PLM Standards in Aerospace and Defence – An industry approach to interoperability

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The Journey

- **Problem**
  - **What is the Industry Problem to be solved?**
  - **Vision for the Future**

- **The US response**
  - **What is the AIA?**
  - **What is the EEIC?**
  - **What does the EEIC do?**

- **The common approach**
  - **The EEIC Approach to Interoperability**
  - **The ASD Strategic Standardisation Group**

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Challenges facing the global industry

Digital collaboration needed to improve competitiveness

Increasing use of digital product models from the preliminary design to customer support

Long term archiving of model-based dossier

Proliferation of proprietary formats, "digital breaks"

Processes, methods and tools
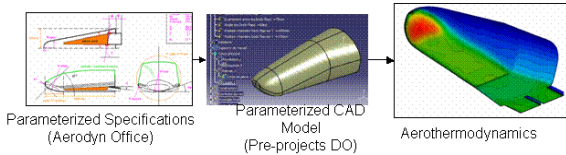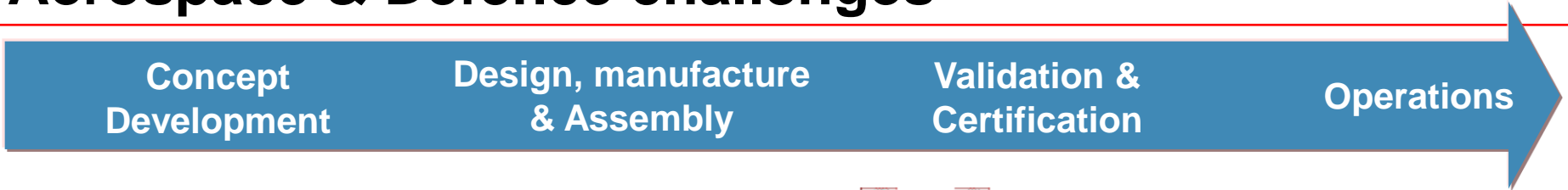
Suppliers supporting global market

Heterogeneous practices, process and platforms

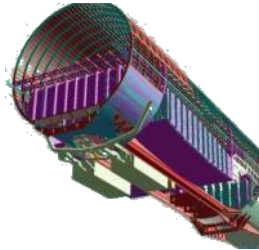Cost of evolution and maintenance of effective digital infrastructure

Need to secure the investment made in collaborative infrastructure (e.g. PLM)

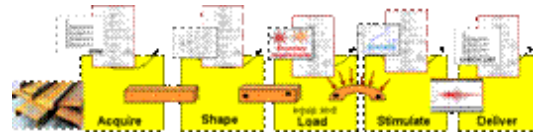New contract models: Information Exchange / IPR issues

Aerospace & Defence challenges

Concept Development	Design, manufacture & Assembly	Validation & Certification	Operations

Parameterized Specifications (Aerodyn Office)

Parameterized CAD Model (Pre-projects DO)

Aerothermodynamics

Acquire · Shape · Inhibit and Load · Stimulate · Deliver

« Full virtual concept » deployed with System contractors and with Disciplines

« Full virtual rigs » deployed with Testing Labs and Certification authorities

Ground segment
MROs
OEMs
Operators
Supply cha...

« Full 3D configured DMU» deployed with component and sub-assembly Suppliers
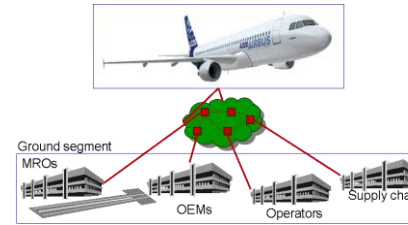
« Full virtual A/C services » deployed with Operators and MROs

How to organise collaboration around these artefacts?
How to reach collaboration industrial performance?

Standards!

The global perspective

- The aerospace value chain is becoming increasingly global in nature, with suppliers in many countries supporting manufacturers in the US and Europe, across many home markets.
    - This implies the use of global standards, which is already AIA and ASD policy
    - The value of exploiting such standards is now being promoted by consultancies such as Gartner
- Our customers are also recognising the value of standards-based links to the supply network for all classes of information exchange.
    - In the US defence sector, consideration is being given to possible DFARS clauses mandating the use of DoD architecture components
    - In the UK, the MoD has already developed a joint logistics architecture with industry, based on global standards
    - In Europe, OCCAR is seeking to efficiently manage and support trans-national projects
    - Logistics information for collaborative in-theatre operations, and consistency between projects on information planning
    - The ATA is setting up global eBusiness standards for the airline industry
    - Defence ministries are also working on collaboration on these trends reinforcing the opportunity for global collaboration on setting industry standards

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The opportunities

**"The great thing about standards is that
there are plenty of them to choose from"**

- **Globally there is a proliferation of official bodies, communities of interest, conferences, Trade Associations and individual industries addressing standardisation**

- **Standards are being developed to address:**
  - **Different business processes**
  - **Different levels; information, process, IT, deployment**
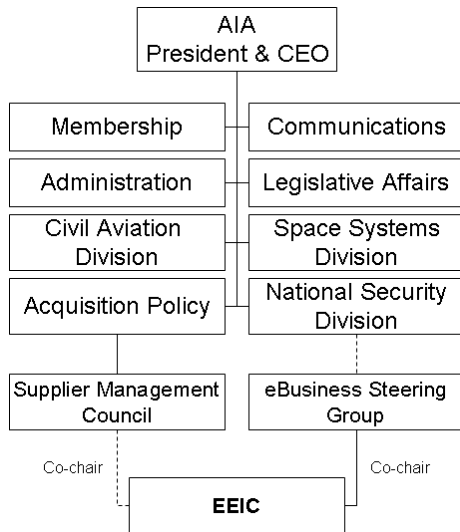 - **Tailoring for contract needs**
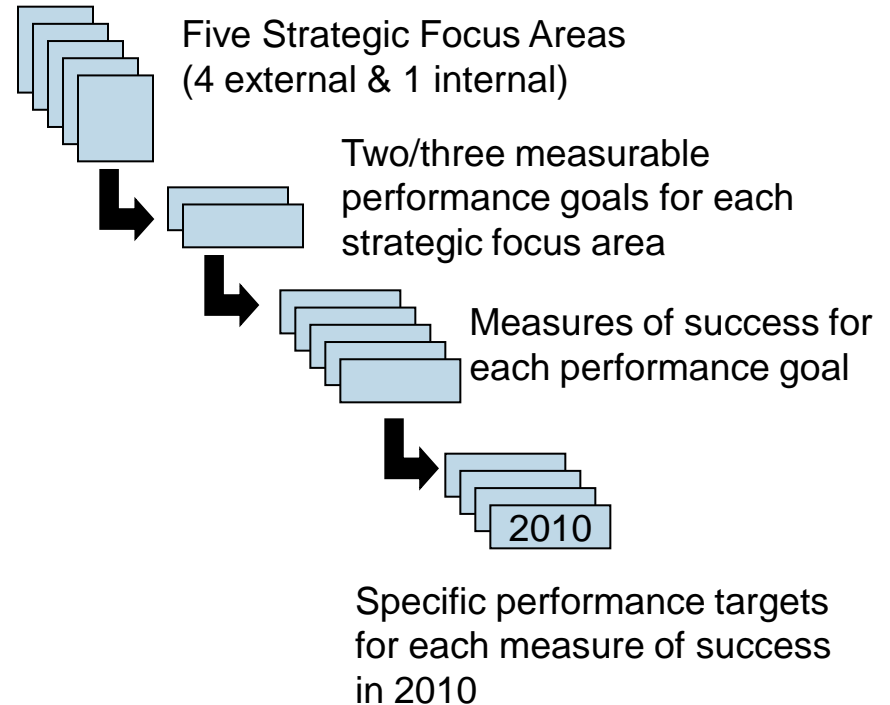
The US response

