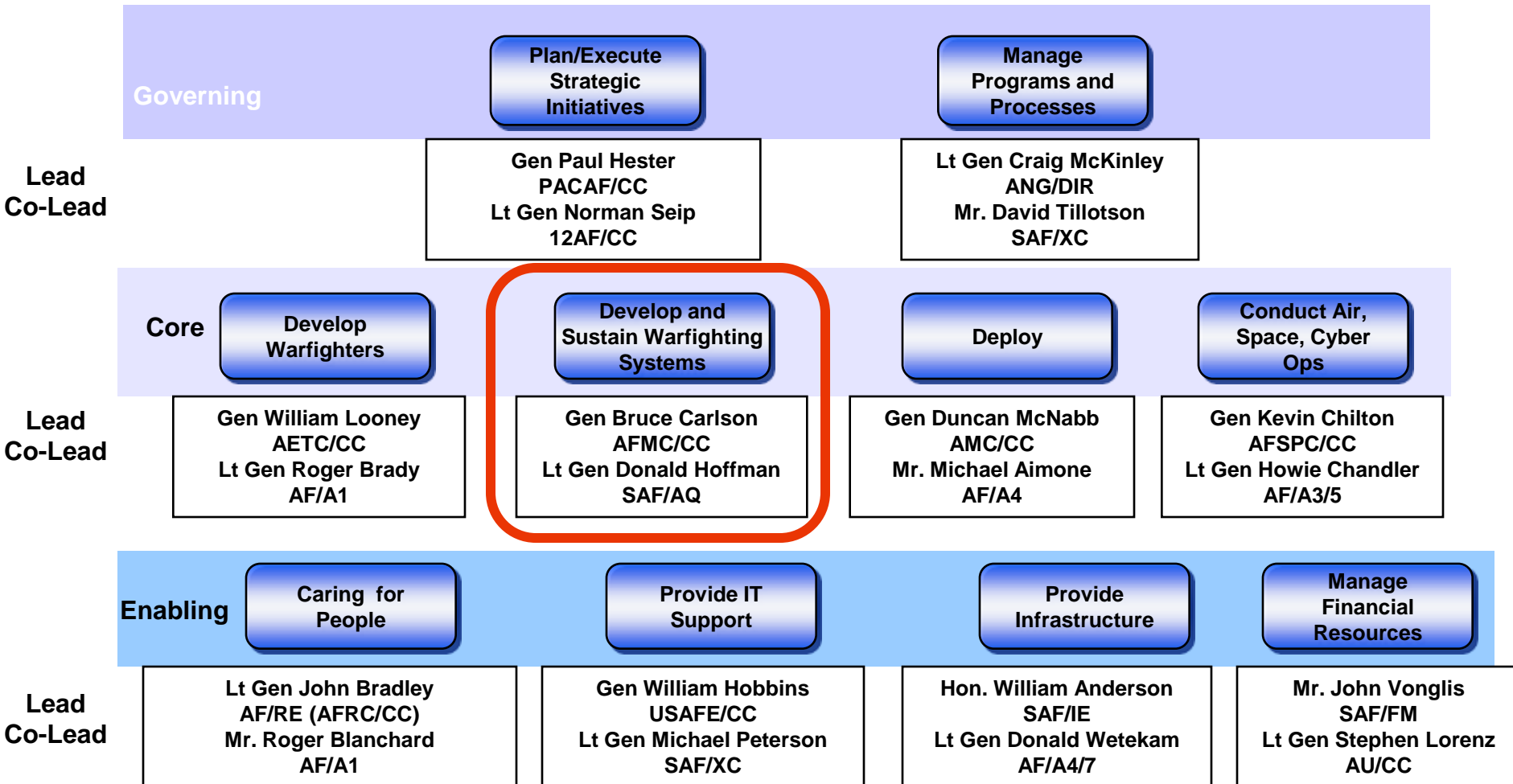
Integrity - Service - Excellence



**Develop and Sustain Warfighting Systems (D&SWS)**



# SECAF / CSAF Approved Air Force Process Owners





# D&SWS Sub-Process Teams

## (Jun '08)

Process Owner  
Co Lead

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/IEL (Ms. Walker)

Advisors:  
BG Smoot (AFMC/A1)

### Technology Development

\*AAC/CA (Ms. Stokley)  
SAF/AQR (Mr. Jagers)  
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)



