Wide Area Multilateration Implementation (WAM) Example

Presented to: ADS-B Implementation Workshop
Presented by: Alex Rodriguez (AIR-132)
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Module Objectives

- Definition of AMS
- AMS Policy
- AMS Guidance
- Lifecycle Management Process
- WAM Implementation Example
- Document Summary
Definition of AMS

Acquisition Management System (AMS) establishes agency-wide policy and guidance for all areas of lifecycle acquisition management.
AMS Policy

• Acquisition Management Policy describes the mandatory requirements of the AMS, applicable to all activities associated with the analysis of agency needs for:
  – Products, Services, and Facilities
  – Determination of Requirements
  – Analysis of Investment alternatives
  – Establishment of Investment Programs
  – Allocation and Expenditure of Resources
  – Procurement
  – Deployment, In-Service Management, and Disposal of products and services
AMS Guidance

• Acquisition Management Guidance is the set of agency-endorsed guidelines, processes, instructions, templates, databases, handbooks, checklists, and other information that supplements, expands, illustrates, or implements acquisition management policy.

• Derived from the AMS Policy and is followed unless a rational basis for adopting a different approach exists.
Lifecycle Management Process

FAA LIFECYCLE MANAGEMENT PROCESS

Legend
1. Concept & Requirements
   Definition Readiness Decision
2. Investment Analysis Readiness Decision
3. Initial Investment Decision
4. Final Investment Decision
5. In-Service Decision

IN-SERVICE MANAGEMENT

SOLUTION IMPLEMENTATION

DISPOSAL

INVESTMENT

ANALYSIS

Initial Investment Analysis
Final Investment Analysis

SERVICE ANALYSIS & STRATEGIC PLANNING

Research for Service Analysis

Federal Aviation Administration
Service Analysis and Strategic Planning

Flowchart:
- Gather Information on Service Environment
  - Analyze Service Shortfalls & Concepts
  - Assess FAA Strategic & Performance Goals
- Prepare Preliminary Shortfall Analysis
- Does Shortfall Impact NAS?
  - Yes: Go To ConOps Change Development and Decomposition
  - No: Assess Priority & Time Phasing
- Prepare EA Change
- Does FAA EAB Endorse?
  - Yes: is Investment Action Needed Now?
    - Yes: Prepare Plan for CRD
    - No: Defer Initiative
  - No: Rework Or Defer
- JRC Approve Enterprise Architecture
- Ready for CRD?
  - Yes: Go To CRD
  - No: Rework Or Defer

ConOps – Concept of Operations
CRD – Concept and Requirements Definition
EA – Enterprise Architecture
EAB – Enterprise Architecture Board
JRC – Joint Resources Council
NAS – National Airspace System
Acquisition Example

• Colorado Mountain Airport Surveillance
  – Background
    • Over the past 15 years the Ski Country of Colorado has become an increasingly popular recreational destination
    • The corresponding increase in traffic volume resulted in increased delays and denied service especially during bad weather
    • FAA implemented a Special Traffic Management Program (STMP) during peak travel months in an effort regulate traffic to the airports
      – Program keeps traffic volume manageable but produces extended delays and/or diversions and denial of services
    • Shortfall analysis suggested that a lack of surveillance is one of the main reasons behind the economic losses as a result of reduced capacity
      – The base of existing radar coverage is at or above 12,000ft
Concept and Requirements Definition

ACAT – Acquisition Category
CMTD – Concept Maturity Technology Development
EA - Enterprise Architecture
Acquisition Example

- Alternatives Analysis
  - An alternatives analysis was conducted to determine the most cost and operationally effective solution to increase airport capacity
    - Ten (10) airports were included in the analysis
  - Analysis was divided into two phases:
    - A preliminary analysis for establishing initial evaluation criteria, potential alternatives, and down selecting alternatives
    - A detailed analysis for producing a technology recommendation on the basis of effectiveness, risk, benefits, and cost considerations.
  - The following alternatives were considered during detailed analysis
    - ATCBI-6 SSR Interfaced to ERAM
    - ADS-B 1090ES Surveillance interfaced to ERAM
    - Multilateration with 1090ES ADS-B interfaced to ERAM
    - Multilateration with 1090ES and UAT ADS-B interfaced to ERAM
Acquisition Example

– Alternatives Analysis (con’t)
  • An evaluation team was established to identify evaluation criteria and assign a relative weighting to each criterion
  • The team assessed the effectiveness of each alternative on the basis of the following evaluation criteria:
    – Performance
    – Aircraft Equipage
    – Maintainability
    – Execution Schedule
    – Deployment Complexity
  • The evaluation team also assigned risk levels to implementing each alternative
  • A life cycle cost estimate was developed for each alternative
Investment Analysis
Acquisition Example

