



Aircraft Battle Damage Assessment & Repair (ABDAR)

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Goal: Develop and demonstrate technology to enable more quick and accurate assessments of aircraft damaged in combat

Objectives:

- Develop, test algorithms to guide the thorough assessment of aircraft damage
- Identify and test electronic data types to support the assessment and repair of damaged aircraft
- Accomplish field test to compare assessment performance between paper and electronic data

Transition Agent: AFMC/LGX, F-22 SPO, JSF, MSG, HQ AFSOC

End User: CLSS personnel

Payoffs

- Assessment time reduced by over 72%
- Assessment accuracy improved by over 96%
- Accuracy of documentation of damage, repairs, and parts usage improved by over 136%

Technology Transition

Primary Customer: AFMC/LGX

Needed: Now

Technology to be Transitioned: Hardware requirements study, system requirements study, software design specification, and reports

Technology Transition Plan: Signed by AFMC and AFSOC/LG.



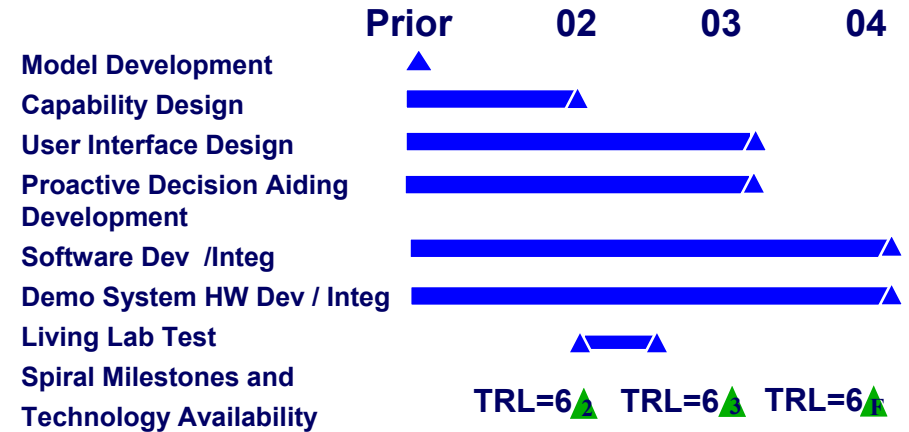
Logistics Control and Information Support (LOCIS)



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Technology Investment Schedule

As of May 02



Description

- Improve wing level command and control information to LG and OG commanders by providing insight into status, capabilities, and limitations of unit logistics, despite disparate data sources

HE Technologies

- Simulations for Proactive Decision Support
- Real-time Information from Passive Data Collection
- Web-based Adaptive, Customizable User Interface
- Alerts, Warnings, and Notification Techniques

Benefits to the Warfighter

- Reduce time to respond to changing operational requirements or status changes
- Faster, more accurate response to operational taskings
- Proactive – vs – reactive decision making
- More efficient use of resources
- Reduce report generation times

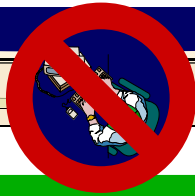
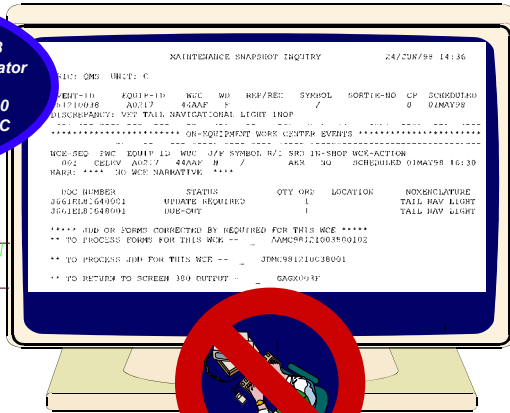
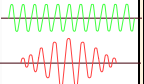


Passive Data Collection Using FM-radios & Other Voice Input Technologies



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MOC red1 preflight complete 378
MOC blue 6 352 abort oxygen regulator
MOC red1 engine start 378
AGE blue 2 245 moved to spot L20
5 4 296 1107 break time 1300 ETIC



Context Filtering
Word Spotting
Voice Recognition
Rule Based
Maintenance Expertise

Improved Timeliness of Data
Passive Data Collection
Improved MDC Accuracy

FUNDING:

Phase I (SBIR)	May 98 – Feb 99	\$100,000
Phase II (SBIR)	Feb 99 – Feb 01	\$730,000
F-15 PDM (WR-ALC)	May 00 – Feb 01	<u>\$105,000</u>
		\$935,000

Description

- Provides accurate and timely data input to legacy systems. Reduce management workload by allowing voice recognition queries of data systems. Eliminate need for technicians to manually enter status information.

