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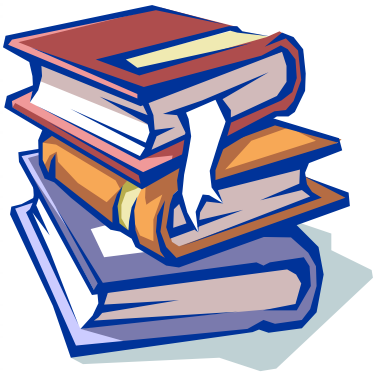
Interoperability Overview

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The Rai, Amsterdam, The Netherlands
FEB 25 - 27, 2002

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Dictionaries of Tortured English



C-commerce
B2B
workflow
XML
Web Services
A2A
Integration
EAI
BPM
Portals

?

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Interoperability?



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Agenda

- Re-introduction of interoperability demands
- Intellectual's Guide to Software Interoperability
- Technology Overview of Interoperability
- Business Value Proposition for Interoperability
- Interoperability Review

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Travel Companies Require Interoperability

- With themselves
  - Internal systems designed by different people at different times for different purposes
  - Mergers and acquisitions
  - Restructuring and competitive efficiency
- With their partners
  - Demand for industry exchanges, alliances, collaboration
  - Competing industry standards, slow/partial adoption
  - New business models

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But Interoperability is Very Difficult

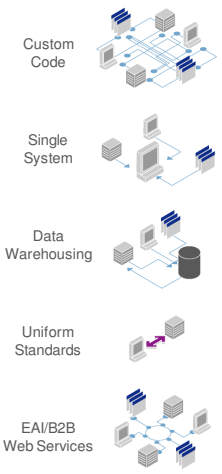
- 82% of current application integration projects are behind schedule and over budget · The Gartner Group
- 88% of all data integration projects have either failed or significantly overrun budgets · Standish
- 30% of the entire IT budget is spent on building, maintaining, or supporting integration · Forrester
- 70-95% of the total cost of ownership (TCO) on current EAI and B2B integration solutions is spent on maintenance · US Government

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Most Technology "Solutions" are Failing



- Current EAI/B2B solves only 50% of the problem – still requiring tightly-coupled, bounded information
- XML is not a silver bullet solution – lacks semantics
- Uniform standards are painfully slow to develop, difficult to change once agreed to, and once certified they're usually misused and abused
- Custom coded solutions usually result in un-maintainable spaghetti code after a short period
- Issues surrounding disjoint exchange vocabularies account for the majority of integration problems
- 85% of project effort is in understanding the database schema design and business rules
- Data Warehouses and Single Systems are impractical (for use as integration solutions)

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New Solutions are Emerging That Enable:

- Modularized business information
- Dynamic discovery and collaboration
- Freedom from monolithic standard vocabularies
- Independence from custom code

Resulting In:

- Increased efficiencies and reduced total costs
- Quicker response to changing business environments
- Greater customer loyalty and competitive differentiation
- Improved ability to drive market expansion

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Interoperability for Intellectuals

The Core Ideas

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Logical Form vs. Observable Fact

Plato



Aristotle

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747 Wheel Assembly Bill of Materials?

