



Digital Enterprise Research Institute www.deri.org




**Process Interoperability
with Semantic Web Services**

Michael Stollberg
DERI Austria
Harmination in eTourism Workshop
26-Jan-2007

© Copyright 2007 Digital Enterprise Research Institute. All rights reserved. www.deri.org



DERI ... About Us



Digital Enterprise Research Institute www.deri.org

- DERI = Digital Enterprise Research Institute
- established in 2002
- Director: Dieter Fensel
- Mission: “make semantic technologies a reality”
 - Ontologies
 - Semantic Web Services
 - => Semantically Enabled Service-Oriented Architectures
- public funding & industrial cooperations
- 120 members world-wide

making semantics **real.**



DERI International – Status



Digital Enterprise Research Institute

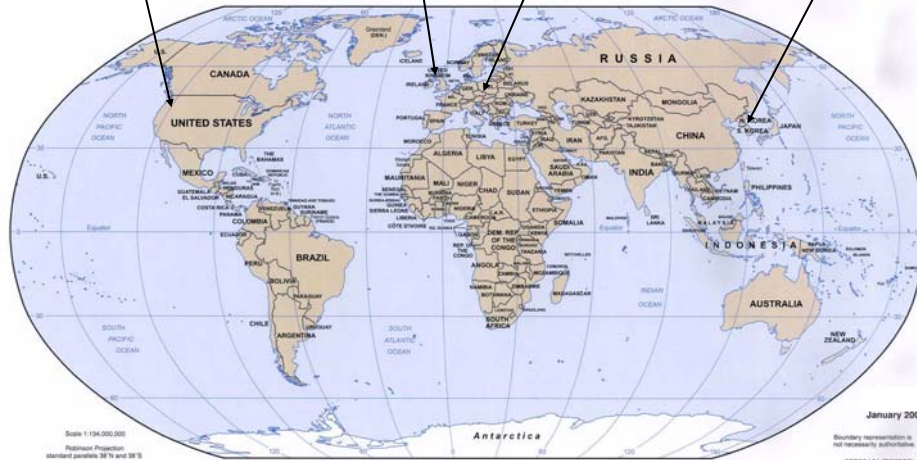
www.deri.org

DERI
Stanford

DERI
Galway

DERI
Innsbruck

DERI
Seoul



Content

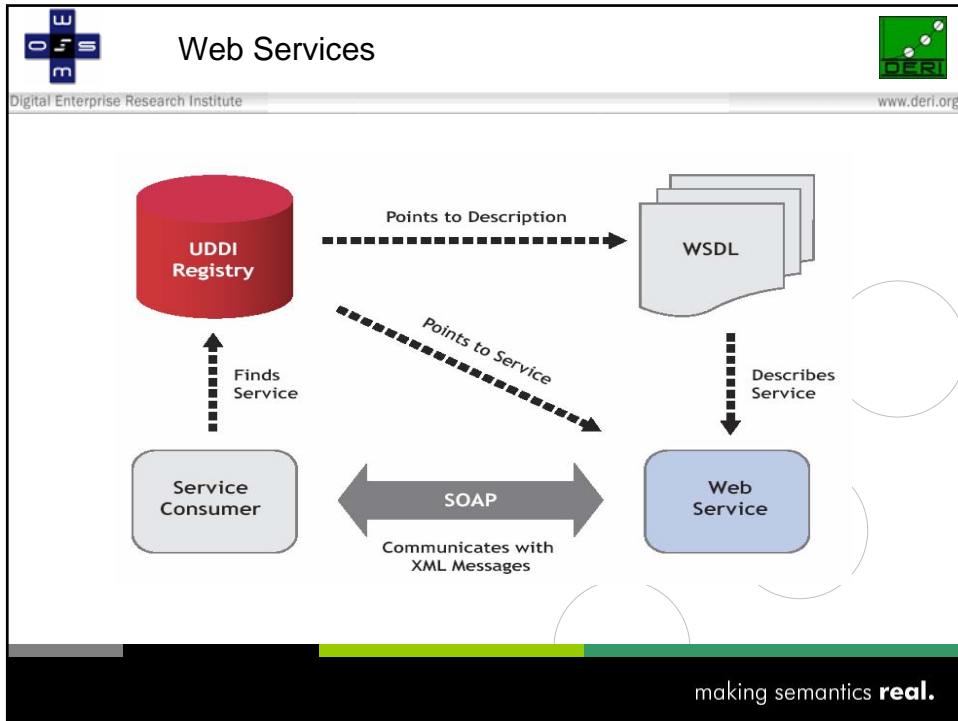


Digital Enterprise Research Institute

www.deri.org

- **Semantic Web Services**
 - Aim & Approach
 - The Web Service Modeling Ontology WSMO
 - Semantic SOA
- **Process Interoperability**
 - Web Service Interfaces
 - Process Level Mediation
 - Process Mediation Patterns

making semantics **real.**



Deficiencies of WS Technology

Digital Enterprise Research Institute www.deri.org

- current technologies allow usage of Web Services
- but:
 - only syntactical information descriptions
 - syntactic support for discovery, composition and execution
 - => Web Service usability, usage, and integration needs to be inspected manually**
 - no semantically marked up content / services
 - no support for the Semantic Web

