

# **Intelligent Document Content for e-Business**

**Dan Z. Sokol  
Cohesia Corporation**

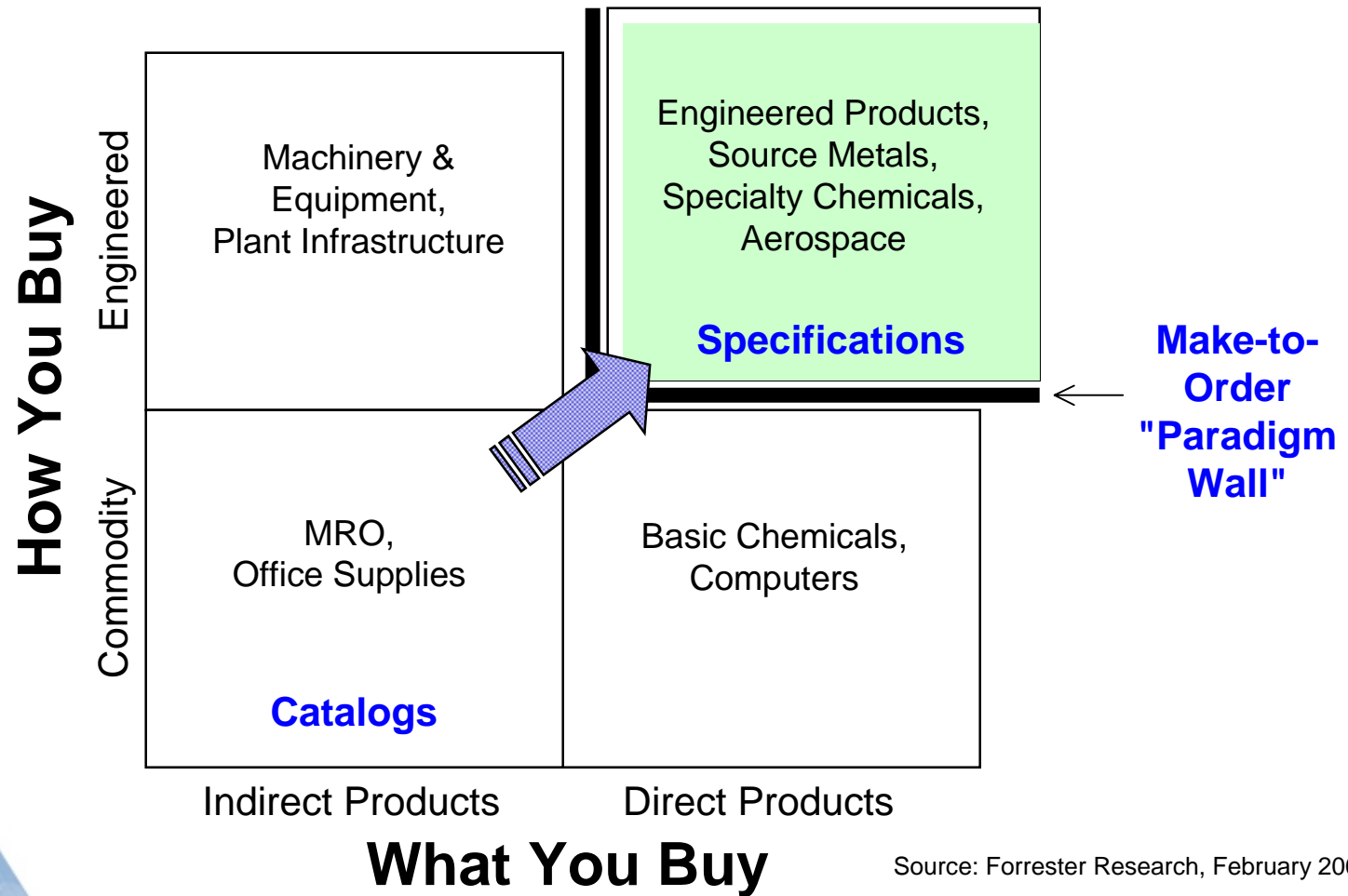
**Knowledge Technologies 2001  
Austin, Texas**

# Outline

- **e-Business Environment**
- **XML & Communication**
- **Intelligent Document**
- **Business Application**
- **Summary**

# e-Business Environment

# e-Business Environment



# e-Business and Specifications


"To buy books on Amazon.com, a consumer only requires a credit card ... Buyers on MetalSite must specify the type of product & create product *specifications* that drive the request for quotes (RFQ)."

Goldman Sachs, "B2B: 2B or Not 2B", February 2000

"The *specifications* and attributes that define products and services are vital to their purchase and sale ... a core and central piece to the B2B e-infrastructure puzzle"

US Bancorp Piper Jaffray, "The B2B Analyst", September 2000

# Specification Documents

 The Engineering Society For Advancing Mobility Land Sea Air and Space® 400 Commonwealth Drive, Warrendale, PA 15096-0001 Submitted for recognition as an American National Standard	<b>AEROSPACE          MATERIAL          SPECIFICATION</b>	<b>SAE</b>	<b>AMS 5613P</b>
		Issued MAR 1948 Revised MAY 1995 Superseding AMS 5613N	
STEEL, CORROSION AND HEAT RESISTANT, BARS, WIRE, FORGINGS, TUBING, AND RINGS 12.5Cr (SAE 51410) Annealed UNS S41000			
<b>1. SCOPE:</b> <b>1.1 Form:</b> This specification covers a corrosion and heat resistant steel in the form of bars, wire, forgings, mechanical tubing, flash welded rings, and stock for forging, flash welded rings, or heading. <b>1.2 Application:</b> These products have been used typically for parts requiring strength and oxidation resistance up to 1000 °F (538 °C), but usage is not limited to such applications. <b>2. APPLICABLE DOCUMENTS:</b> The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. <b>2.1 SAE Publications:</b> Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001. AMS 2241 Tolerances, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire MAM 2241 Tolerances, Metric, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire AMS 2243 Tolerances, Corrosion and Heat Resistant Steel Tubing MAM 2243 Tolerances, Metric, Corrosion and Heat Resistant Steel Tubing AMS 2248 Chemical Check Analysis Limits, Wrought Corrosion and Heat Resistant Steels and			

- **Documents** – Communicates technical details of product expectations
- **References** – Specific Requirements are located elsewhere in other documents
- **Organizations** – Published by large companies and industry organizations



# Specification Details

- Textual Data
- Essential Technical Details
- Open to Interpretation

Vendor must meet one of the alternate requirements (a or b) listed below:

a) The hardness shall not exceed 88 Rockwell "B" as received.

b) The tensile strength shall not exceed 100,000

Element	min	max
Carbon	--	0.08
Manganese	--	0.35
Silicon	--	0.35
Phosphorus	--	0.015
Sulfur	--	0.010
Chromium	14.00	17.00
Nickel + Cobalt	70.00	--
Columbium + Tantalum	0.70	1.20
Titanium	2.25	2.75
Aluminum	0.40	1.00
Iron	5.00	9.00
Cobalt	--	1.00
Copper	--	0.50

