Semantic Interoperability Levels for Comparing Use Cases

Describing Value-Add of Semantic Web Design Using a Practical Interoperability Scale

Implementing W3C Semantic Web Standards for Interoperability

Oct. 26, 2011
Problem

Articulating the Interoperability Value Proposition.

Getting Funded.
Business IT Gap

Business Expert’s Perspective: Processes

Querying the Process Space

Manual Labor Language Gap

IT Implementation Perspective

© SUPER Armin Haller & Marin Dimitrov
This Benefits You

• **For**: Business Decision Makers

• **Who Need**: Tool that Gets the IT Team to Put the Interop Benefits in a Clear, Concise Presentation.

• **For**: CIOs, IT Architects, IT Project Managers

• **Who Have**: Interoperability Project or Technology

• **Who Need**: Means to Communicate Interoperability Value Prop to Business Decision Makers

• **So they can**: Get Funded, Get Paid, Solve Expensive Interoperability Problems.
A Current Method

"Measure for Merit for Coalition Interoperability"
Interoperability Model:
A composite of Materiel & Non-materiel solutions

Layers of Interoperability

- Mission/Business Objectives
- Harmonized Strategy/Doctrines
- Aligned Operations
- Aligned Procedures
- Knowledge/Awareness
- Information Interoperability
- Data/Object Model Interoperability
- Network Interoperability
- Physical Interoperability

IA = Information Assurance

Non-Materiel Solutions

- Process, Organization, People
- Data, Information, Knowledge
- Information Transport

Technology Solutions

Adapted from “Beyond Technical Interoperability – Introducing a Reference Model for Measure of Merit for Coalition Interoperability’. Dr. Andreas Tolk, VMASC, ODU. 8th CCRTS, NDU, June 2003
Comparing Use Cases

Situation: Legal Contract Management System
Client Situation

Managing Data & Rule Complexity
Client Data Alignment Problem

Goal: Understand Situation & Context
Rules Drive the Business

The Ability to Manage Rule Complexity Determines Success or Failure.
Risk vs. Loss.

Business Rules Drive Integration Costs

Figure 1: A Medical Claim Rule Set

IF
Claimant is Plan Member

AND
MD Is Approved Provider
Claimant Is Dependent
Reject Claim

OR

AND
There Is Medical Necessity
Reject Claim

AND
Procedure Is Covered

THEN
Look-up Payment

DECISION TABLE

$  $  $  $
$  $  $  $
$  $  $

Source: Celent Analysis
Rule Change is the Norm

Rules Become more Complex and Change More Frequently

Magnitude

Drivers
- Increased Market Pressures
- Organizational Integration
- Globalization

Business Rule Changes

Frequency

- Opportunity Costs
- IT Costs

Source: Gartner, Pega
Rules Enable Unified Workflows

Answers these Questions:
What needs to be done?
Who is supposed to be doing it?
Who is approved to share work in what step?

CLIENT SOLUTION
1 Unified Workflow

Partner 1
1
2
3
4
5
6
7
8

Partner 2
1
9
3
2
8
4
7
12

Partner 3
1
2
3
4
7
6

Partner 4
1
2
3
4
5
6
7
9

Partner 5
1
8
2
3
7
4
5
11
6
9
10

8 Steps
Straight Through

8 Steps
(50 Screen Builds)
Looping

12 Steps
Random

7 Steps

9 Steps

11 Steps
Random

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Solution

Interoperability for: Rules, Workflows, Data

based on **W3C** Semantic Web Standards
Interoperability Drives Value
Connect Industries & Governments

HealthCare  Insurance  eCommerce

Drywall Contractor  Contractor Materials

Today:
Loss of Variety and Detail

Martin Hepp,
mhepp@computer.org

Many Different Products
Variety in Preferences
Manufacturers & Retailers
Consumers
Web Search
Solution Strategy

Step 1: Specify the UI Specs & Data
Mockup Screens
Identify Workflows, Business Rules, Data Model
Import & Verify Data Preserving Original Semantics

Step 2: Build a Common Knowledge Model
Connect Classes, Infer Data Structure
Import Instance Data, Browse
Build Screens Adding Rules & Workflows to complete the App

Step 3: Access Your Connected Knowledge
Facet Browse Data with Speed
Navigate Workflows
Access Remote Data, Enter New Data

Step 4: Extend with Confidence
Accounting, Billing, Business Dev., IT, Brokers, Policies, SalesForce
Knowledge Model Grows to be Richer, More Connected
Access Data From Everywhere
Step 2

