



RAM Foreign Military Sales (FMS)



Staggering Accomplishments...

Limitless Possibilities

DISTRIBUTION STATEMENT A: Approved for public release; distribution unlimited.
Review completed by the AMRDEC Public Affairs Office (23 Oct 2014; PR1076)

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Presented by:

Giselle Smith, IRTC

Megan Shumate, AMRDEC

Jason Jodon, IRTC

5 November 2014



RAM Foreign Military Sales Outline



I. Foreign Military Sales Overview

II. RAM Overview

III. Missile FMS Support

- i. Stockpile Reliability Program (SRP)
- ii. Field Surveillance Program (FSP)

IV. Aviation FMS Support

- i. Aviation System Assessment Program (ASAP)

Foreign Military Sales (FMS) Overview

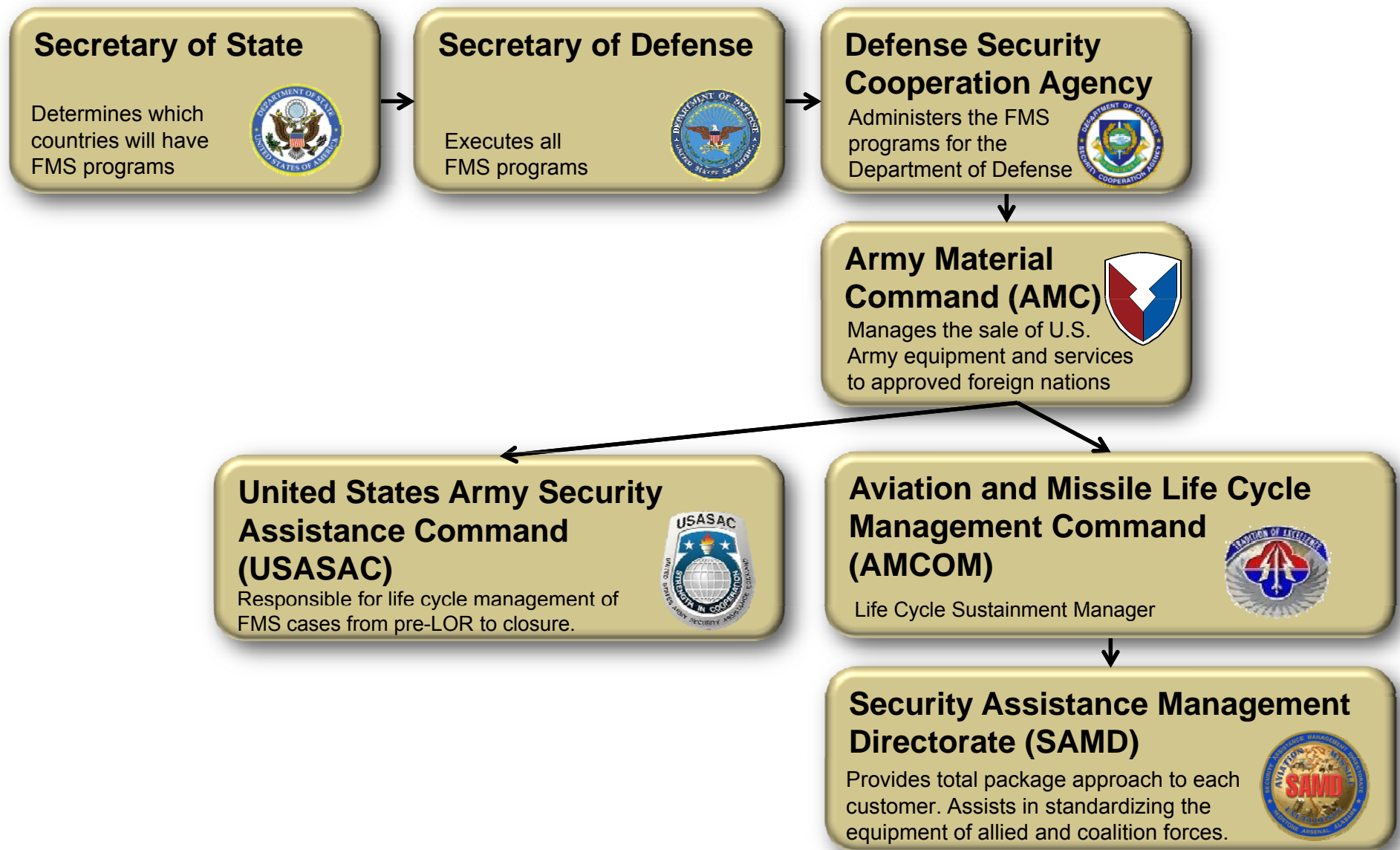


Foreign Military Sales Background



- A government-to-government method for selling U.S. defense equipment, services, and training.
- A form of security assistance authorized by the Arms Export Control Act (AECA) and a fundamental tool of U.S. foreign policy.
- Defense Security Cooperation Agency (DSCA) assigns cases to Implementing Agencies based on case requirements
- **Scope of FMS Business**
 - ◆ 161 Partner Countries
 - ◆ 13,000 active FMS cases valued at \$403 billion
- Within the U.S. Army, U.S. Security Assistance Command (USASAC) manages more than 4,600 cases valued at more \$134 billion

"As a country continues to strengthen its ability to defend its borders, to protect itself and potentially, to operate with partners in the region or with the U.S., all of that strengthens the U.S. from a security perspective." - Vice Admiral William Landay





Foreign Military Sales Importance of Participation



DoD 5105.38-M, Security Assistance Management Manual (SAMM), Oct 3, 2003

C1.1. Security Assistance Programs

➤ C1.1.1 Definition and Purpose:

- Security Assistance is a group of programs, authorized by law, that ***allows the transfer of military articles and services to friendly foreign Governments.***
- Security Assistance transfers may be carried out via sales, grants, leases, or loans and are authorized under the premise that if these transfers are essential to the security and well being of allied Governments and international organizations, they are ***equally vital to the security and economic well being of the United States*** (U.S.).
- Security Assistance programs support U.S. national security and foreign policy objectives.
- They increase the ability of our friends and allies to ***deter and defend against possible aggression, promote the sharing of common defense burdens, and help foster regional stability.***
- Security Assistance can be the delivery of defense weapon systems to foreign Governments; U.S. Service Schools training international students; U.S. personnel ***advising other Governments on ways to improve their internal defense capabilities***; U.S. personnel providing guidance and assistance in establishing infrastructures and economic bases to achieve and maintain regional stability; etc.

"When we assist other nations in meeting their defense requirements, we contribute to our own security."

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.