Yield Point Offset	0.2% Gauge Length
Yield Strength (min.)	130,000 psi
Yield Strength (max.)	150,000 psi
Tensile Strength (min.)	135,000 psi
Elongation (min.)	12%
Ra (min. - 0.500" RD)	34%

Above properties shall be applied to longitudinal direction of

Lot Quantity (Bars)	Sample Quantity per Lot (Random Bars)	
	Tensile Tests	Metallographic Examination
1-15	2	1
16-30	4	2
31-150	6	3
151-500	8	5
Over 500	6/	7/

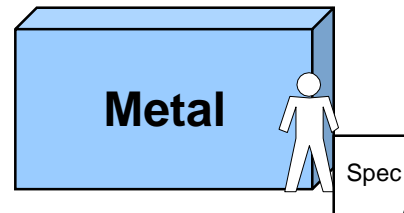
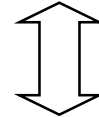
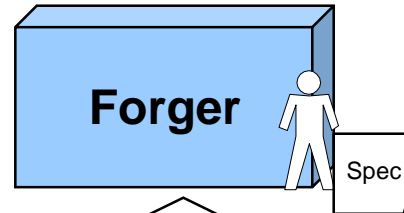
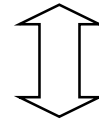
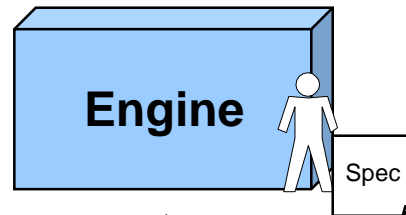
Solution Heat Treatment: Heat to a temperature within the range of 1825 to 1900 °F (996 to 1038 °C), hold at the selected temperature within ±25 °F (±14 °C) for 4 hours ± 0.5, and cool at a rate equivalent to an air cool or faster.

Stabilization Heat Treatment: Heat to 1825 to 1900 °F (996 to 1038 °C) and hold for 4 hours ± 0.5.

Precipitation Heat Treatment: Heat to 1825 to 1900 °F (996 to 1038 °C) and hold for 16 hours ± 0.5.

Material shall be shipped in containers of suitable strength and construction, preferably wood, to prevent damage or misshaping of material, and each container shall not exceed 550 lbs. gross weight. Containers shall not exceed 13 feet 0 inches in length and, where possible, height and width should not exceed 10 inches square. Containers shall be clearly marked with customer's name and address, purchase order number, alloy, heat number, and weight,

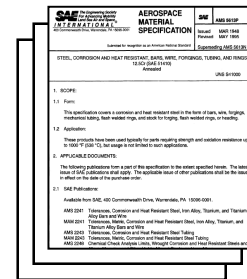
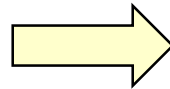
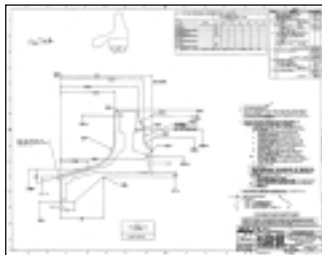
# e-Business Supply Chain



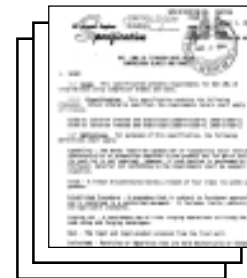
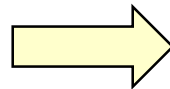


# Typical Supply Chain Situation

This single component part



Directly or indirectly references 90 documents



Average of 10 pages per document

- Only portions of each document are applicable to the specific part
- Documents often contain conflicting requirements
- Requirements can be ambiguous and subject to interpretation
- Numerous business processes dependent upon the details

**It takes time to sort through the documents... it takes labor to do it right... missing the details can have significant impact on quality**

# Current Supply Chain Impact

A4 THE WALL STREET JOURNAL THURSDAY, APRIL 6, 2006

## FAA Says Boeing Didn't Keep Adequate Controls on Its Suppliers

By ANDY PASZTOR

Staff Reporter of THE WALL STREET JOURNAL  
The Federal Aviation Administration has concluded that Boeing Co.'s commercial-jet unit failed to maintain adequate quality controls over its sprawling network of suppliers, according to government and company officials.

Partly in response to the criticism, Boeing is increasing scrutiny of vendors, including requiring sharply stepped-up testing of certain parts and materials before they are accepted or installed in aircraft, said Lisa Otis, vice president of quality for Boeing's commercial airplane operations.

In addition, Boeing is moving to devote more resources, from assigning additional manufacturing employees to focusing higher-level executive attention, on methods to ensure strict compliance with quality and engineering specifications by its roughly 3,500 suppliers, Ms. Otis said in an interview.

The company is determined "to improve our oversight of suppliers," she said, because "we can't stand errors in that area." Federal regulators "think it's absolutely the right approach," she noted, as part of Boeing's overall drive to improve quality controls throughout its factories.

turned out to be defective and prone to cracking after the parts were installed.

Samples from every batch of heat-treated alloys produced by Houston-based Kaiser for use as fasteners must be tested at each step of the metal-making process, according to demanding tests. Alcoa tank beams' both instances are conducted to Boeing.

Pittsburgh

taken interim of heat-treat designing the the potential tings in the h extra testing believes the l "an isolated said the comy orous quality are eager to v sure that pro specifications Without re Odis said that

## Defense contractors agree to \$1.23 million settlement

Provided government nonconforming goods

By WES HILLS  
Defense Correspondent

DAYTON — Four Ohio defense contractors have agreed to pay \$1.23 million to settle claims they provided nonconforming armored vehicle shells to the U.S. Army.

The shells were provided under a \$186 million contract to armor-plate High Mobility Multipurpose Vehicles.

## Airline Regulators Fret Over Breakups Of GE Jet Engines

By WILLIAM M. CARLEY and SCOTT MCCARTNEY

Staff Reporters of THE WALL STREET JOURNAL

NEWARK, N.J. -- Seconds before a Continental Airlines DC-10 lifted off at Newark International Airport last April, pilots heard a "boom" as their left engine partly disintegrated. Like shrapnel from an artillery shell, shards of metal bounced off the

eng it, too. Only jet thundered

the pilots circled : crippled plane lants had the 220 nd over, heads . As the jet came troller radioed to

O'Gara Boss & Eisenhardt Armoring Co. of Fairfield will pay \$1.1 million to the U.S. Treasury; L-T Enterprises Inc. of West Chester will pay \$15,000; Complate Metalworks Technology Inc. of Cincinnati will pay \$40,399, and Mastec Inc. of Batavia will pay \$75,000, under the terms of the settlement approved by U.S. District Judge Sandra S. Beckwith.

O'Gara produced more than 1,500 armored shells, according to the Defense Criminal Investigative Service, which announced the settlement Tuesday.