AIA Purpose and Structure
EEIC Purpose & Structure
EEIC Concept of Operations

AIA Overview

- **The Aerospace Industries Association represents the USA's leading manufacturers and suppliers of civil, military, and business aircraft, helicopters, UAVs, space systems, aircraft engines, missiles, materiel, and related components, equipment, services, and information technology.**

Strategic planning

Five Strategic Focus Areas
(4 external & 1 internal)

Two/three measurable performance goals for each strategic focus area

Measures of success for each performance goal

2010

Specific performance targets for each measure of success in 2010

```
          AIA
    President & CEO

Membership        Communications
Administration    Legislative Affairs
Civil Aviation    Space Systems
  Division          Division
Acquisition Policy  National Security
                      Division

Supplier Management   eBusiness Steering
    Council               Group

Co-chair              Co-chair

           EEIC
```
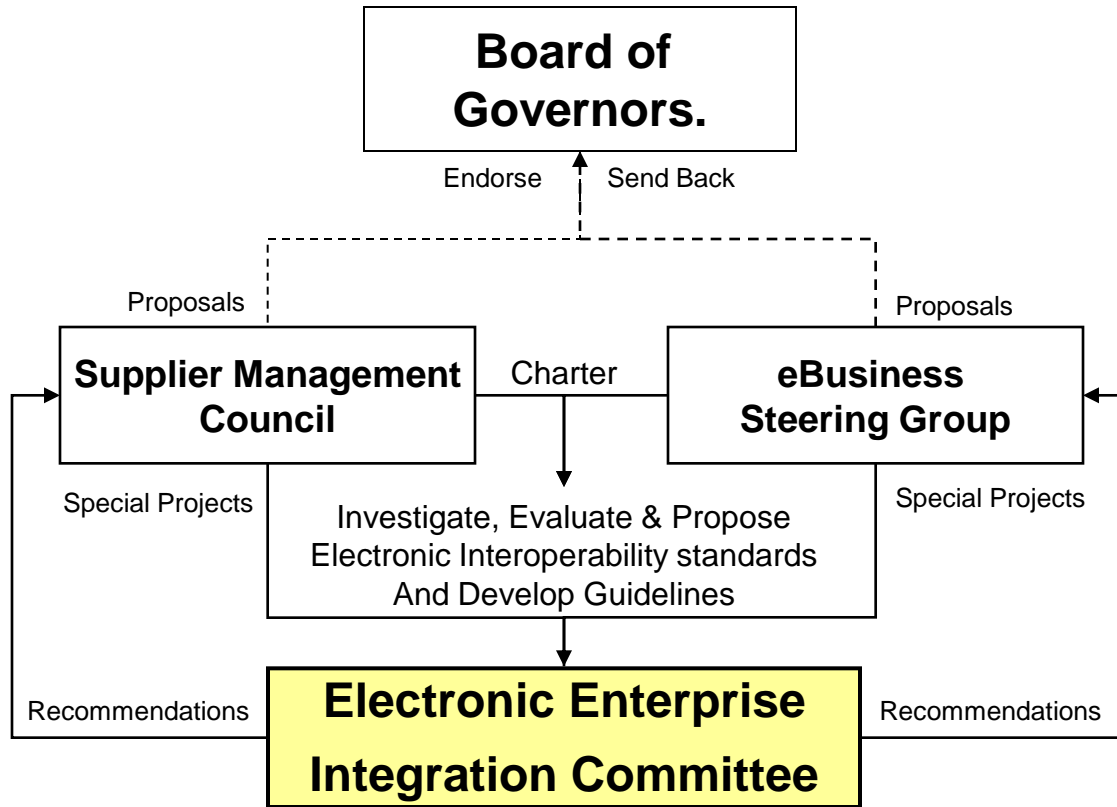
AIA Exists to Advance the Aerospace Industry in the United States

The business case for interoperability

- **AIA members are committed to a vision for e-Business across the industry, where:**
  - **all participants in the aerospace value chain will be able to exchange information across an information backbone:**
    - **product design**
    - **business relationships**
    - **transactions**
    - **and product support**
- **the vision is to be achieved through industry-level adoption of policies and standards**
- **benefits to prime contractors, suppliers and customers through**
  - **simplification of electronic trading,**
  - **fewer interfaces and simpler processes**
  - **reduced support costs**
  - **more agility**
  - **responsive teaming**
- **generate innovative process changes to further improve performance**

EEIC Overview

Board of Governors.

Endorse   Send Back

Proposals   Proposals

Supplier Management Council   Charter   eBusiness Steering Group

Special Projects   Investigate, Evaluate & Propose Electronic Interoperability standards And Develop Guidelines   Special Projects

Recommendations   **Electronic Enterprise Integration Committee**   Recommendations

Undertakes projects to propose standards enabling interoperability in the Aerospace industry

- **EEIC is chartered jointly by eBSG and SMC and reports to both**
- **EEIC has Co-Chairs who represent both chartering organizations**
- **EEIC has a standing charter which drives ongoing activity**
- **eBSG or SMC periodically make requests to EEIC for investigation or analysis**
- **EEIC sends recommendations to the chartering organizations which they accept and elevate to the BOG, or send back for more work**
- **EEIC reaches out to relevant projects in other Committees, eg. EMC, PSC, Legal**

EEIC Is the Working Arm of Both SMC and eBSG

What does the EEIC do?