Foreign Military Sales Total Package Approach



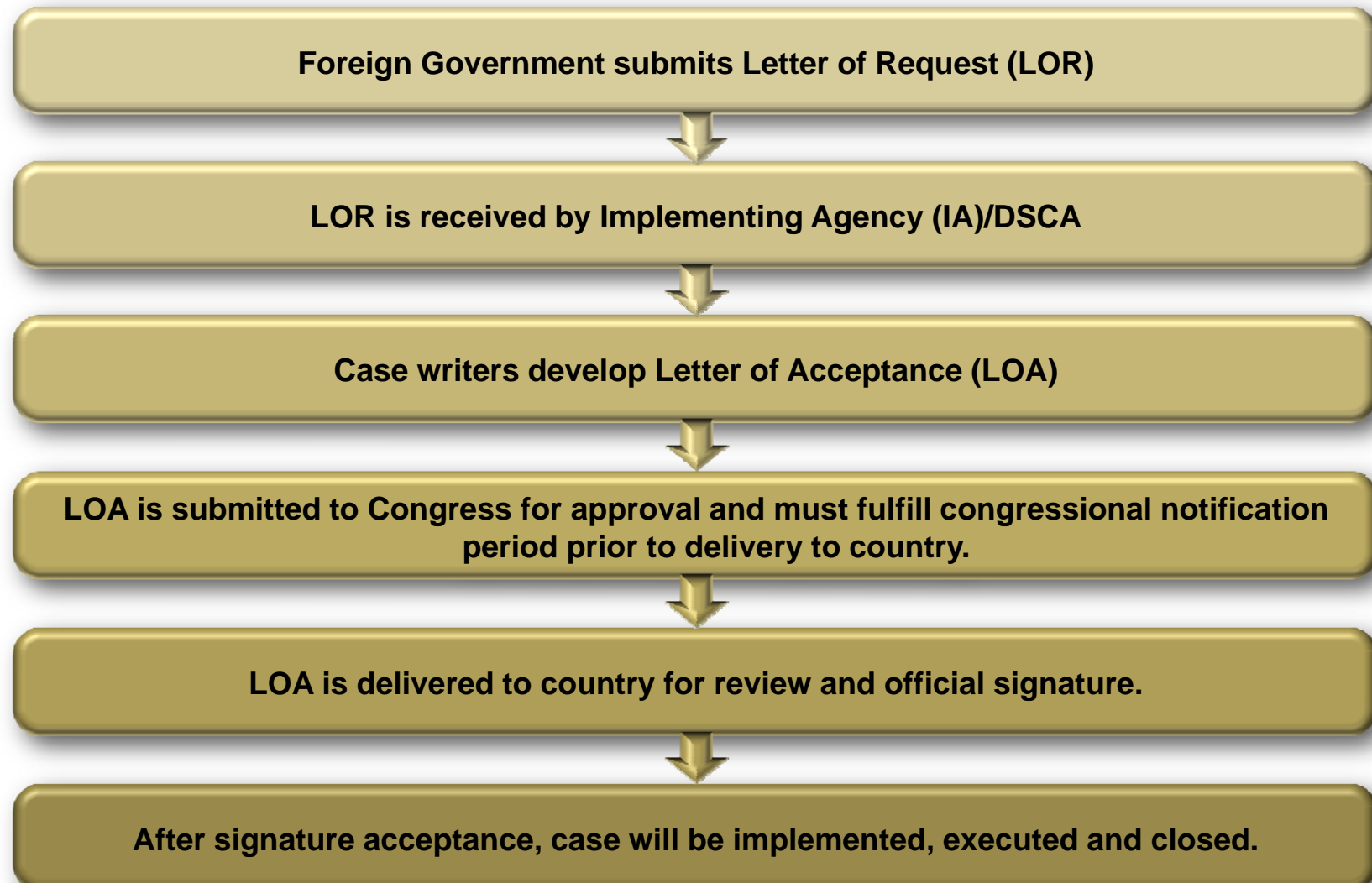
DoD 5105.38-M, Security Assistance Management Manual (SAMM), Oct 3, 2003

C4.5. General FMS Policies.

- Detailed procedures for FMS programs, including writing LOAs and managing cases, are found in Chapters 5 and 6. The following broad policies apply and should be ***noted early in the FMS process.***
- **C4.5.3. Total Package Approach (TPA).**
 - A TPA ensures that ***FMS purchasers can obtain support articles and services required to introduce and sustain equipment.***
 - The ***complete sustainability package*** must be offered to the purchaser when preparing Price and Availability (P&A) data or LOAs.
 - In addition to the system itself, other items to consider in a ***total package include: training, technical assistance, initial support, ammunition, follow on support, etc.***

"If partners have U.S. equipment and training and are following U.S. doctrine, our interoperability is greater with them" - Derek Gilman, DSCA General Counsel

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.





Foreign Military Sales Alternative Purchase Options



Direct Commercial Sales

- **Customers can negotiate direct with the Vendor**
- **Vendors must obtain export approval from the U.S. State Dept**
- **Customers assume full management responsibilities**
- **Generally, contracts require larger down payments than through FMS**
- **Fewer funding options**

Hybrid Cases

- **Customers are able to purchase their equipment through DCS, but also open FMS cases for services including technical assistance and follow on sustainment packages**

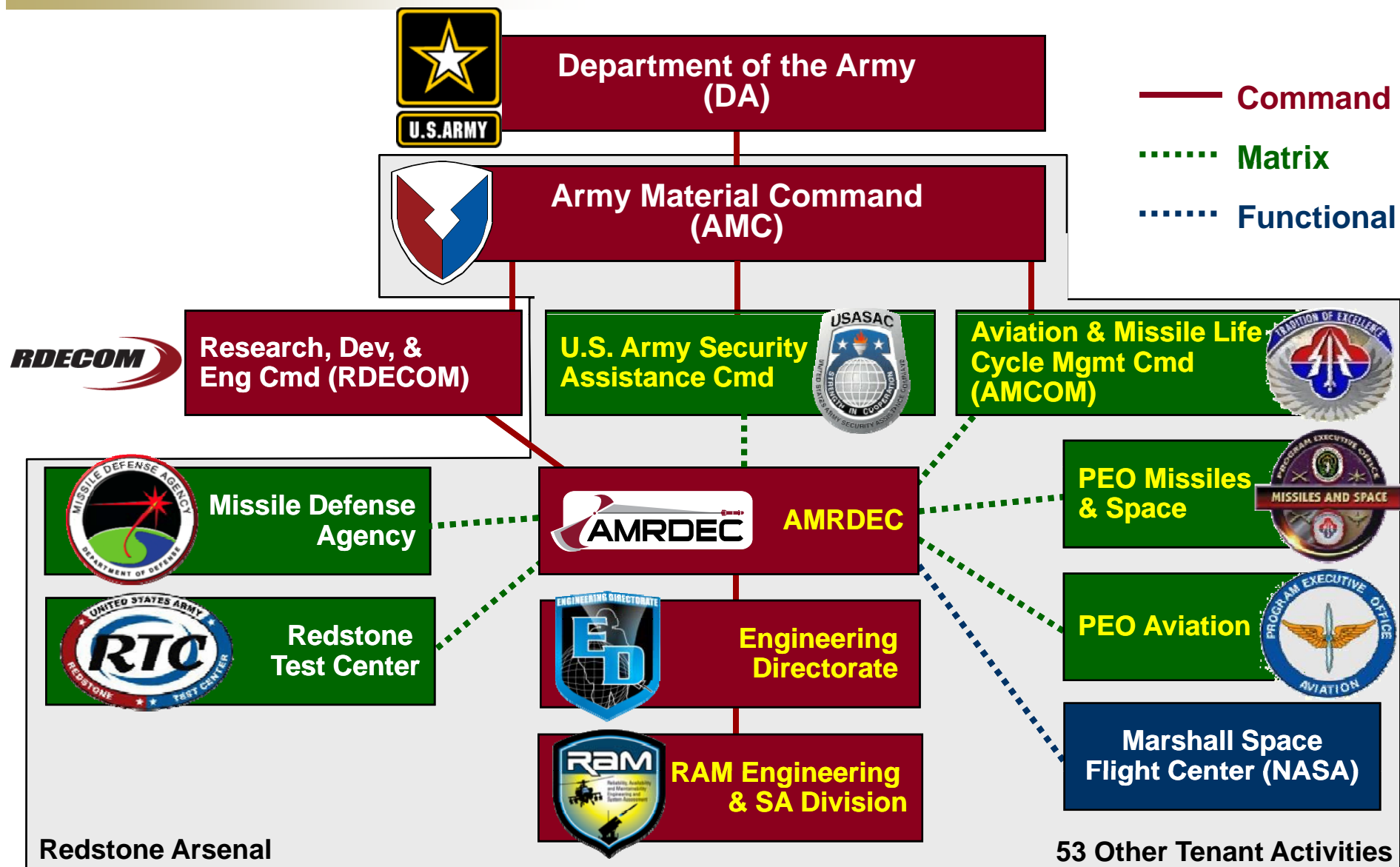
- All FMS Cases must comply with the Arms Export Control Act (AECA) and receive export authorization prior to delivery of any defense articles.
- International Traffic in Arms Regulation (ITAR)- set of U.S. government regulations that control the export and imports of defense related articles on the United States Munitions List (USML)
 - ◆ These regulations implement the provisions of the AECA
- All reports generated by RAM are always reviewed to ensure compliance with these regulations.
- Prior to delivery to a foreign country, all reports must be approved by the AMRDEC Foreign Disclosure Office as well as the relevant Program Office.
- Proper protocol for information transfer:



RAM Overview



Reliability, Availability & Maintainability Organizational Structure



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.



