



# **AIA *e*Business and the Metadata Harmonization Project**

Ron Schuldt

Lockheed Martin Enterprise Information Systems  
Co-Chair, AIA Electronic Enterprise Working Group

GEIA Workshop  
September, 2002

# Agenda

---



- *Identify the drivers that caused Aerospace Industries Association (AIA) Executive Committee members (CEOs) to put a priority on solving e-business interoperability issues*
- *Describe the strategy they took*
- *Describe an AIA-led project that is expected to yield cost reduction opportunities for companies that take advantage of the project's recommendations*

## Charge from the AIA Executive Committee

At its 14 March 2001 meeting, the AIA Executive Committee agreed to **establish a corporate-level steering group to coordinate the various ebusiness activities** currently underway at AIA and to **establish clear policy** defining what common ebusiness practices are and how they are to be implemented

AIA Executive Action Report 6-2001  
DTD 23 March 2001

Dual representation from each member company encouraged

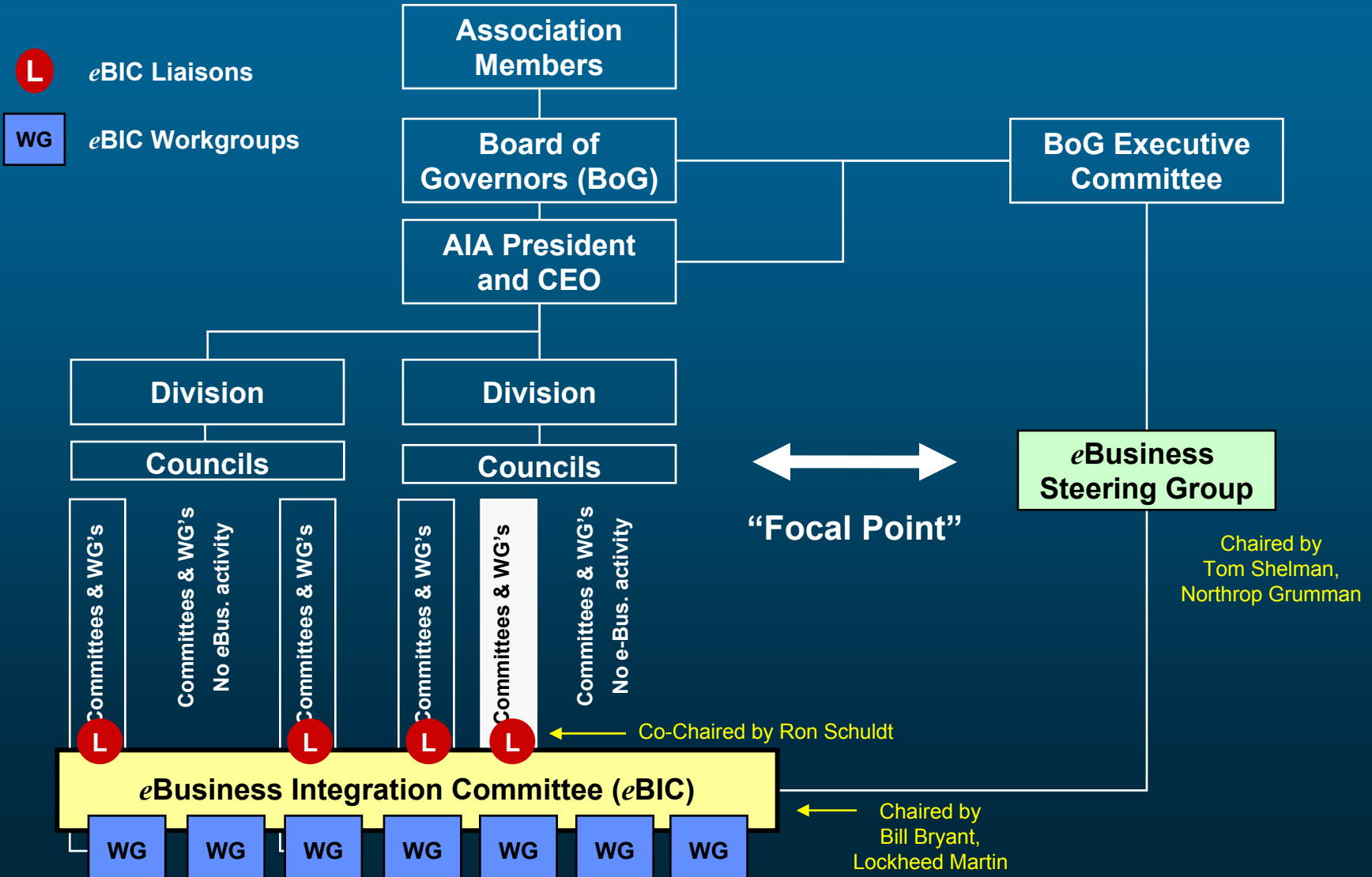
Business Focus (Functional VP)

Technical Focus (CIO)

## AIA Member companies with eBSG representatives

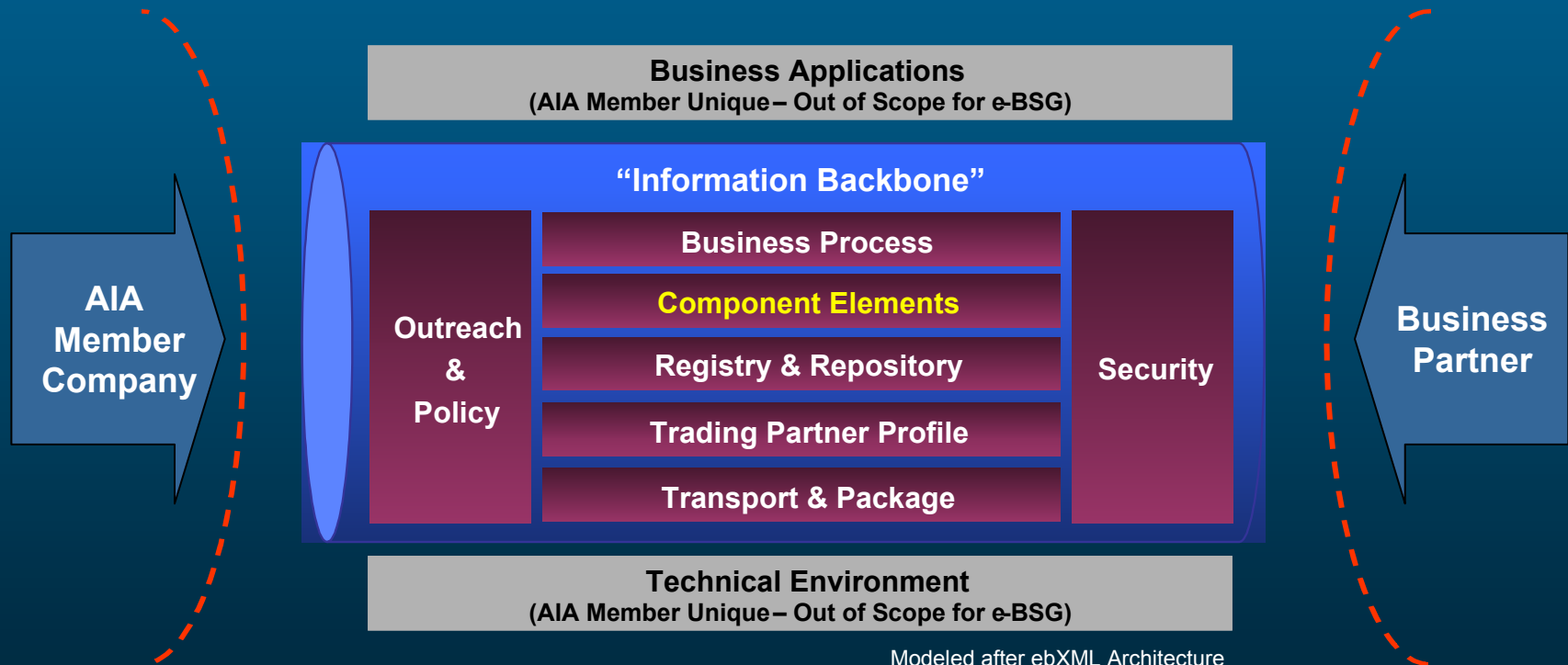
- AAI
- BAE Systems
- Boeing
- Exostar
- Goodrich
- General Dynamics
- Honeywell
- Lockheed Martin
- MOOG
- Northrop Grumman
- Parker Aerospace
- Raytheon
- Rolls Royce
- Textron
- TRW
- United Technologies
- Vought Aircraft

# Relationship to AIA Organization



# EB Interoperability Framework

Industry-level interoperability enabled by common framework that defines scope and elements of the “Information Backbone”



Modeled after ebXML Architecture

**AIA ebusiness workgroups aligned with the Framework**

## *AIA Electronic Enterprise Working Group (EEWG)*

### **Scope:**

The scope of the EEWG effort is **transaction data and metadata about technical data that goes through the firewall in support of e-business.**