Several of O'Gara's suppliers,

including those involved in the settlement, produced parts that did not meet design requirements, and O'Gara did not exercise adequate oversight of its subcontractors, according to the allegations, which said the shells were not welded by certified welders.

The allegations surfaced under provisions of the False Claims Act, which allows private citizens to sue on behalf of the government to recover funds obtained under fraudulent pretenses, according to the DCIS.

► Contact Wes Hills at 225-2261 or e-mail him at wes\_hills@coohio.com

# XML & Communication

# e-Business Success

...It's harder than people think, and most of the enablers are about the "A" word:

## **A**utomation

- Reduce errors to improve quality
- Codify processes to reduce labor
- Mechanize processes to reduce time

# XML – The Reality

**"XML is a low-level format, roughly equivalent to IP in networking. IP is the Internet's foundation... But IP alone isn't enough. IP is an application foundation, not an application itself."**

David Megginson, Leader of the initiative that created the Simple API for XML

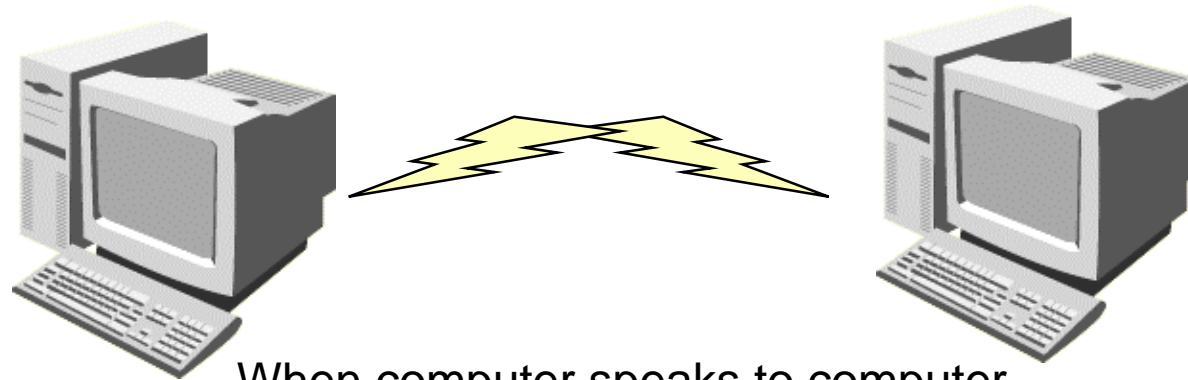
**"We must accept the cold fact that XML does not by itself enable automated interchange or information reuse."**

Robin Cover, Leader of effort to make XML a standard

**"We need languages for expressing the relationships between different sorts of data...The semantic web will be revolutionary for e-commerce."**

Tim Berners-Lee, Leader of effort to create world wide web

# e-Business Communication

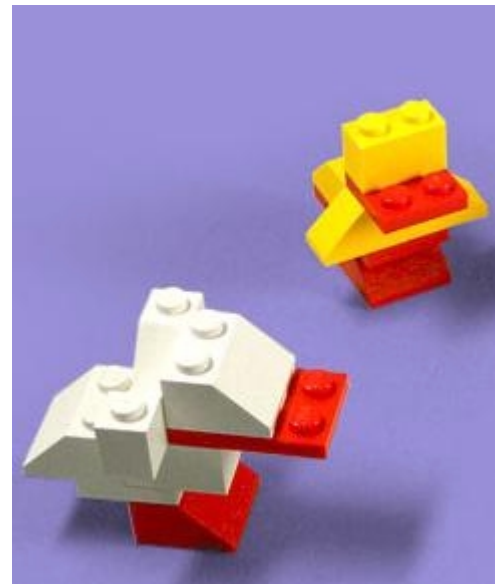


When computer speaks to computer,  
how does each *interpret* what the  
other *means*?

**Connecting Does Not Necessarily  
Mean *Communicating***

# e-Business Communication

**Develop a set of written instructions that would enable a 3rd party to reproduce a small, 10 brick Lego model**



# Samples of Vocabulary Used

- |                     |                        |                      |                          |
|---------------------|------------------------|----------------------|--------------------------|
| • Reference point   | • Align with           | • Rectangular        | • Pegs up                |
| • Long, thin        | • Across, crosses      | • Opposite direction | • Form                   |
| • Looking forward   | • For example          | • Immediately to     | • Levels                 |
| • Place together    | • Headed west corner   | • Layers             | • Attach to              |
| • Front, back       | • Placed on            | • Stacked            | • Counting from          |
| • Overhanging       | • Co-ordinates         | • Composed of        | • Flush                  |
| • Centred           | • Horizontal, vertical | • Made up of         | • On the end             |
| • On top of         | • Brick, piece         | • Column             | • Long side              |
| • To 1              |                        |                      |                          |
| • Over              |                        |                      |                          |
| • Brick             |                        |                      |                          |
| • Point             |                        |                      |                          |
| • Flat surface down | • Flat bucket piece    | • Open face towards  | • Largest                |
| • Crossways         | • Layers               | • Next               | • Sideways               |
| • At position       | • Funny piece          | • Overlapping        | • Back to front          |
| • Back from front   | • 1st, 2nd ...         | • Edge               | • Edges aligned with     |
| • Facing forward    | • Same orientation     | • Yellow             | • It is totally abstract |
| • Abstract          | • Equal to             | • Translucent        | • Buttons up             |
| • Begin over        | • Knobs                | • Weird              | • Orientation            |