Aviation

- Supports All PEO Aviation PMOs
- Aviation RAM Support
- Aviation System Assessment Program (ASAP)
- Condition Based Maintenance (CBM)
- Reliability Centered Maintenance (RCM)
- Reliability Improvement Projects (RIPS)



Missile

- Support All PEO M&S PMOs
- Missile RAM Support
- Missile Health Monitoring
 - ◆ Desiccant Humidity Indicator Device (DHID)
 - ◆ SQUID
- Reliability Improvement Projects (RIPs)
- Stockpile Reliability Programs (Army & FMS)
- Sustainability Support for Missile Operations



RAM Technology

- S&T Program Support
- Early RAM Development
 - ◆ Requirements
 - ◆ FMECA, Fault Trees
 - ◆ Predictions/Allocations
- Science & Technology Development
- Models & Methodology Development
 - ◆ PROTOCOL
- Policies and Procedures

Plan, develop, and manage RAM and System Assessment programs for missile & aviation systems throughout the life cycle, including research into RAM methodologies and advanced technologies.



Reliability, Availability & Maintainability FMS Involvement



Missile Support

- ◆ **20 countries participate in Joint Stockpile Reliability Programs (SRP) and Field Surveillance Programs (FSP)**
 - Joint SRP – Optional sustainment support for smaller, less expensive missile systems (ex. HELLFIRE)
 - FSP – Fair share sustainment support for larger, more expensive systems (ex. PATRIOT)
- ◆ **Increased data sharing opportunities**
 - Enhance deployment strategies
 - Lessons Learned from malfunctions/failure modes
 - Increased data sample size and confidence (environments, optempo, maintenance, and development strategies)
- ◆ **Ample cost sharing benefits**
 - Reduced reliance on US Army budget variances
 - Offsets costs in maintaining US Army SRP test facilities, hardware, & technical expertise.

Aviation Support

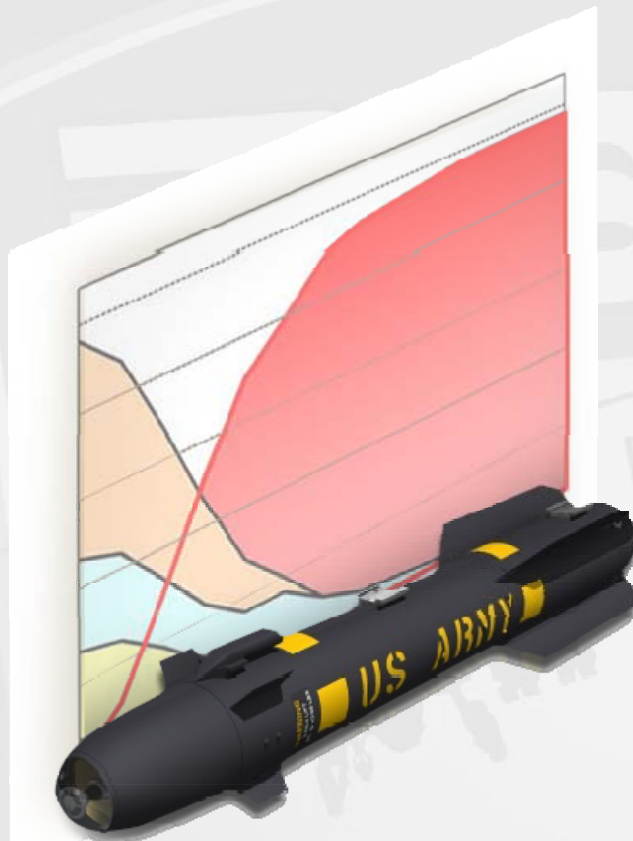
- ◆ **Primarily supporting Blackhawk and Cargo FMS Customers through Aviation System Assessment Program (ASAP)**
 - Anticipated customer growth
 - Customized reports
 - Recommend spares levels

RAM & SA continues to be a vital piece of the TPA offered for confidence and sustainment of the FMS customer's investment.

Support is coordinated with individual PMO's and SAMD representatives.

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Missile FMS Support

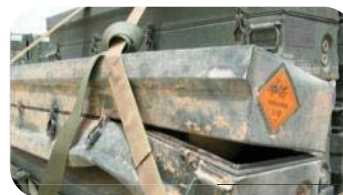


- “The SRP provides ***cradle to grave*** responsibilities, to include demilitarization, for monitoring the performance, reliability, and safety characteristics of ammunition items and Class V components.”
- “An Army program that ***continually measures stockpile reliability*** is essential for providing data to ensure that ammunition and ammunition components, ***available for issue and use, are safe and reliable.***”
- “The SRP consists of the ammunition ***surveillance*** program, the stockpile ***function test program***, and the stockpile ***laboratory test program***. Depending on the type and nature of the ammunition item to be evaluated, any part or all of these programs will be used.”

The Stockpile Reliability Program (SRP) is the U.S. Army's sole mechanism for providing **cradle to grave assessment of the performance, reliability, and safety** characteristics of U.S. Army missile systems worldwide.

CHALLENGES

- Extreme storage and handling environments
- Variations during production
- Expiring shelf life

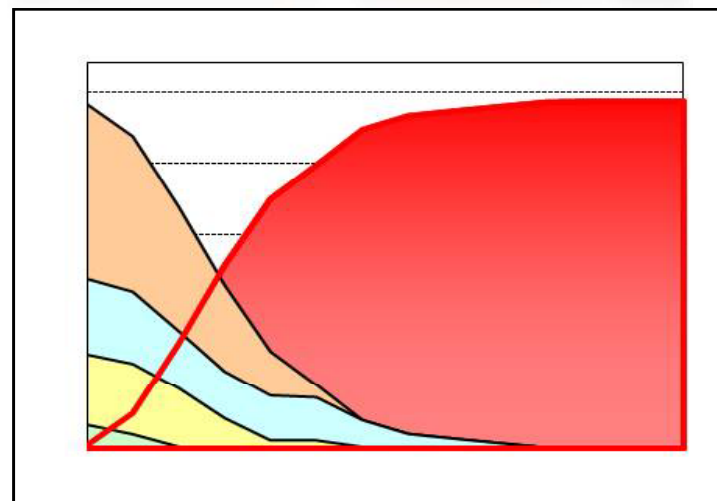


RESPONSIBILITIES

- Continuously monitor & evaluate missile inventory
- Implement shelf life extensions
- Support failure investigations
- Reduce risk of catastrophic events
- AMRDEC is the authority for the Army's missile SRP

BENEFITS

- Increased confidence in performance and reliability
- Increased safety for the soldier
- Supports RAM technology development
- Immediate identification and segregation of failing missiles
- Avoids new missile procurement



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.



COMPONENT TESTING

- One-shot and electronic components are functionally tested at temperature
- Provides detailed performance parameters not available in the all-up-round configuration
- Best data for trending/predicting continued performance



FLIGHT TESTING

- Best snapshot of reliability in a controlled flight environment
- Missiles can be temperature conditioned and fired at various targets, ranges, etc
- Data is trended to ascertain reliability as the system ages



FIELD DATA

- Firing reports completed by the user during training/ combat firings
- Good source of actual performance data in field environment
- Risk of high variability in data; mitigated by large repository of firing data



VISUAL INSPECTION

- Quality Assurance Specialist, Ammunition Surveillance visually inspect inventory.
- Immediate removal of visually unserviceable missiles from the inventory
- Failures are returned for repair or demilitarized.