### ***EEWG Leadership:***

Ron Schuldt, Lockheed Martin EIS, Co-Chair for 2 year term representing AIA Member companies (71 companies as of June 12, 2002). Term expires Dec 31, 2003

Angela Baker, LMI Aerospace, Co-Chair for 2 year term representing AIA Associate Member companies (134 companies as of June 12, 2002). Filling remainder of partial term – full 2 year term expires Dec 31, 2004

Bill Lewandowski, Vice President, Supplier Management, AIA Staff

### ***Major Projects:***

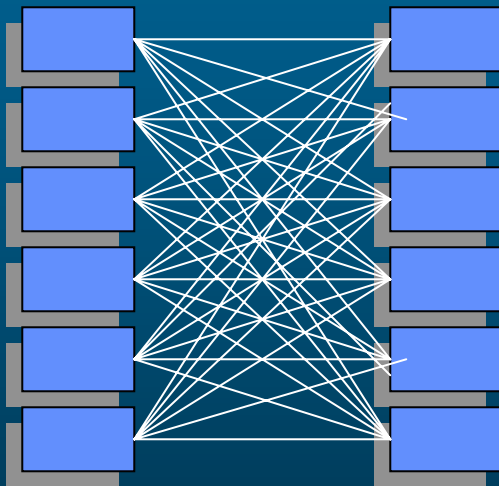
Harmonization of EDI (X12) transactions used within aerospace – led by Tom Warner, Boeing

Aerospace XML – conversion of the harmonized EDI transactions to XML – led by Tom Warner, Boeing

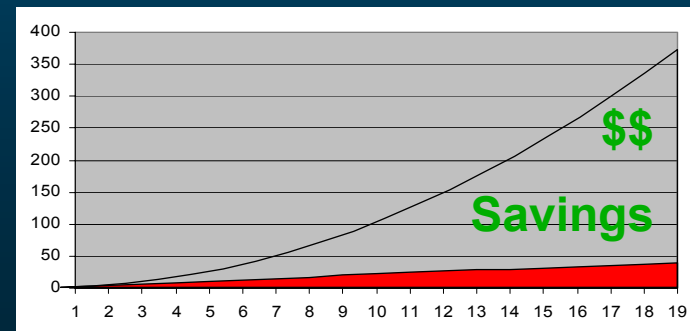
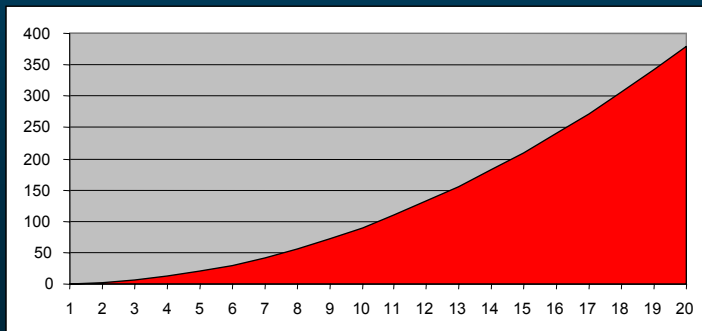
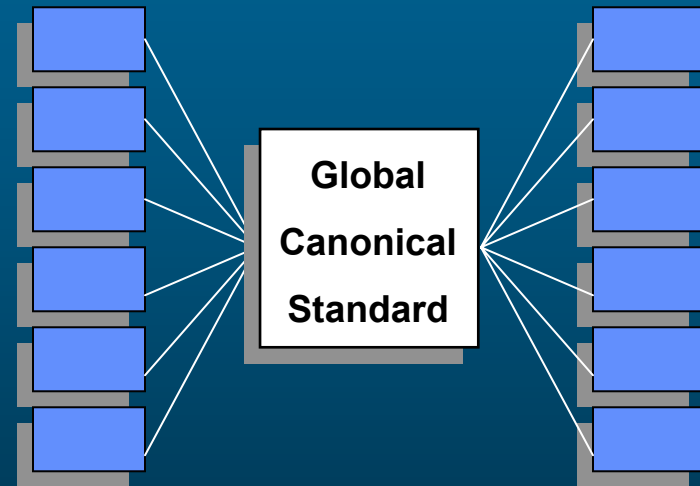
**Metadata Harmonization – assigned by e-BSG – led by Ron Schuldt, Lockheed Martin**