# 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**



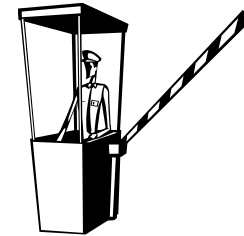
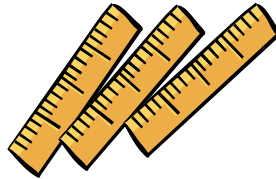
# Three TD Initiatives

**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

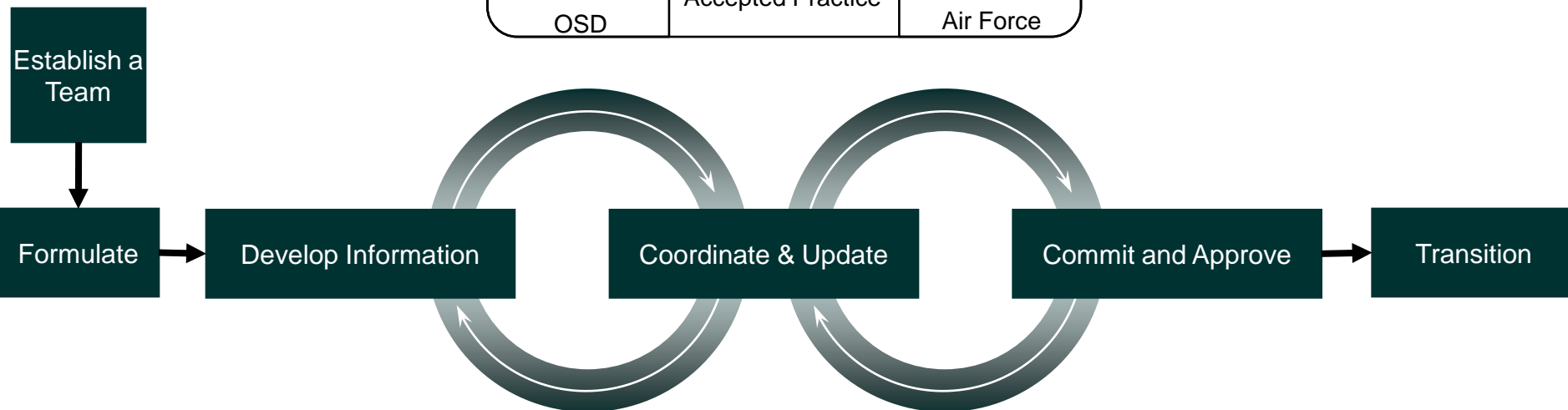
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- **Initiative focus on Technology Transition**
  - **Early and complete life-cycle transition planning**
  - **Create a common understanding of the technology transition processes to be applied at all life cycle stages**
- **Initiative Goal – Improve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