NON-DESTRUCTIVE TESTING

- Missiles are electronically tested worldwide
- Immediate identification and segregation of failing missiles
- Not capable of testing "one-shot" components (batteries, fuzes, motors...)



Joint Stockpile Reliability Program Concept



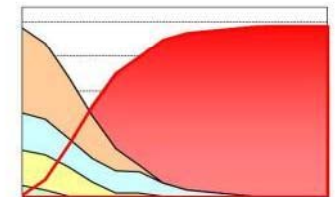
SHELF LIFE REPORTS

VISUAL INSPECTIONS



**AS-BUILT AND
HISTORICAL DATA
RESEARCH**

**GENERAL TECHNICAL
SUPPORT ON SHELF LIFE
ISSUES**



**IN-COUNTRY, NON-
DESTRUCTIVE TESTING**

**FLIGHT OR COMPONENT
TESTING**

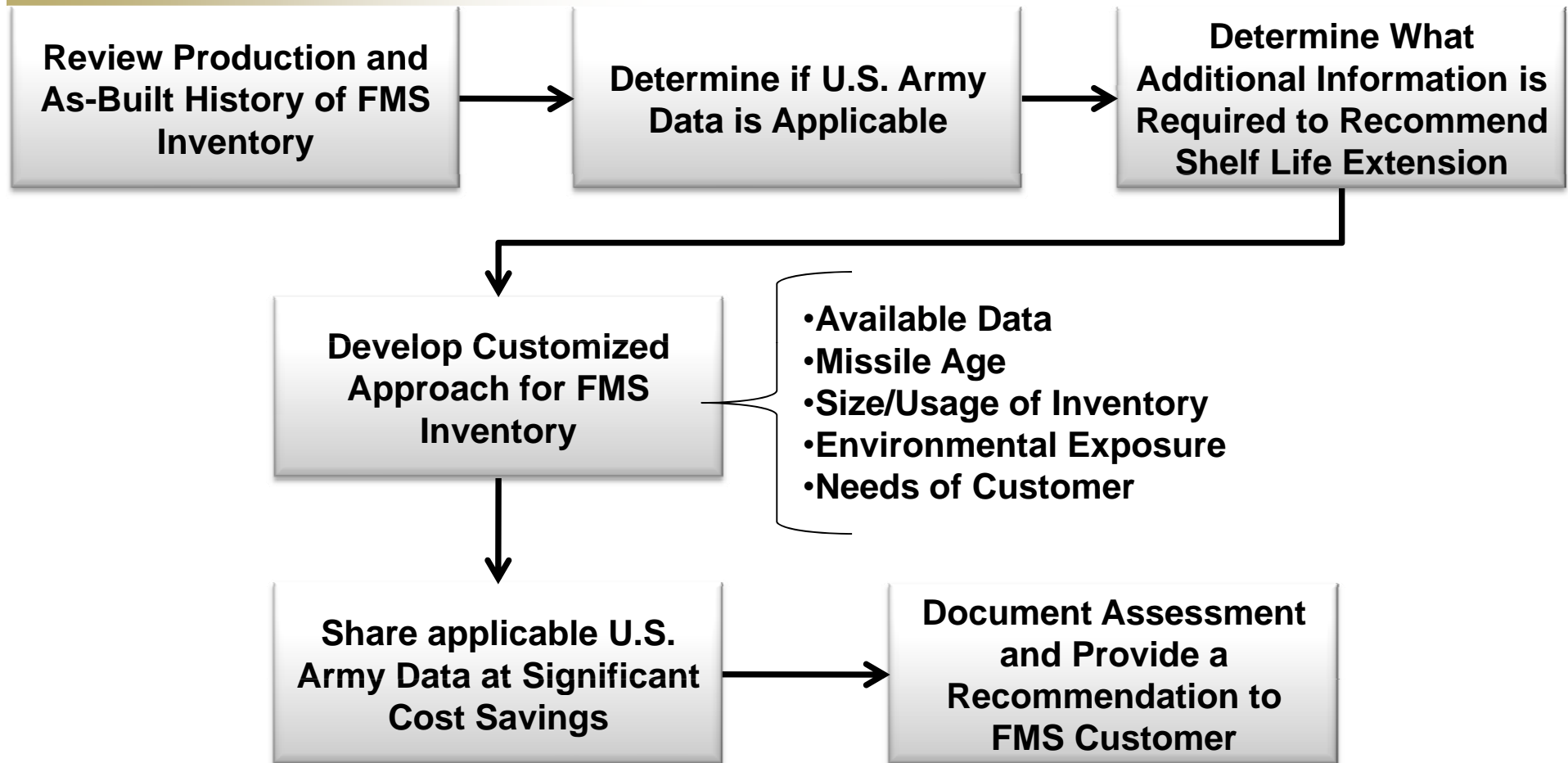


Foreign military services are responsible for making any extension decisions beyond the shelf life that the system was assigned when delivered. However, the U.S. Army can provide various levels of data, analysis, and testing to support and make shelf life recommendations to the FMS customer.

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.



Joint Stockpile Reliability Program Analysis Process



U.S. Army SRP can develop a customized approach to suit the needs of the FMS customer.



Joint Stockpile Reliability Program Benefits



U.S. Army

DATA SHARING OPPORTUNITY

- Increase sample size; confidence in analysis
- Data collected from varied environmental storage and flight conditions, platforms/usage rates
- Shared lessons learned
- Data sharing between missile system SRP's supports identification of common manufacturer defects

PROGRAM SUPPORT

- Reduced reliance on US Army budget variances
- Offsets costs in maintaining US Army SRP test facilities, hardware, & technical expertise.

Customer

LEVERAGE EXISTING TEST CAPABILITY, DATA AND EXPERTISE

- Centralized U.S. Army organization for all missile SRP
- U.S. Army has large missile inventories and the most comprehensive SRP in the world.
- Avoid development and maintenance of separate FMS test capabilities, facilities, and expertise
- Data sharing between missile system SRP's supports identification of common manufacturer defects
- Technical support on ALL shelf life related issues

COST SHARING OPPORTUNITY

- Significant cost avoidance for development and maintenance of separate FMS test capabilities, facilities, and expertise
- Significant leveraging of test costs with increased data and confidence (ex. van transportation).

AMC's Long Term Goal: "Achieve interoperability with other services and our multinational and interagency partners."

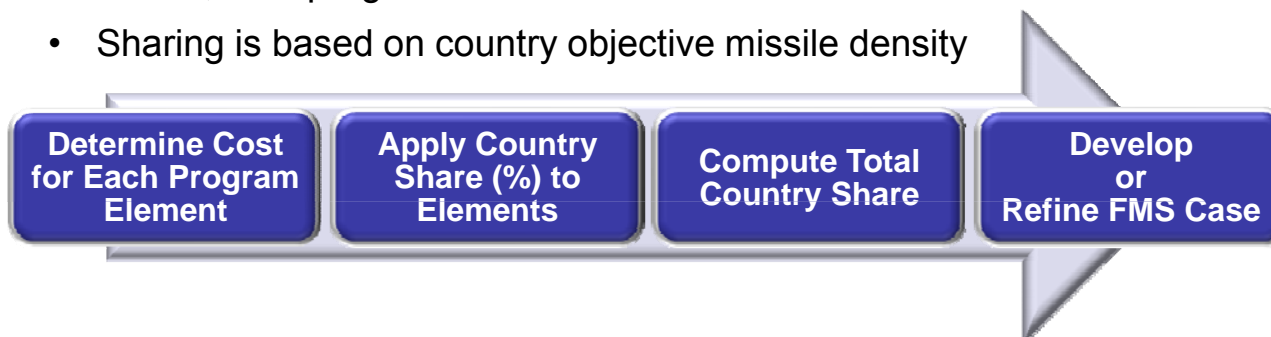
The Field Surveillance Program (FSP) encompasses the total effort to maintain, support and continually assess the health of the worldwide missile stockpile.