# The Integration Problem & Goal

Current Point-to-Point Approach ---  $n(n-1)$



Future UDEF Canonical Approach ---  $2n$

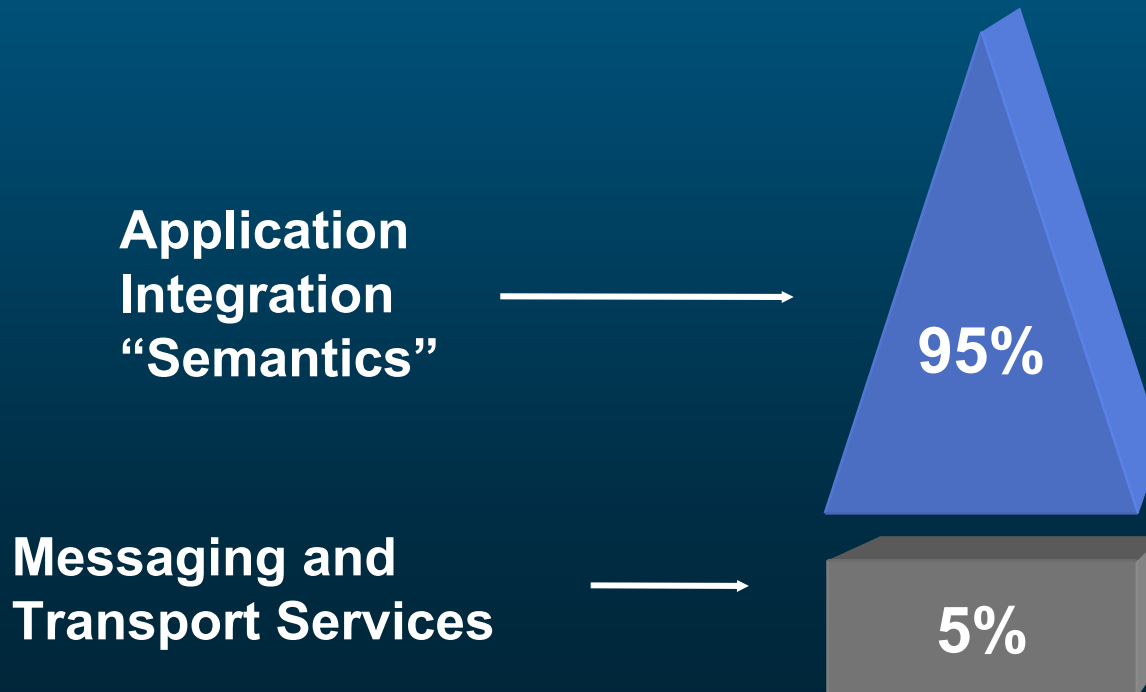




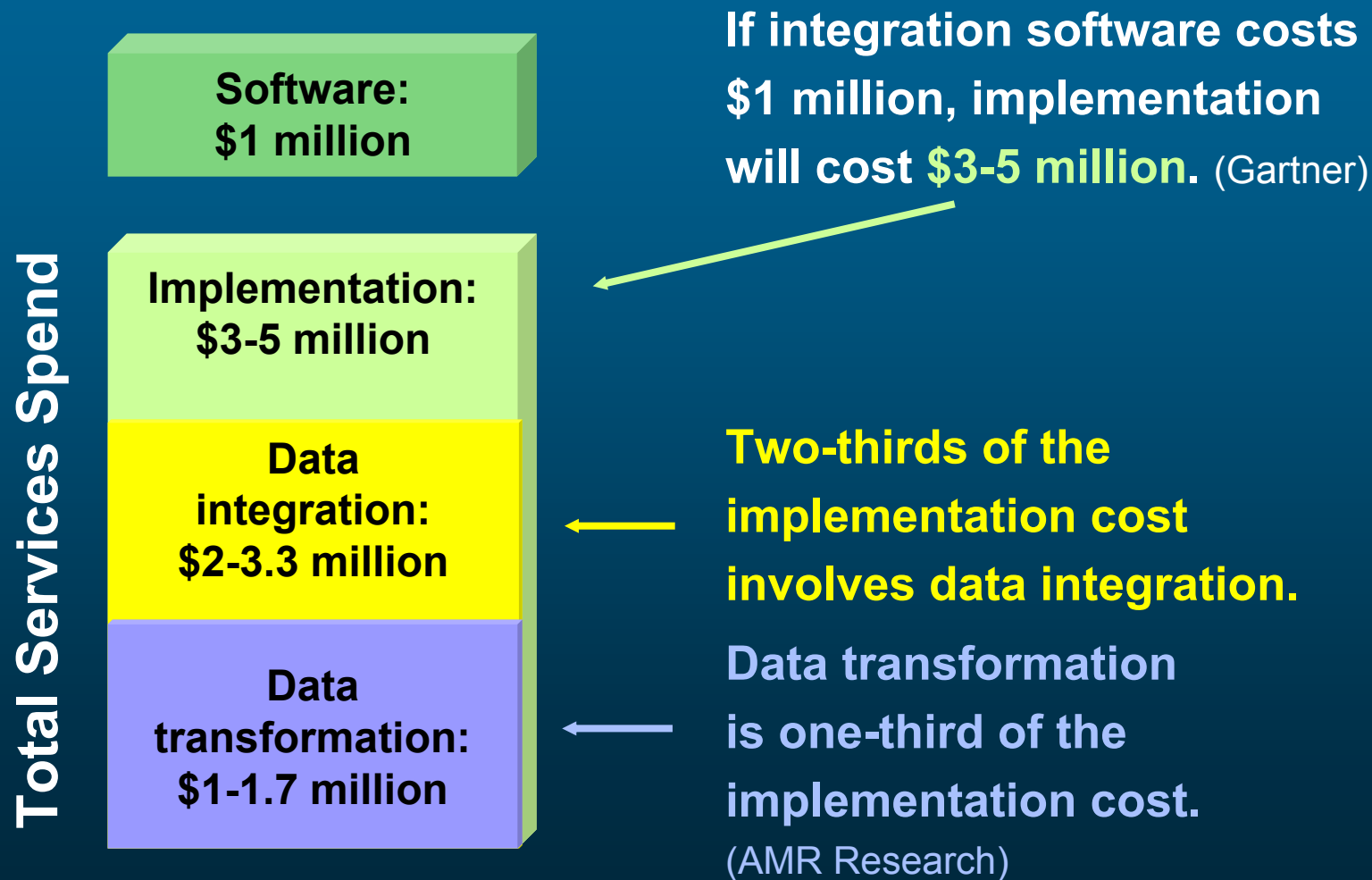
# The Interoperability Challenge

*“According to Gartner Group, 35-40% of all programming effort in a typical computing environment is devoted to developing and maintaining the extract and update programs whose only purpose is to transfer information between different databases.” Quote from Ernst & Young Financial Analysis of “Enterprise Application Integration – Constellar and British Power Achieving Business Benefit”*

*“Interoperability required the entire interfaces between applications to be standardized. Only 5% of the interface is a function of the middleware choice. The remaining 95% is a function of application semantics.” Gartner Group*



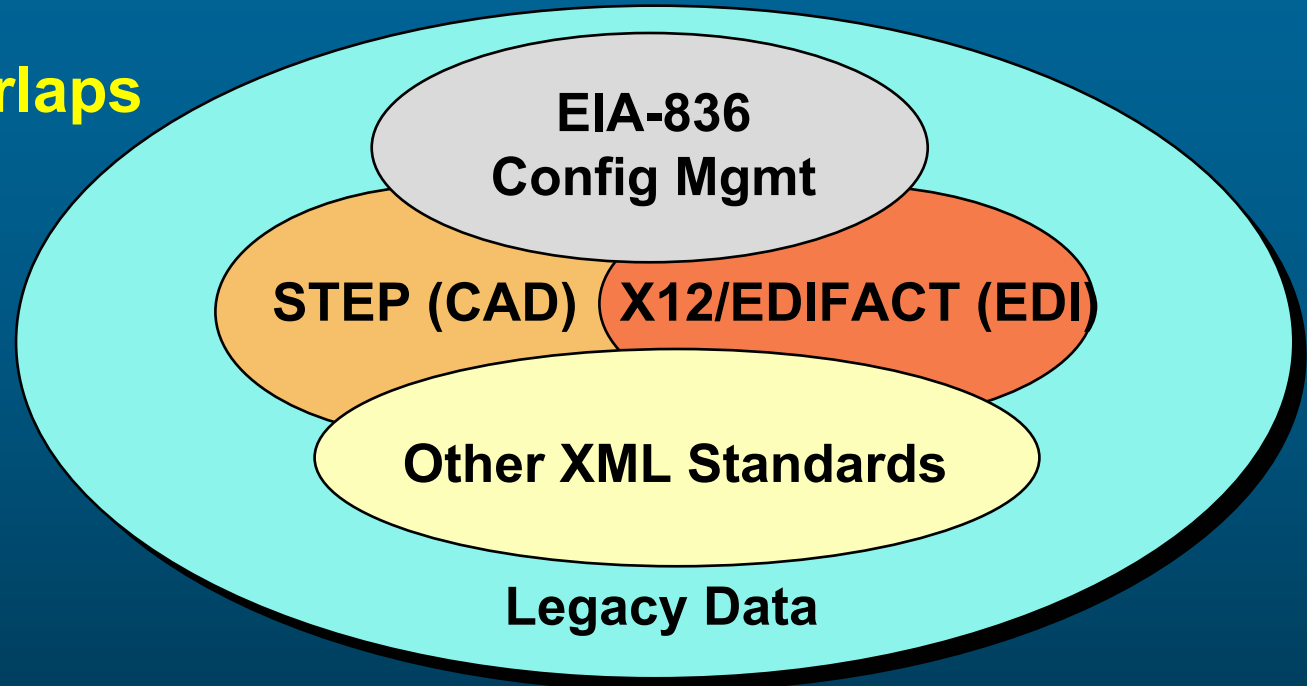
# An Integration Cost Illustration



# The Standards Problem Summarized



## Conflicting Overlaps



Though semantically equal, the following are 4 different XML tag names

```
<PARTNUMBER>111-222-333</PARTNUMBER>
```

```
<partNumber>111-222-333</partNumber>
```

```
<PartNumber>111-222-333</PartNumber>
```

```
<partnumber>111-222-333</partnumber>
```

As result, many industries including aerospace are defining their metadata (tag name) XML standards necessary for e-business – **too many standards**

# Small Sample of the “Other XML Standards”



- HL7 - Health Care <http://www.hl7.org/>
- IFX - Interactive Financial Exchange <http://www.ifxforum.org/>
- FPML – Financial Products <http://www.fpml.org/>
- SWIFT – Business Messages based on EDIFACT (for International Trading Partners) <http://www.swift.com/index.cfm>
- HR-XML – Human Resources and Benefits  
<http://www.hr-xml.org/channels/home.htm>
- OAG – ERP and Middleware Vendors <http://www.openapplications.org/>
- RosettaNet – IT and Electronic Components Industry  
<http://www.rosettanel.org/rosettanel/Rooms/DisplayPages/LayoutInitial>
- ACORD – XML for the Insurance Industry <http://www.acord.org/>
- XBRL – Business Reporting - Accounting <http://www.xbrl.org/>
- TranXML – Transportation XML <http://www.transentric.com/default2.asp>

# Example Overlaps

## UDDI

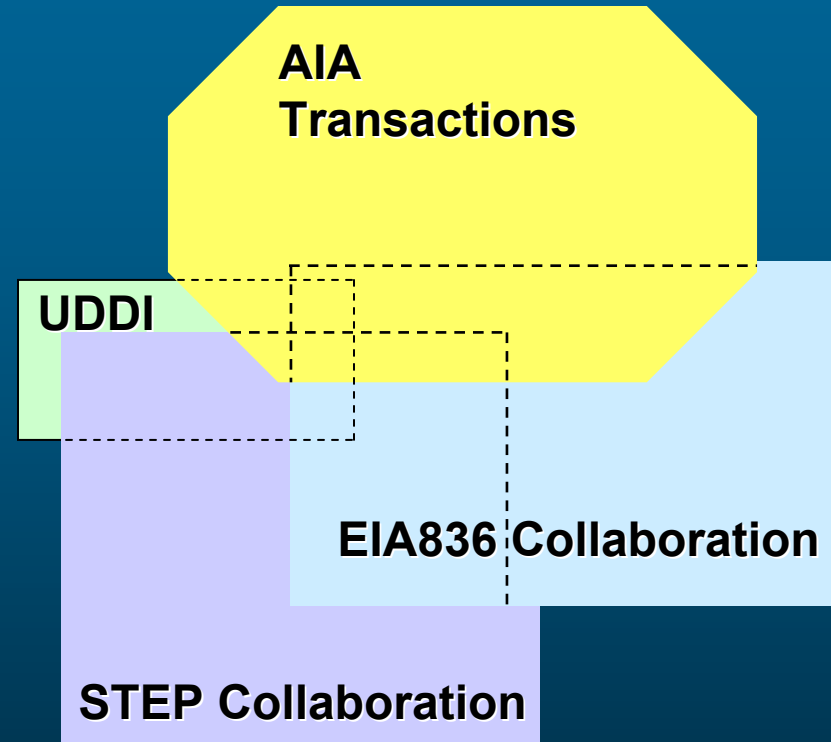
- Universal Unique ID (UUID)
- Globally unique
- Supports many ID codes
- 128 bit hexadecimal (8 char AN)