- **Based on the AIA objective, the overall concept of operations of the EEIC is to:**
  - **Solicit, identify and rationalize specific business requirements.**
  - **Identify and assess key standards and initiatives, as framework components within an overall framework for eBusiness**
  - **Develop AIA position statements on relevant standards/initiatives**
  - **Undertake projects to ensure that appropriate standards are available to industry in a timely manner, together with suitable guidance material if required**
  - **Develop guidelines for deployment of such components to meet specific business scenarios**
  - **Seek industry endorsement of the resulting standards and solutions**

The EEIC Is Chartered to Recommend Interoperability Standards

Approach

**Standards Strategy
Concept of Operations
Project tracking Radar
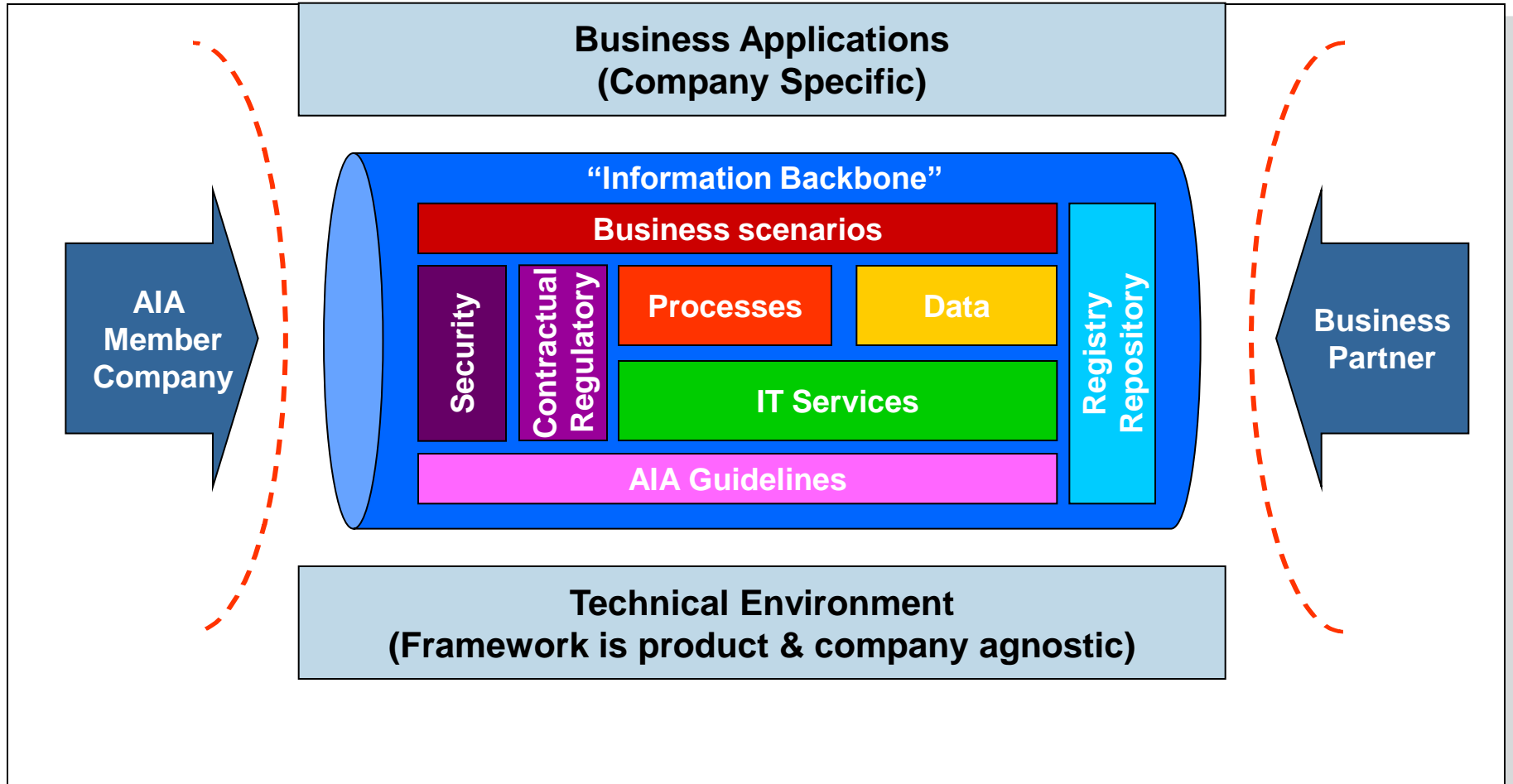Standards Assessment Criteria**

The Path to AIA eBusiness Interoperability

- **Many eBusiness scenarios can be identified**
- **Many standards and initiatives have the potential to satisfy part of the overall industry requirement for interoperability**
  - **Between companies and business partners**
  - **Between functions in an organisation**
  - **Between application systems**
- **Challenge:**
  - **reduce overall cost and complexity by identifying the most appropriate solution components**
  - **provide concrete guidance on how to satisfy specific business requirements using an appropriate selection of those components**
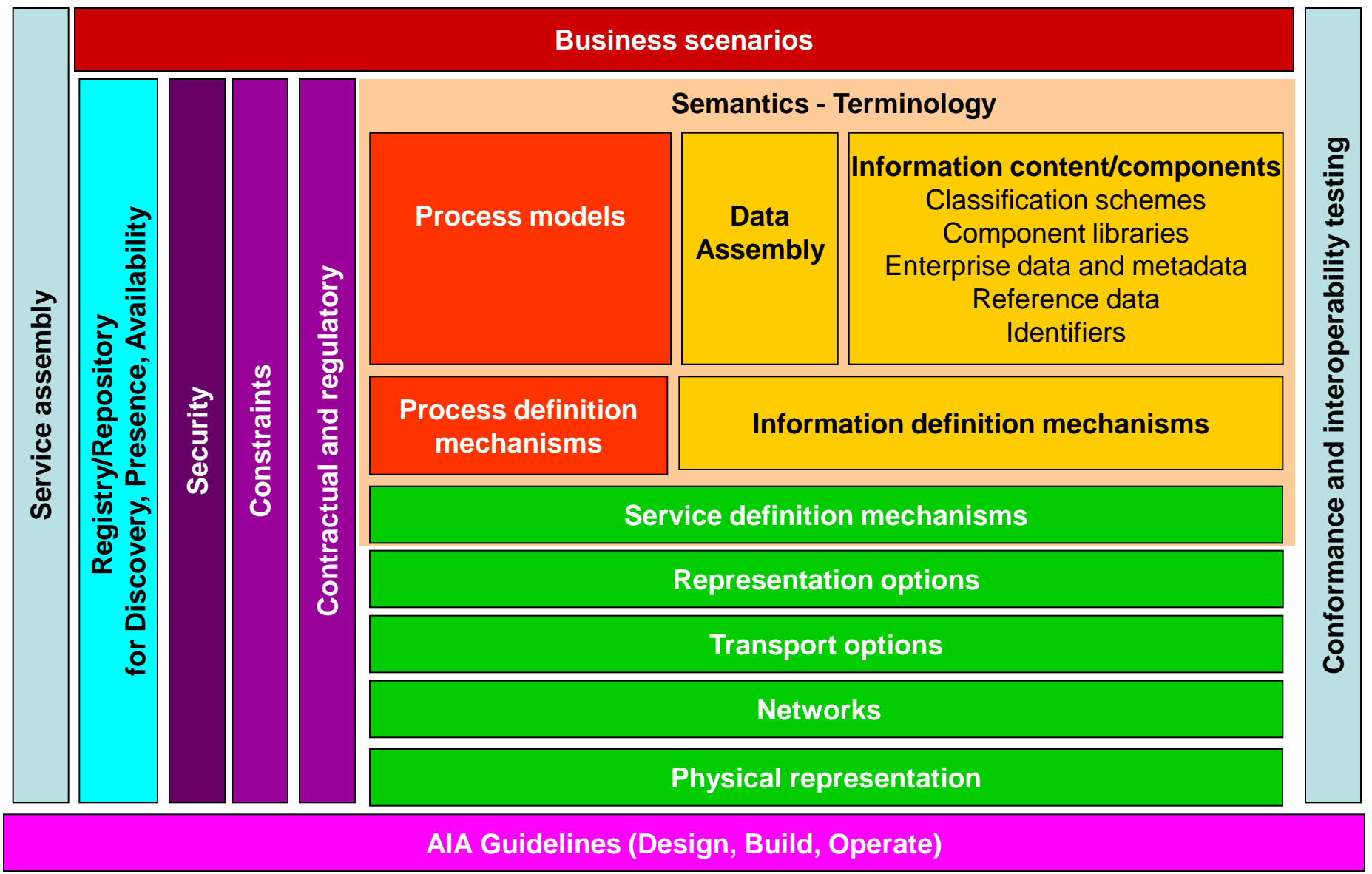
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Standards strategy