Technologies

- “Hands-Free” computing environment
- Passive data collection
- Automatic reach-back reporting for deployed units

Benefits to the Warfighter

- Eliminate manual “fat-finger” data entry
- Improved data accuracy and timeliness
- Increased usability (Voice Query Interface)
- Security built-in to FM-radios
- Affordable implementation SW and HW



Technology for Maintainers



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•Technology Solutions

- Corrosion Prevention & Control Technologies
- Non-Destructive Testing & Evaluation Technologies
- Structural Repair Technologies
- Coating Technologies
- Engine Technologies
- Subsystem Diagnostic & Repair Technologies
- Maintenance Avoidance Technologies
- Maintenance Management and Control
- Maintenance, Repair & Overhaul Business Practices



ManTech Lean Blade Repair



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Technology Investment Schedule As of 04 APR 2001

Prior 01 02 03 04

Transition to OC-ALC/LP

Technology Availability



Description

- Establish a low cost high quality “Lean” repair capability for advanced propulsion systems

Technology

- Model repair process enterprise
- Develop analytical tool box
- Implement advanced manufacturing concept
- Develop automated blade tracking system

Benefits to the War Fighter

For F100 engine low pressure stage 1 nozzle and stator:

Repair process travel distance reduced from 9 miles to 2 miles

Flow days reduced from 111 days to 55 days for nozzle and from 90 days to 15 days for stator

Net cost avoidance of \$21.5M over ten years

Similar payoff for other components



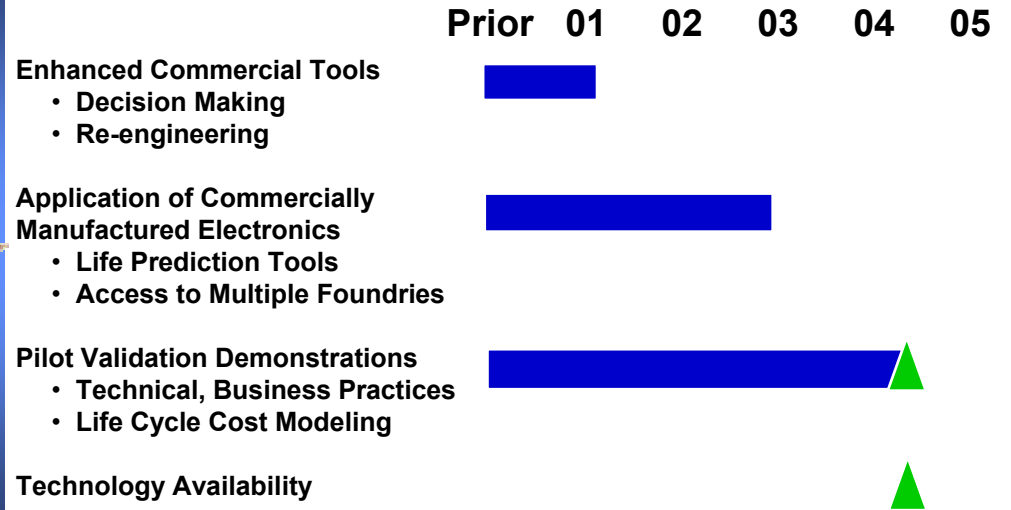
Electronic Parts Obsolescence Initiative



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Technology Investment Schedule As of 12 Feb 2001



Description

- Develop technologies to improve obsolescence management to ensure mission readiness and increase the fielded life of weapons systems at an affordable cost

Technology

- Proactive decision management tools & business practices; physics of failure reliability prediction; re-engineering tools; life cycle cost modeling

Benefits to the War Fighter

- Ability to efficiently insert current/new technology
- Ability to efficiently respond to loss of supplier base or discontinuance of specific product line
- Ability to identify implement the most affordable obsolescence solutions
 - Substantial reduction in support costs



Lean Depot Repair



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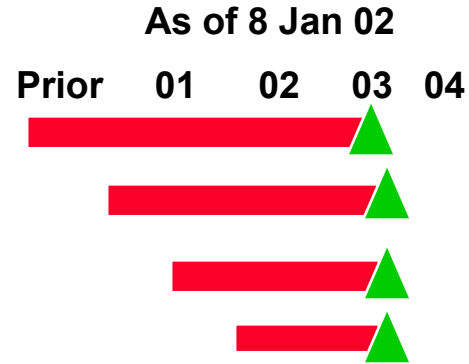