Bill of Materials

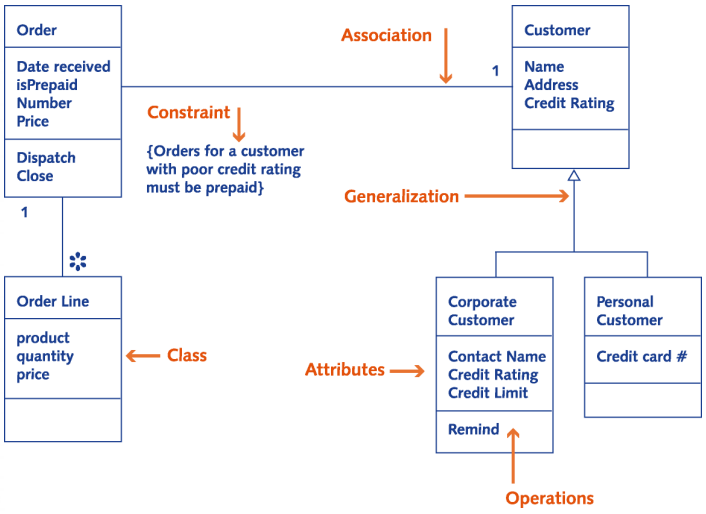
LENGTH / QUANT.	SIZE 1	SIZE 2	DESCRIPTION
11503	SCH20	10"	Pipe seamless - ANSI B36.10 - Sch 20
8	9212G	10"	90 Elbow LR - Sch 20 - ANSI B16.9 (p83)
9	9G01G	10"	Welding Neck Flange - Sch 20 - 150 Lbs
2	9G182	10"	Gate Valve - 150 lbs - Trim F6 (p153)
1	9216G	10"	Straight Tee - Sch 20 - ANSI B16.9 (p87)
2		10"	Handwheel Operator
28	WELD1	10"	SCH20 Std Wt Buttwelding Smls - ASTM A-234 Gr WPB
60	03850	M22	130 Studbolt with 2 nuts - ASTM A 193 Grade B7 (p282)
5	GASKET	10"	150# Gasket Non metallic ANSI B16.21 - 1



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Unified Modeling Language (UML)



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Abstract Form vs. Physical Representation

Noumenal





Phenomenal

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What Does Language Mean for Us?

- "A rose by any other name…"
  - Shakespeare
- "The definition of a word is how it is used…"
  - Wittgenstein
- "how many shades of green would a child see in a field of grass had the child not been taught the word 'green'?"
  - Brakhage

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Philosophy:
Who Needs It?

– Ann Rand

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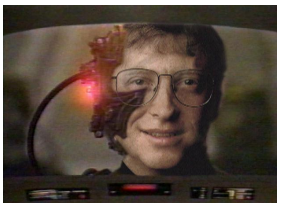
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Interoperability?

Interoperability is the ability of one system to use the parts of another, completely autonomous, system in its own environment

Integration?