Get a Common Knowledge Model

Connect Classes
Add Rules
Import Instance Data

- Outlook
- Legacy System
- Legacy System
- SalesForce

- eMail Network via CITRIX

- Name Insured
- eMail Addr
- Text: Bid Price
- Text: Carrier Name
- Text: Expire Price

- Effective Date
- Quoted Premium
- Bound Premium
- Expiring Premium

- Broker
- Agent
- Policy Type
- Liability Territory
- Deductible
- Medical / Fire
- Class Code
- Locations
- Payroll per CC
- Loss History

- Client No.
- CSR
- Producer
- Additional Insured
- New Residential Construction

- Subjectivities
- 5 Years Loss Runs
- Signed Supplement App
- Signed Surplus Lines Tax Docs

- Endorsements:
- Additional Insured
- New Residential Construction

- Special Notes:
- Limits
- Deductible
- Pricing Notes

- Quote Data
- Commission
- Payroll Receipts

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Common Knowledge Model
Connect Knowledge.

W3C Semantic Standards Enable Very High Interoperability

SalesForce
Customer
Agency
IT Dept
Accounting
Contracts
Quotes

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Interoperability Comparison Tool

Client System: Before vs. After
## Interoperability vs. Approach/Effort

<table>
<thead>
<tr>
<th></th>
<th>Ad Hoc</th>
<th>XML, Import/Export</th>
<th>XML, SOA</th>
<th>Semantic Web</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Custom Programming</td>
<td>Batch Processing</td>
<td>Live Web Services</td>
<td>RDF-based</td>
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<tr>
<td>7. Live Interoperability with 1-way Update</td>
<td>Custom code enables interop. No rules or semantics. Expensive to maintain.</td>
<td>Mapping Live XML is OK. No rules or semantics. Expensive to maintain.</td>
<td>Mapping WS is very hard. No rules or semantics. Expensive to maintain.</td>
<td>Easy with shared ontology. No configuration required. Easy to maintain with rules.</td>
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### Automated

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### Manual

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### App. Examples:

- NetRate via CITRIX
- CA CSLB Site
- ACORD Form (Fax)
- Worksheet WORD
- Unstructured eMail
- Great Plains Accounting
- Oracle DocuMaker
- Vertafore Policy Issuance (VPI)
- Vertafore ImageRight (PDF)
- USP: CGI INSideOut
- SAP Data Integrator
- Appulate Server
- ACORD Form (XML)
- Vertafore AMS 360
- Semantic Platform
- Applied Sys TAM/EPIC
#1: Interoperability by Step

## Legacy
- Semantic RDF-based
- XML, SOA Web Services (Live)
- XML, Import/Export (Batch)
- Unstructured

## Automated
- Step 1 Pre-Quality Submission Entry
- Step 2 Pre-Quality General Interview
- Step 3 Pre-Quality Class Codes
- Step 4 New Quote Enter Rate Info
- Step 5 Show Broker Indication Display Proposal
- Step 6 Show Quote & Terms Final Proposal Draft
- Step 7 Bind Policy

## Manual
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## Sales Lead Filter
- Rating
- Policy Document Management

## Time
- Seconds / Minutes
- Minutes / Hours

## Interoperability Levels
1. Low: None. No interoperability enabled.
2. Programmatic: write custom program
3. Third Party Translation
4. Export Import through intermediate product
5. Direct Import Export
6. Live Interoperability - read only
7. Live Interoperability with 1-way Update
8. Live Interoperability with 2-way Update

## Import/Export
- Excel Import/Export
- ACORD Form
- Quote WORD (PDF)
- Policy WORD (PDF)
- CA Web Site
- Worksheet WORD

## Carrier: Legacy Rating via CITRIX, Web Site

## Legacy Agency Management System

## Sales Lead Filter

## Rating

## Policy Document Management
#1: Interoperability by Step

<table>
<thead>
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<th>Automated</th>
<th>Manual</th>
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<td>8. Live Interoperability with 2-way Update</td>
<td>5. Direct Import Export</td>
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<td>4. Export Import through intermediate product</td>
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<td>1. Low: None. No interoperability enabled. Import/Export to Excel, Word, Email</td>
<td>2. Programmatic: write custom program</td>
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## Sales Lead Filter
- Step 1 Pre-Quality Submission Entry
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## Rating
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## Policy Document Management
- Step 1 Pre-Quality Submission Entry
- Step 2 Pre-Quality General Interview
- Step 3 Pre-Quality Class Codes
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- Step 5 Show Broker Indication Display Proposal
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---

**Time**
- Seconds / Minutes
- Minutes / Hours

**Interoperability by Step**
- Semantic RDF-based
- XML SOA Web Services (Live)
- XML Import/Export (Batch)
- Unstructured

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Interoperability Solutions

Join: NCOIC.org
Interoperability Rules.