## EIA-836

- Organization ID
  - » CAGE, DUNS, FSCM, etc.
- ID length not specified

## AIA EDI

- Originating Company ID Number
- Supports many ID codes
  - » CAGE, DUNS, FSCM, etc.
- ID length (10 char AN)



## Example Overlaps

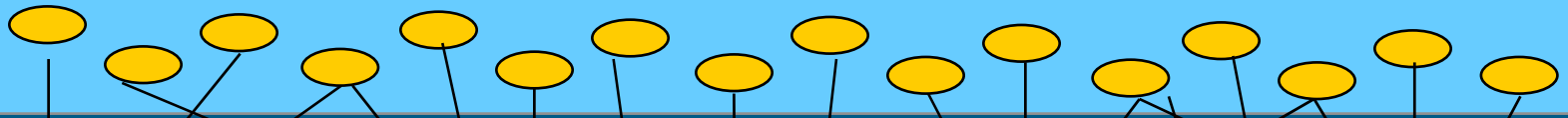
- Supplier ID
- Address
- Part Number

# Metadata Harmonization Project Scope

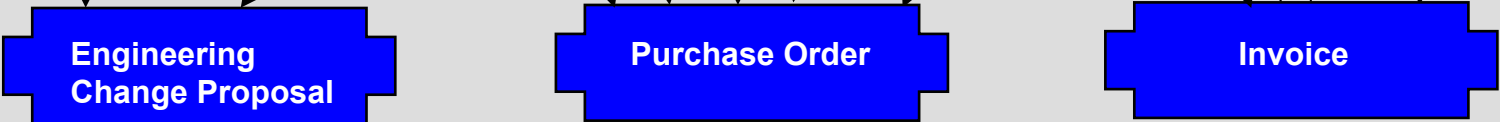


Project Scope

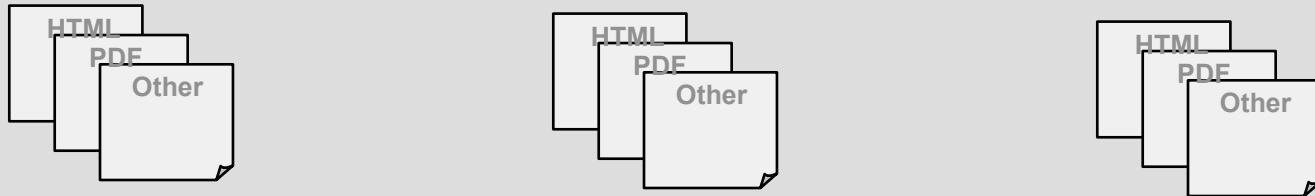
Harmonized Data Elements from X12, EIA836, STEP, UCC, etc. – “Components”



Standard Reusable Segments – “Subassemblies”



Standard DTDs and Schema – “Assemblies”



Standard Style Sheets for Browser Display

Stds such as X12 and EIA-836

# Metadata Harmonization Project

## Summary



### Description

The Metadata Harmonization Project (MHP) is defining an Aerospace Process Standard that will enable companies in the industry to reduce the costs of integrating their systems with trading partners. The MHP is **creating a data interchange matrix that was directed by the e-BSG.**

### Business Problem

- Standards used within AIA overlap
- Difficult to understand what the standards contain without some form of comparison
- Cost effective interoperability depends on adoption of standards
- Substantial overhead dollars required to integrate heterogeneous systems

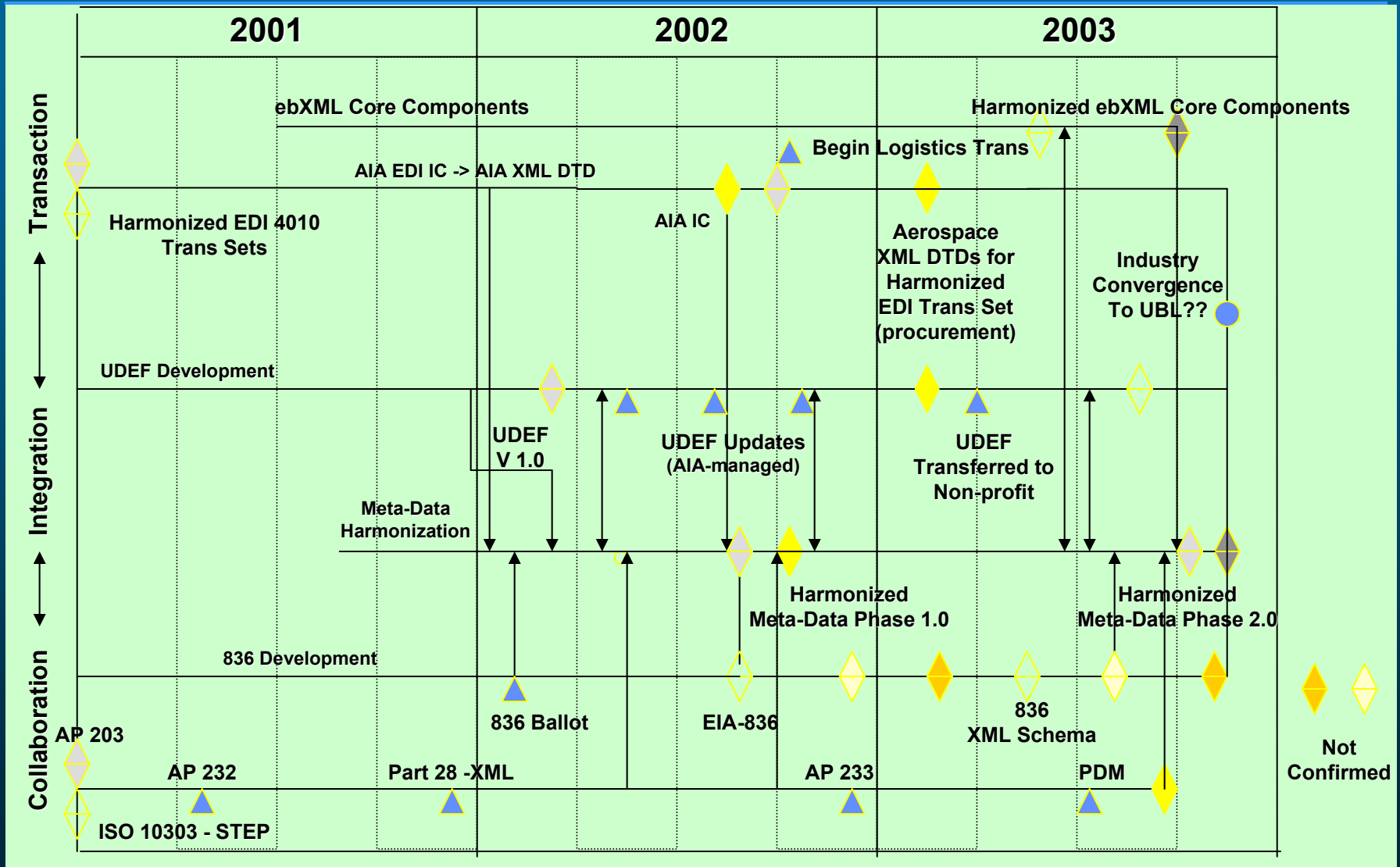
### Major Milestones

- E-BSG assigned EEWG MHP – Aug 2001
- Phase 1 complete – Aug 2002
- E-BSG approval of Phase 2 – Sept 2002
- Support from Contivo for Phase 2 – Aug 2002
- Phase 2 EEWG complete – Nov 2003

### Dependencies

- AIA member company adoption of the MHP Process Standard
- On going maintenance of matrix is dependent on the UDEF
- Sufficient resources
- Require effective marketing of the MHP products (i.e., SMC Master Classes)

# Metadata Harmonization Project Roadmap



National/International Standard    
 Increments    
 AIA WG or Committee Adoption    
 AIA e-BSG Adoption



# Mapping Matrix Summary



## Sample Mapping Matrix Extract

UDEF ID	UDEF Role or Type of Object	UDEF Object	UDEF Type of Property	UDEF Property	EIA-836			EDI (X12)	
					Name	Definition	Valid Values	Name	D
3_6.35.8		Enterprise	Defense Logistics Assigned	Identifier	CAGE Code	A Commercial and Government Entity (CAGE) ...	5 alphanumeric character	DE 98 + DE 66/ Code M4	
ah.3_10.35.8	Manufacturer	Enterprise	NATO Assigned	Identifier	NSCM Code	A standard NATO supply code ...	string	DE 98/ Code M9 + DE 66/ Code 37	