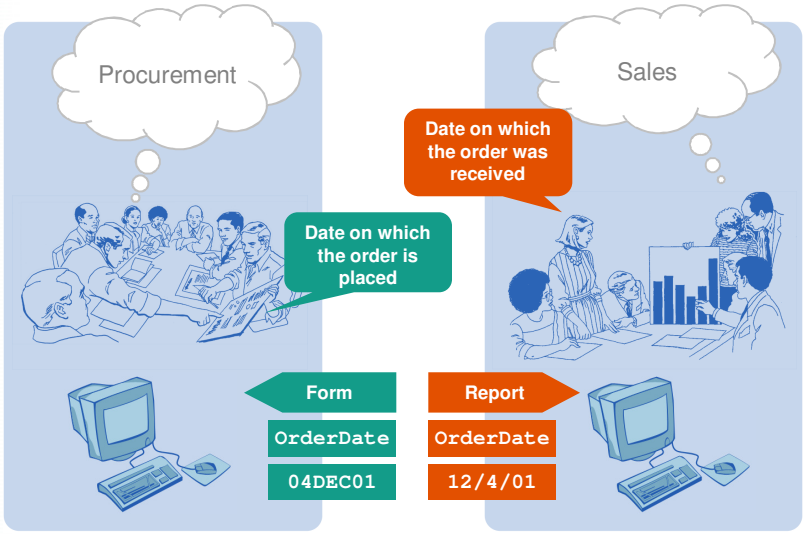
Integration makes everything the same



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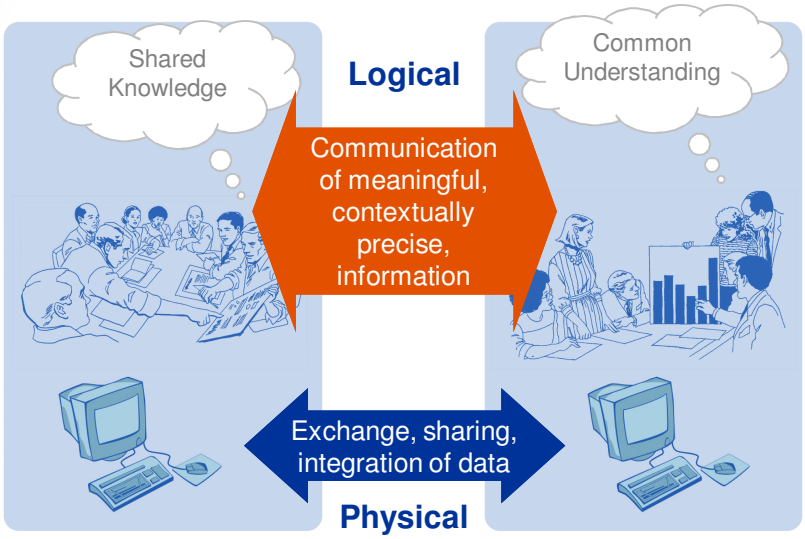
Different Representations of Information



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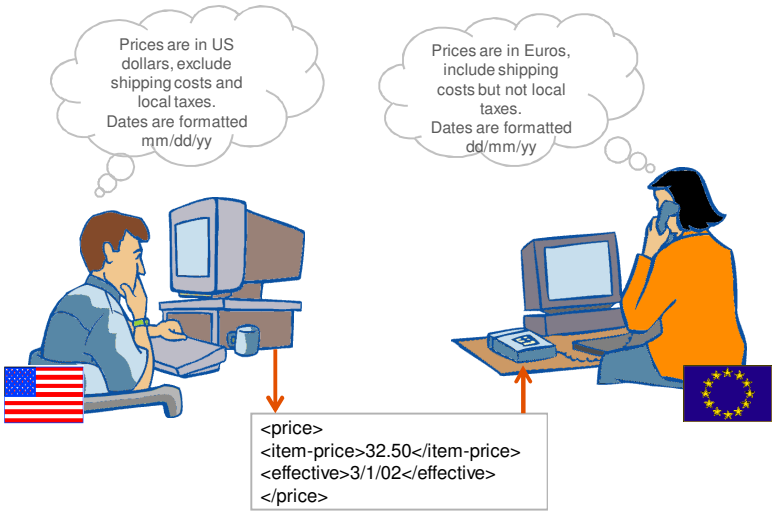
Information Interoperability in Two Dimensions



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No Two Software Systems (or people) Understand the Same Thing at the Same Time



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The Meanings Exist With the Programmer!

```
if (queueType == IMessageQueue.IBM_MQ_SERIES) {
            //*************************
            // Get the IBM Message Queue
            //*************************
            IBMMQSeries ibmmqseries = null;
            try {
                // Get a naming context
                InitialContext jndiContext = new InitialContext(env);
                // Get a reference to the IBMMQSeries Bean
                Object ref  = jndiContext.lookup("services/IBMMQSeries");
                // Get a reference from this to the Bean's Home interface
                IBMMQSeriesHome home =
                    (IBMMQSeriesHome) PortableRemoteObject.narrow
                    (ref, IBMMQSeriesHome.class);
                // Create an IBMMQSeries object from the Home interface
                ibmmqseries = home.create();
            }
            catch(Exception e) {
                System.out.println("Exception: " + e.toString());
            }
}
```

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The Meanings Exist with the Analyst!

```
<other_document>
  <other_document.document_number>436</other_
  <other_document.document_title/>
  <other_document.document_type>FIG</other_do_
  <other_document.document_subject_name>6</ot
  <other_document.documented_part_cage>82918<
</other_document>
<part_classification>
   <part_classification.classification_type>sm
   <part_classification.code_value>XC</part_cl
   <part_classification.description/>
</part_classification>
```

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The Meanings Exist with the Standards (???)