- **In order of preference**
  - **AIA adopts existing standards for use in the aerospace industry**
  - **AIA influences standards organizations through participation to meet its requirements**
  - **AIA develops its own standards when none exists from standards organizations**
    - **AIA may then submit a proposal to the applicable standards organization for international adoption**
- **In each case**
  - **The AIA may supplement existing standards with aerospace-agreed implementation conventions (subset), models/examples, and guidelines**

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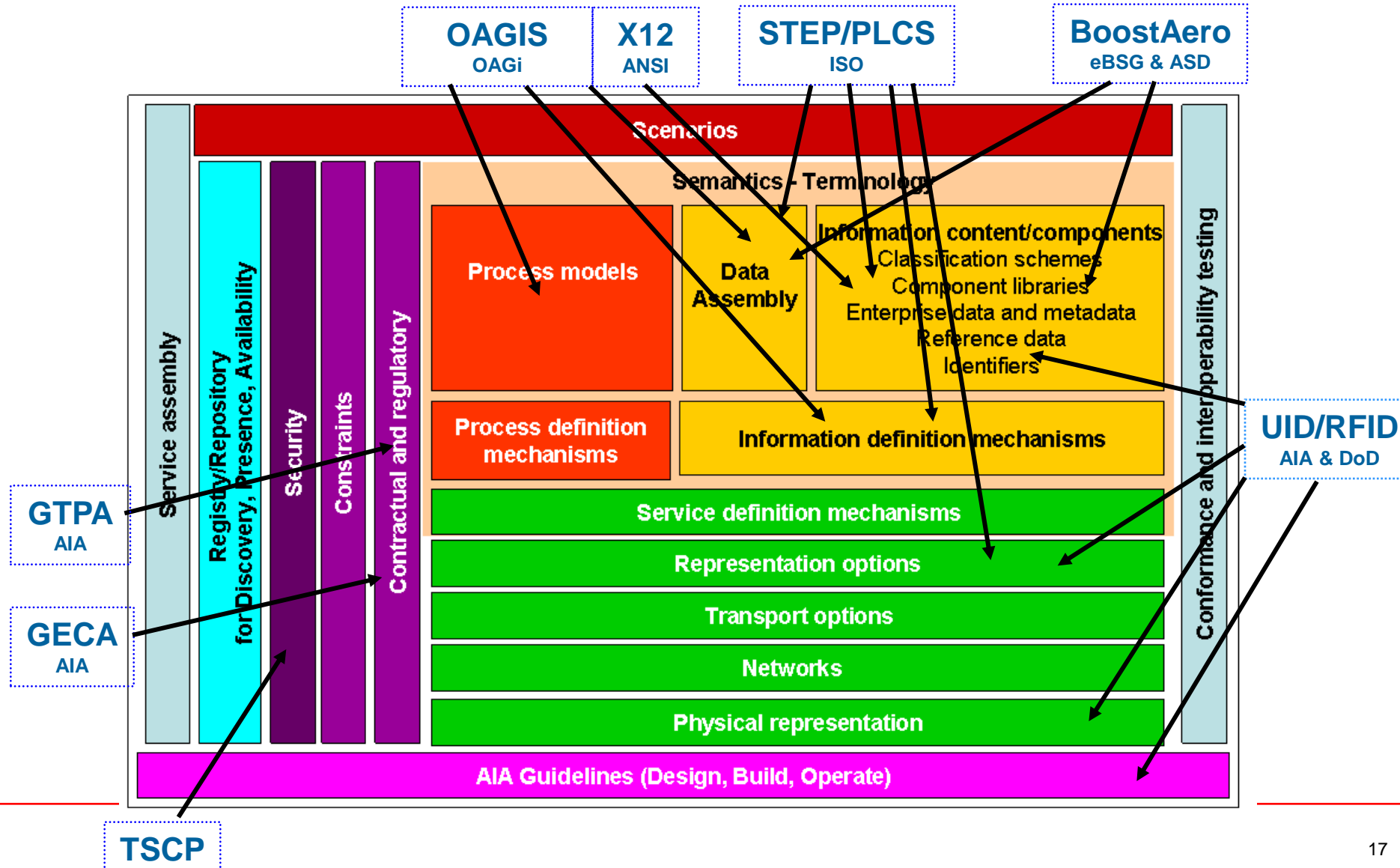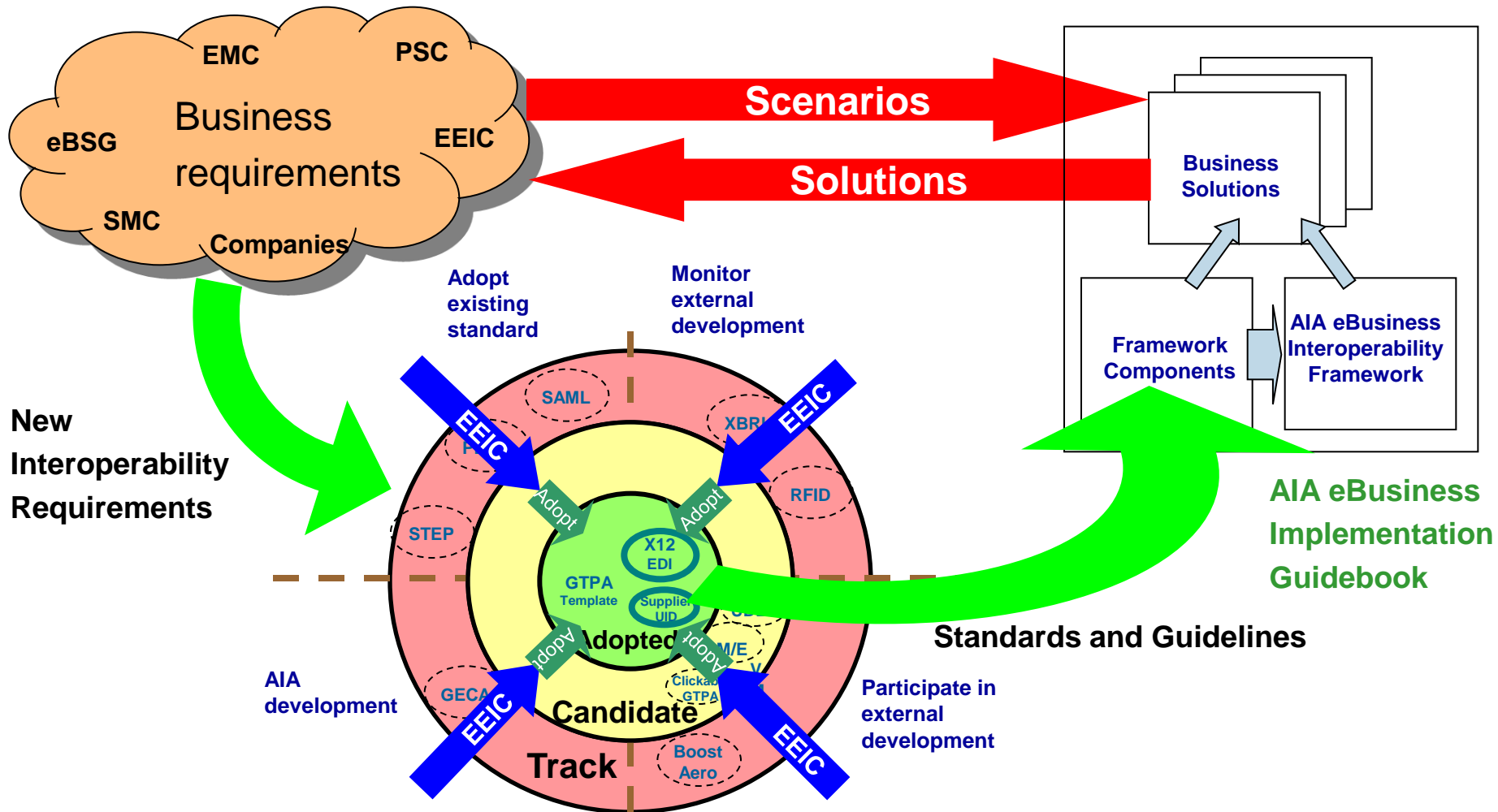# High Level Framework