=> current Web Service Technology Stack failed to realize the promise of Web Services as basis for SOA

making semantics **real.**

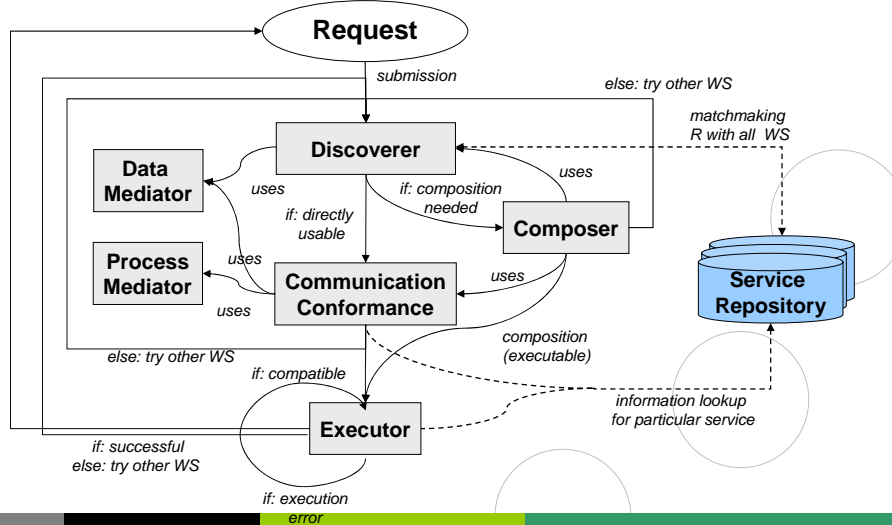


Semantic Web Services



Digital Enterprise Research Institute

www.deri.org



making semantics **real.**



Web Service Modeling Ontology WSMO

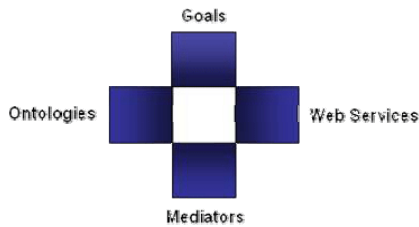


Digital Enterprise Research Institute

www.deri.org

Objectives that a client wants to achieve by using Web Services

Formally specified terminology of the information used by all other components



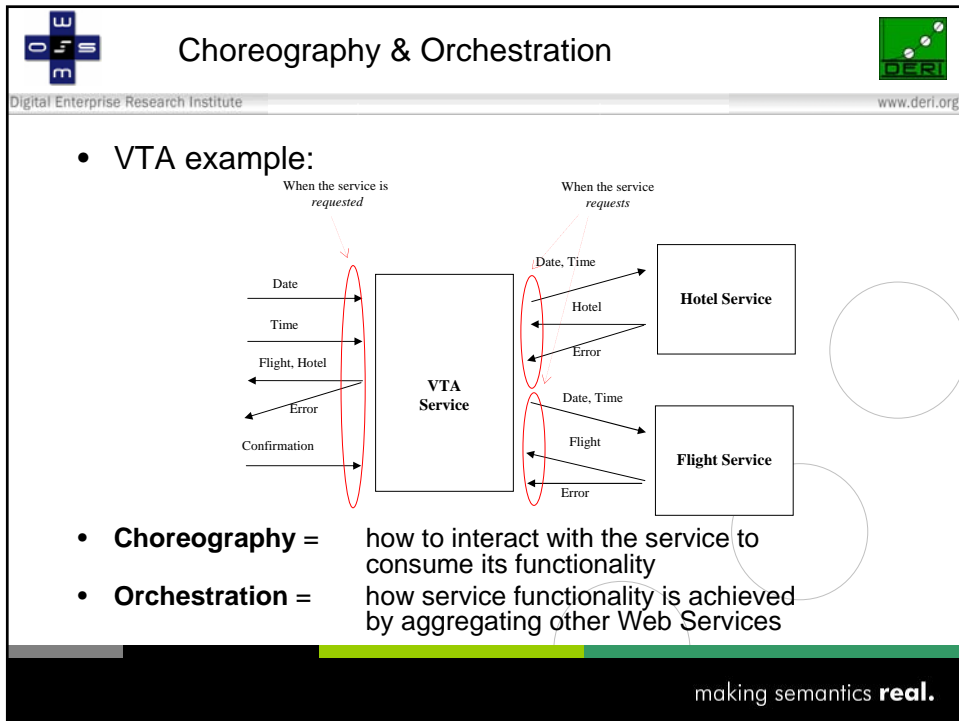
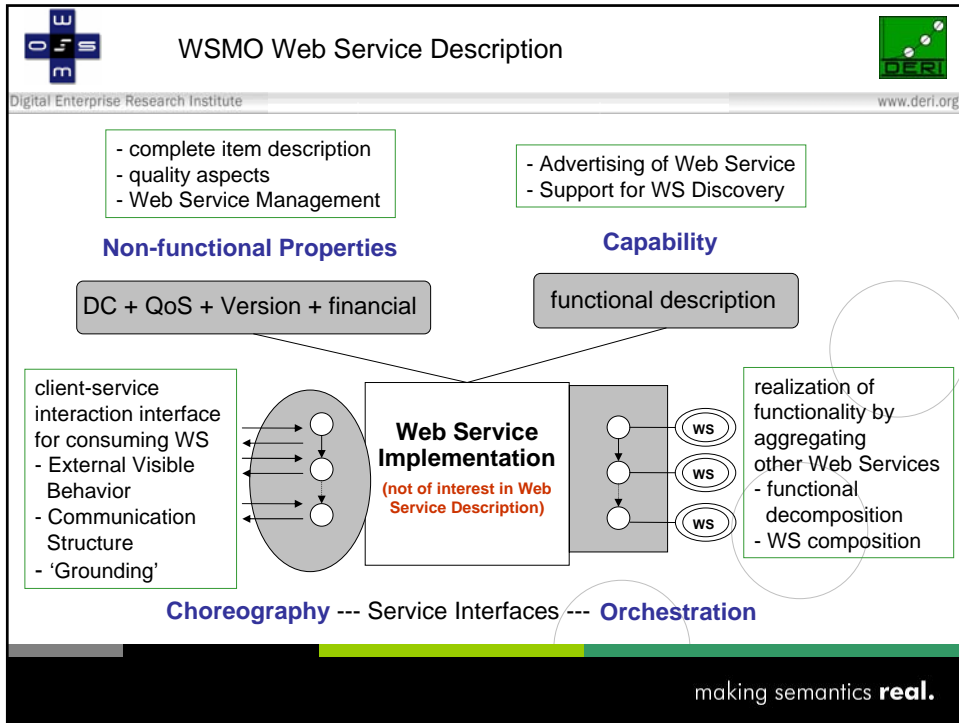
Semantic description of Web Services:
- **Capability** (functional)
- **Interfaces** (usage)