### Phase One Summary

- Focus on four topics
  - Enterprise Identification
  - Document Identification
  - Product Identification
  - Asset Identification
- Four standards – EIA-836, X12, STEP, UCC
- Goal – to understand the process and the necessary resources to proceed into second phase
- Target completion – August 2002

### Phase Two Summary

- In planning stages
- Include additional standards such as ATA Spec 2000
- Require support from tool
- Require XMLization of the UDEF
- Require UDEF transfer to non-profit
- Require additional business process experts – especially contracting and inbound/outbound logistics
- Target completion – November 2003

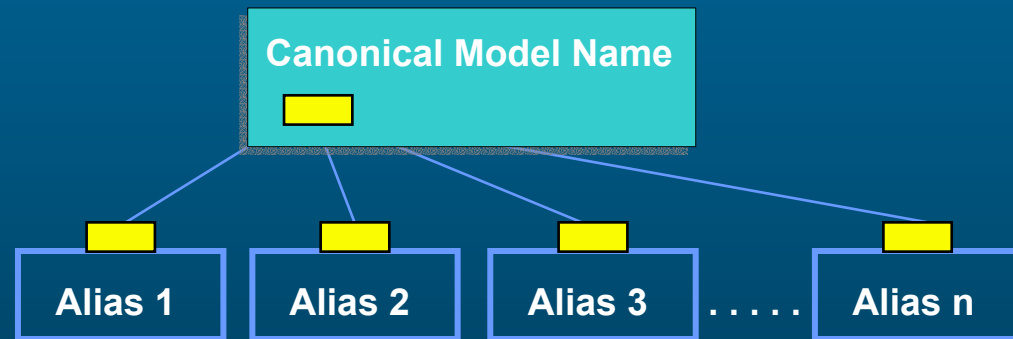
# The UDEF Summary

## Summary Description

The Universal Data Element Framework (UDEF) is a **rules based metadata naming convention** that greatly accelerates data integration for large data integration projects. Once a data element concept has been mapped to the UDEF, the data element can then be assigned a UDEF derived **intelligent unique ID**.

## Current Business Problem

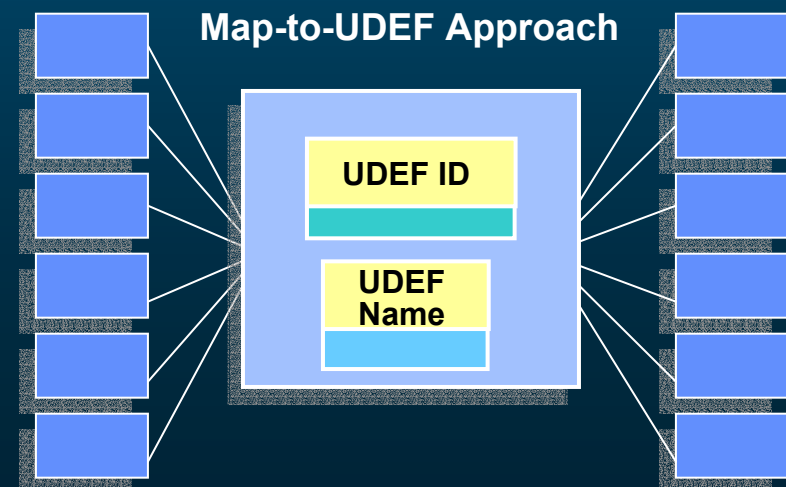
- Point-to-Point Interfaces are the Norm
- Mappings are Time Consuming Process
- Lack Consistent Naming Convention
- Lack Standard Data Names
- System Experts Often Retained to Support Interface Development



## Benefits of UDEF

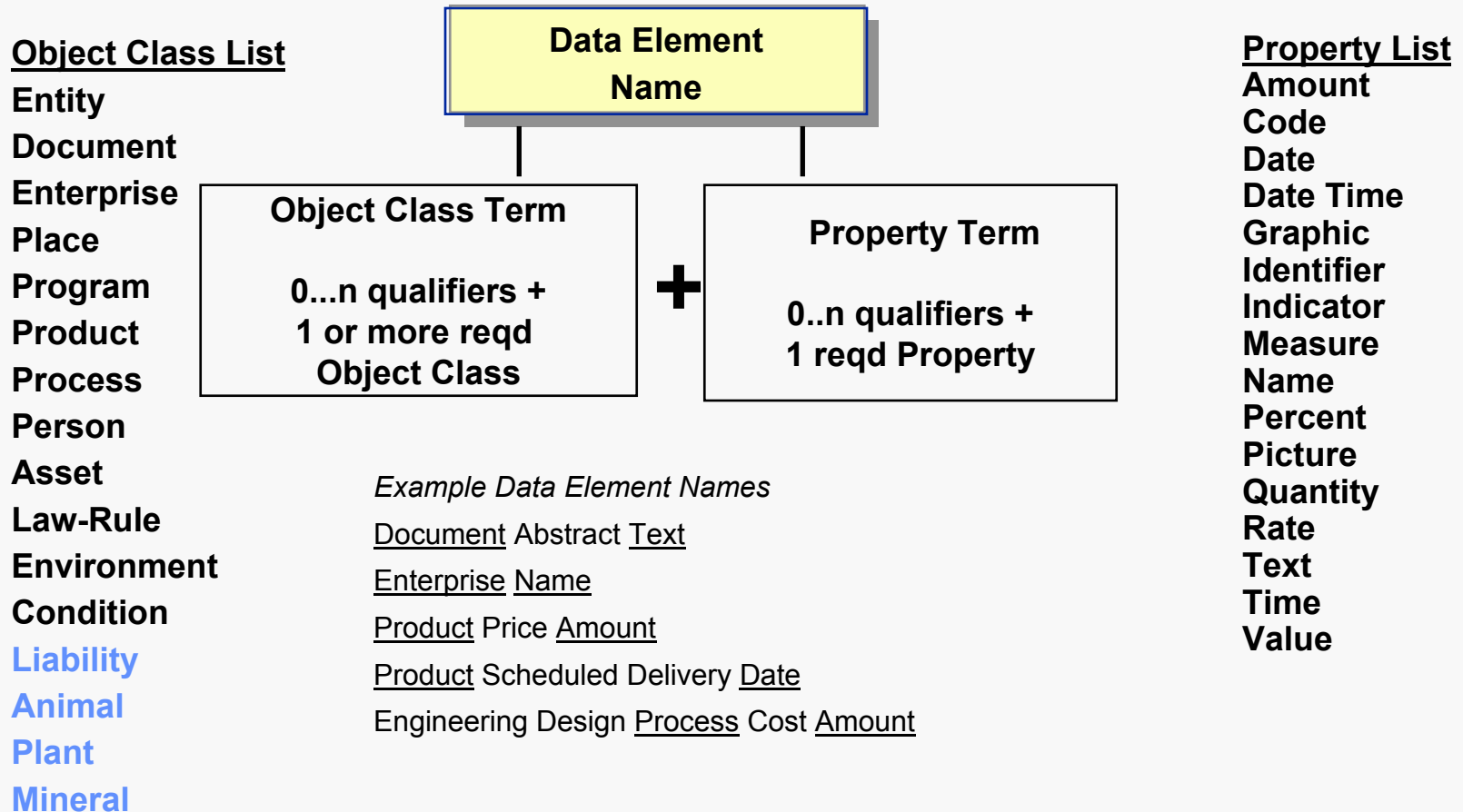
- Depending on complexity, the time and effort required to analyze and map any pair of systems reduces substantially (potentially by order of magnitude) as the number of systems to be integrated increases beyond three or four (break even point)
- UDEF IDs add computer sensible intelligence to the names of elements within any system – thereby reducing dependence on requiring the system expert for mapping the system to any other system
- UDEF is gaining momentum as an e-business standard – adopted by AIA, EIDX, and OAG – gaining interest by UCC, CompTIA, DISA, and RosettaNet