Key Components for Building Interoperability

eBusiness Component Framework

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Service assembly

Registry/Repository for Discovery, Presence, Availability

Security

Constraints

Contractual and regulatory

Conformance and interoperability testing

Business scenarios

Semantics - Terminology

Process models

Data Assembly

Information content/components
Classification schemes
Component libraries
Enterprise data and metadata
Reference data
Identifiers

Process definition mechanisms

Information definition mechanisms

Service definition mechanisms

Representation options

Transport options

Networks

Physical representation

AIA Guidelines (Design, Build, Operate)

Example Mapping to Framework

CONOPS: Two processes

Delivering Business Solutions

Scenarios — Composed of

Scenarios form the basis for defining solutions

Which Enable

Definition Process

Process

Data

Constrained by

Contract & Regulatory

Security

Delivered by

IT Services

Design Guidelines

Implementation Guidelines

Operational Guidelines
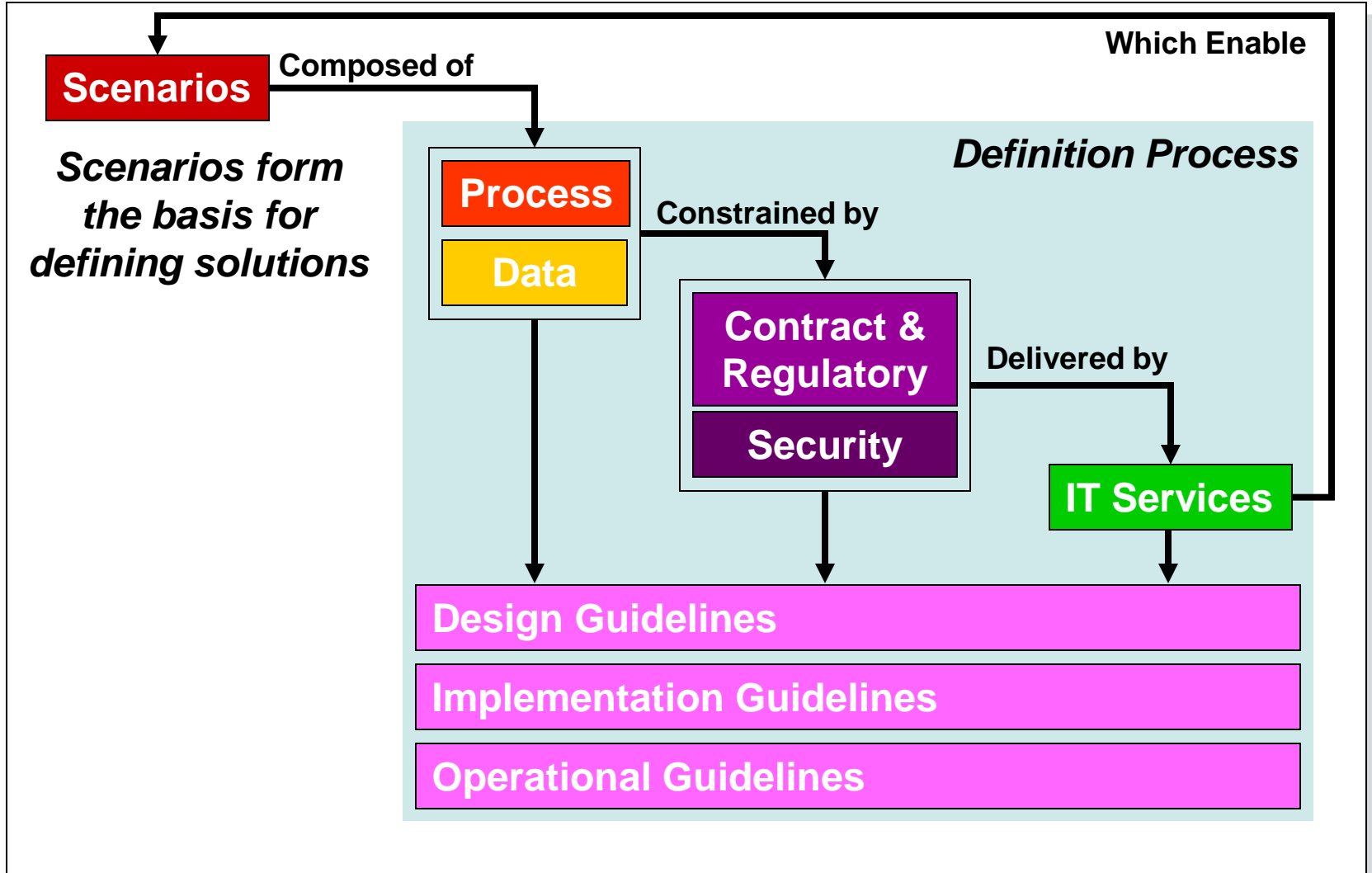
Adding new components
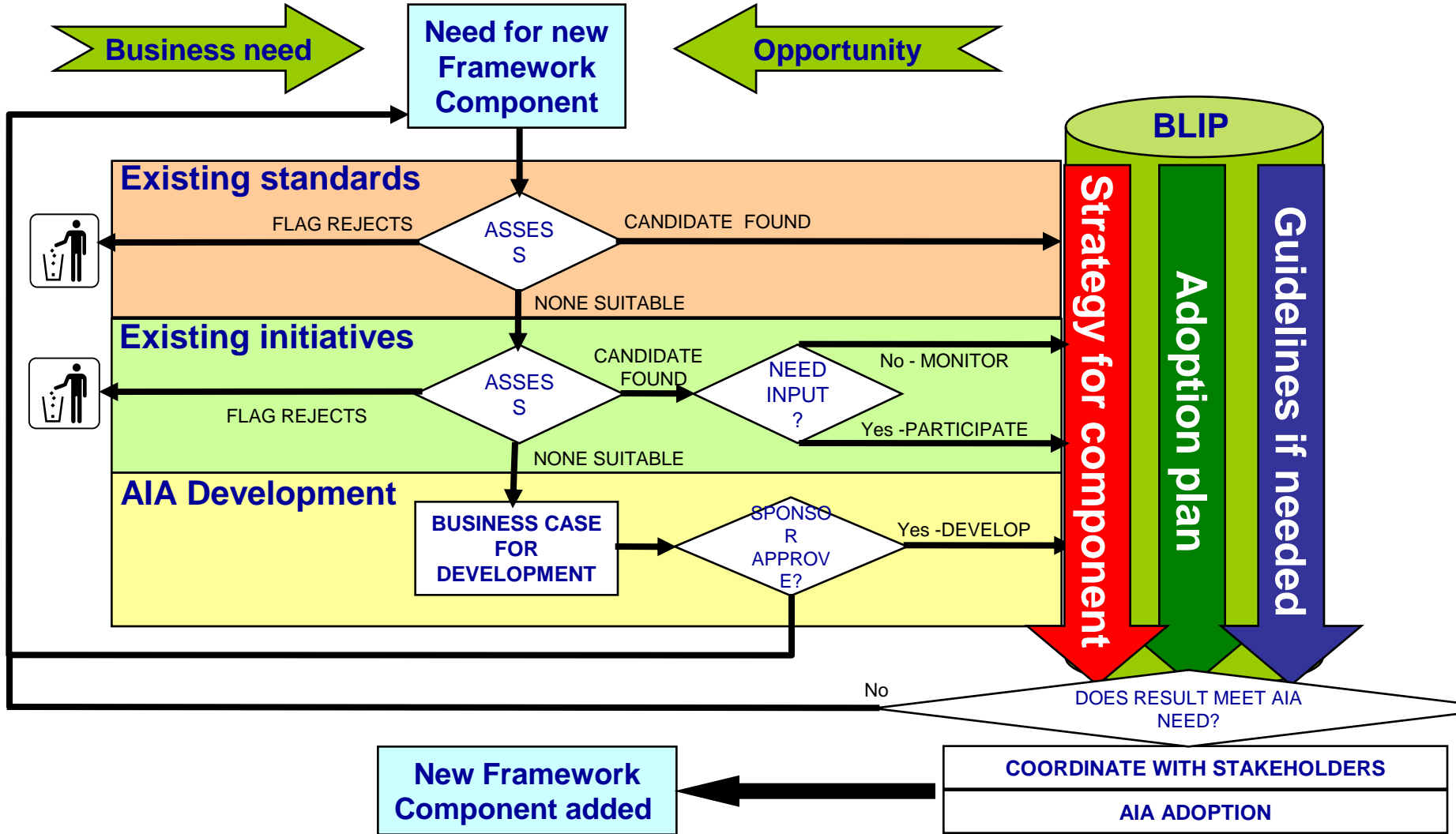
EEIC Standards Radar Screen

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Track | Candidate | Adopted

AIA Guidelines

Adopt existing standard

Monitor external development

AIA development

Participate in external development

UIMA

TSCP

PM/EVM

CPI

Boost AeroSpace

Boost Aero

SEINE

EIA-927

Units ML

RFID App Stds

ebXML

UDEF Guidebook

PLCS

Supplier RFID

X12 EDI

OTD

S3000L

STEP

2010

GECA Template

GTPA Template

Supplier UID

SOA

LOTAR

2010

Clickable GTPA

2010

EDIG

WAWF

TDP (SMC)