Encompasses an integrated program of checks, tests, and recertification activities conducted over the life cycle of the missile to assess and maintain the health of the deployed stockpile

- Destructive and non-destructive testing
- US and FMS assets
- Includes natural/accelerated aging, component/missile level testing, replacement of limited life components/purge of faults

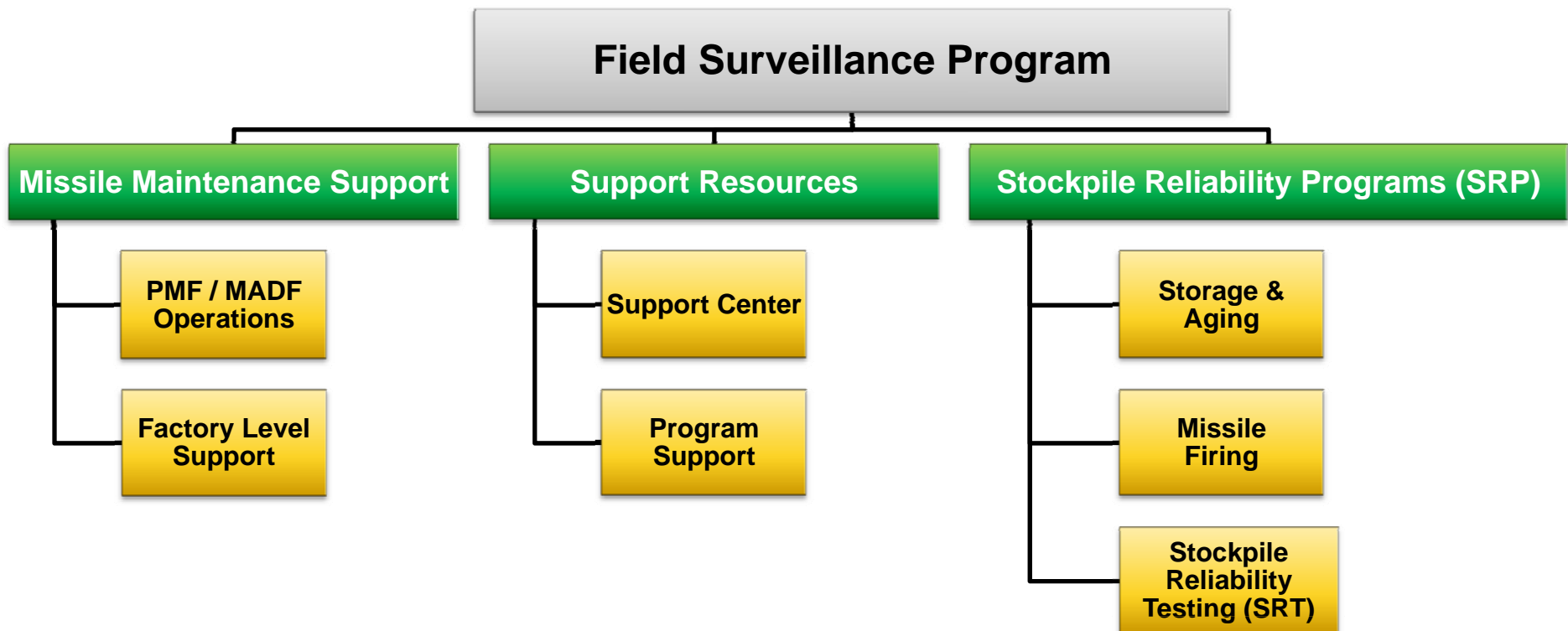
Shared program required by policy as a condition of ownership

- "Fair Share" program based on worldwide tactical inventory levels; Countries share test data, test assets, and program costs
- Sharing is based on country objective missile density



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

**The FSP is structured with a combination of reliability
and maintenance activities**



PATRIOT has missile facilities across the globe capable of missile testing, recertification, upgrade, and repair

- PATRIOT Maintenance Facilities - Missile conversion, upgrade, and subsystem replacement
- Missile Assembly and Disassembly Facilities - Limited part testing and major component replacement
- OEM Support - Piece part repair and Replacement / Missile Upgrade



Field Surveillance Program provides shared funding for:

- Technical Support
- Certified Round Data Management (CRDM)
- Electronic Data Collection System (EDCS)
- Consumables
- Test Equipment Maintenance / Upgrades
- Procedures

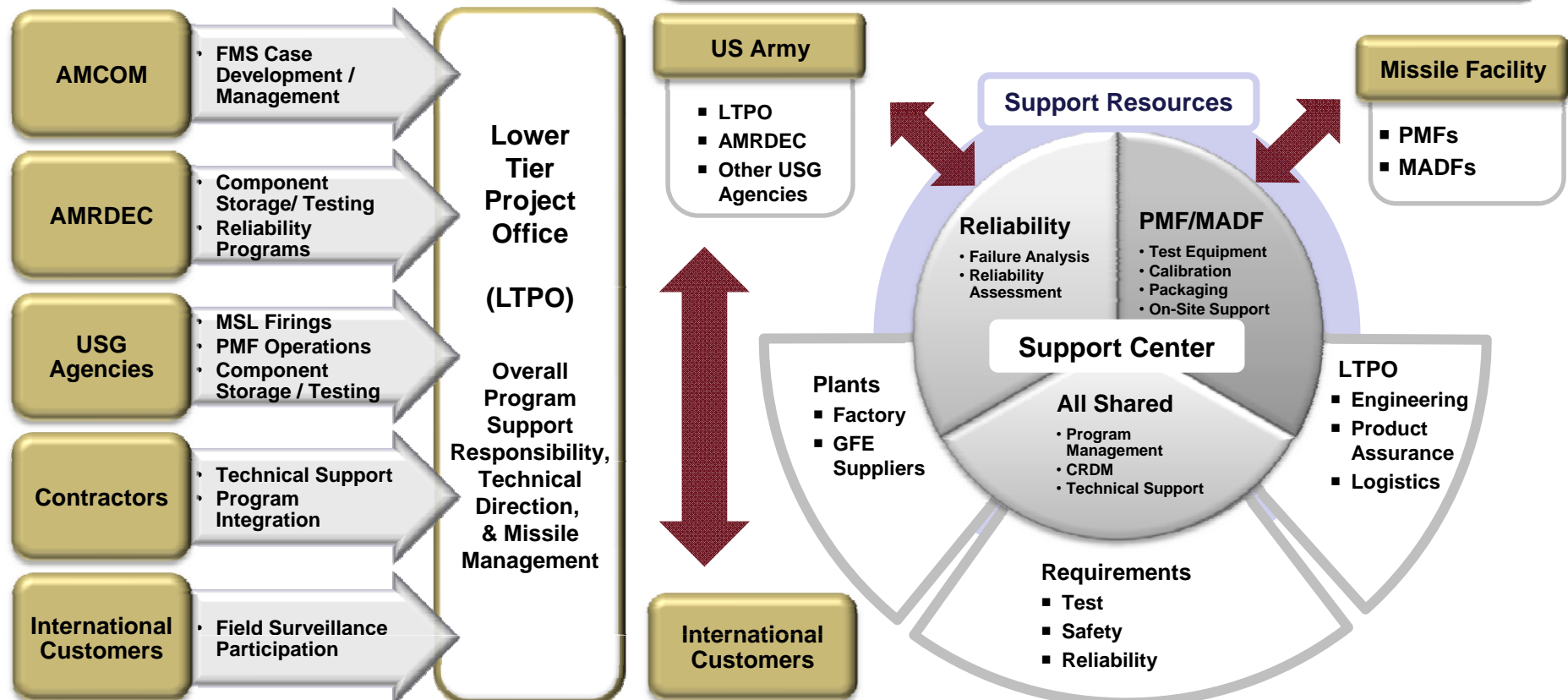
TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Program Support

