

Air Force Materiel Command

War-Winning Capabilities ... On Time, On Cost



Sustainment Technology Process

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Integrity ~ Service ~ Excellence



AFMC Interest in CTMA



- ***“...share current and future trends and successes in CPI initiatives, highlight current technology initiatives and identify funding opportunities for needed depot maintenance technologies.”***



Overview



- **Sustainment Technology Process**
- **Funding**
- **Current needs- examples**
- **Way ahead**



AFMC/CV MOA Tasking



- **Jan 06 AFMC/CV directed MOA between AFRL and sustainment organizations**
 - **Develop strategy to address sustainment challenges**
 - Establish process to identify high-value S&T *solutions*
 - **Establish senior level group to sponsor high-priority and cross-cutting needs**
 - Oversee process and commit resources





Process Improvement Guiding Principles



- **“One Materiel Enterprise”**
 - Integrate processes, consistency between processes
 - Supports achieving E-Log21 goals and Sustainment transformation initiatives
- **End-to-end view**
 - Process improvements will affect entire technology transition process (Reqmts Gen, Development, Transition and Implementation)
 - Identified funding gaps will require Command and higher Headquarters involvement for resolution
- **Process won't be perfect the first time**
 - Continuous improvements
- **Process must be flexible**



Future State



- **Increased Senior level oversight and involvement in the process**
 - **SSSC guides S&T Sustainment priorities**
 - **Advocate resource commitments**
 - Leverage existing AFMC corporate processes
- **Direct collaboration between Tech provider, Need submitter and Implementer**
 - **Process engineering effort to strengthen technology contribution to AF sustainment (weapons systems and depot modernization)**
 - Common center requirements generation process
 - Leveraging Technology Working Groups
- **Technology Transition Planning**
 - **Agreement document between Tech provider, Need submitter and Implementer**
 - **Milestone completions reviewed through SSSC**
- **Technology Advisory Group (TAG) and Depot Technology Modernization (DTMP) processes replaced by STP process**



Sustainment Technology Process Governance



- **S3C – Provides direction and oversight of sustainment technology through development, transition and implementation**
- **Sustainment Review Group – Prioritize needs; identify cross-cutting needs and recommend inputs to the S3C**
- **Requirements Generators – Identifies near, mid and long-term sustainment technology needs focused on the Enterprise field, depot, and test requirements**
 - **Technology Workings Groups**
 - **Centers (Sustainment and Test)**
 - **MAJCOMS**



S3C Charter



Senior Sustainment Steering Committee

Chair: AFMC/A4, Brig Gen Bruno
 Deputy: AFMC/A2/5, Brig Gen Wolfenbarger

GO & SES

Members

OC-ALC/CA	AAC/CA	AMARC/CA
OO-ALC/CA	ESC/CA	AFMC/EN
WR-ALC/CA	AFRL/CA	NWC/CC
AFMC/A8	AFMC/A3	AFMC/FM
ASC/CA		
AF/A4M	ACC/A4	AFSPC/A4
AF/A4RC	AETC/A4	AMC/A4
SAF/AQR	AFSOC/A4	

Guidance

Internal Resources

- AFRL
- AFMC Centers
- AFMC Corporate Process
- AFMC CMP Council

Advocacy

External Funding Sources

- MAJCOM, OSD
- Programs

Sustainment Review Group

Chair: AFMC/A4
 Members: HQ AFMC/A2/5, A3, A4, A8, EN, FM, AFRL, MAJCOM/A4/A8 AFMC Centers EN, XR and XP

O-6 & GS-15

Technology Working Groups

AFMC Centers

MAJCOMS

Requirements Generation/Transition Agents

Outputs

- High Priority Sustainment Tech Needs
- Planning Documents
- ID Funding Source

Strategic Vision & Sustainment Thrust



S3C Purpose / Responsibilities



- **Provide oversight & strategic direction**
 - Capability planning
 - AFRL FLTC
- **Guide investment strategies**
 - Input to portfolio chgs within HQ, AFRL, Centers & MAJCOMs
- **Direct & Guide resources**
- **Provide top cover**

Define, sponsor and resource requirements for sustainment technology transition



AFMC Sustainment Review Group (SRG)



Purpose: Action body to facilitate Sustainment Tech Transition process

Responsibilities/Output:

- Integrate information on AFMC sustainment technology strategy and strategic focus areas
- Recommend high priority and cross-cutting sustainment needs
- Review/coordinate sustainment technology transition and implementation plans
- Assist in identifying funding sources for Sustainment Tech Needs
- Provide guidance and assistance to Technology Working Groups (TWG)
 - Set overarching guidelines and expectations of TWGs
 - Establish templates for charters, CONOPS, presentations, etc