EKM

2010

S1000D

REACH IT

As of 2010-09-16
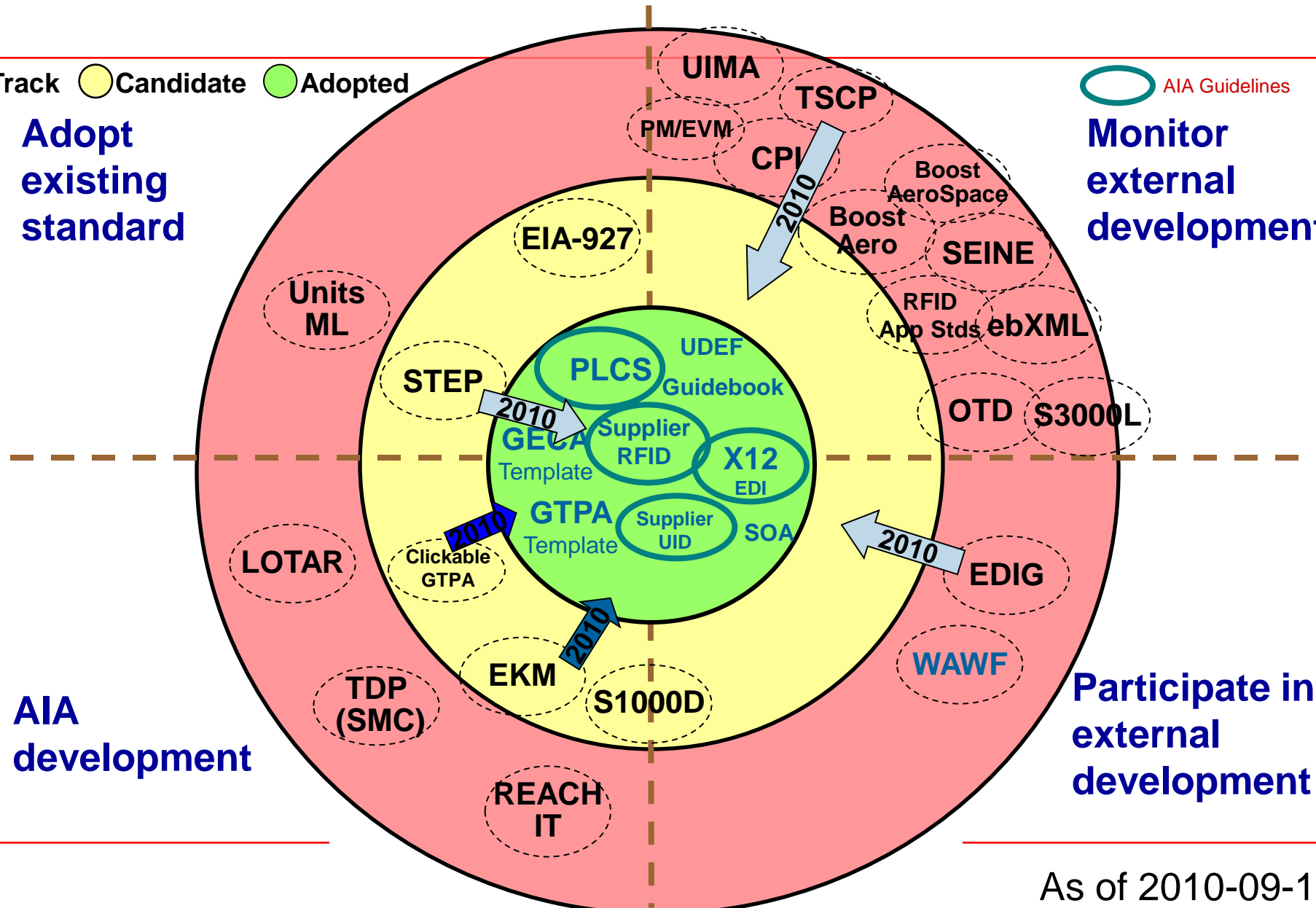
Information behind the "Radar blip"

- **Abstract**
- **Full Title of Standard or Initiative (Acronym)**
  - **Responsible organisation**
- **Business justification**
- **Description of activity/deliverables**
- **Relationship to other standards**
- **Known implementations**
- **Link to a standards host site**
- **Link to supporting material**
- **Business benefits**
- **Location in EEIC Framework**
- **EEIC Action Plan – Monitor/Participate/Develop/Adopt – Guidelines?**
- **EEIC Status (updated as necessary)**
- **Adoption plan**
- **Stakeholder adoption statement (final disposition decision)**
- **AIA recommendation (published on AIA website)**
- **Lead Organization within AIA**
  - **Other stakeholders – by function/organisation**

Assessment Criteria

Ensure Compliance with Guiding Principles

- Based on the results of science, technology and experience; promotes optimum community benefits.
- Provides clear business value & supports the industry business strategy and requirements
- Must align with the context of an overall architecture strategy that is driven by the business
- Leverage available standards and technologies, first within aerospace, then in the broader market
- Partner with aero-related groups to increase adoption and lower workload: ATA, ASD, other AIA Councils etc.

Qualify against Standards Selection Criteria

- Basis for one or more Framework Components
- Web / Internet-based standards
- Preferably globally accepted
- "Open" host organization committed to collaboration with other groups to ensure interoperability
- SW/HW vendor participation in the process and commitment to use the results in their products
- Critical mass for adoption
- Interoperability with the standards used by our customers and supplier

Evaluate against Architectural Principles

- Business must drive information technology architecture decisions:
- Use industry proven approaches
- Open and/or vendor neutral standards
- The architecture must enable secure communications and appropriate protection of information and technology.
- Reduce integration complexity: Keep it simple.

Evaluate against AIA project criteria

- The project proposal needs to satisfy the criteria established by the AIA for all new projects.
- Within EEIC charter and scope.
- An issue the AIA can effectively address.
- A clearly defined and measurable outcome.
- Clearly defined sunset provisions.
- Senior-level commitment from multiple AIA member companies.
- Contributes to AIA meeting its goals and objectives.
- A clearly defined "customer pull" or "company push."

AIA eBusiness Implementation Guidebook

- **Concept of operations**
  - **eBusiness Interoperability Framework**
    - **Description of framework and its use – simplified from MoU/MG model**
    - **Lower levels of detail for boxes where needed**
    - **Selection criteria for different components within a box**
  - **Radar screen**
  - **Blips**
  - **EEIC standards selection process**
- **Building a solution**
- **Extending the framework**
- **Extensible taxonomy of framework components**
  - **Shows coverage of adopted blips – matrix against framework**
  - **Populated from adopted blips – list of blips in framework classification**
  - **Common guidance information**
- **Extensible set of scenarios and corresponding solutions**
  - **Scenarios – in business terms**
  - **AIA eBusiness Framework Components required**
  - **Architectural guidance – design time**
  - **Implementation guidance – build time**
  - **Operational guidance – run time**

http://www.aia-aerospace.org/resource_center/ebusiness/

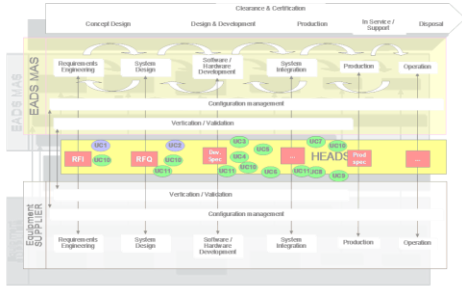# The ASD Strategic Standardisation Group