– Alternatives Analysis (con’t)
  
  • A life cycle cost estimate was developed for each alternative
    – Estimates were compared with the effectiveness scores and risk levels associated with each alternative
  
  • Multilateration with 1090ES and UAT ADS-B interfaced to ERAM was selected based on the effectiveness scores, relative risk levels, and life cycle costs

– Benefits Analysis
  
  • A detailed Benefits Analysis was conducted in conjunction with the alternatives analysis
    – Identified the solution which yielded the most economical results
    – FAA, User, and Indirect benefits are included in the analysis

– Investment Analysis results support decision to move forward with implementation
  
  • Positive Benefit to Cost ratio
Solution Implementation
Acquisition Example

- Solution Implementation
  - Detailed requirement documentation was developed to support acquisition activities including:
    - Specifications
    - Interface Requirement Documents
    - Statement of Work
  - Request for Proposal (RFP) for system procurement published
  - Proposals from vendors evaluated for conformance with solicitation and “best value” solution
  - Contract awarded based on the outcome of the proposal evaluations
  - Post-award conference held with Vendor to discuss development and implementation activities and schedule
Acquisition Example

- Solution Implementation
  - The following major contractual milestones were defined:
    - System Requirements Review – discuss interpretation and issues with any program requirements
    - Preliminary Design Review (PDR)
    - Critical Design Review (CDR)
    - Factory Acceptance Tests (FAT)
    - Site Acceptance Tests (SAT)
  - Once Vendor testing was completed the FAA conducted the following activities:
    - Operational Test and Evaluation (OT&E)
    - Independent Operational Assessment
  - The system then entered an Initial Operational Capability (IOC) period once all stakeholder major issues have been addressed
Hawaii ADS-B LV2: 24 Hour Snapshot
(Fri July 10th, 2015) Suitable for ATC automation

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Note: Some aircraft with multiple flights

Green = DO-260B
In-Service Management

Flowchart:
- From Solution Implementation to Sustain & Execute In-Service Planning.
- Is Solution Within an Operational Capability?
- Deliver Services/ Sustain Services.
- Evaluate Performance & Customer Expectations.
- Solution Meeting Service Needs?
- Is the Service Needed?
- Analyze Upgrade Options/Affordable Within Existing Budgets?
- End Service Life & Dispose/Obtain, Validate, and Deploy Upgrade.
- Go to Service Analysis.
- Verify and Validate Operational Capability/Obtain Remaining Solutions.
Document Summary

- Minimum Operational Performance Standards (MOPS) for Aircraft Surveillance Applications (ASA) System [RTCA DO-317A and Eurocae ED-194]

- TSO-C74d: Air Traffic Control Radar Beacon System (ATCRBS) Airborne Equipment
- TSO-C112d: Air Traffic Control Radar Beacon System / Mode Select (ATCRBS/MODE S) Airborne Equipment
- TSO-C154c: Universal Access Transceiver (UAT) Automatic Dependent Surveillance-Broadcast (ADS-B) Equipment Operating on Frequency of 978 MHz
- TSO-C157a: Aircraft Flight Information Services – Broadcast (FIS-B) Data Link Systems and Equipment
- TSO-C166b: Extended Squitter Automatic Dependent Surveillance - Broadcast (ADS-B) and Traffic Information Service - Broadcast (TIS-B) Equipment Operating on the Radio Frequency of 1090 Megahertz (MHz)
- TSO-C195a: Avionics Supporting Automatic Dependent Surveillance-Broadcast Aircraft Surveillance Applications

- AC 90-114, Change 1: Automatic Dependent Surveillance-Broadcast (ADS-B) Operations
- AC 20-165A: Airworthiness Approval of Automatic Dependent Surveillance - Broadcast (ADS-B) Out Systems
- AC 20-172A: Airworthiness Approval for ADS-B In Systems and Applications

- 14 CFR 91.225: ADS-B Out Equipment and Use
- 14 CFR 91.227: ADS-B Out Equipment Performance Requirements

- FAA Order 8200.45: Automatic Dependent Surveillance-Broadcast (ADS-B) Flight Inspection

http://rgl.faa.gov/
Implementation Summary

• Having a clearly identified AMS process is a powerful tool to ensure a standardized approach in the decision making process.
  – Policy
  – Guidance

• Lifecycle management does not end at deployment.
  – In-Service Management