Federal Data & Apps
DoD, DoE, DHS

NetCentric (Semantic) Interoperability
Industry Meets Govt
Build Your Knowledge Ecosystem

Government Communities

Semantic Web 3 Universe

Your Communities

Non-Profits

Industry

UN
Learn More

JOIN: NCOIC

Visit: NCOIC.org
SCOPE Working Group
Backups

What are W3C Semantic Web standards?
What Are Semantic Web Standards?
A “Web of Connected Data”
where computers are able to automate more intelligent decisions for you.

The Semantic Web is an evolving development of the World Wide Web in which the meaning (semantics) of information and services on the web is defined, making it possible for the web to "understand" and satisfy the requests of people and machines to use the web content.[1][2] It derives from World Wide Web Consortium director Sir Tim Berners-Lee's vision of the Web as a universal medium for data, information, and knowledge exchange.[3]
## Web 2.0 vs. Semantic Web

http://www.w3.org/standards/semanticweb/

<table>
<thead>
<tr>
<th></th>
<th>Web 2.0 technology</th>
<th>Semantic Web technology</th>
<th>Web 2.0 disadvantages</th>
<th>Semantic Web benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Linked Documents</td>
<td>Linked Data (RDF)</td>
<td>No Interoperability</td>
<td>Real-time Mashups &amp; data updates</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Data Silos (in a logical sense, it lacks metadata)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>URL</td>
<td>URI (RDF)</td>
<td>Semantically empty links</td>
<td>Computers Interpret Info</td>
</tr>
<tr>
<td>3</td>
<td>Taxonomies &amp; Tag Clouds</td>
<td>Shared Vocabularies - Ontologies</td>
<td>Semantic confusion, Duplicate terms.</td>
<td>Intelligent Discovery</td>
</tr>
<tr>
<td>4</td>
<td>Config. Files, Macros</td>
<td>Rules-based Inferencing</td>
<td>Document dead ends</td>
<td>Automated Data Interpretation &amp; presentation</td>
</tr>
<tr>
<td>5</td>
<td>Database Query Lang. (SQL)</td>
<td>Logical Query Language (SPARQL)</td>
<td>Text line searches give irrelevant results. Constantly dig for info</td>
<td>Deep Reasoning automates Info Retrieval</td>
</tr>
</tbody>
</table>
It’s the Next Big Leap

Web 1.0
250k Sites
45 Million Users

Web 2.0
80 Million Sites
1 Billion+ Users

Web 3.0
8 Billion Sites
4 Billion+ Users
4 Billion Computers

"Users Pull Info"
"Users Share Info"
“Computers Interpret Info”

Collective Intelligence
User Generated

Intelligent Discovery
Computer Generated & Interpreted

Basic Publishing

1995  2005  2010  2020
Shift to Knowledge Models

benefit

Information Technology

Knowledge Technology

Intelligence

Collect

Search

Structure & model

Integration

Rules

Search

Manage Complexity

Re-Use knowledge

Today:
Loss of Variety and Detail

Martin Hepp, mhepp@computer.org

Many Different Products
Variety in Preferences

Manufacturers & Retailers
Consumers

Web Search
Data is Smart

Smart Data is Cool.
High Resolution, Global Interoperability

Phase 1

Global
GNEP
DOE - DOD - DHS +
UN, NATO

National
DOE - DOD
President
Congress

Intra-Agency
DOE <=> DOD
Top Management

DOD
Team Leaders

Phase 2

Phase 3

Phase 4
Abstract ID: 13616
Semantic Interoperability Levels for Comparing Use Cases

Describing Value-Add of Semantic Web Design Using a Practical Interoperability Scale

Interoperability levels are an effective means of expressing the maturity of an IT system for ease of comparing before and after implementations of a semantic web system in a legacy environment.

Prior art describes Interoperability levels in a manner that is not always practical in a setting with non-technical business users, which can quickly lose focus and impact of the intent of the tool (e.g. LISI Model). Prior art also fails to capture the relative impact of different technologies as they move data across an operational workflow.

This presentation will reveal a simple, practical method for describing the interoperability value-added when moving from a legacy environment to a semantic environment with a common workflow. The case study describes an intensive rule-based system for processing legal contracts in the insurance industry. The application could easily be applied to a wide range of eGovernment situations seeking relief from data alignment problems of legacy IT Systems: SoS, C3I, Healthcare, Technology Transition, Energy, Nuclear Waste Remediation, and more.