ebXML — Creating A Single Global Electronic Market

UN/CEFACT OASIS

{ RosettaNet }

Accredited Standards Committee X12

cxml.org

FpML.org Financial Products Markup Language

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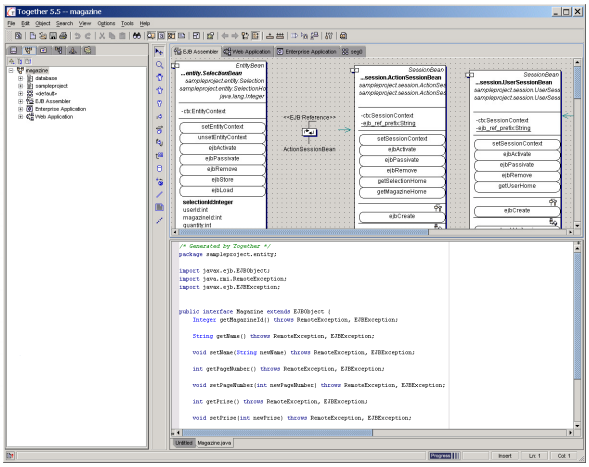
The Meanings are Defined by How it's Used!

```
Properties props = System.getProperties();
ORB orb = ORB.init(args,props);
org.omg.CORBA.Object obj =
      orb.string_to_object(args[0]);
try {
   WeatherInfo wInfo =
WeatherInfoHelper.narrow(obj);
} catch (org.omg.CORBA.BAD_PARAM bp) {
}
WeatherData data = wInfo.get_weather("Dutzow");
System.out.println("The weather in Dutzow is:");
System.out.println("Temperature: "+data.temp);
System.out.println("Wind:"+
    data.wind_direction_and_speed);
System.out.println("Humidity: "+data.humidity);
```

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Traditional Integration Tools Bind Information



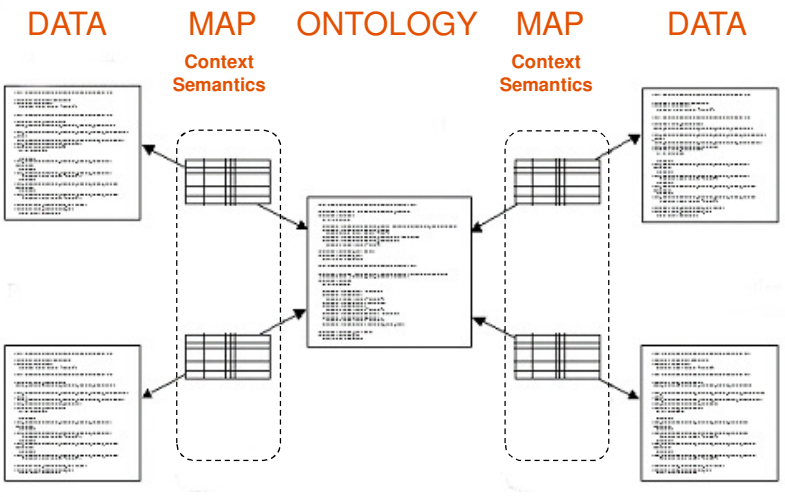
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Information Interoperability is Different

- Semantic Mediation
- Semantic Mapping
- Context Sensitive

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Expressing the Physical in the Abstract



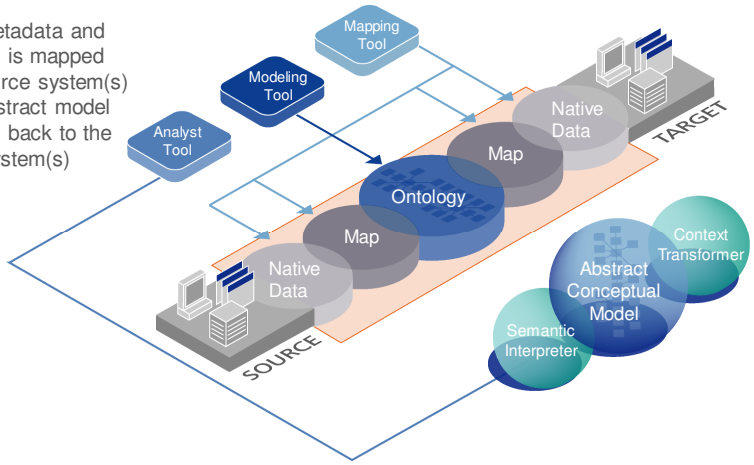
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Interoperability Tools and Artifacts

A revolutionary approach to interoperability for disparate systems

Data, metadata and "context" is mapped from source system(s) to an abstract model and then back to the target system(s)