**If this is what it's like for a Lego model, imagine complexity for an aircraft engine**

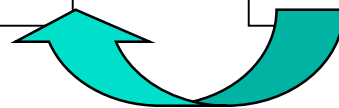
# Actual e-Business Scenario

## Buyer's Purchase Order

Melt Atmosphere = Inert Gas  
Sulfur < 2.0%  
Niobium < 0.5%

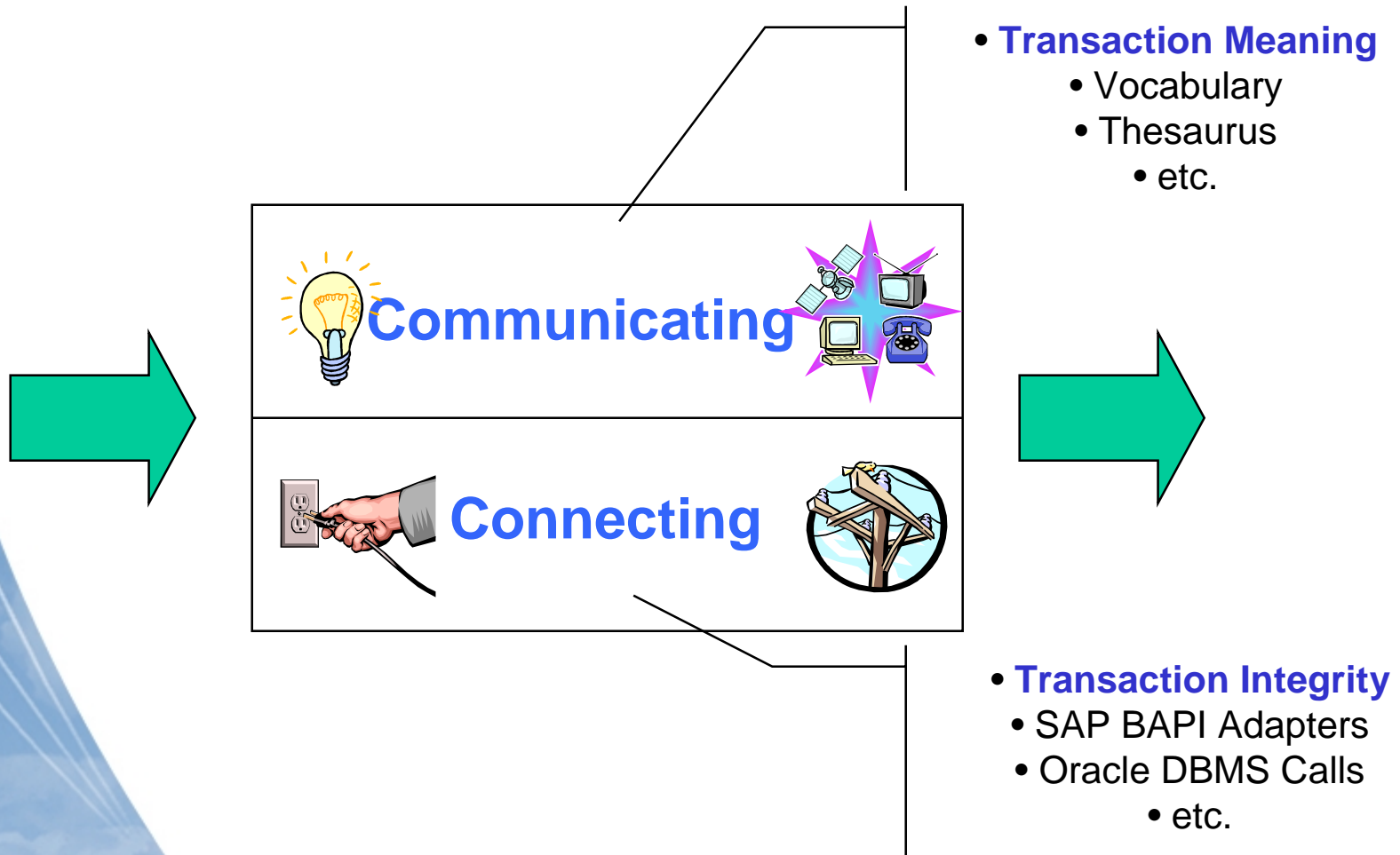
## Seller's Inventory

Melt Atmosphere = Argon  
Sulfur < 1.7%  
Columbium = 0.2%



**Is this a match?**

# e-Business Integration Challenge

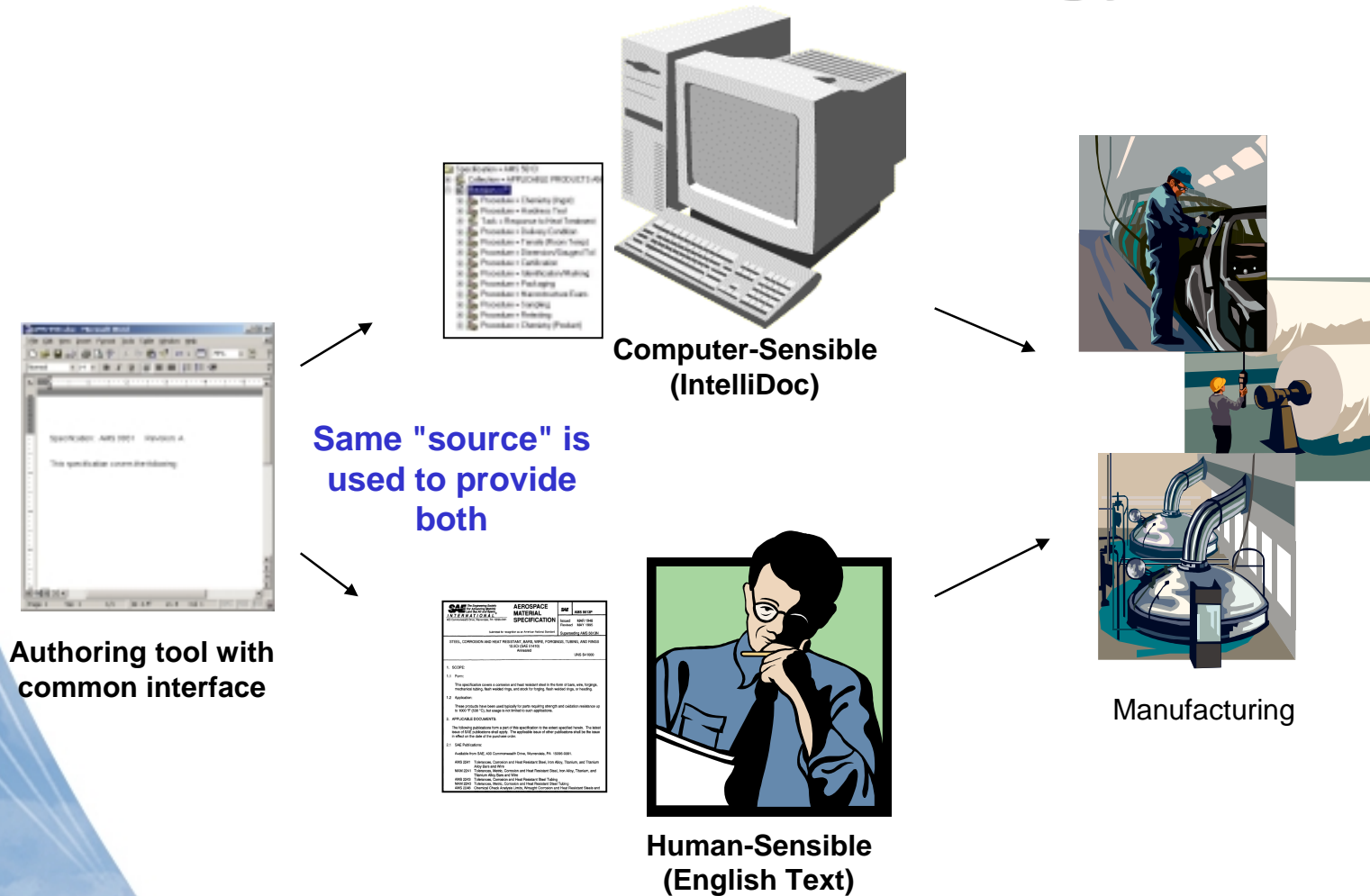


# e-Business – "Communicating"

- **A key to the solution are business documents such as specifications**
  - **There is a need to provide automation around the interpretation of the content in business documents**
  - **Product specifications contain the attributes that define make-to-order products**
- **The solution requires a product with greater semantic richness than a database approach**
  - **There is varying terminology, and organizations do not adhere to a global vocabulary**
  - **There are complex relationships between the attributes (e.g., Argon and inert gas)**