Universal ID = 



# The UDEF Naming Convention

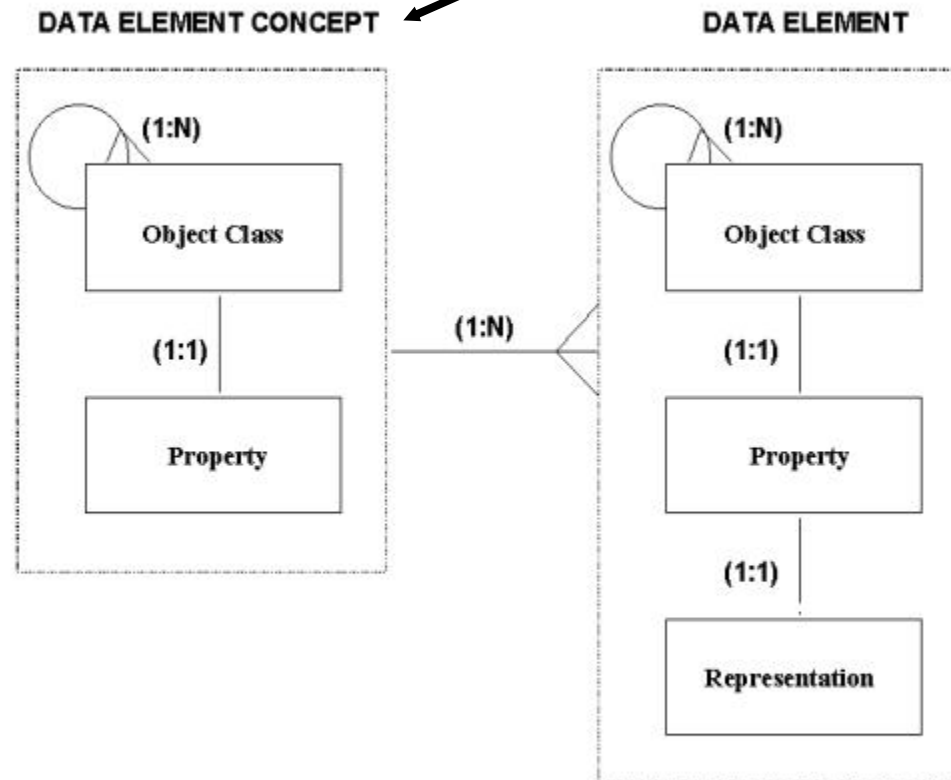
Complies with ISO 11179 Naming Convention and Supports ebXML



Names constructed follow the rules of English – modifiers precede the word they modify

# Data Element Concept per ISO 11179

## UDEF Maps Data Element Concepts

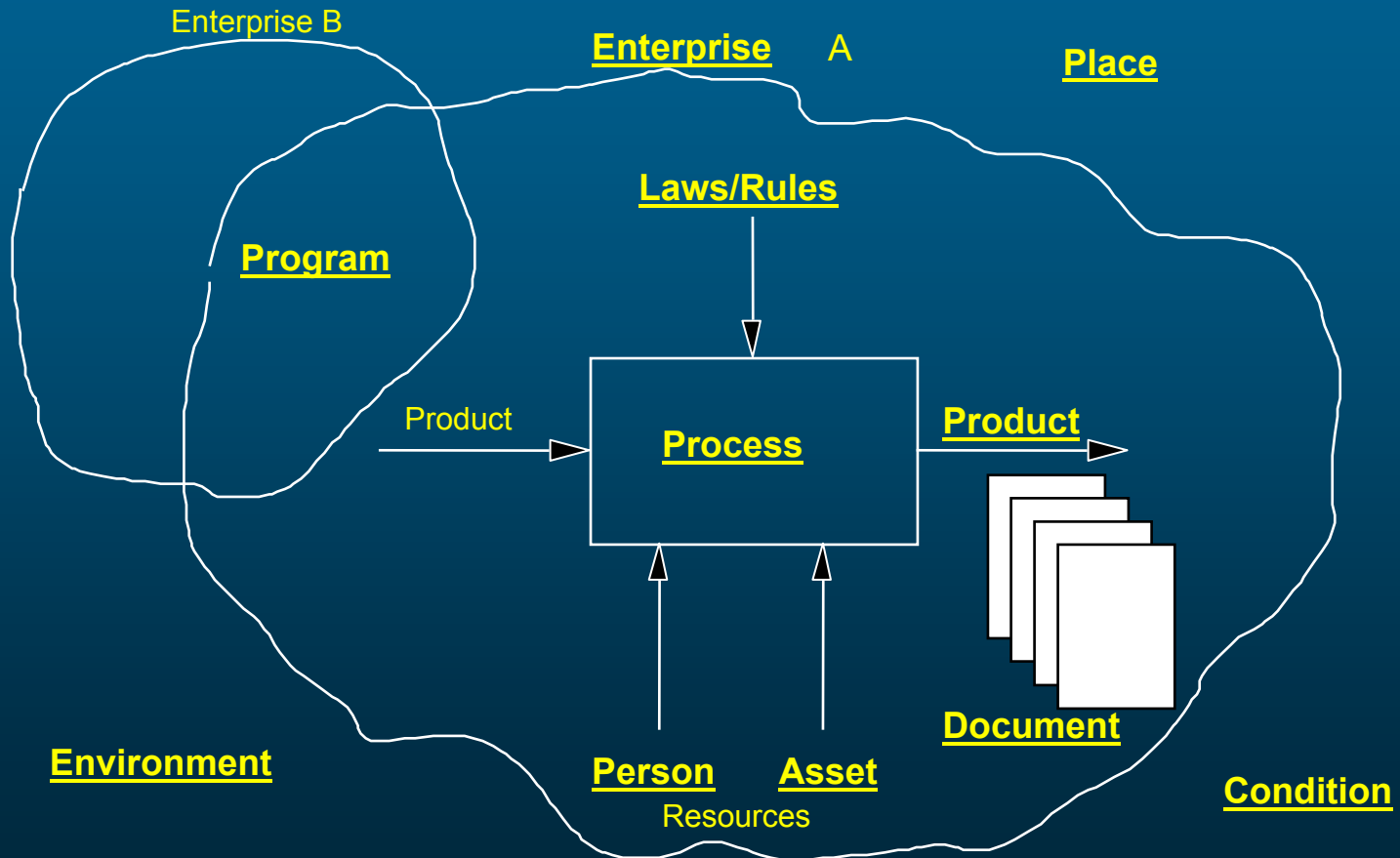


### Data Element Concept - definition

“A **concept** that can be represented in the form of a **data element**, described independently of any particular **representation**”