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New Kind of Middleware to:

- Formalize the descriptions of concepts in the form of digital ontology models
- Formalize the object-to-concept and concept-to-concept relationships among schema
- Formalize the capture of contextual perspective in software systems
- Fully realize the dream of true loosely-coupled information interoperability

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Interoperability for Technologists

The Technical Differentiation

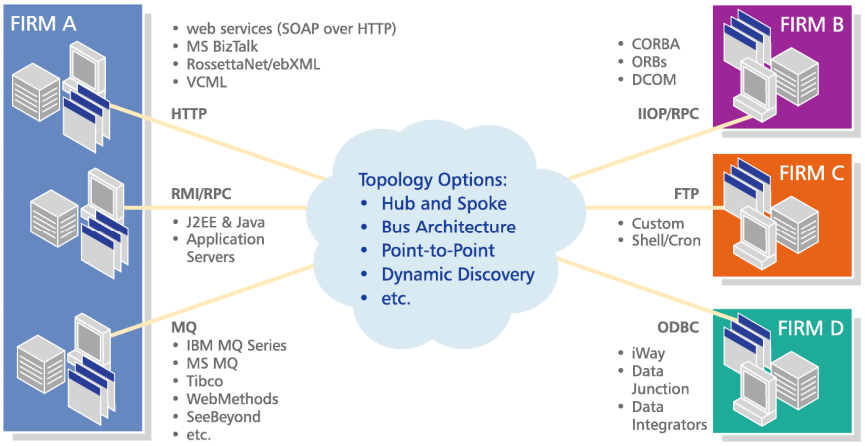
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Interoperability Defined: Part One

Connectivity management links software together

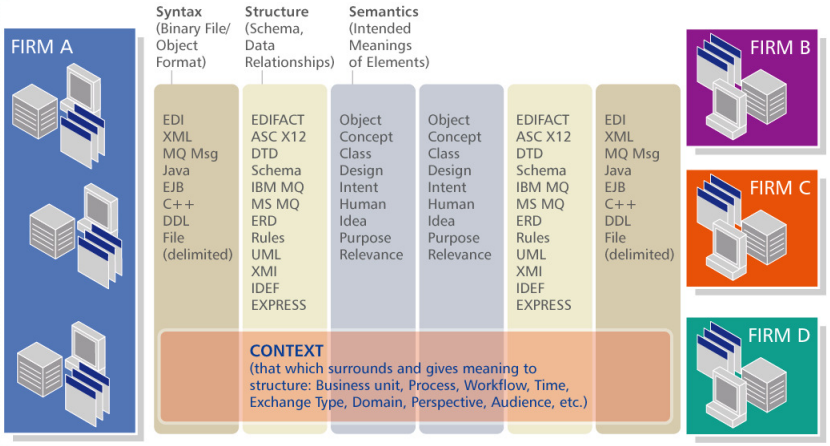


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Interoperability Defined: Part Two

Information management unifies information



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A Complete Interoperability Solution

An overall solution requires both connectivity management and information management components

Within these broad categories there are both competing and complementary solution sets:

Connectivity Management (adapters, transport, process control)	**EAI & B2B**	**Web Services**
Information Management (data transformation, business rules, shared meaning and context)	**Custom Code or Document Standards**	**Enterprise Information Interoperability**

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EAI and B2B Vendor Solutions

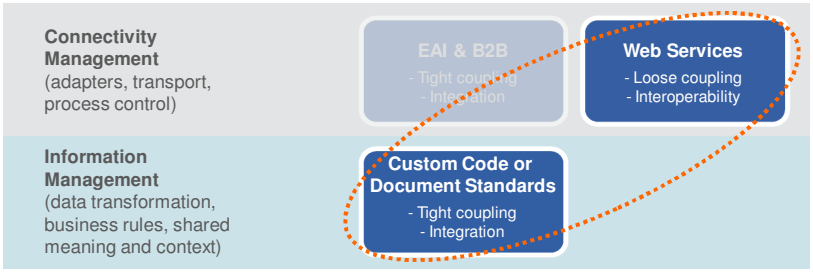
Connectivity Management (adapters, transport, process control)	**EAI & B2B** - Tight coupling - Integration
Information Management (data transformation, business rules, shared meaning and context)	**Custom Code or Document Standards** - Tight coupling - Integration