# Intelligent Document

# IntelliDoc<sup>®</sup> Technology




## Research Basis

- **NSF research grants for "Computer- Assisted Document Interpretation"**
- **NIST contract to submit IntelliDoc technology as part of ISO 10303 standard**



# IntelliDoc<sup>®</sup> Technology

 <p><b>SAE</b> The Engineering Society For Advancing Mobility Land Sea Air and Space 400 Commonwealth Drive, Warrendale, PA 15096-0001</p>	<p><b>AEROSPACE MATERIAL SPECIFICATION</b></p>	<p><b>SAE</b></p>	<p><b>AMS 5613P</b></p>
		<p>Issued MAR 1948 Revised MAY 1995</p>	<p>Superseding AMS 5613N</p>
<p>Submitted for recognition as an American National Standard</p>			
<p>STEEL, CORROSION AND HEAT RESISTANT, BARS, WIRE, FORGINGS, TUBING, AND RINGS 12.5Cr (SAE 51410) Annealed</p> <p style="text-align: right;">UNS S41000</p>			
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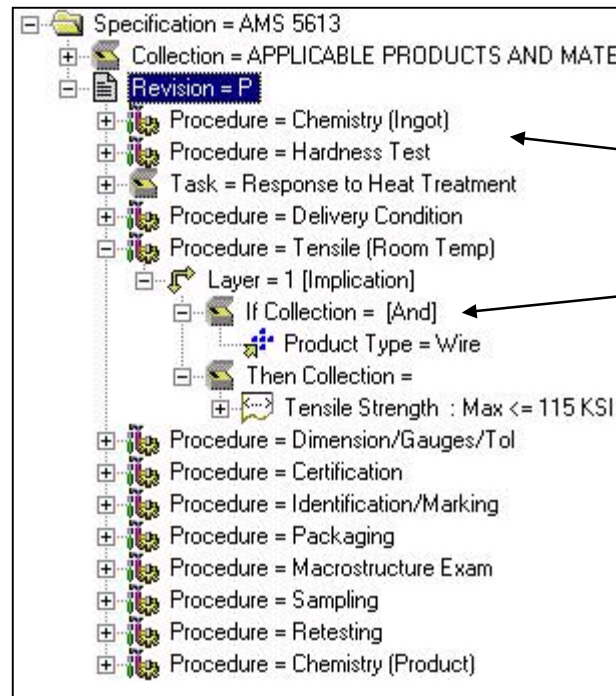


<ul style="list-style-type: none"> <li>Specification = AMS 5613 <ul style="list-style-type: none"> <li>Collection = APPLICABLE PRODUCTS AND MATE</li> <li>Revision = P <ul style="list-style-type: none"> <li>Procedure = Chemistry (Ingot)</li> <li>Procedure = Hardness Test</li> <li>Task = Response to Heat Treatment</li> <li>Procedure = Delivery Condition</li> <li>Procedure = Tensile (Room Temp)</li> <li>Procedure = Dimension/Gauges/Tol</li> <li>Procedure = Certification</li> </ul> </li> </ul> </li> </ul>
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**Spec: Text**

**Spec: IntelliDoc**

# IntelliDoc Documents

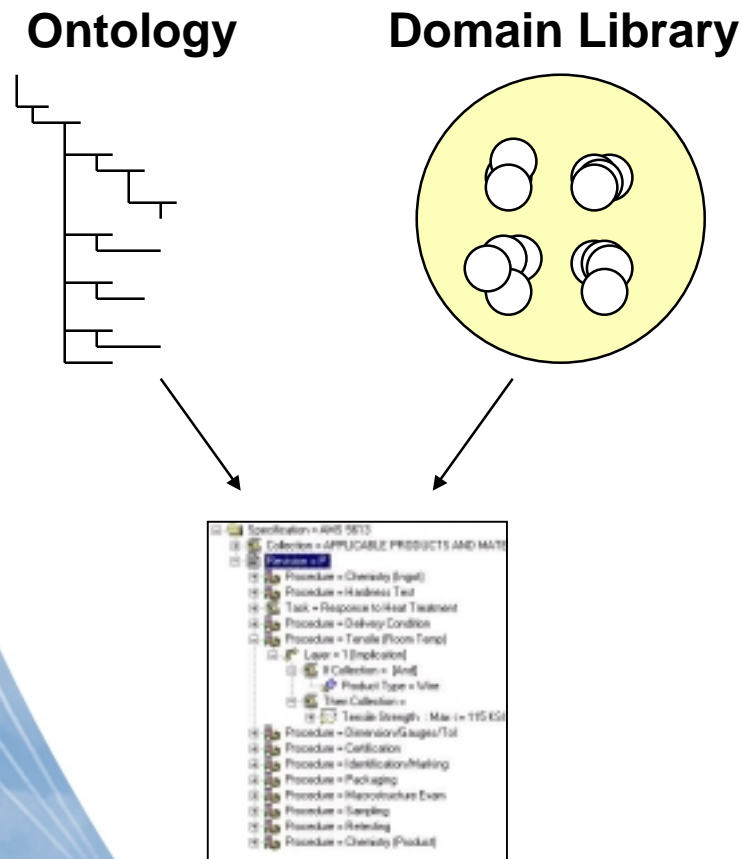


**Business documents  
that contain both**

- data
- logic

**that are sensible  
for computer  
processing**

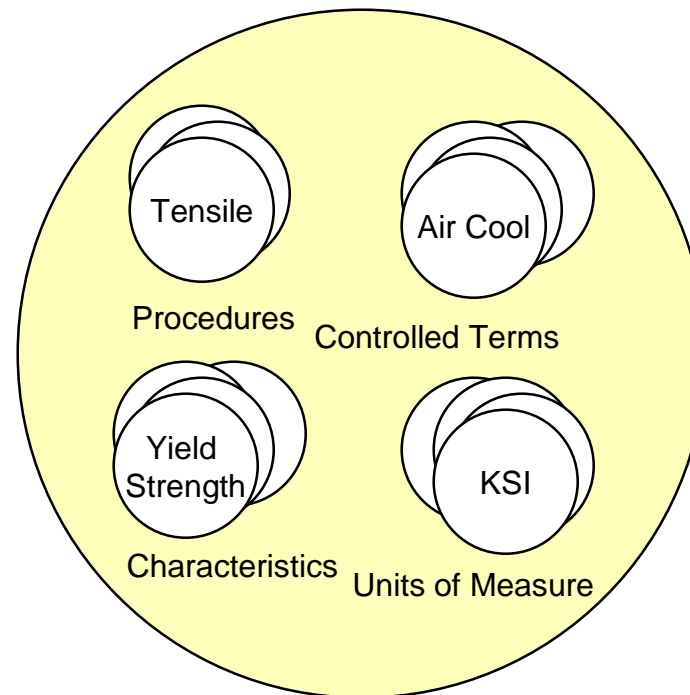
# IntelliDoc “Document”