- USG support to manage the FSP
- Contractor technical support to all phases of the FSP

PATRIOT Missile Support Center

- Engineering and technical support to the PATRIOT missile facilities
- Support of non-provisioned test equipment, missile piece parts and consumables
- Certified Round Data Management failure analysis & reliability assessment





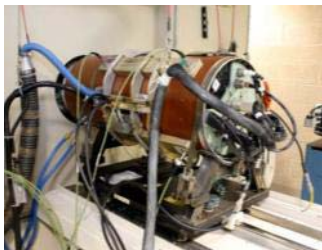
STORAGE AND AGING PROGRAM

- Monitors the effects of storage and environment on the missile round and its components
- Determines usable life for missile component in order to minimize recertification frequency



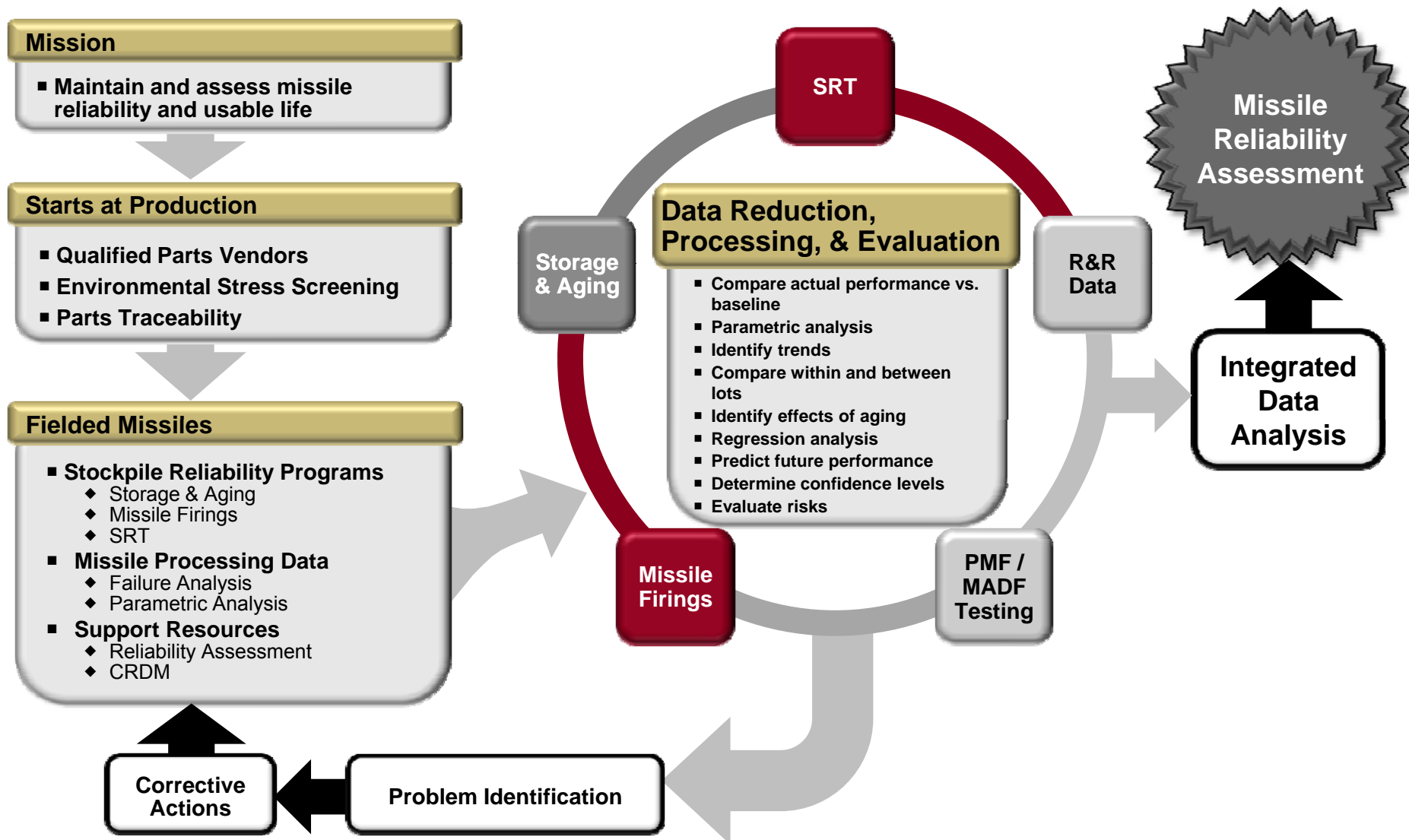
MISSILE FIRING PROGRAM

- Define and establish assessment of field missile reliability trend and performance in the tactical environment
- Older missiles drawn from the deployed stockpile and tested to validate that the stockpile contains good missiles
- Identifies potential field problems leading to design improvements, further inspections, etc



STOCKPILE RELIABILITY TESTING

- Establish and detect trends in reliability performance of worldwide deployed stockpile through non-destructive testing
- Failures are scored to determine potential flight impact
- Customers provide missiles for testing on a fair share basis





Field Surveillance Program Benefits



- ✓ Identified latent defects, safety issues, failure modes, need for corrective action, risks
- ✓ Confirmed acceptable missile reliability, life of components
- ✓ Enabled extension of missile operational life, extension of recertification interval, development of corrective actions, greater than \$15B life cycle cost avoidance, extrapolation of lessons learned to PAC-3 missile deployment
- ✓ The FSP has been very successful over the last 30 years by extending the PATRIOT Missile recertification interval and exceeding mission requirements over multiple configurations located worldwide.

Success has been achieved at a minimum shared program cost with US and International Partner participation.



Missile SRP and FSP Summary



- **Redstone Arsenal is considered a Center of Excellence for Missile SRP and FSP.**
 - In FY14, SRP supported extensions on over \$3.2B of the U.S. Army inventory. These missiles would have otherwise been restricted from use and required reprourement at a cost much higher than the original procurement of the existing inventory. SRP has demonstrated a 22:1 return on investment
 - A \$16.5B cost avoidance has been documented for supporting PATRIOT recertification from 30 to 45 years.
- **The Joint SRP and FSP provides the U.S. Army with the opportunity for significant leveraging of cost with increased data and confidence.**
 - Aggressively pursuing alternate funding sources significantly offsets U.S. Army SRP costs.
- **20 Customers (US Navy, US Air Force, and FMS) participate in Field Surveillance Programs and Joint Stockpile Reliability Programs**
 - PAC-2 PATRIOT and PAC-3, STINGER, JAVELIN, HELLFIRE, LONGBOW, TOW, THAAD, ATACMS, GMLRS

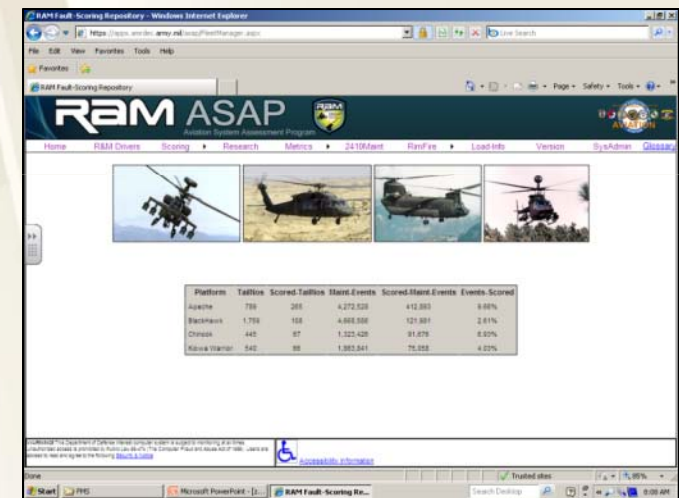
“When we assist other nations in meeting their defense requirements, we contribute to our own security.” - DoD 5105.38-M, Security Assistance Management Manual (SAMM), Oct 3, 2003