# UDEF Objects – For Context

## Entity



# Data Element Concepts of UDEF



## Any data of interest to the ENTERPRISE .....

### E-Business Transactions

- Request for Quote
- Purchase Order
- Advance Ship Notice
- Invoice

### Technical Data

- Tradeoff Studies
- Specifications
- Designs
- ECPs
- Software

### Process Data

- Engineering
- Manufacturing
- Procurement
- Test
- Maintenance
- Operations

### Program Data

- Contracts
- Schedules
- Risk

### HR - Data

- Assignments
- Evaluations
- Salary
- Benefits

### Logistics Data

- Repair
- Transport
- FD/FI
- Inventory

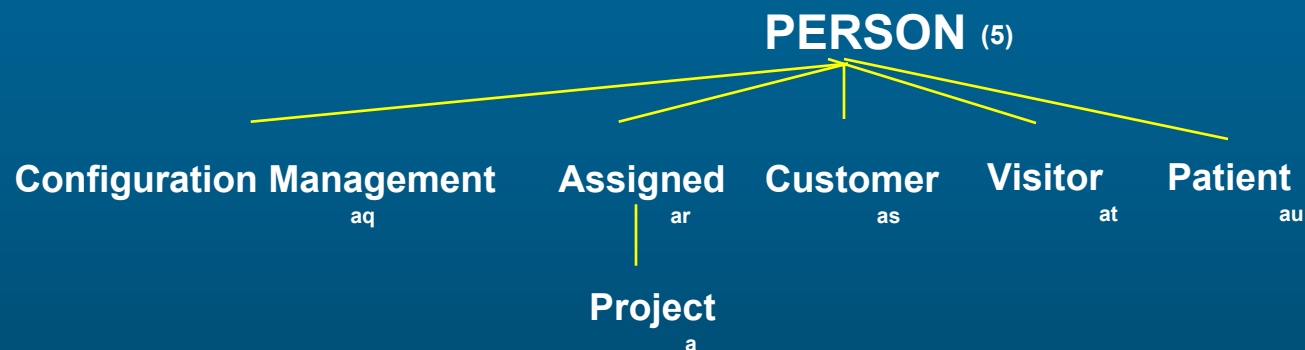
### Finance Data

- General Ledger
- Accts Payable
- Accts Receive

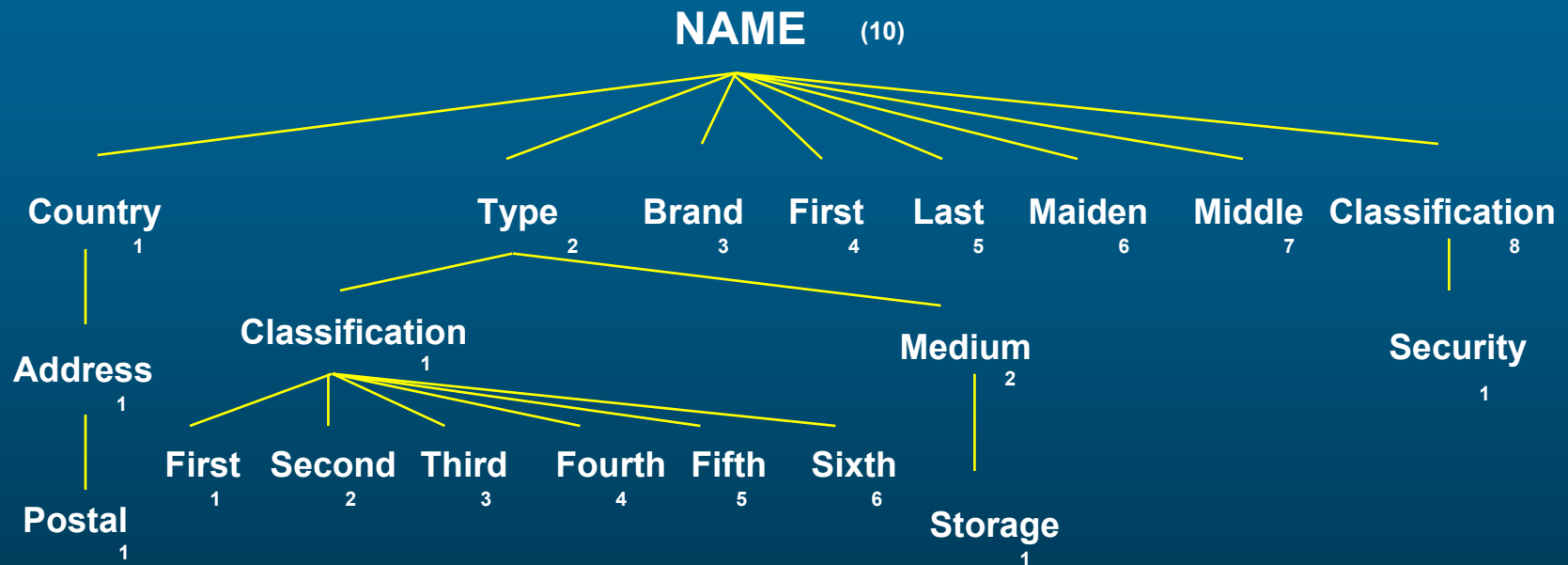
### Scientific Data

- Statics
- Dynamics
- Thermal

# Example “Enterprise” Object Tree



# Example “Name” Property Tree





# How to Map to the UDEF

1. Identify the applicable UDEF property word that characterizes the dominant attribute (property) of the data element concept. For example, Name, Identifier, Date, etc.
2. Identify the dominant UDEF object word that the dominant property (selected in step 1) is describing. For example, Person\_Name, Product\_Identifier, Document\_Date, etc.
3. By reviewing the UDEF tree for the selected property identified in step 1, identify applicable qualifiers that are necessary to unambiguously describe the property word term. For example, Last Name
4. By reviewing the UDEF tree for the selected object identified in step 2, identify applicable qualifiers that are necessary to unambiguously describe the object word term. For example, Customer Person
5. Concatenate the object term and the property term to create a UDEF naming convention compliant name where it is recognized that the name may seem artificially long. For example, Customer Person\_Last Name
6. Derive an intelligent UID based on the UDEF taxonomy that carries the UDEF inherited indexing scheme. For example <CustomerPersonLastName GUID="as.5\_5.10">

# Example Mappings

## CM Data Elements

**document-publication-date**  
**document-data-rights-expiration-date**  
**document-sheet-total-quantity**  
**document-sheet-size-code**  
software-**product-version-identifier**  
**product-part-identifier**  
reference-**document-revision-identifier**  
**enterprise-division-address-text**  
**program-name**  
**product-quantity**  
**enterprise-address-text**

## Universal ID

**2\_5.6**  
**2\_1.2.6.6**  
**2\_1.8.11**  
**2\_1.6.4**  
**p.9\_8.8**  
**9\_5.8**  
**aj.2\_9.8**  
**3\_2.12.14**  
**10\_10**  
**9\_11**  
**3\_12.14**

# Additional Example Mappings

## X12 & EDIFACT Data Elements

**country code**  
**invoice number-** assigned by issuer  
**purchase order type code**  
**postal code**  
**location qualifier**  
**location identifier**  
**contract effective date**  
**expiry date of import license**  
**item number - product**  
**item number - service**  
**price**

## Universal ID

**e.7\_4**  
**bd.2\_1.35.8**  
**d.t.2\_33.4**  
**7\_1.10.4**  
**7\_20.33.4**  
**7\_8.4**  
**e.2\_13.6**  
**a.be.2\_6.6**  
**9\_8**  
**f.9\_8**  
**9\_2.1**

# Goal - UDEF IDs Become Global Unique IDs (GUIDs)



UDEF ID = ebXML UID	EIA-836	X12 (EDI)	Vendor A
9_5.8	Product Part Identifier	Product/Service ID	Part No
9_9	Product Name	Product/Service Name	
y.3_9		Entity (Supplier) Name	Supplier
e.2_8	Contract Document Identifier	Buyer's Contract Number	Contract No
f.g.9_11	Component Product Quantity		
2_33.4	Document Type Code	Report Type Code	Doc Type

<ContractDocumentIdentifier **DOC:GUID="e.2\_8"**>123abc</ContractDocumentIdentifier>

<BuyersContractNumber **DOC:GUID="e.2\_8"**>123abc</BuyersContractNumber>

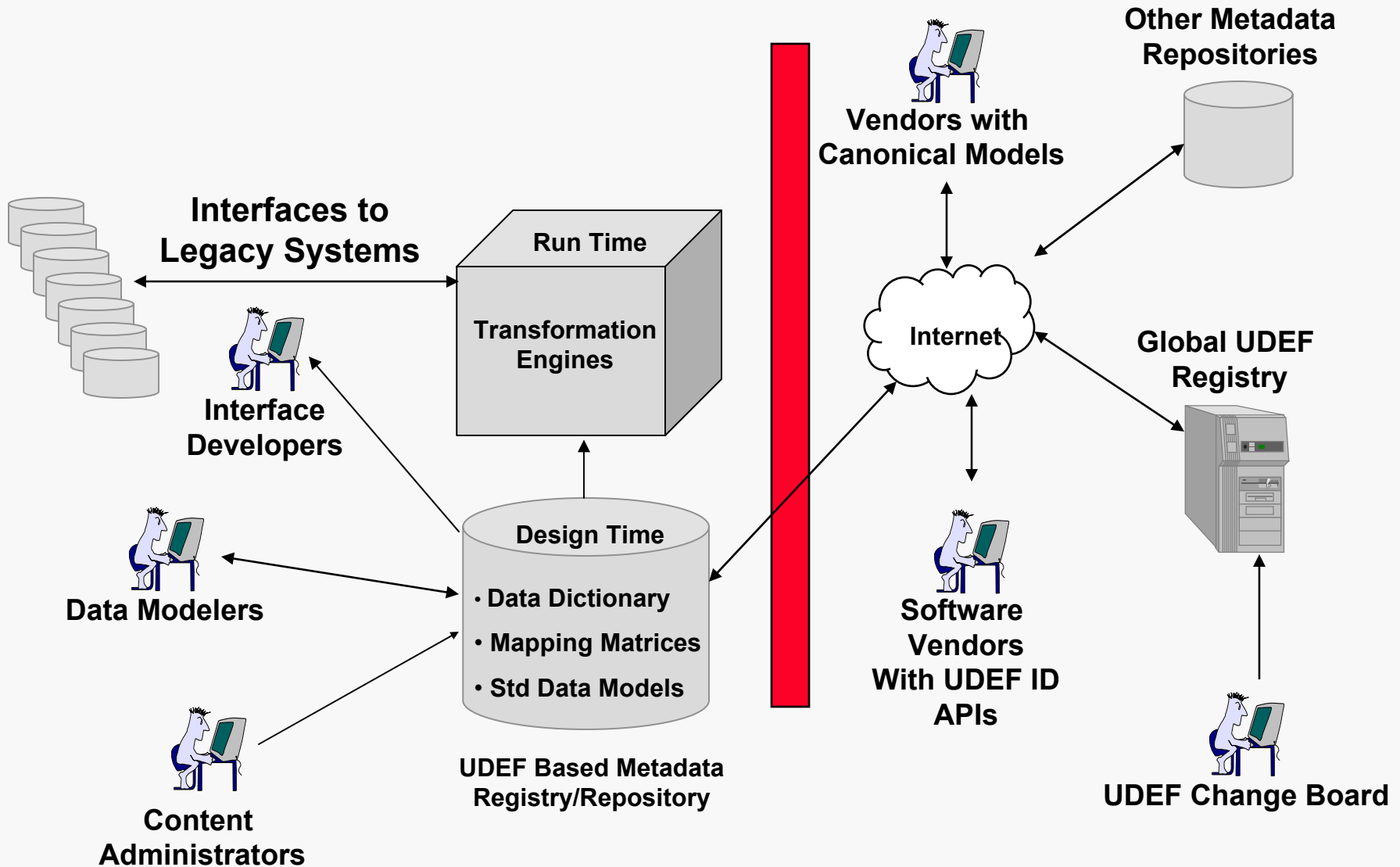
<ContractNo **DOC:GUID="e.2\_8"**>123abc</ContractNo>