**Definition: instance of a named container for semantic objects with data and logic**

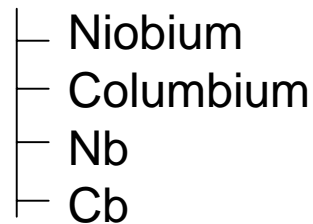
# IntelliDoc Domain Library

Semantic objects with vocabulary and defined relationships



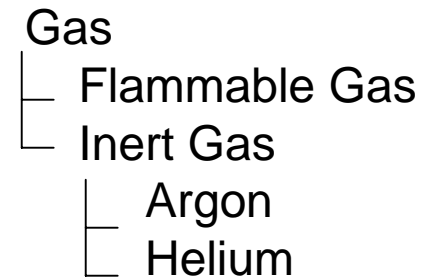
# Domain Library - Relationships

## Aliases



*Niobium is another label for Columbium*

## Generalization/Specialization

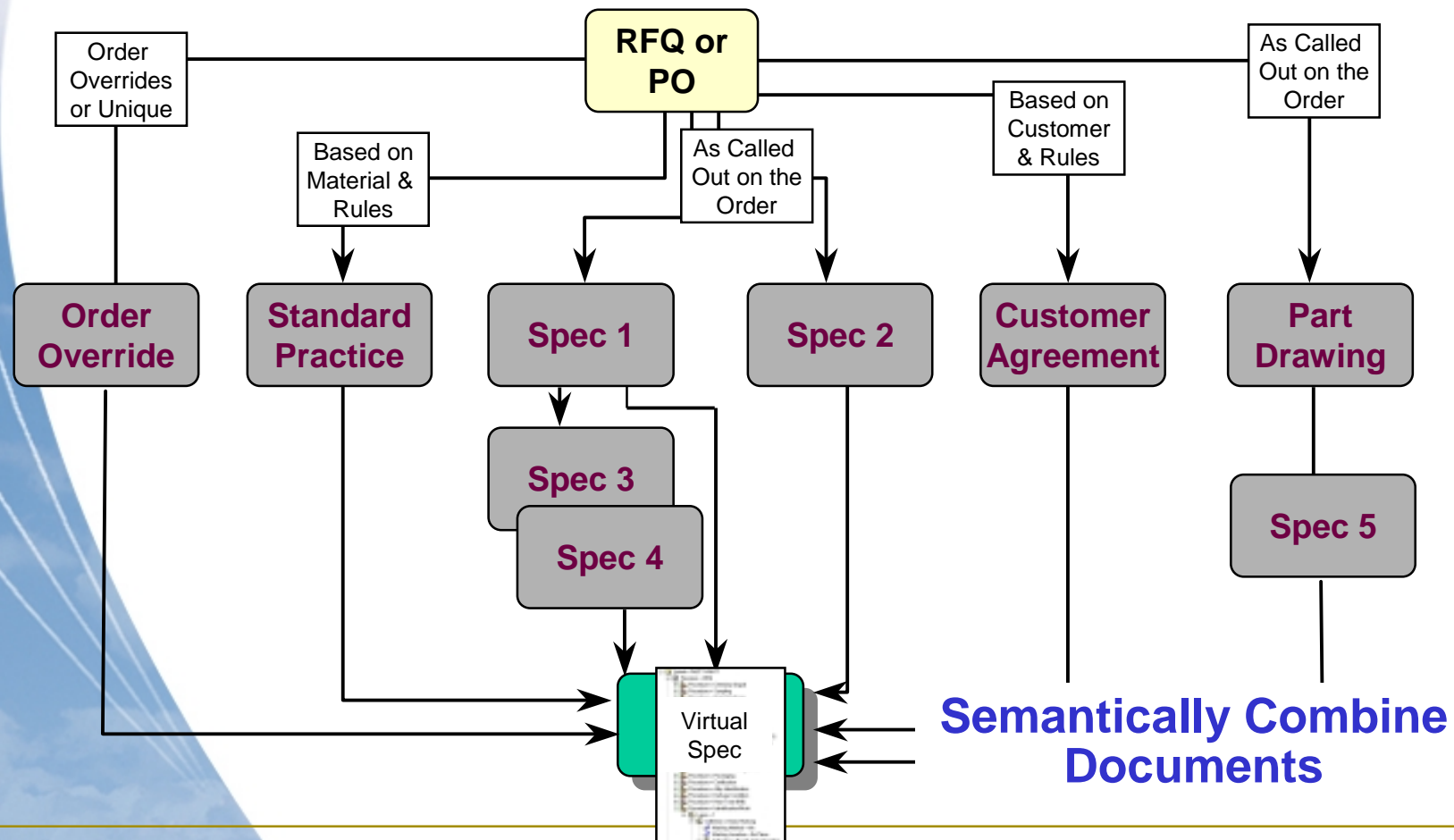


*Argon is a Inert Gas*

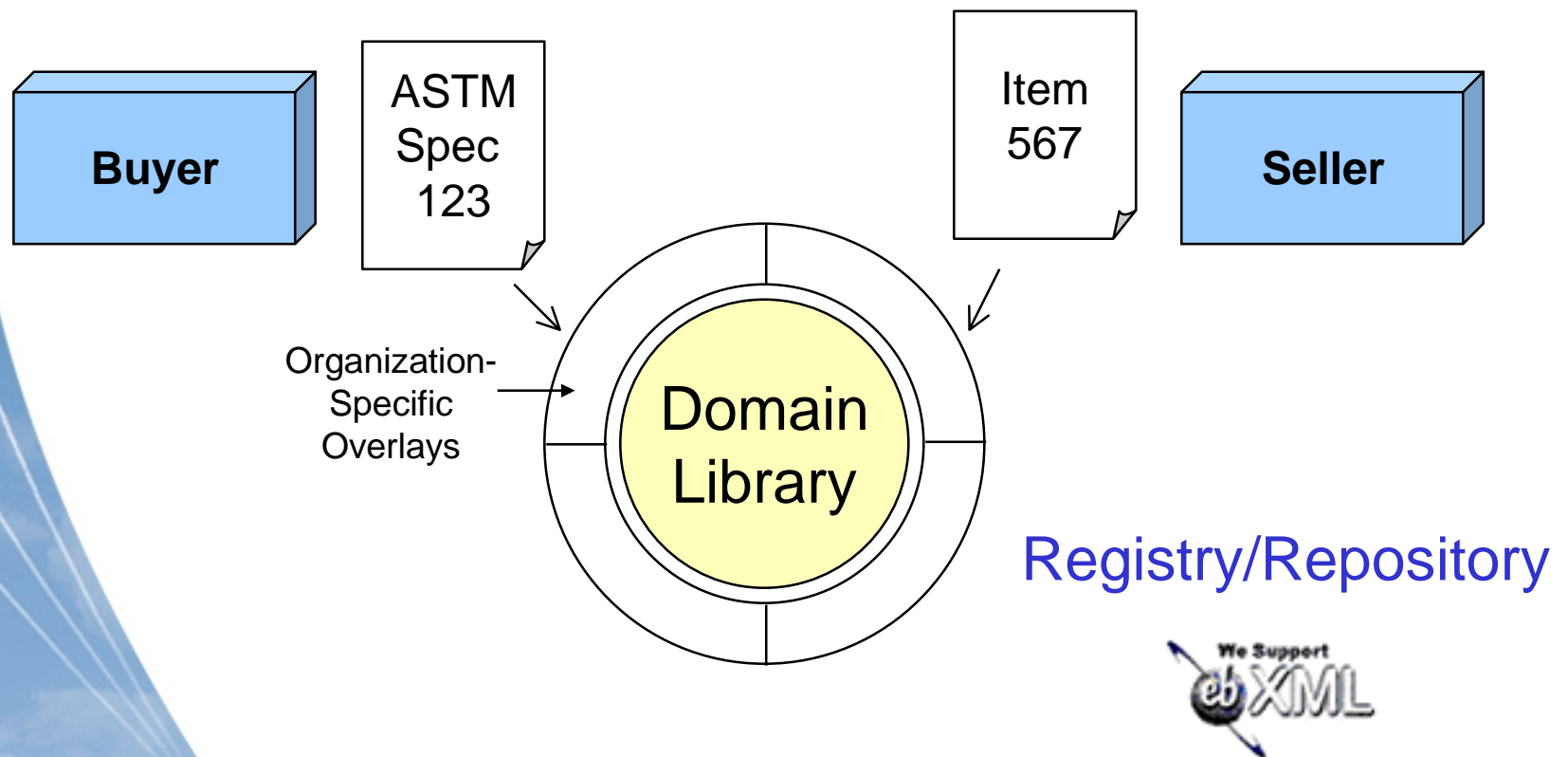
# IntelliDoc Software Engine

- **Analyzer** – reads document to identify key questions and business issues
- **Configurator** – generates comprehensive order/part spec by combining requirements