Before

F-15 Wing



After



Air Force Problem

Depot Repair takes longer than scheduled - example: aircraft overhaul is scheduled at 180 days, averaging 280 days

Technical Approach

Apply Lean Principles to Maintenance, Repair, and Overhaul (MRO)

- Flow, pull, value, value stream and perfection

Benefits to the Air Force

Customers: WR-ALC, ACC (F-15), AMC (C-5)

- Saved \$12M across WR-ALC, to date
- F-15 Wing
 - on-time completion: Jan - 0%; Jun - 95%
- F-15 Horizontal Stabilator
 - production doubled in 6 weeks
 - flow days reduced from 61 to 36
- C-5 Floorboard production increased 289%



Where Can We....



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- **Reduce Costs**
- **Reduce Time**
- **Reduce Waste**
- **Increase Durability / Reliability**
- **Improve Processes**
- **Improve Quality**
- **Assess and Predict**
- **Improve Environmental Stewardship**

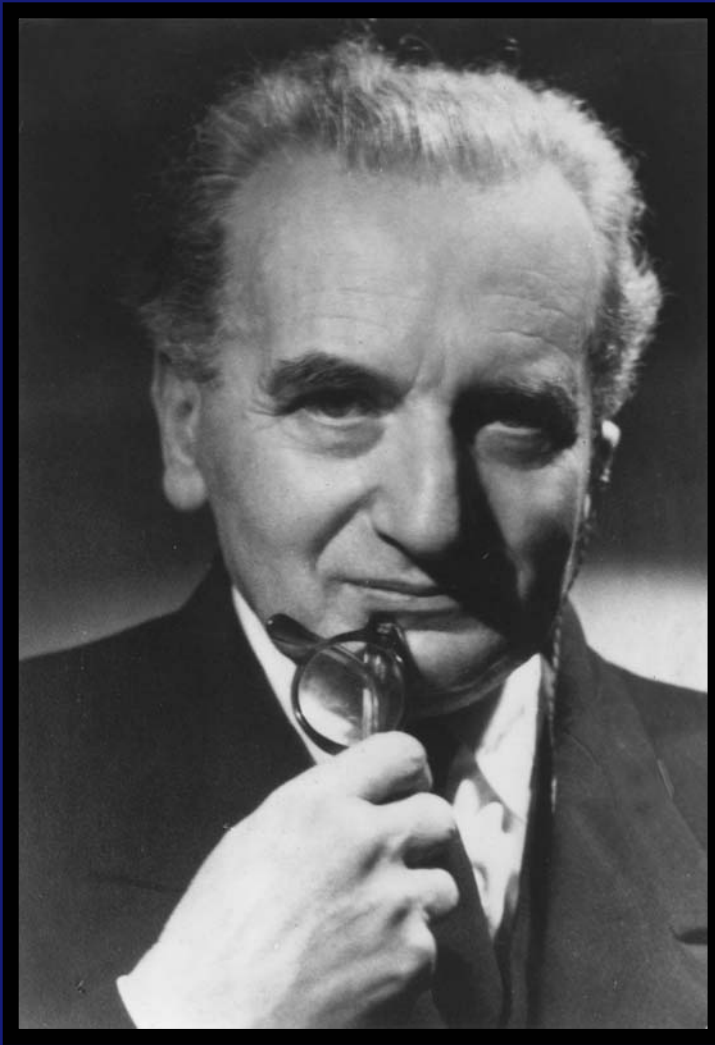
This Is Our Focus



General John Jumper
Chief of Staff USAF

**“the two most important things we do:
flying and fixing airplanes.
That doesn’t mean that you’re not
important if you’re not pulling on a
pole in the cockpit or turning a wrench
on the flightline. It means that the
importance of the rest of us is how we
contribute to flying and fixing
airplanes.”**

From ACC News Service *Jumper looks back, looks ahead*
Released: Aug. 30, 2001



**“Science is the key to
Air supremacy”**

DR. THEODORE VAN KARMAN

**“The first essential of
Airpower is pre-eminence
In research”**

GENERAL H. H. ARNOLD





Overview



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- **AFRL Organization**
- **Maintenance Dilemma**
- **Technology Solutions**
- **Questions**



Questions



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