Sustainment Overview

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What is Sustainment

• Joint Publication (JP) 3-0, Joint Operations
  – Sustainment: The provision of logistics and personnel services necessary to maintain and prolong operations through mission accomplishment and redeployment of the force
  – Logistics: Supply, maintenance operations, deployment and distribution, health service support (HSS), logistic services, engineering, and operational contract support

• Joint Publication 4-0, Joint Logistics
  – Maintenance Operations: Depot maintenance operations, field maintenance operations and manage life cycle systems readiness
  – Supply: Manage supplies and equipment, inventory management and manage supplier networks

AFRL Sustainment Science Focus On Maintenance Operations & Supply
### Problem: Aging USAF Aircraft

<table>
<thead>
<tr>
<th>Year</th>
<th>Aircrafts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950s</td>
<td>A-2, T-37, F-8, F-105, B-60, B-52, A-3, S-2, F-10, F-100, B-57, F-102, F-104, A-4D, B-66, F-11, C-130, F-101</td>
</tr>
<tr>
<td>1970s</td>
<td>A-6, E-2, SR-71, C-141, B-70, F-111, A-7, OV-10, C-5</td>
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<td>1980s</td>
<td>F-14, S-3, A-10, F-15, F-16, B-1, E-3, AV-8, F/A-18</td>
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<td>1990s</td>
<td>E-4, KC-10, F-117, T-46, T-45, B-2, CV-22</td>
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<td>2000s</td>
<td>T-1, VC-25, E-8, T-6, C-17, MQ-1</td>
</tr>
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<td>2010s</td>
<td>F-22, RQ-4, MQ-9</td>
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<tr>
<td>2020s</td>
<td>F-35, KC-46, MQ-X</td>
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**Currently in inventory**

**Projected inventory**

**Source:** AF/A4/A7

**Average Aircraft Has Been In Service 25 Years**
S&T Sustainment Products

Tools/Processes To Perform Sustainment Tasks Better

Technologies To Fundamentally Change USAF Sustainment

Sustainable Technologies for the Future Fleet
AFRL Sustainment S&T Vision

Lead the Discovery, Development and Transition of Technology Solutions to Ensure Current and Future Fleets are Safe, Available and Affordable
Affordability & Sustainment Emphasis Areas

Support Sustainment of Current AF Fleet (Field and Depot)

- Improve Fleet Health Management
- Improve Manufacturability of AF Systems

Enable Longer Life, Lower Life Cycle Cost Systems

Enable Robust Design of New Systems
Support Sustainment of Current AF Fleet (Field & Depot)

• Deliver Technologies To
  – Improve resolution of non-destructive inspections
  – Reduce component failure rate
  – Reduce hazardous materials usage
  – Provide technical expertise to support fielded systems
  – Develop material substitution and obsolescence solutions
Improve Fleet Health Management

- Develop Technologies That
  - Maximize useful life of engine components
  - Enable condition-based maintenance of aircraft structure
  - Characterize, model & test structural component damage
Enable Robust Design of New Systems

• Expand Engineering Tools To
  – Improved design tools for corrosion resistance
  – Utilize residual stress in structural design
  – Improve prediction of aircraft structural life
  – Demonstrate novel propulsion technologies
Improve Manufacturability of AF Systems

- Develop Manufacturing Technologies To
  - Reduce touch labor and cycle time to manufacture systems, sub-systems & components
  - Increase yield, integration and reliability
  - Ensure manufacturability of new technologies
Enable Longer Life, Lower Life-Cycle Cost Systems

• Create Technologies That
  – Enable earlier management of manufacturing risk
  – Integrate “cradle-to-cradle” digital environments
  – Allow production rate-independent assembly & fabrication
  – Reduce life-cycle cost of low observable systems
  – Integrate computational methods for discovery, design and manufacturing
Partnersing Opportunities

• Wright Dialogue with Industry
  – 22-24 July at Wright-Patterson AFB

• Areas of Interest
  – Risk calculations and risk-based decision making
  – Composite materials and certification
  – Digital twin/digital thread concepts
  – Non-destructive inspection techniques (airframes, engines, satellites and weapons)
  – Manufacturing technologies
Sustainment Demonstrations

Durability of Embedded Sensors
- Ground Based Demo & Flight Demo Begin 2015

Sonic Infrared Nondestructive Evaluation
- Probability of Detection Evaluation May-June 2014

Friction Plug Welding for Panel Repair
- Full Scale Repair Demo June 2015

Rapid & Accurate Fuel Leak Detection
- RFID Tag Demo Complete
America Makes

- A Defense-wide Manufacturing S&T team-led, Multi-agency collaboration between industry, government and universities
- Public-private partnership

- Shared facilities open to industry
  - Especially attractive to small businesses
- Enabling technology transition and commercialization
- Addressing Technology Readiness Level (TRL) / Manufacturing Readiness Level (MRL) 4-7
  - Bridge the gap in Manufacturing Innovation
- Educational outreach and workforce development

A Model for Manufacturing Innovation Institutes
Advanced Power Technology Office

Priority #1
Improve Resiliency
- Reduce Mission Energy
- Improve Energy Delivery

Priority #2
Reduce Demand
- Advanced Technology Development
- Efficient Operations

Priority #3
Increase Supply
- Waste Energy Harvesting
- Renewable Energy Integration

Priority #4
Foster Energy Aware Culture
- Measure OE Consumption
- Analyze Energy Impacts

REPRESENTATIVE DEMONSTRATION PROJECTS

Cavalier AFS
#1, 2, & 4

Next Generation Flightline
#1, 2, & 4

Maui Advanced Energy Storage
#1, 3, & 4

Distribution A, Approved for Public Release (88ABW-2014-1455)
What We Want to Hear From Industry

- What are industries “Big Bets?” How is industry making decisions for IR&D?
- How can AFRL and industry achieve better alignment (road-mapping)?
- What are the current trends in S&T that AFRL may be missing?

http://www.defenseinnovationmarketplace.mil/