- **Attributor** – filters pertinent spec document requirements and provides attributes to other systems
- **Translator** – provides thesaurus of terminology and document vocabulary
- **Comparator** – matches and compares specs with specs and results with specs
- **Author** – enables creation of IntelliDoc documents with rules, attributes, etc.

# IntelliDoc Configurator



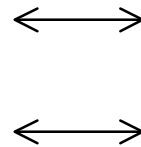
# IntelliDoc Active Dictionary



# IntelliDoc Active Dictionary

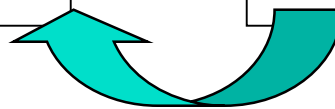
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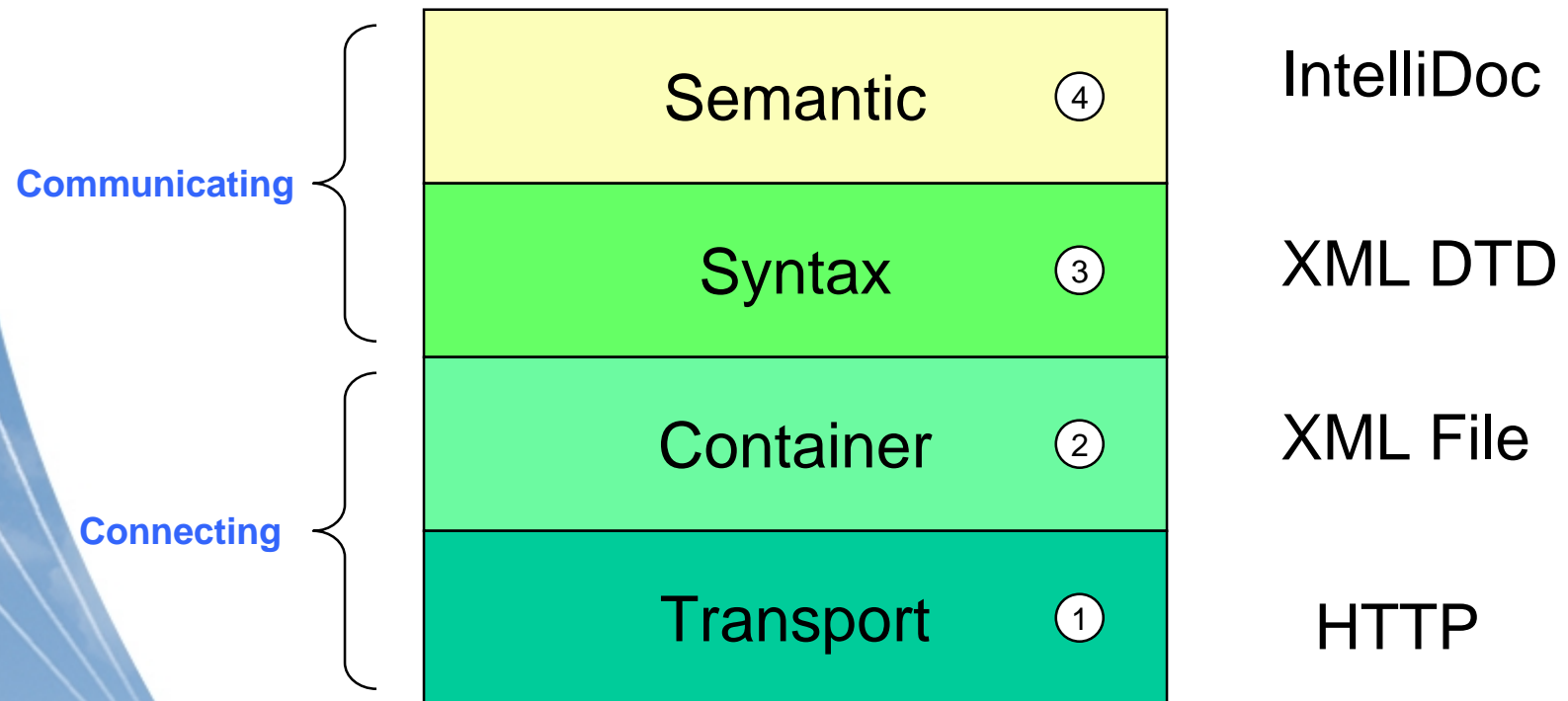
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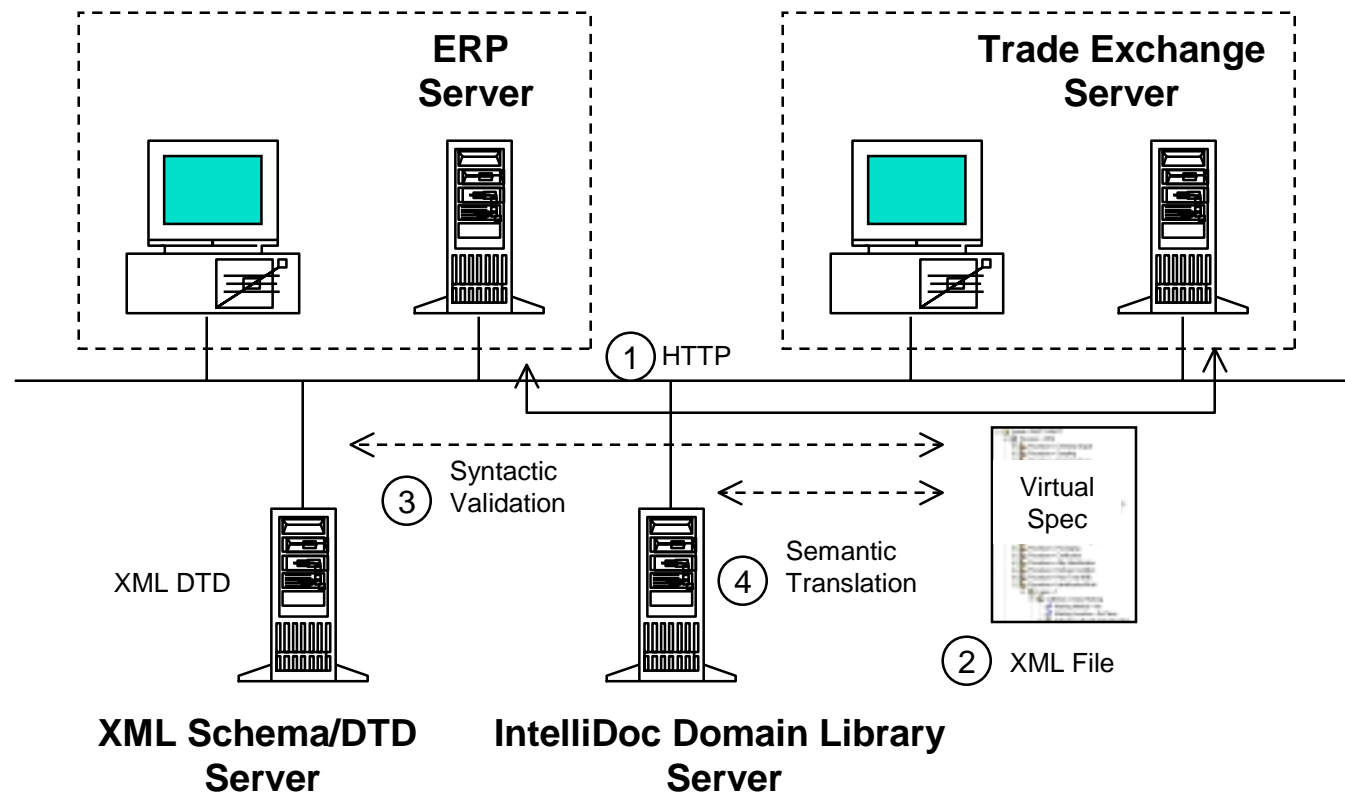