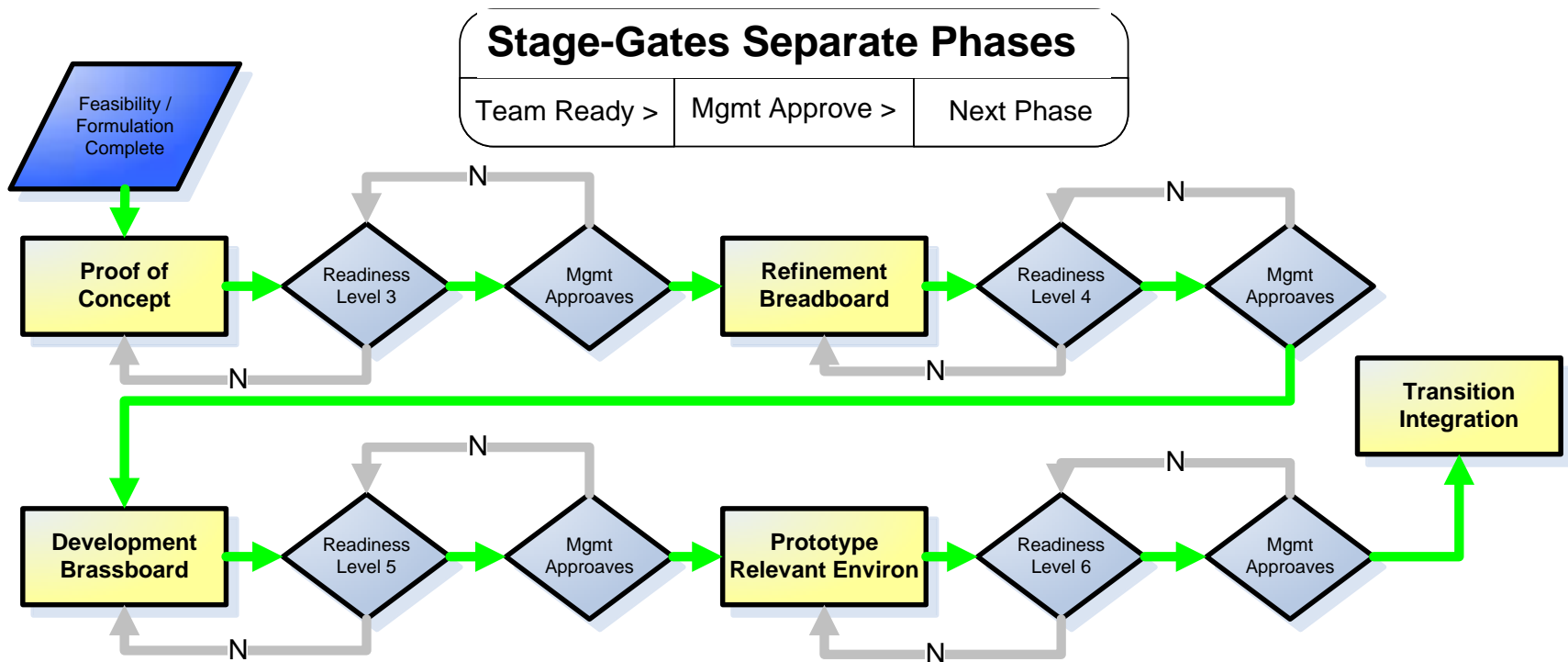
- **Current Best Practice: Transition process Iterative w/in technology readiness phases:**
  - **Establish a team, formulate a strategy**
    - **Iterate: develop/gather information, document and coordinate agreement, and commitment / approval**





# 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!

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- **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

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- **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**



# User Guide

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- **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 Manger 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

Owner:

AFRL Technology Developer, pre MS-A

### Tech Transition Plan (TTP)

- Signature Page
- Development Strategy
  - Participants
  - Tech Availability
  - Program Objectives
  - Target Acq Programs
  - Approach
  - Products / Payoff
  - Risk Analysis
  - Exit Criteria / RL
- Acquisition Strategy
  - Identify Stakeholders
  - Capability / Rqmts
  - Bus/Contract/Fin
  - Logistics / Mfg
  - Intelligence
- Transition Strategy
  - Integration Plan

Owner:

Acquisition PM @ MS-A

### Tech Development Strategy (TDS)

(Public Law 107-314, Sec 803)

- Acquisition Approach
  - Supporting Rationale
- R&D Strategy
  - Performance Goals
  - CSP and Spirals
- Describe Tech Demo
  - CSP and Exit Criteria
- Develop Test Plan
  - Goal / Exit Criteria
  - Ensure Maturity Level

Note: Multiple Spirals may be necessary before user & developer agree the solution is: Affordable, Military Useful and based on mature technology

Owner:

Acquisition PM @ MS-B

### LCMP

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

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
  - Supporting Rationale
- R&D Strategy
  - Performance Goals
  - CSP and Spirals
- Describe Tech Demo
  - CSP and Exit Criteria
- Develop Test Plan
  - Goal / Exit Criteria
  - Ensure Maturity Level

Becomes

### 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

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- **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

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## ■ Ease of Use

- Develop a Graphical User Interface
- Prove feasibility of automating the process