Pros:
- Transports are now (mostly) standardized
- Business process a key focus and enabler
- Vendor support provided

Cons:
- Tightly-coupled connectivity (queue, hub, bus, etc.)
- Adapters are a commodity, but still require IDEs
- Scripted environments (proprietary or open)

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Web Services Current Approach

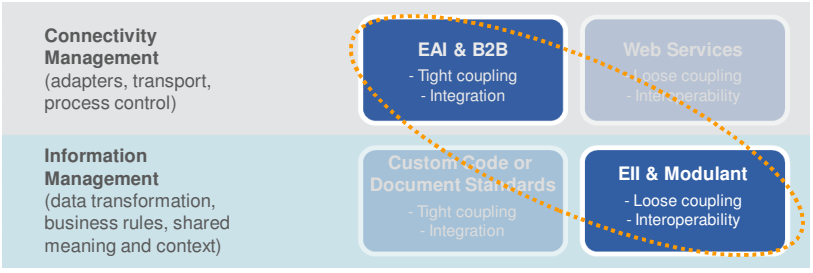


Pros:
- Loosely-coupled physical connectivity
- Dynamic discovery and negotiation
- Standardized XML vocabularies (ebXML, etc.)

Cons:
- Dynamic collaboration not possible without semantic agreement
- Custom application server code (Java or C++ or XSLT) required
- Still emerging capabilities for workflow, security, transactions, etc.

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Complementary to EAI and B2B: A Loosely-Coupled Alternative



- Loosely-coupled information infrastructure
- Tightly-coupled connectivity infrastructure
- Sophisticated business process management toolset
- Scaleable and flexible information framework
- Eliminates lock-in to a single EAI or B2B vendor
- Enables a loose collaboration framework

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Complementary to Web Services: The Holy Grail of Interoperability

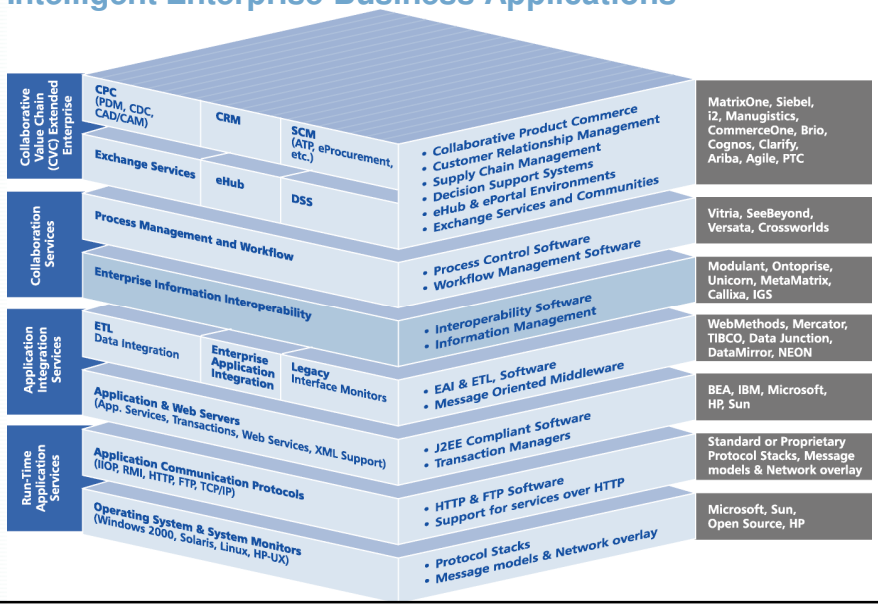
Connectivity Management (adapters, transport, process control)	EAI & B2B - Tight coupling - Integration	**Web Services** - Loose coupling - Interoperability
Information Management (data transformation, business rules, shared meaning and context)	Custom Code or Document Standards - Tight coupling - Integration	**EII & Modulant** - Loose coupling - Interoperability