**This is a match!**

# Relationship with XML

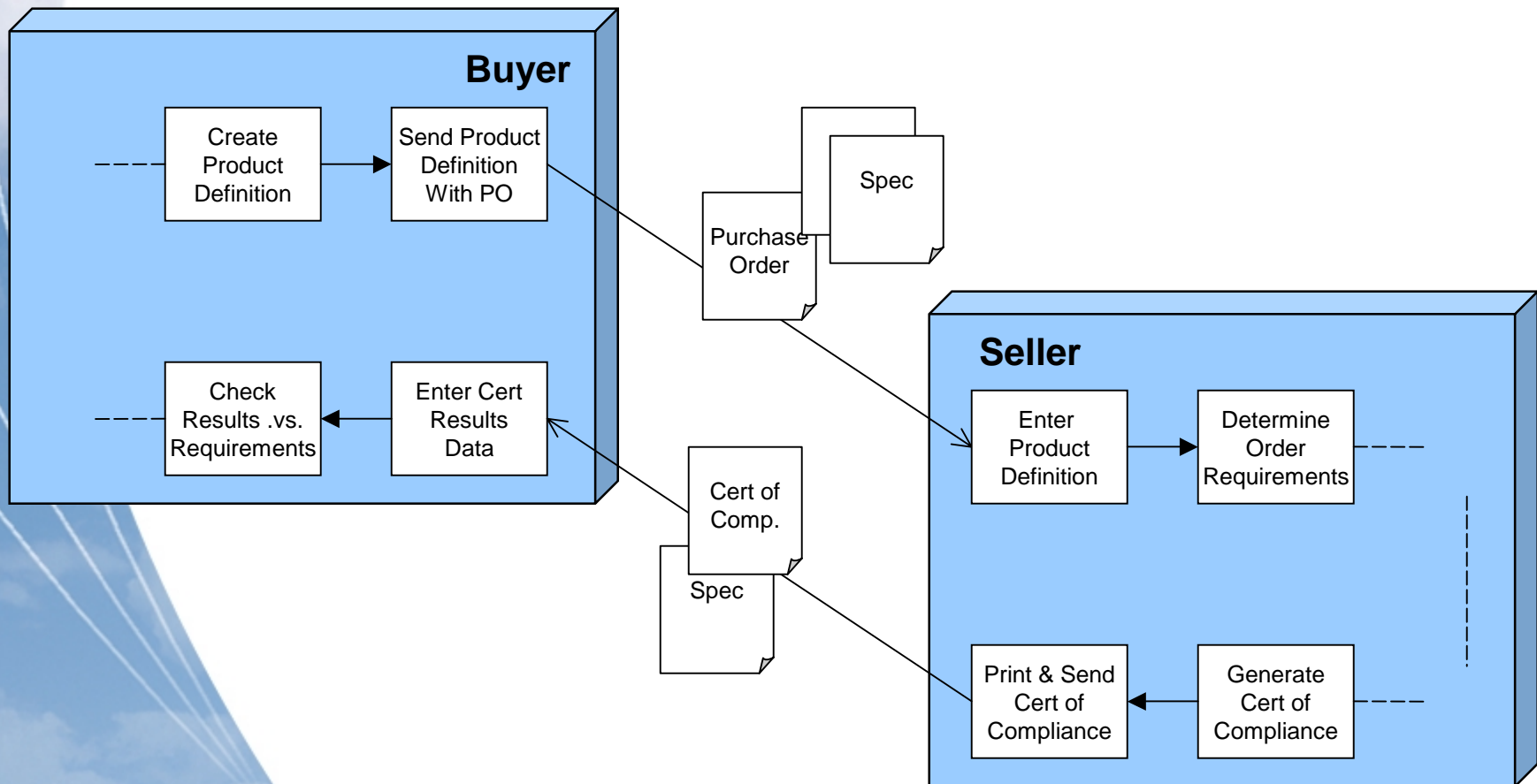


# Domain Library – Integration



# Business Application

# Existing Supply Chain Scenario





# Summary

# Summary

- **e-Business supply chains require greater automation of communication**
- **XML does not solve problem of automating communication by itself**
- **Intelligent document content addresses integration as well as collaboration**