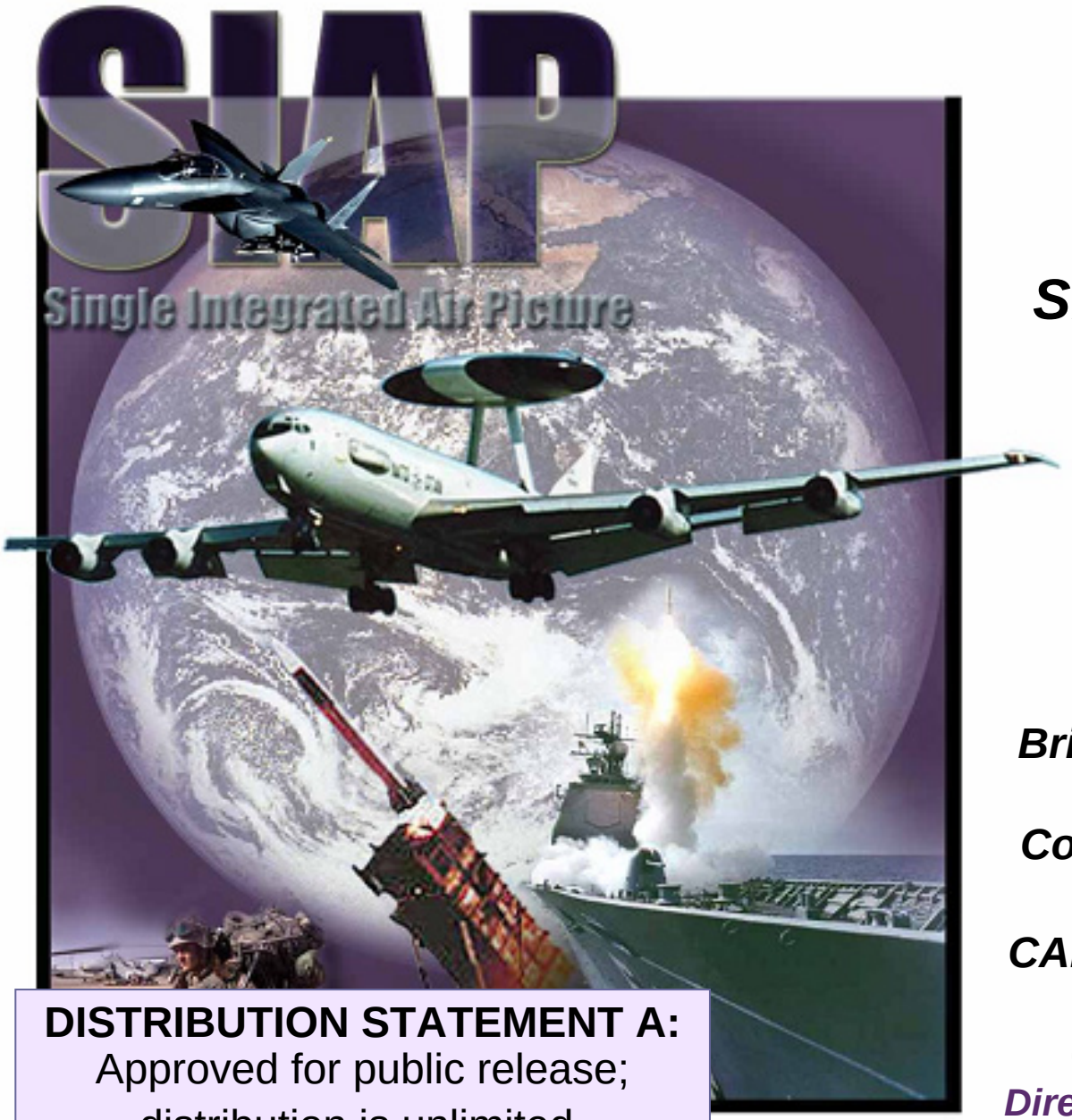

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Joint SIAP System Engineering Organization

Single Integrated Air Picture (SIAP)

HPEC 2006

September 20, 2006

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Why Single Integrated Air Picture (SIAP)?

- **Why SIAP?**
  - Ambiguity of “paper” specifications leads to divergence of implementation
  - Potential Results:
    - Fratricide (“Duals,” “Swaps,” “Merges”)
    - Holes in sensor coverage (lack of joint composite tracking)
    - Less effective allocation/use of assets (ambiguous air picture)
  - Need common approach to track management, sensor registration, composite tracking, combat ID, etc. (called “SIAP”)
  - Enables: Joint Air Operations, Joint Combat ID, etc.