Aviation FMS Support

Aviation System Assessment Program (ASAP)

- Established in 2002
- Serves as the OFFICIAL U.S. Army aviation system assessment tool for reliability & maintainability
- Transforms maintenance records into operational and maintainability metrics that support and enhance fleet management activities
- Trusted engineering data source for U.S. Army Air Worthiness Acceptance Authorities
- Secure, Online, & Centralized location for U.S. Army Aviation Reliability Data
- Customize RAM Metrics within ASAP to PM or FMS requirements
- Contains 1,700,000 total records scored across all aviation platforms



Delivers Unbiased, Actionable, Information



TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

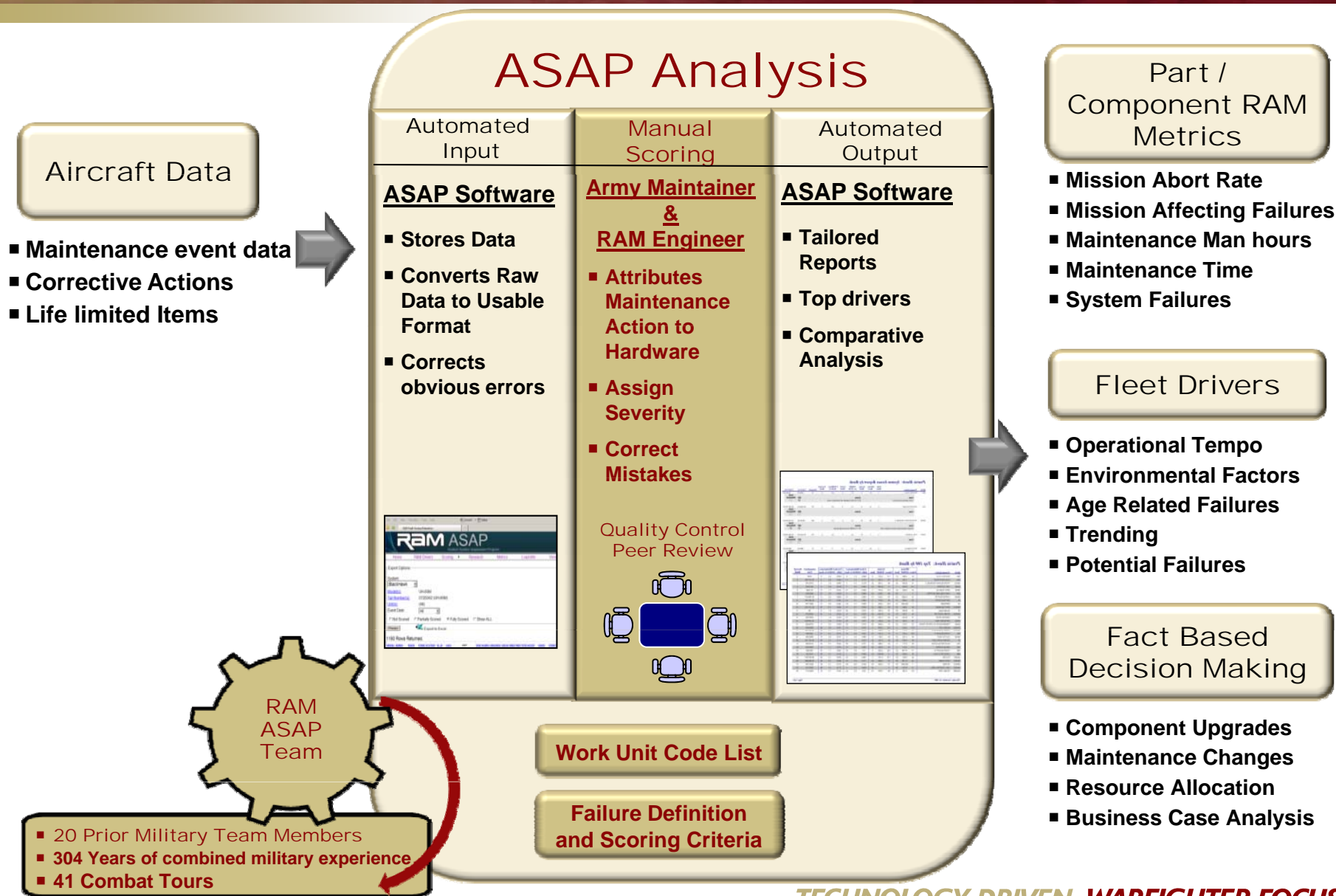


Aviation System Assessment Program Purpose



- **Execute technical analysis to provide effective recommendations for potential improvements**
 - Environmental impacts
 - OPTEMPO
 - Quantitatively effect hardware modifications and processes/procedures
- **Identify Maintenance Man Hours(MMH), cost & availability burdens**
 - Reliability drivers
 - Spare requirements
- **Develop and share “lessons learned” throughout the community**
 - Training
 - Equipment
 - Logistic requirements
 - Split-based operations

Provides Evidence for Fact Based Decision Making



■ Increase CH-47 reliability and maintainability through design and procedural changes

◆ EPUSHA (Electronic Hydraulic Pump)

- Eliminated need to manually charge hydraulic accumulator.

◆ Formation Light

- Designed and qualified new formation light to eliminate moisture intrusion.
- Tripled reliability & reduced maintenance man hours

◆ Composite Tunnel Covers

- Reduced Cost by 44%; Reduced part Count 54%
- Increased Step Load Capability
- Increased Damage Tolerance



Composite Tunnel Cover



Formation Light

❖ *RAM has enabled 70+ reliability and maintainability improvement projects: Average ROI 10 to 1*

■ Reduce field maintenance actions (save valuable time) through procedure changes

◆ Oil Sampling Intervals Extended/Eliminated

- UH-60: Extended inspection hour requirements.
 - Soldier workload decreased; Component reliability increased.
- CH-47: Extended inspection hour requirements. Maintenance burden reduced by 90%.
- AH-64: Oil sampling intervals eliminated.

◆ AH-64, UH-60 Inspection Kitting

- Created unique kits that address all consumed parts for each major inspection. Kits eliminate unused/excess parts. ROI 18:1.

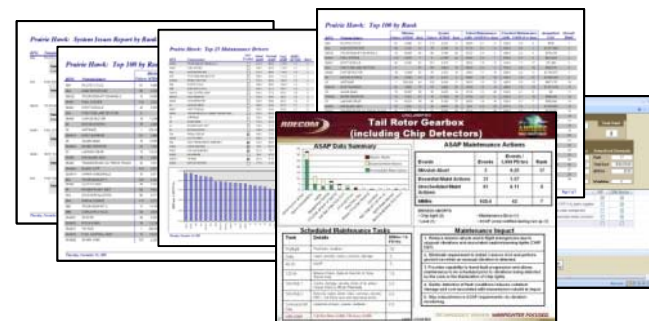
◆ AH-64: Maintenance Test Flight Reductions

- Main Rotor Blade Tracking Wedges over conventional Trim Tab bending methods
- 50% reduction in tracking flights per aircraft
- Saved thousands of maintenance man hours per year

ASAP serves as the TRUSTED engineering data source for justifying improvements to Army Air Worthiness Acceptance Authorities.