O-6/GS-15 - Review

- Chair: AFMC/A4
- Members: HQ AFMC/A2/5, A3, A4, A8, EN, FM, AFRL, MAJCOM/A4s, Product Ctrs XR, Sustainment Ctrs MAs and ENs



Technology Working Groups (TWGs)



- **Purpose**
 - Promote the introduction and use of sustainment technologies within the Air Force while supporting Air Force e-Log21 goals.
- **Collaborative body**
 - HQ AFMC
 - AFMC Centers
 - Program Offices
 - Original Equipment Manufacturers
 - Using Commands
 - Academic centers of excellence
- **Scope**
 - Airframe Sustainment
 - Identify/resolve common airframe system sustainment issues
 - Propulsion Sustainment
 - Identify/resolve common Gas Turbine Engine (GTE) issues
 - Maintenance Repair & Overhaul Production (MRO&P) Sustainment
 - Identify/resolve common sustainment issues
 - Combat Sustainment
 - Identify/resolve common Combat Support Systems sustainment issues



Proposed Strategic Technology Sustainment Thrusts & TWGs

Top Down Capability Driven Process to Support Strategic Sustainment Technology Investments

Strategic Drivers

E-Log21

- Reduced O&S Costs and increase system availability

AFMC Balance Scorecard

- Sustain Weapon Systems
- Improve equipment availability at reduced cost
- Enhance Sys Reliability

Customer Needs

- MAJCOMs
- AFMC

AFRL FLTC

- Affordable Mission Generation & Sust

Agile Combat Support

- Agile, Responsive & Effective Sustainment

Strategic Thrusts

• Improve the sustainability of weapon systems, and influence the sustainability of new systems in development

• Improved Inspection, Fault Detection, Prognostics and Diagnostics Capability (Sense and Respond)

• Apply Advanced Practices for Maintenance, Repair & Overhaul, Production Processes, and Supply Chain management

Focus Areas

- Crack & Corrosion Detection
- Coat/Decoat
- NDI
- LO Maintainability
- CBM + Integrity
- Maintenance Shop Improvements
- Aircraft Subsystem Diagnostics
- AGE, Test Equip & Avionics
- Obsolescence Management
- Supply Chain Enhancements

Technology Working Groups

Airframe Sustainment - TWG

Propulsion Sustainment - TWG

MRO&P Sustainment - TWG

Combat Sustainment - TWG



Funding: Internal and External Sources



- **Internal**
 - FY07/08: None
 - FY09 & beyond: Aging Aircraft PE (~\$20M)
- **External**
 - Data calls originating (mostly) from Air Force or OSD
- **Goal**
 - Maximize funding opportunities
 - Increase efficiency of managing multiple data calls
 - Manage at HQ
 - Submit selected needs into appropriate calls



Common Data Call Elements



Common Data Call Elements																			
Required Data Elements	ORF	TTI	ACTD	JEFX	CTMA	SBIR	P2	SERDP	ESTCP	FCT	RTOC	WRAP	CTEIP	ICR&D	GWOT	DAC	CASI	NDCMM	
References						X													
Problem																			
Problem Statement/Basis for Requirement	X	X	X		X	X				X	X		X	X		X	X	X	
Solution																			
Objective						X	X												
Proposed Solution/SERDP Relevance/Proj Desc.	X	X	X		X			X			X		X						X
Technical Objective/Challenge Summary								X	X							X			
Technical Approach/Description								X	X				X						
Methodologies/Concept of Operations									X			X						X	
Deliverables	X				X		X				X					X	X		
Countries/Companies producing foreign item										X									
Category of FCT effort (comparison vs qualification)										X									
Phase I Goals						X													
Phase II Goals						X													
Description of Project Acquisition												X							
Weapon System(S) Supported													X						
Benefit																			
Statement of Military Benefit & Requirements Definition/P2 Benefits				X			X												
Financial Benefit/Cost Savings					X		X												
Readiness Benefit/DoD Benefit/Foreign Partner Benefit					X				X				X						
Value to Warfighter/Benefits	X	X														X	X	X	
Project Category or Technology Area/Topic Area					X	X			X										
Name/Purpose/Benefit of Foreign Item										X									
Impact Statement											X								
Cost Benefit Analysis/Cost avoidance											X					X		X	
Transition																			
Transition Acceleration		X																	
Commitment to Transition/Strategy/Plan	X	X	X	X				X	X										
Integration Strategy				X															
Exit Criteria		X															X		
Technical Maturity	X	X							X										
Foreign Partner Commitment														X					