Overview

- **History**
  - SIAP Definition
  - Program Summary/Evolution
- **Present**
  - Attributes
  - Warfighting Benefits
  - Stakeholders / collaborative program structure
  - Challenges
- **Future Potential Capabilities**
  - Fighters
  - Offensive air picture
  - CID
- **Summary**
  - Conclusion

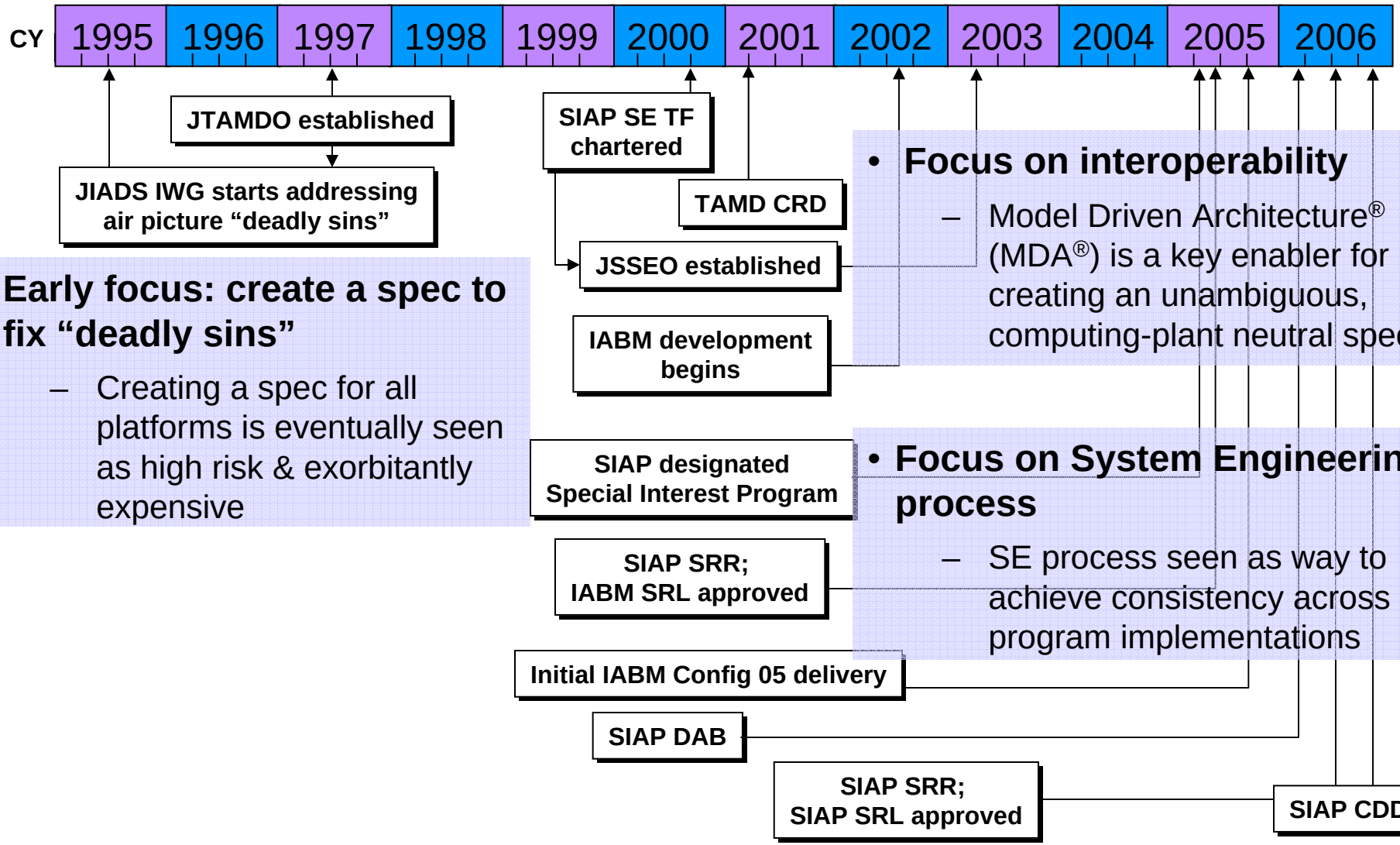
SIAP Definition

- **Single Integrated Air Picture:**
  - Consists of common, continuous, and unambiguous tracks of airborne objects... so that our Joint and coalition warfighters can ***exploit the full range of our weapons***, reduce the risk of fratricide and counter emerging threats
  - Each object must have one, and only one, track identifier and associated characteristics