- Loosely-coupled information infrastructure
- Loosely-coupled connectivity infrastructure
- Standards-based business process management
- Scaleable, flexible, and complete solution framework
- Eliminates need for monolithic vocabulary standard
- Enables dynamic discovery *and* collaboration

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Intelligent Enterprise Business Applications



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Information Interoperability Characteristics

Semantic Mediation

- Uses an ontology to mediate variant application semantics
- Abstracts disparate vocabularies and information to enable distributed exchange of application data

Semantic Mapping

- Captures and expresses the local, specialized vocabulary in terms of the ontology
- Preserves the native application semantics of the data

Context Sensitivity

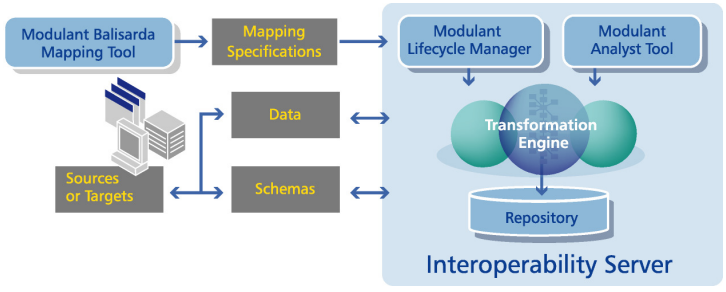
- Accommodates the fact that any data's meaning is always bound to a particular viewpoint or context
- Mapping approach and ontology usage must be sensitive to this

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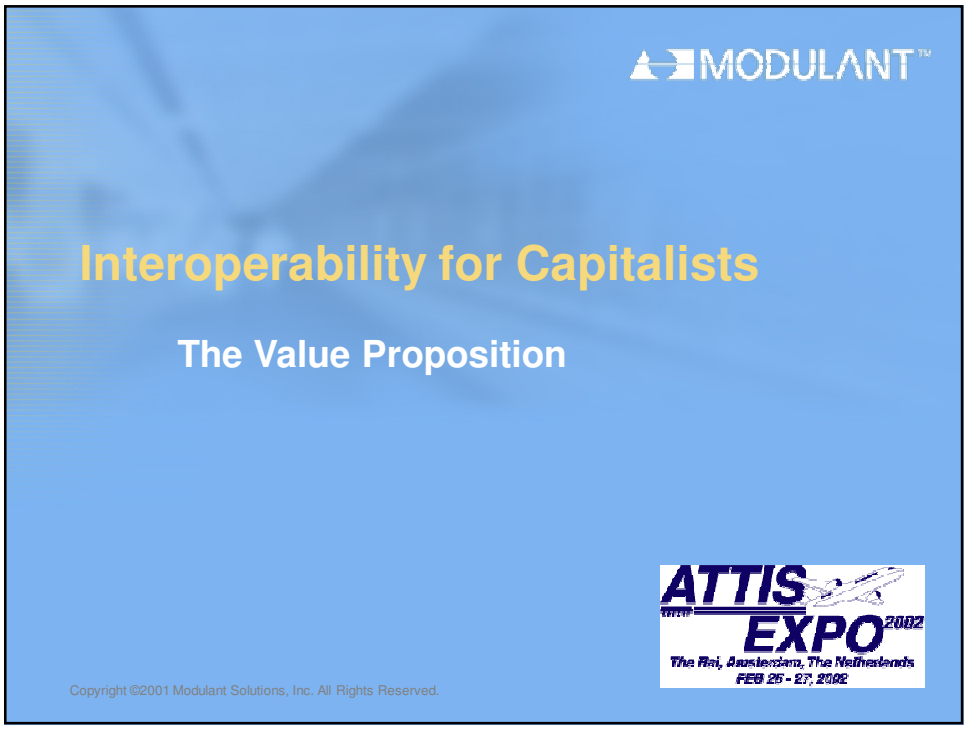
How Interoperability Software Works

- Context Mapping Tool
- Run Time Interoperability Server
  - Context Transformation Engine
  - Human Interface to Server Software
  - Automated, Programmatic Interface to Server Software



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Why bother?
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Interoperability for Capitalists
The Value Proposition
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Technology Advantages are Created:

- Modularized business information
- Dynamic discovery and collaboration
- Freedom from monolithic standard vocabularies
- Independence from custom code

Resulting In:

- Increased efficiencies and reduced total costs
- Quicker response to changing business environments
- Greater customer loyalty and competitive differentiation
- Improved ability to drive market expansion

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Interoperability Value Proposition

- **Enhances collaboration capabilities**
  - Provides a consistent, unified definition of information across the extended enterprise
  - Reduces barriers to supply and design chain collaboration caused by incompatible systems
- **Promotes operational agility**
  - Creates a loosely-coupled, scalable, and highly-adaptable interoperability framework that enables companies to respond quickly to changing business requirements
  - Allows the flexibility to leverage existing IT investments and integration architectures, and the freedom to choose best-of-breed applications in the future
- **Reduces IT expenditures**
  - Significantly reduces the need for custom coding, lowering implementation costs
  - Requires minimal ongoing maintenance, delivering lower total cost of ownership
- **Mitigates risk of project failure**
  - Resolves complex conflicts of meaning (semantics), structure (syntax), and hierarchy (schema), addressing the root cause of the high failure rates and long implementation cycles characteristic of EAI and ERP integration projects
  - Reliable and repeatable method of ensuring that interoperability is achieved

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Interoperability for Dummies

Repeat After Me…

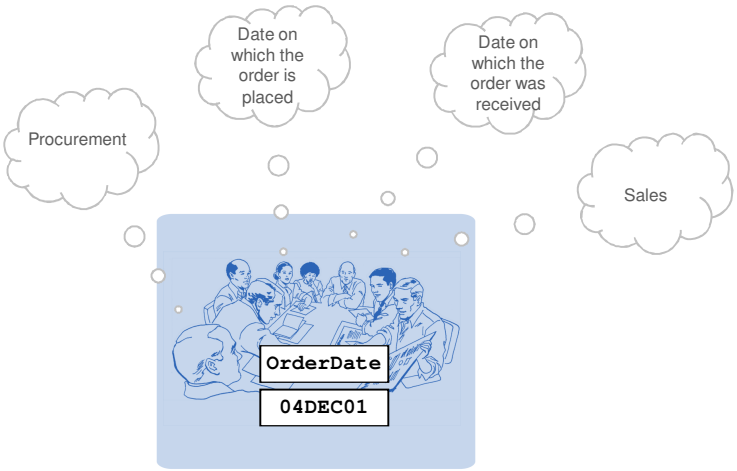
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Interoperability is about resolving differences in *meanings, culture, jargon, and other intangibles* between applications – without brittle custom code.



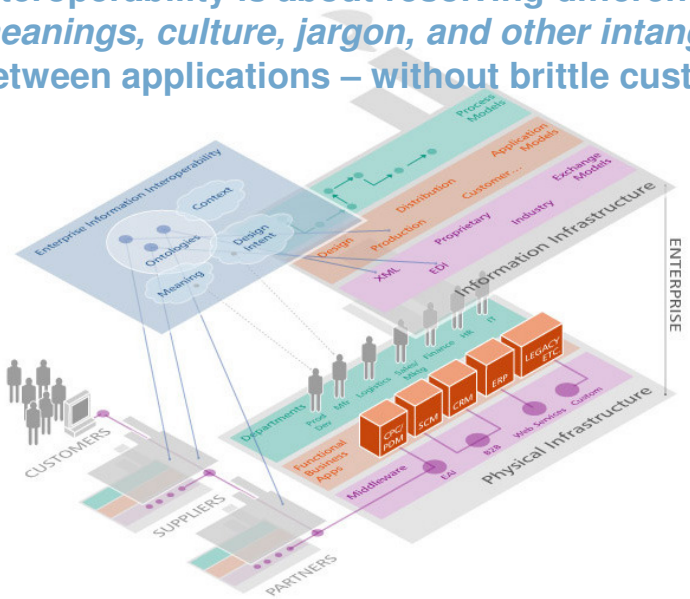
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Interoperability is about resolving differences in *meanings, culture, jargon, and other intangibles* between applications – without brittle custom code.



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Questions?



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