ATM System Requirements Process

Steve Bradford
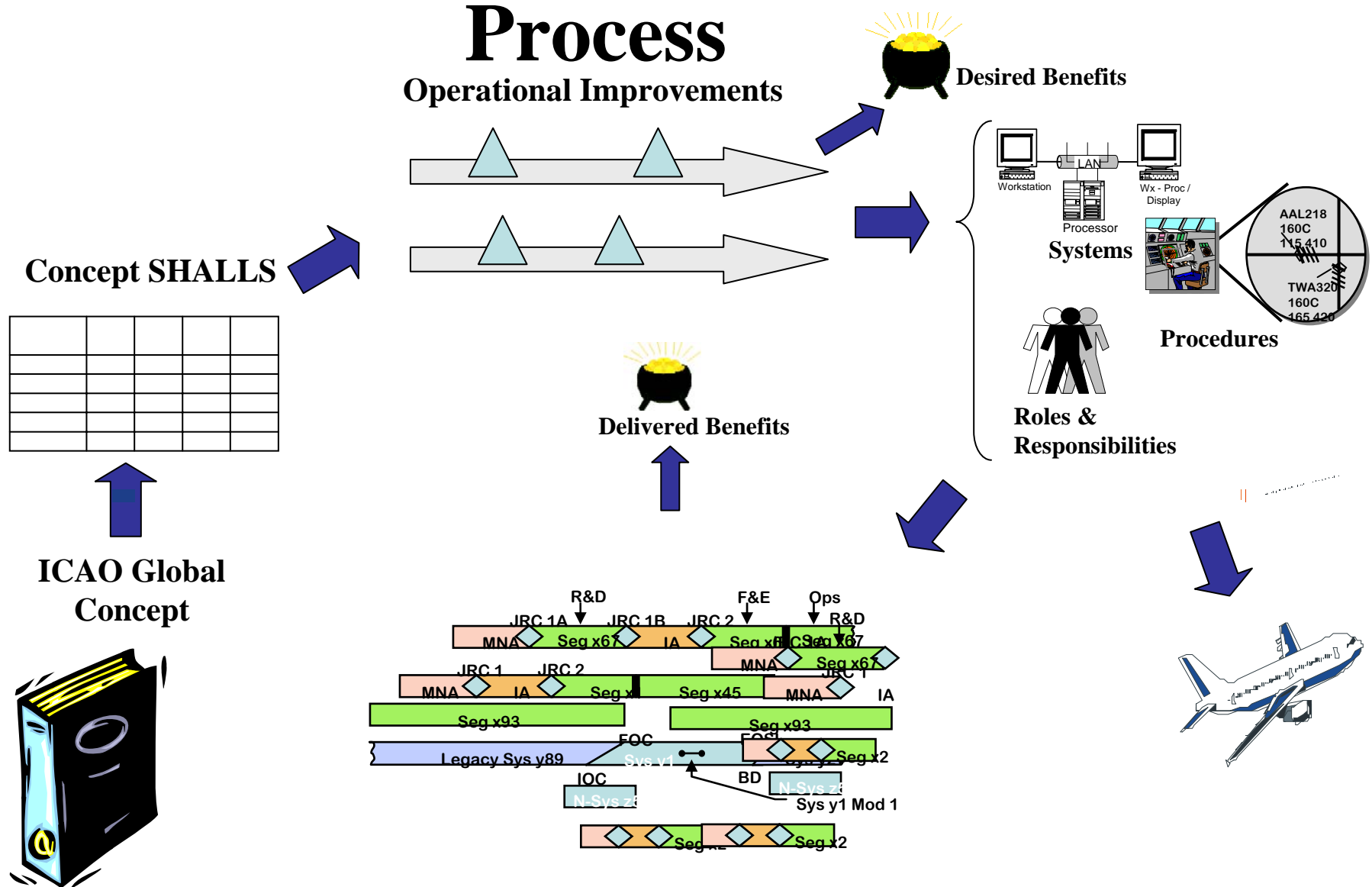
28 November 2005

ATM System Requirements

- An ATM system requirement is a statement of functionality and/or operating characteristics necessary to fulfil the expectations and deliver the benefits envisioned in the application of the OCD. :
  - Each requirement uses the words **shall** or **will** for "base" elements of the OCD.
  - Each requirement uses the word **should** for "desirable" elements of the OCD.
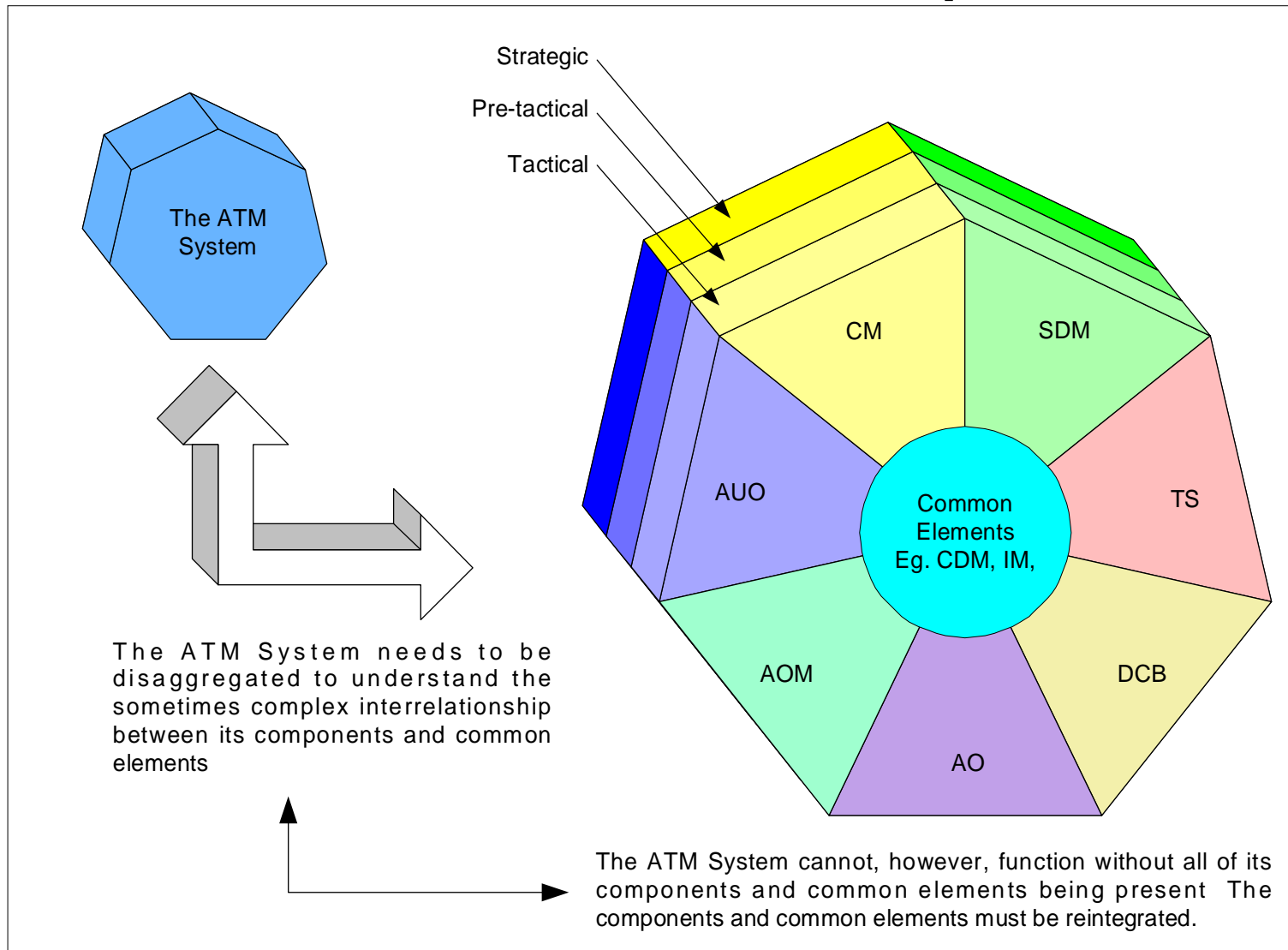
The End-to-End Development Process

Operational Improvements

Desired Benefits

Concept SHALLS

Systems

Procedures

Delivered Benefits

Roles & Responsibilities

ICAO Global Concept

R&D

F&E   Ops

JRC 1A   JRC 1B   JRC 2   R&D

MNA   Seg x67   IA   Seg x67

JRC 1   JRC 2   MNA   Seg x67

MNA   IA   Seg x45   Seg x45   MNA   IA

Seg x93   Seg x93

FOC   FOC

Legacy Sys y89   Sys y1   Seg x2

IOC   BD   N-Sys z5

N-Sys z5   Sys y1 Mod 1

Seg x2   Seg x2

The Relationship

- The **Global ATM Operational Concept**

  – Presents a vision for an integrated, harmonized, and globally interoperable ATM system planned up to 2025 and beyond.