Program Summary

- Joint effort established 2000
- Designated a Special Interest Program 2005
- Congressional Interest Item
- International Interest
- Reports to USD(AT&L) via Service Acquisition Executive
- Open acquisition
- Broad industry involvement

Program Evolution



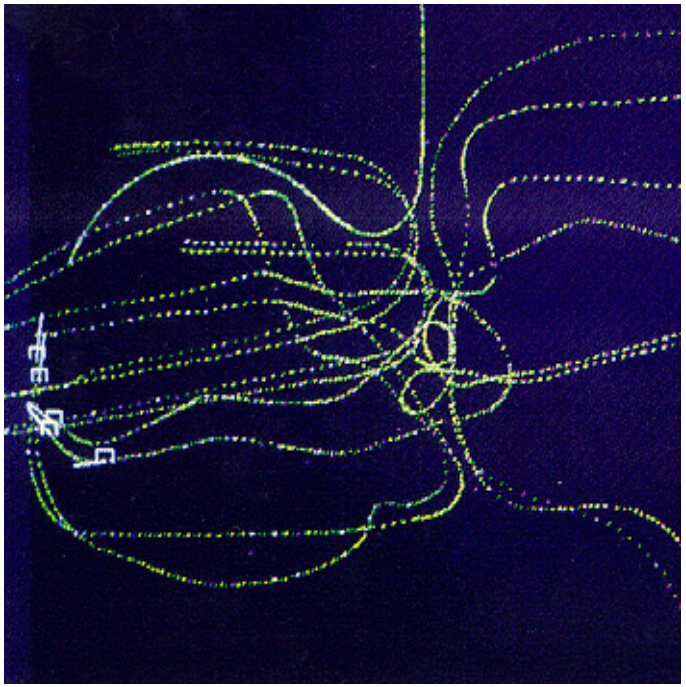
- **Early focus: create a spec to fix "deadly sins"**
  - Creating a spec for all platforms is eventually seen as high risk & exorbitantly expensive

- **Focus on interoperability**
  - Model Driven Architecture® (MDA®) is a key enabler for creating an unambiguous, computing-plant neutral spec

- **Focus on System Engineering process**
  - SE process seen as way to achieve consistency across program implementations

SIAP Metrics: 'Yardsticks' to Measure Capability Against Requirements

SIAP Attributes:

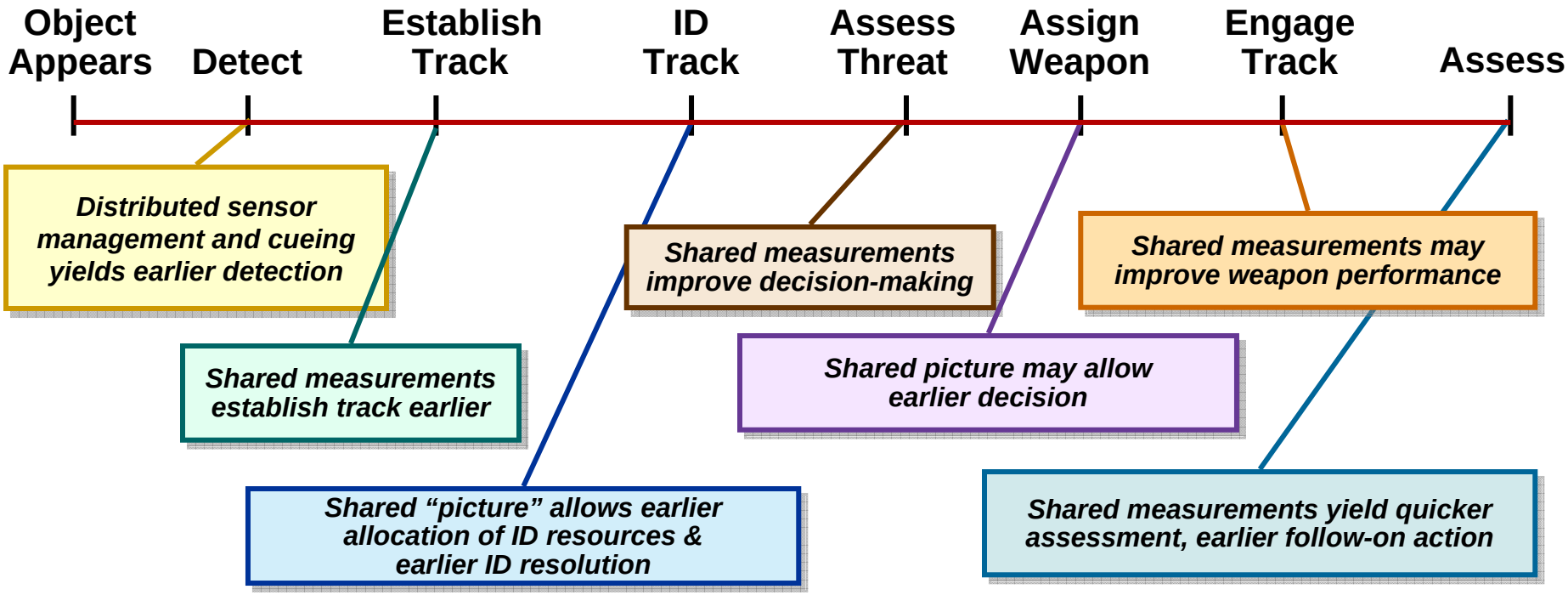


- **Completeness***
- **Clarity***
- **Continuity***
- ***Kinematic Accuracy*****
- **ID Completeness***
- **ID Accuracy***
- ***ID Clarity*****
- ***Commonality*****

*** JROC Approved Requirements**

***** SIAP Measures Of Performance***

Warfighting Benefits



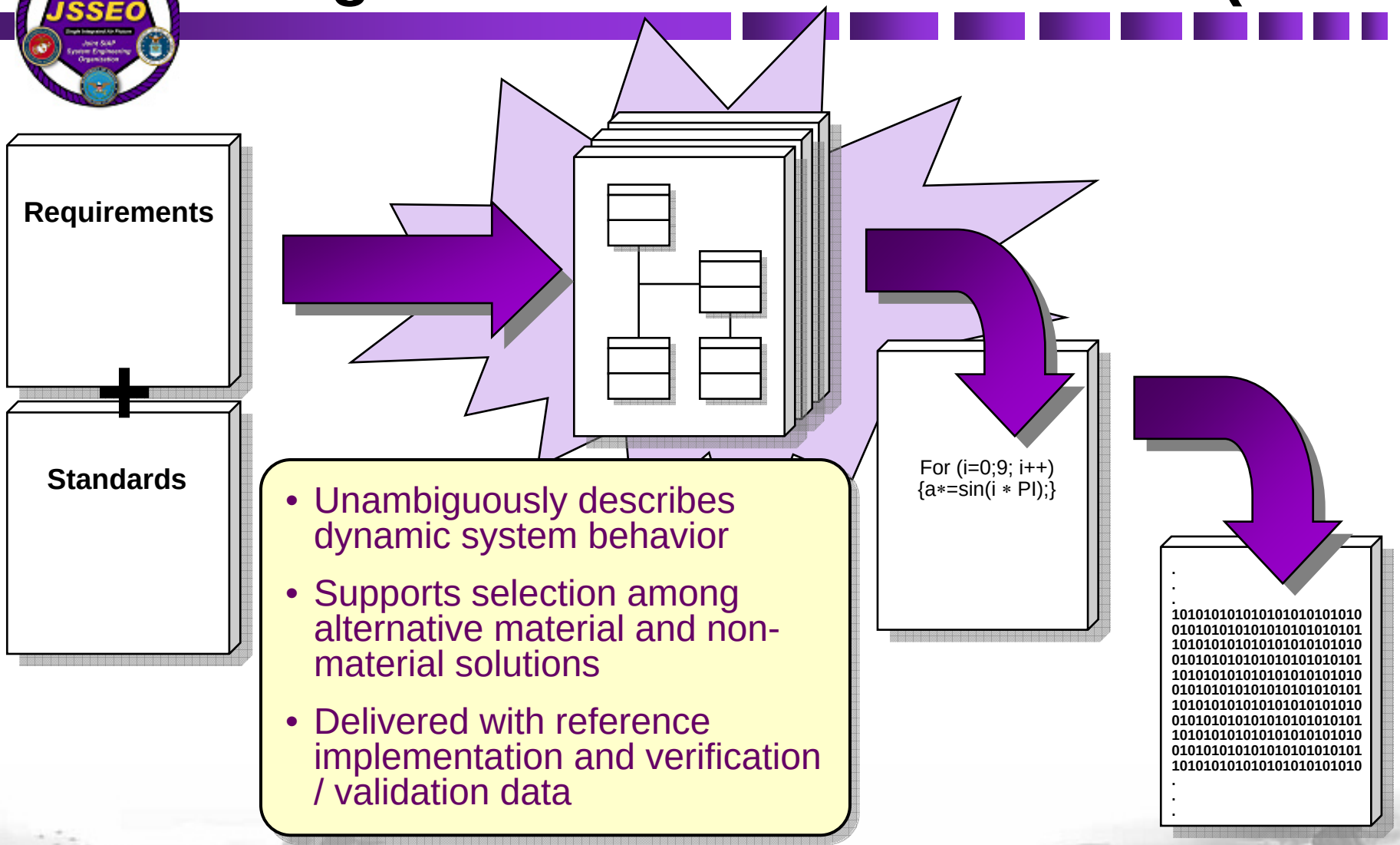
- Counter emerging threat
- Exploit full range of weapons
- Reduce fratricide