## ■ Portfolio Management

- Develop capability to output Readiness data

## ■ Reporting

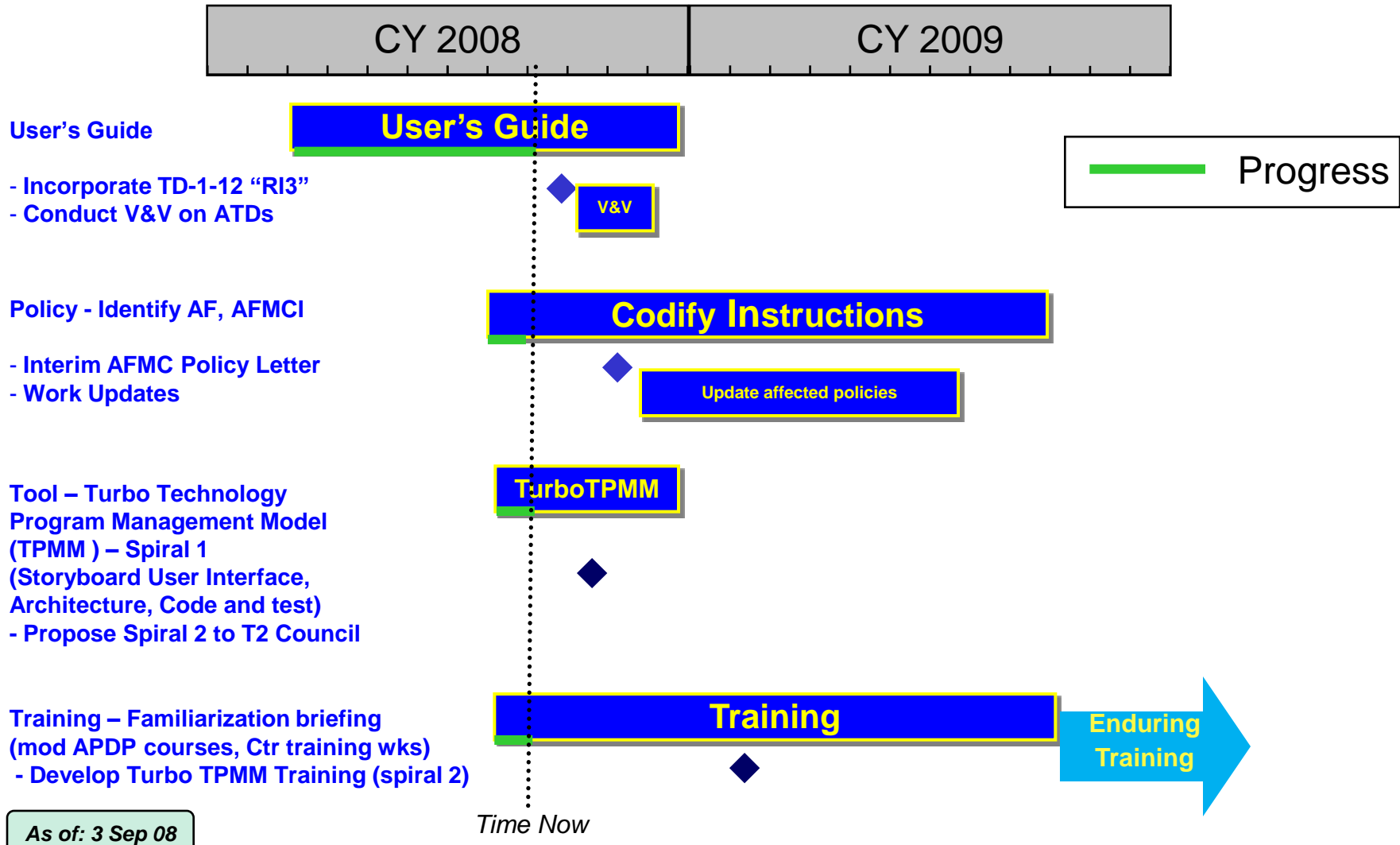
- Develop a Reporting Capability

## ■ Common Language

- Adapt Army to USAF lexicon, templates, events



# Schedule





# Summary / Way Ahead

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- **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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# Questions?

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## A few words about...

# Technology Transition!

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- **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.**