- The **Performance-based Transition Guidelines**

  – Address the evolutionary nature of the operational concept.

- The **ATM Performance Manual**

  – Describes a process for developing performance objectives, metrics, and indicators in the context of overall ATM system behaviour responding to ATM community expectations.

- The **ATM System Requirements**

  – Identifies requirements where a *significant* change to operating practices will be required. The requirement set is not intended to be exhaustive.

Framework for the Requirements

The ATM
System

Strategic
Pre-tactical
Tactical

CM

SDM

AUO

Common
Elements
Eg. CDM, IM,

TS

AOM

AO

DCB

The ATM System needs to be disaggregated to understand the sometimes complex interrelationship between its components and common elements

The ATM System cannot, however, function without all of its components and common elements being present The components and common elements must be reintegrated.

Format of the Requirements Document

- To meet the expectations of the ATM community regarding access and equity, the ATM system **shall**:

  - **Be designed** to accommodate all types of airspace user missions and all types of vehicles and associated characteristics **[R45, R46]**; and

    - ***Explanatory Text***: Any type of user mission will be accommodated, and an appropriate type/level of service will be provided. Different types of mission will- or may have- different planning horizons. The ATM system will accommodate and be able to handle different planning horizons.

Links to the OCD – Appendix 1

ATM Require-ment Number	Requirement	OCD Reference
R01	Recognize that operation of the ATM system will not compromise the sovereignty of any State	2.2.2, Appendix A (States)
R02	Establish agreements to ensure that sovereignty of airspace is respected without imposing inefficiencies on ATM airspace management	2.2.2, Appendix A (States)
R03	Allocate airspace volumes that enable safe and efficient trajectory allocation and modification, from strategic to tactical	2.2.2

Contents

Performance and Expectations

- **Safety**
- **Security**
- **Cost-Effectiveness**
- **Access and Equity**
- **Capacity**
- **Environment**
- **Predictability**
- **Community Participation**
- **Flexibility**
- **Efficiency**
- **Global Interoperability**

INFORMATION MANAGEMENT AND SERVICES

- **Information Services**
- **Collaboration**

SYSTEM DESIGN AND ENGINEERING

- Interoperability, Seamlessness, and Infrastructure
- Human Design and Automation
- Spectrum
- Aircraft Design

ATM SYSTEM COMPONENTS

- Airspace Organization and Management
- Aerodrome Operations
- Demand and Capacity Balancing
- Traffic Synchronization
- Airspace User Operations
- Conflict Management
- ATM Service Delivery Management

Key Cross Cutting Themes

- Information Management

- Collaborative Decision Making

- Cost-Benefit And Business Case
  - Allocated versus Unallocated Requirements
    - *Cost-benefit analysis (CBA)*
    - *Cost-effectiveness analysis (CEA*)
    - *Business case evaluation*

Information Management

- Managing information and providing information services ensures cohesion and linkages between the ATM components
  - **Implement** system wide information management
  - **Provide** a global, common aviation data standard and reference system
  - **Provide** to the ATM community accredited, quality-assured, and timely information
  - **Be capable of** collecting and integrating information from diverse sources to produce a complete and accurate view of the ATM system state
  - **Make available** to the ATM system flight parameters and aircraft performance characteristics

Collaboration

- **Collaborative Decision Making (CDM)**
  - **Ensure** that ATM system design, development, implementation, and operation are determined by CDM, system safety, and system wide business cases
  - **Ensure** that decisions on the evolution of the ATM system are made through CDM with affected ATM community members
  - **Ensure** that the airspace user community participates in CDM
  - **Ensure** mutual exchange of relevant and timely data:
    - to allow CDM on the consequences of airspace user system design changes
  - **Employ** CDM to reconcile information needs and the availability of, or access to, information

Cost-Benefit And Business Case

- **Cost-benefit analysis (CBA)** —gives an indication of the total economic welfare effects of a project by comparing all costs and benefits
- **Cost-effectiveness analysis (CEA)** —differs from a CBA in that it asks a different question; namely, given a particular objective, which is the least costly way of achieving it
- **Business case evaluation** —takes the financial cost-benefit analysis a step further - includes the implementation cost and operating cost savings, which are included in the cost-benefit analysis, but also consequent changes in revenues

Thank You