Integrated Architecture Behavior Model

- **Tool to enforce discipline and deliver distributed interoperable capabilities**
- **'Independent' of host systems' computing environment**
- **A *computerized specification***
- **A *conformance tool***
- **A *"software jig"***
- **IABM Consists of:**
  - Platform Independent Model (PIM) in xUML
    - Class diagrams
    - State diagrams
    - ASL code
  - Algorithm libraries
  - Reference Implementation

Using Model Driven Architecture® and industrial standards to increases warfighter effectiveness and long term acquisition efficiency

Integrated Arch Behavior Model (IABM)



- Unambiguously describes dynamic system behavior
- Supports selection among alternative material and non-material solutions
- Delivered with reference implementation and verification / validation data

Gives industry & JITC a model of the distributed system to show what "good" looks like--automate the standards

From SIAP Concept to Capability

- Combat scenarios, operational concepts and mission area ICDs drive the IAMD architecture and define mission threads
- Net-Ready KPP links Service systems to approved architecture
- A computerized spec (the IABM) captures the behavior of the IAMD architecture and provides an executable template for what "good" looks like

Structured, disciplined, collaborative approach

From SIAP Concept to Capability *(cont.)*

- **Services use this model / template as a "software jig" to create computer programs that conform to approved architecture**
- **Service Operational Test Agencies and Joint Interoperability Test Command compare system performance to computerized spec (IABM) to validate architectural conformance and certify satisfaction of Net Ready KPP requirements**

Structured, disciplined, collaborative approach

Stakeholders / Collaborative Program Structure

- **Army**
- **Marine Corps**
- **Navy**
- **Air Force**
- **USJFCOM**
- **Other COCOMs**
- **OSD**
  - AT&L
  - PA&E
- **Joint Staff**
- **JITC**
- **DOT&E**
- **MDA**

- **Pathfinders***
  - Army – IBCS (Full), JLENS GS (Partial), Improved Sentinel (Partial), Patriot Radar (Partial), SLAMRAAM (Partial)
  - Air Force – AWACS 40/45, BCS
  - Navy – AEGIS, SSDS Mk II, E2
  - Marine Corps - CAC2S

***SIAP Capability Drop 1 (as of Mar 2006 DAB)**

Challenges

- **Satisfying requirements**
- **Maintaining schedule in a collaborative development environment**
- **Implementing model on existing or upgraded systems with inherent limitations on:**
  - Computing power
  - Bandwidth
- **Complying with information assurance and security instructions or best practices**

Future Potential Capabilities - Fighters

- **Pipe – Peer to Peer or Link 16**
- **Operational Flight Program Implementation**
- **Opportunities for cost avoidance**

Future Potential Capabilities – Offensive Air Picture (SAM's, …)

- **Support for Attack Operations**
- **Connectivity to other emerging programs (e.g., DCGS, NCCT)**
- **Element in Common Tactical Picture**

Future Potential Capabilities – CID

- **Pipe – Peer to Peer**
- **Leverage Service (Navy) advanced fusion algorithms**

Conclusion

- SIAP is a “system of systems” Special Interest Program
- SIAP is focused on tactical warfighting, and is relevant across tactical, operational and strategic levels
- SIAP is vital for air operations and air defense and is an enabler of Combat ID, time sensitive targeting and joint integrated fires
- SIAP has many diverse and important stakeholders
- SIAP defined by and for warfighters
- SIAP designed and delivered by the acquisition community and technology community