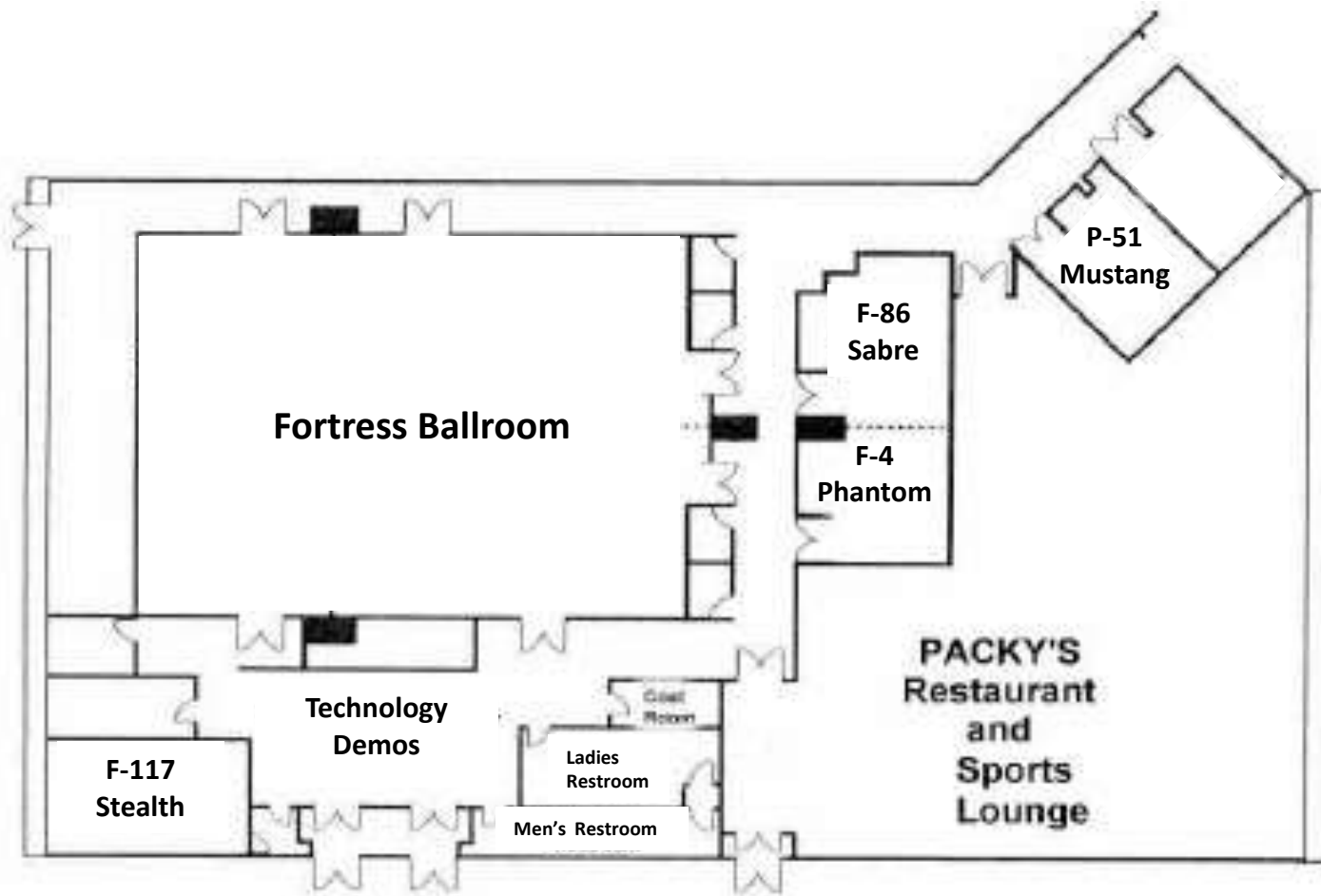
# Integrated Lifecycle Management

Forward thinking from the beginning  
Cradle-to-Grave affordability  
Realistic planning, development & execution

Time	Topic
<p>2:35-3:20</p> <p><i>All 5 Sessions Run Concurrently</i></p>	<p>Breakout Sessions –</p> <p>A. Air Force Research Lab – Core Process 3 - Accelerated Technology to the Warfighter (Fortress Ballroom)</p> <ul style="list-style-type: none"><li>- Chair/Briefer: Dr. Alok Das, ST, AFRL Senior Scientist for Design Innovation</li></ul> <p>B. Develop and Sustain Warfighting Systems (D&amp;SWS) - Improved Technology Maturity Assessments (TD-1-12) (Mustang Room)</p> <ul style="list-style-type: none"><li>- Chair: Maj Gen Tom Owen, AFMC/A4</li><li>- Presenters: Dr. Kyle Yang, MIT/LL</li></ul> <p>C. D&amp;SWS - High Confidence Technology Transition (TD-1-13) (Phantom Room)</p> <ul style="list-style-type: none"><li>- Chair: Maj Gen Curtis Bedke, AFRL/CC</li><li>- Presenter: Dr. Claudia Kropas-Hughes, AFMC/A5S</li></ul> <p>D. D&amp;SWS - Identify and Prioritize Technology Needs (TD-1-14) (Sabre Room)</p> <ul style="list-style-type: none"><li>- Chair: Maj Gen Marshall Sabol, AFMC/A8/9</li><li>- Presenter: Mr. Keith Thompson, AFMC/A5</li></ul> <p>E. D&amp;SWS - Continuous Capability Planning (CCP) and Developmental Planning (Stealth Room)</p> <ul style="list-style-type: none"><li>- Chair/Presenter: Mr. Randy Brown, SES, AFMC/A2/5</li></ul>