Common Data Call Elements



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Required Data Elements	ORF	TTI	ACTD	JEFX	CTMA	SBIR	P2	SERDP	ESTCP	FCT	RTOC	WRAP	CTEIP	ICR&D	GMOT	DAC	CASI	NDCMM
Jointness/Dual-Use																		
Cooperative Development								X										
Dual Use Commercialization						X												
Joint use Potential/Support/Performers		X	X						X									
S&T Base		X																
Cost/Schedule																		
Duration Limits/Milestone Schedule	X	X			X		X											
Quad Chart		X	X	X								X						
Funding Profile/Us & Foreign Contribution	X	X	X				X					X		X				
50% Matching Funds		X																
Spend plan (commitment, oblig, expend); Cost Breakdown	X		X					X	X	X								X
Project Mgt (monthly schedule)	X		X						X		X			X			X	
Other																		
Effectuated Maintenance Process					X													
Testing/Demonstration requirements/Candidate item to be tested	X		X													X		
Risks (technical, funding, schedule)	X		X	X					X		X	X		X				
Affordability/interoperability/sustainability	X																	
Supportability/Support Strategy/Info Support Plan				X								X						
Residual Assets/capabilities			X															
Related Efforts									X									
Issues/Concerns/Availability of domestic candidates				X			X			X		X						
Demonstration Results												X						
Acq Plan/Contracting Strategy												X						
Progress Report							X											
International Agreement Vehicle														X				
Foreign/Domestic Industrial Base Impact														X				
Background																	X	
Intellectual Property Rights																X		



Current Needs



- **50 needs**
 - **Categories**
 - **NDI**
 - **CBM**
 - **Coatings**
 - **LO Maintenance**
 - **Other**
 - **Circuit breakers**
 - **Fiber optics**
 - **High power amplifiers**
 - **Traveling wave probes**
 - **Etc.**
 - **Most needs submitted into CTMA in Jun 07**



NDI of Honeycomb Bonded Structure



#5

<p>Problem Statement/Purpose The new technology should:</p> <ul style="list-style-type: none">• Current methods do NOT detect bond-line failures.• Meet or exceed current flaw detection requirements.• Capable of inspecting 100% of the part.• Inflict no damage to the part.• Reduce number of technicians required.• Reduce chance of false calls & add consistency.• Inspect two and three layers deep.• Applicability across weapon systems.• SBIRs do NOT address entire scope of problem.• Portable unit to be developed.• #1 (of 33) WR-ALC Technology Need Area	<p>Benefits</p> <ul style="list-style-type: none">• Possibility to Enhance Existing SBIR Efforts• Capability Enhancement- Increased depth of inspection & perform inspection over the entire part• Labor – estimate a 75% reduction in labor required• Reliability – Tap tests are different per individual; Inspection equipment will take variability to near 0%• Inspection time – estimate a 50-75% reduction in time to inspect any part• Repeatability – NDI tool will provide ability to achieve consistent results with each usage <p>• Projected ROI=7, and Payback in 1-2 years</p>
<p>Customers/Stakeholders</p> <ul style="list-style-type: none">• Government – Users w/ honeycomb structure: USAF (C-5, T-38, E-3, F-16, Field units, etc), USN, Federal Aviation Administration (FAA)• Industry – Domestic and foreign Airline Manufacturer and all Airlines will use to inspect their aircraft. <p>Key Impacts</p> <ul style="list-style-type: none">• Avoid mission/flight restrictions• Major improvement over tap tests- both in reliability, repeatability, and cost reduction.• The C-5 has over 24,000 Sq Ft of honey comb material and vast majority is inspected by a tap test.	<p>Deliverables/Timeline/Milestones/Funding Source</p>



ASIP – CBM+ Enterprise Predictive Analysis Environment (EPAE)

#7



<p>Problem Statement/Purpose Executing ASIP related analyses required data access from multiple data bases, uniform data formatting, mathematical manipulation of data, creation of different data structures for running different types of analyses and other separate tasks. A robust ASIP Query Tool, developed for the A-10, automates the above processes and produces text and graphical reports for a discrete set of high priority queries. This web-based software tool can be expanded to accommodate additional queries and communicate with any number of data sources (e.g. existing SQL and Oracle databases captured in systems like AFIRM and ASIMIS). It has broad applicability to all airframes and the ASIP data required to maintain structural integrity.</p>	<p>Benefits Automated interrogation of multiple data sources, automated data manipulation and automated data transfer to analysis tools such as AFGROW and PROF. Provides a GUI and query construct that is independent of data warehousing. Facilitates data transfer to EPAE system</p>
<p>Customers/Stakeholders <u>Transition:</u> SPOs, Sustainment Wings, ALC IT <u>Implementation:</u> ASC/EN, SPOs, Sustainment Wings, ALC IT <u>Customers:</u> ASIP Engineers</p> <p>Deliverables Web-based software Electronic/Hardcopy training & documentation</p> <p>Key Impacts Provides Effective and Efficient Airframe Force Structural Maintenance – facilitates moving data from existing legacy databases to EPAE approved databases</p>	