Benefit – GUIDs eliminate the baggage associated with changing names

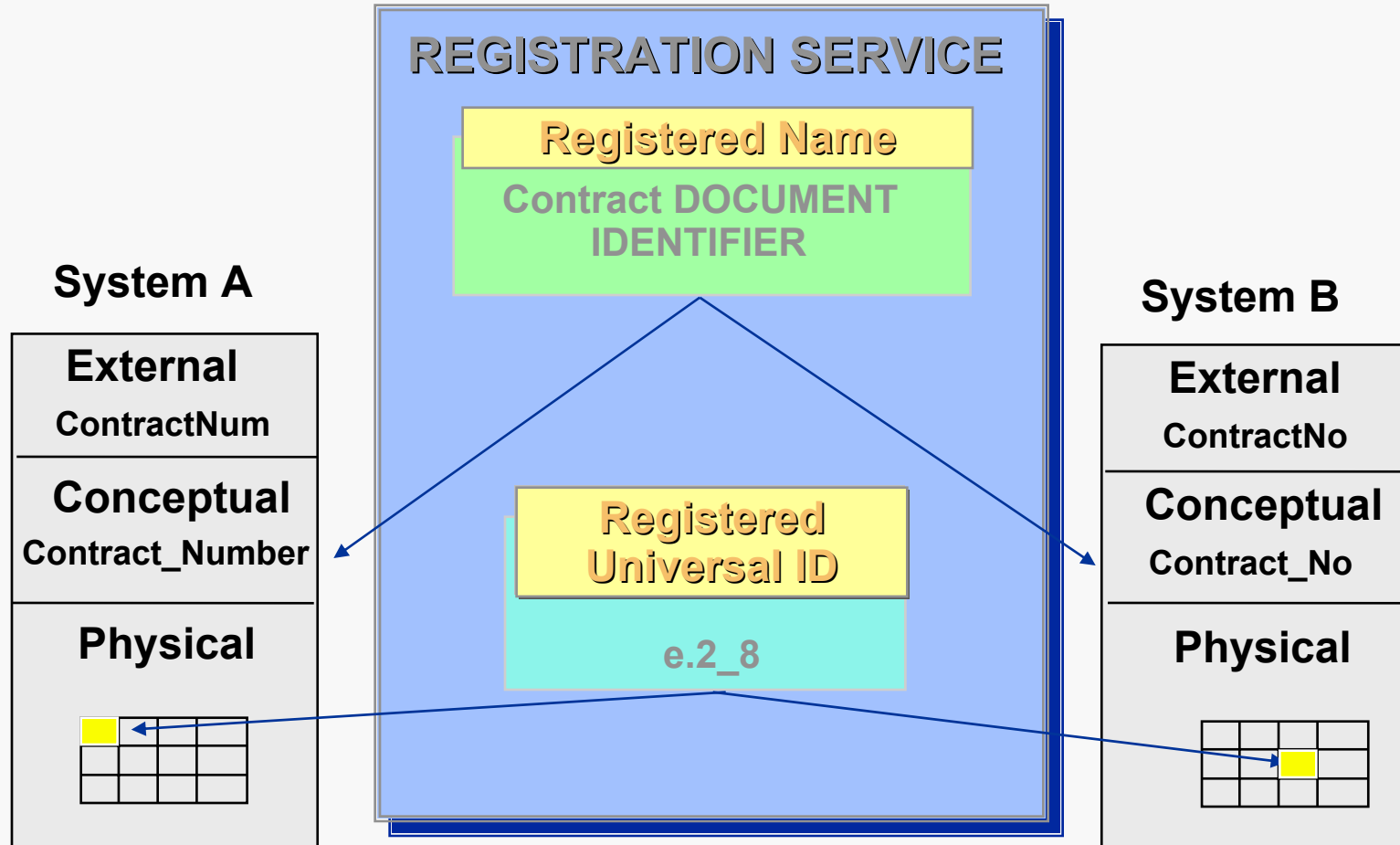
# Benefits of the UDEF

- **Based on ISO 11179 and ebXML standards**
- **Infinitely extensible**
- **UDEF IDs are language independent**
- **Built in indexing for all XML catalogs**
  - Find entries more rapidly within large catalogs
- **Enable faster alignment between disparate legacy systems – even for close matches**
  - Two hinge points (the object and the representation word)
- **Reduce costs associated with interfacing systems within the business**
- **Provide foundation for standardized global XML namespace categories**
  - PER:GUID Person – all XML names with Person as the object
  - PRD:GUID Product – all XML names with Product as the object
  - ENP:GUID Enterprise – all XML names with Enterprise as the object
  - PRC:GUID Process – all XML names with Process as the object
  - PLC:GUID Place – all XML names with Place as the object
  - PRG:GUID Program – all XML names with Program as the object
  - etc

# UDEF Concept of Operation

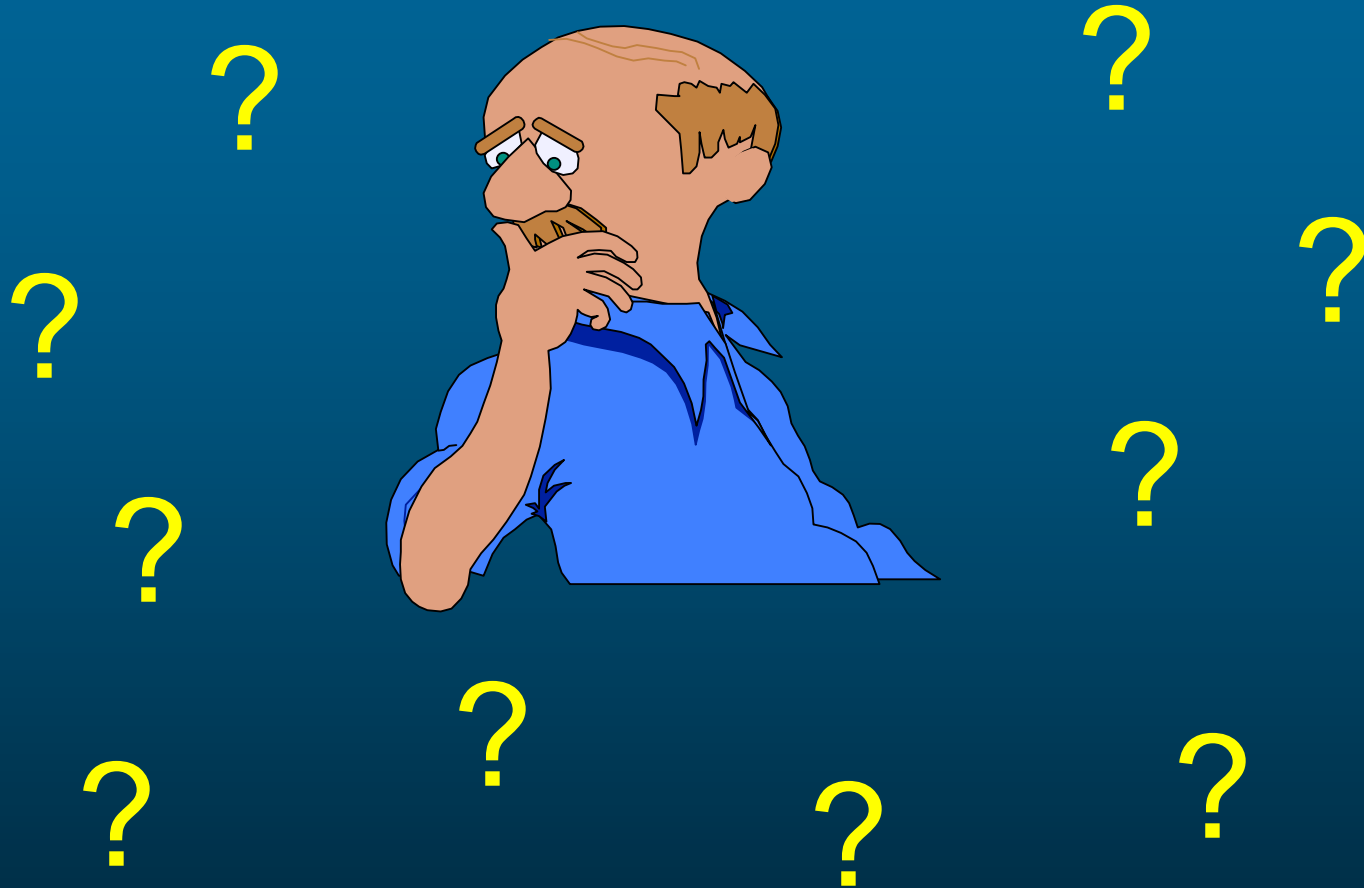


# Global UDEF Registry



AIA, EIDX and AFEL will work with .org to establish this service

# Questions



Ron Schuldt – 303-977-1414 or [ron.l.schuldt@lmco.com](mailto:ron.l.schuldt@lmco.com)