# Facility Map





# Membership

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## ■ 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 Example

## **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 (TDTS) 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

***Tool focuses the team on the tasks necessary to meet these exit criteria.  
Provides a repository for the information created during technology  
development.***



# TurboTPMM – FY08

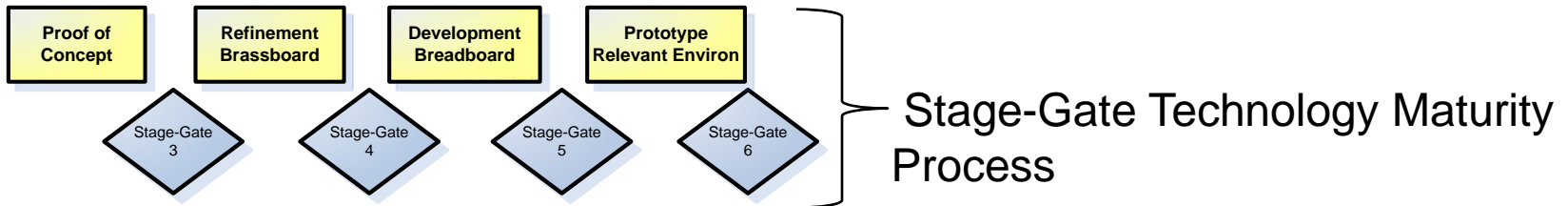
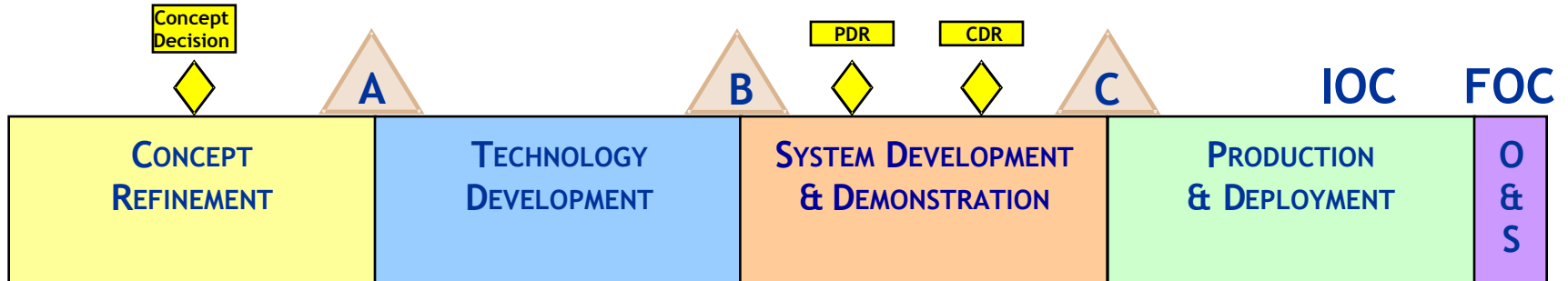
## Development & Deployment

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- **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**



# Stage-Gates Process Alignment with Acquisition



<b>TRL 1-3</b> Proof Of Concept	<b>TRL 4</b> Validation in Laboratory Environment	<b>TRL 5</b> Validation in Relevant Environment	<b>TRL 6</b> Demo in Relevant Environment	<b>TRL 7</b> Prototype In Ops Environment	<b>TRL 8</b> System Qualification	<b>TRL 9</b> Mission Proven	
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<b>MRL 1-3</b> Mfg Concepts Identified	<b>MRL 4</b> Mfg Processes Identified	<b>MRL 5</b> Mfg Processes Developed	<b>MRL 6</b> Critical Mfg Processes Demo'd	<b>MRL 7</b> Prototype Mfg System	<b>MRL 8</b> Process Maturity Demo	<b>MRL 9</b> Mfg Processes Proven	<b>MRL 10</b> Lean System Production
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