SSG organisation and activities
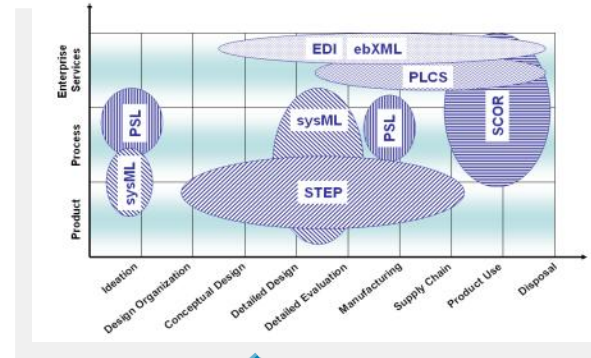
ASD SSG Organization
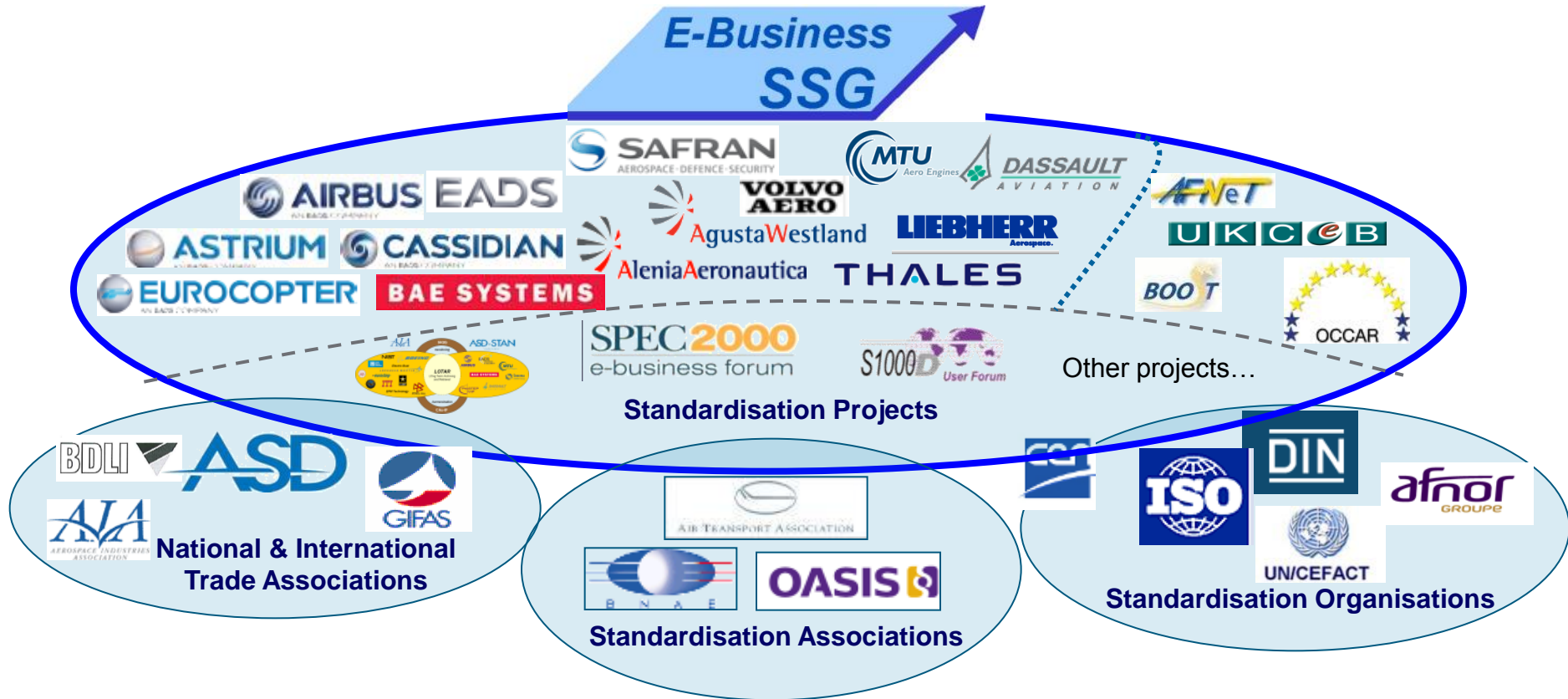
SSG Interoperability framework
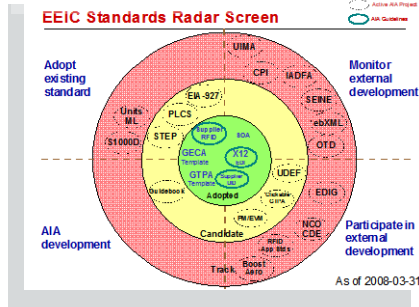
Business Scenario & Use Cases

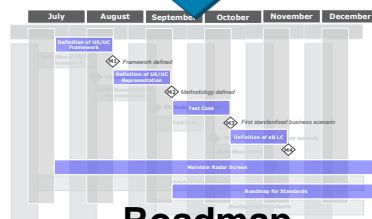**Identify & describe the need**

Life Cycle Gap Analysis

Radar Screen

Address the need

Develop standards & policies

Roadmap

ASD SSG Activities

ASD SSG Radar Screen

Track

Adopt existing standard

Monitor external development

Candidate

Adopted

ASD development

Participate in external development

Blips (ovals): OAGIS 9, RFID App Stds, PLCS DEXs, ebXML, TSCP, SysML, SPEC2000, STEP AP210, SAML, STEP AP212, STEP AP209, ISO 8000, STEP, STEP AP239, ISO 22745, SCORM, STEP AP203, BPMN, STEP AP214, STEP AP233, STEP AP235, 3D Visualisation, XPDL, S2000M, S1000D, STE100, S5000F, EN9300 LOTAR, Boost Aero, S3000L, STEP AP 242, S4000M, TDP message

Blip available — (yy oval, solid)
Blip in preparation — (yy oval, dashed)
Current ASD SSG actions — (arrow)

Last revised: 2010-06-29

AIA/ASD Collaboration

- **MoU in place for S1000D since 2004 (with ATA since 2008)**
- **New MoU for other ILS standards signed July 2010**
- **Discussions held between SSG and corresponding AIA Electronic Enterprise Integration Committee to extend the co-operation**
- **Using common planning process – originating in AIA**
- **Areas of collaboration identified**
  - **LOTAR**
  - **REACH**
  - **Engineering information exchange standards**
  - **3D visualisation**
- **Benefits statement for collaboration prepared**
- **Proposed MoU to cover the entire scope of interoperability**
  - **in AIA Strategic Plan**
- **Regular teleconferences held**

Key messages

- **A consistent set of eBusiness standards is being identified, assessed, developed and implemented in answer to European Aerospace, Space & Defence Industry global needs**

- **ASD SSG provides the needed capability:**
  - **Consensus at European AeroSpace & Defence industry level**
  - **Supported by national trade associations**
  - **Co-ordinated with US activities**

- **Several projects have been launched:**
  - **Long term Archiving and Retention**
  - **TDP Message Standardization**
  - **Development of the Convergent Modular STEP Application Protocol STEP AP242 – Managed Model-Based 3D Engineering"**
    - **based on AP 203 and AP214**
  - **Logistics standards coordination**

- **Coordination and networking are under way**

SSG seeks the widest participation and contributions!

Contacts

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