Maintenance Products

- **RAM Metric Analysis**
 - ◆ Fleet & Component
- **Burden Analysis**
 - ◆ Maintenance Man Hour, cost, & root cause of removal
- **Maintenance Practice Analysis**
 - ◆ Safety of Flight, Aviation Safety Action Message, recommended publications
- **Projection Report**
 - ◆ Maintenance practice changes based on changes in aircraft usage
- **U.S. Army Fleet Comparisons**



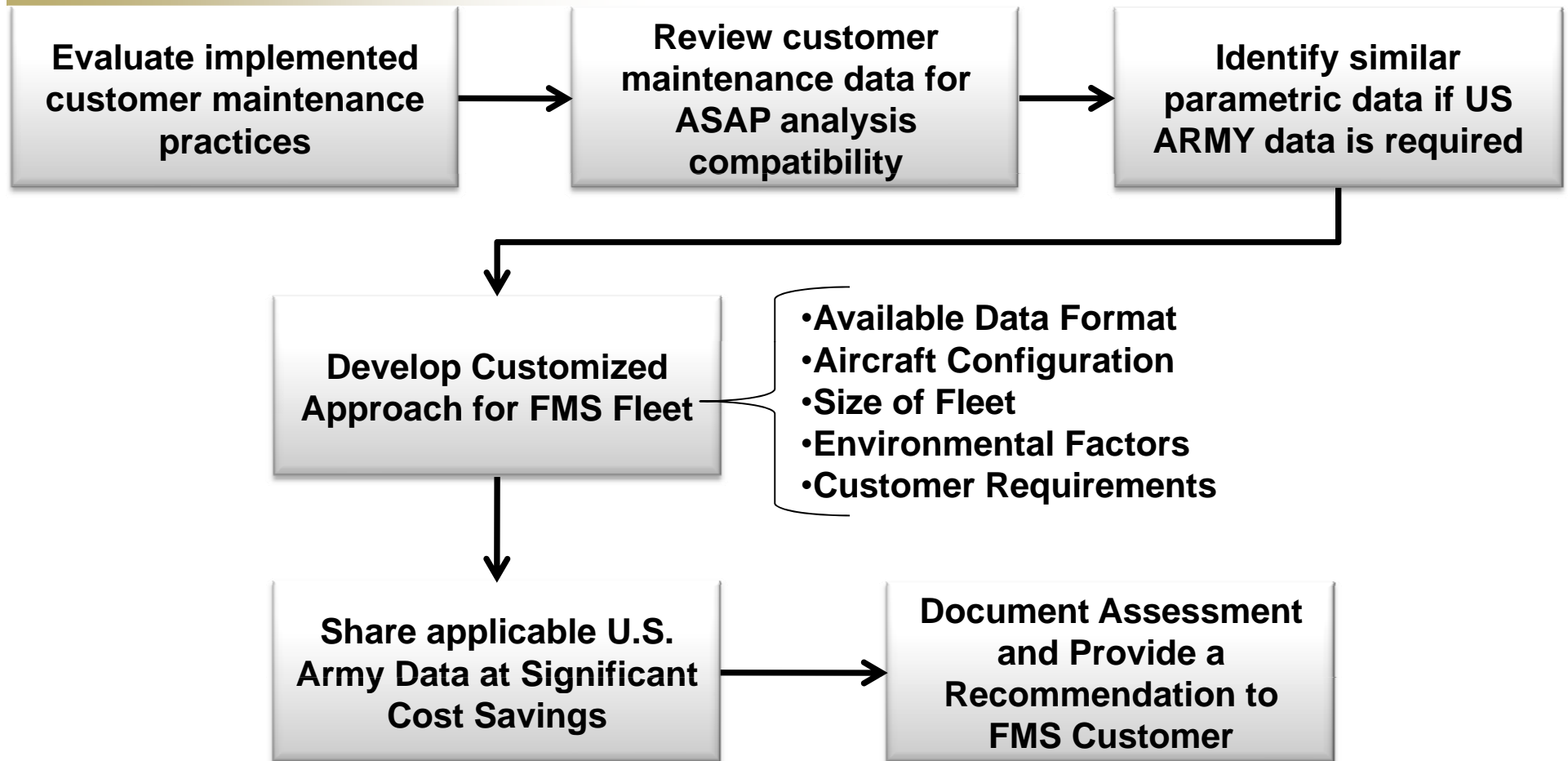
Logistic Products

- **Initial Fielding Usage Rates**
- **Push Package Validation during initial fielding**
- **Prescribed Load List Validation supporting sustainment**
- **Projection Report**
 - ◆ Stock changes based on aircraft usage changes
- **Supply Chain Management Recommendations**



Provides Evidence for Fact-Based Decision Making

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.



ASAP provides the analysis of actual maintenance data to yield quantitative solutions.

■ Analyze maintainability impacts of aircraft modifications to maintenance operations

- ◆ Provide snapshot of potential maintainability challenges associated with aircraft configuration changes through modification or modernization programs.
- ◆ Configurable for comparable flight hour and environmental conditions of the customer's operational environment.

■ Recommend Maintenance Support Packages

- ◆ Provide initial aircraft spare parts level recommendations based upon U.S. Army fleet data and technical manual scheduled maintenance requirements for comparable flight hour and environmental conditions.
- ◆ Recommend number of personnel by occupational specialty, tools, petroleum, oil, lubricants required based upon airframe specific U.S. Army maintenance publications.

■ Other Ad-Hoc Analysis as requested by the customer





Aviation System Assessment Program FMS Customer Benefits



- Optimizes maintenance records & transforms data into actionable information
 - ◆ AMRDEC is an independent, GOV, organization providing unbiased data assessments & recommendations
 - ◆ Manual scoring enables the reclassification of WUCs, assigns severity, and links maintenance actions to hardware
 - ◆ *ULLS-A (E) Raw Data can be misleading and lacks sufficient detail.*
 - *RAW DATA TRACKING of aviation records, inspections, parts ordering, work orders, and 2410 generation.*
- Documents aircraft and system performance regarding Reliability and Maintainability
 - ◆ Reduces costs when evaluating current spares and future systems.
 - ◆ Link maintenance data to parts; Failures are attributed to an actual system
 - ◆ Reduce field maintenance actions (save valuable time) through procedural changes
- Provides factual data to support decision making
 - ◆ Root Cause of Removal & Resolution
 - ◆ Resource Allocation; Return on Investment Analysis
 - ◆ Maintenance Burden Assessment
- Shared Lessons Learned from U.S. Army experience
 - ◆ Increase data sample size; Increase in confidence of analysis
 - ◆ U.S. Army fleet comparisons

ASAP serves as the TRUSTED engineering data source for justifying improvements to Army Air Worthiness Acceptance Authorities.

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.



RAM Foreign Military Sales Summary



- **“When we assist other nations in meeting their defense requirements, we contribute to our own security.” - DoD 5105.38-M, Security Assistance Management Manual (SAMM), Oct 3, 2003**
- **“If partners have U.S. equipment and training and are following U.S. doctrine, our interoperability is greater with them” - Derek Gilman, DSCA General Counsel**
- **RAM Programs (SRP, FSP, and ASAP) continue to be a vital piece of the TPA offered for confidence and sustainment of the FMS customer’s investment.**
- **RAM Programs provide the opportunity for significant leveraging of cost with increased data and confidence.**



RAM Foreign Military Sales Resources



- **SAMM (Security Assistance Management Manual)**
<http://www.dsca.mil/samm/ESAMM/ESAMM.htm>
 - ◆ Provides legal guidelines that must be followed for any Foreign Military business.
- **DISAM (Defense Institute of Security Assistance Management)**
<http://www.disam.dsca.mil/pages/pubs/greenbook.aspx>
 - ◆ Resource for Foreign Military education
- **DSCA (Defense Security Cooperation Agency) - <http://www.dsca.mil/>**
 - ◆ Provides news/updates for Major Arms Sales notifications
- **Recommended DISAM courses:**
 - **Security Cooperation Management**
 - Familiarization
 - Logistics
 - Financial Management
 - Program and Case Management
 - **International Program Security Requirements**