Plastic Media Blast Masking Process Improvement #10



<p>Problem Statement/Purpose</p> <p>During aircraft paint removal using Plastic Media Blast (PMB), personnel must avoid intrusion of the removal media into the a/c. Antiquated masking processes require large blocks of flow time and man-hours.</p> <p>Development Effort Initiated by Robins:</p> <ul style="list-style-type: none"> • Initial design capability established through industry. Refinement required to maximize benefit. • Assembled basic kits using COTS technology for advancing masking processes. • Requires additional refinement of adhesive formulation to permit non-climate controlled application. • Need kit refinements to maximize utility for F-15. • Need kits for the C-17 and C-5 to transition to other weapon systems 	<p>Benefits</p> <ul style="list-style-type: none"> • Flow Days - Estimate a 20% Reduction in De-paint Time (Avail ↑, \$ ↓) • Man-hours - Process will reduce man-hours. Masking typically requires 40% of the stripping time and cost, and this new process will reduce the process flow time by 40%. • Availability – Aircraft are available to MAJCOMs sooner. <p>#3 (of 33) WRALC Technology Need Area</p>
<p>Customers/Stakeholders</p> <ul style="list-style-type: none"> • Government – AF and All DOD users of PMB <ul style="list-style-type: none"> – F-15, F-16, F-18, C-5, C17 • AAWG – Originally #3 of 9 on FY09 list <p>Key Impacts</p> <ul style="list-style-type: none"> • Reductions will save man-hours and flow time in a critical path process in the PDM 	<p>Deliverables/Timeline/Milestones/Funding Source</p>



Arc Fault Circuit Breakers (AFCBs) #4



Problem Statement/Purpose

F-15 has experienced serious fires from aging wiring system components. Conventional thermal circuit breakers do not detect arc faults in electrical wiring – presently only continuous electrical overloads are detected

Develop Arc Fault Circuit Breakers (AFCBs) designed to detect arc faults and prevent arc propagation – miniaturize it for fighter aircraft

Benefits

Designed to mitigate the affects of electrical arcing in aircraft wiring systems

- Safety: minimizes risk of wire fires
- Limits damage to faulted wire
- Limits electronic damage
- Limits structural damage
- Reduces troubleshooting & repair time

Customers/Stakeholders

- Joint project with FAA, NAVAIR, ASC/AAA, OO-ALC, Coast Guard

Key Impacts (if any)

- 143,520 man-hours used for wiring related maintenance in 2003 (not including phase)
- \$3.9M man-hour costs for wiring related maintenance in 2003 alone

Funding

- FAA & Navy have spent over \$7.7M to date prototyping AFCBs for Aircraft.
- AFRL/ML & Robins are current entering Flight Testing AFCBs on F-15C/D & F-15E Aircraft. Funding to date of just over \$2M.
- AFRL/ML needs an additional \$0.35M to address the higher amperage AFCBs for the F-15
- AFRL/ML needs an additional \$0.75M for similar transition effort with F-16 at Hill AFB.

Deliverables/Timeline/Milestones/Funding Source



Way Ahead



- **Distribute needs**
- **Determine level of interest from services & industry**
- **Identify solid candidates for consideration in fall timeframe**
 - Write support letters, concept papers, etc. as needed
- **Stay engaged with CTMA for FY08 & beyond**
 - High priority needs collected from Tech Working Groups, ALCs, and MAJCOMS in Dec 07
- **Participate in upcoming OSD data calls**



Summary



- **Sustainment Technology Process is in place**
- **AFMC will work with CTMA to identify & persue candidate project proposals**
- **AFMC will pursue all potential funding options**
- **Quads found on *Tech Transition Management* CoP at:**

<https://afkm.wpafb.af.mil/ASPs/DocMan/DOCMain.asp?Filter=OO-ST-MC-03&FolderID=OO-ST-MC-03-31&Tab=0>



E-Log21 Objectives



- **Ensure premier, agile support for expeditionary operations (rapid deployment).**
- **Implement an integrated logistics enterprise (increased situational awareness/visibility of parts).**
- **Institutionalize performance-based logistics to sustain and reconstitute the Total Force, thus ensuring today's warfighter readiness.**
- **Improve defense capabilities and cost effectiveness through innovative, world-class logistics operations.**