Connectors between components with mediation facilities for handling heterogeneities

Core Elements for SESA

W3C Member Submission 04/2005

making semantics **real.**





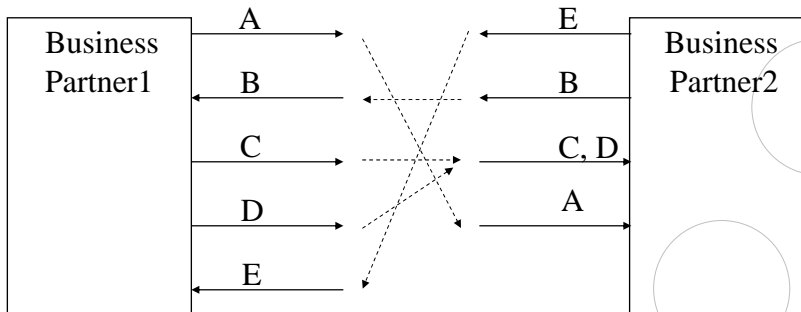
Process Level Mediation



Digital Enterprise Research Institute

www.deri.org

- Only if the two match precisely, a direct communication may take place
- not a priori compatible behavior interfaces for communication & information interchange => **behavioral incompatibility**



- partially resolvable by **process mediation patterns**

making semantics **real.**

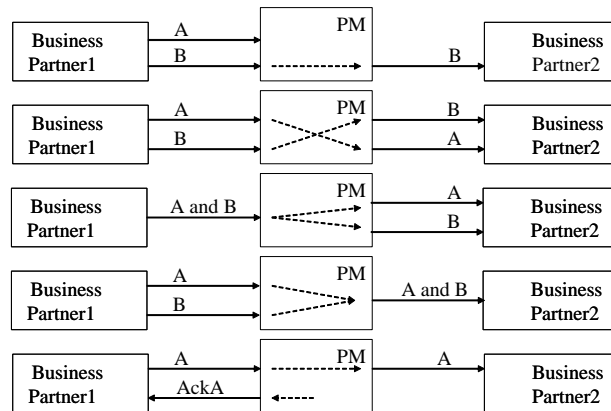


Patterns for Resolvable Mismatches



Digital Enterprise Research Institute

www.deri.org



can resolve about 80 % of process level mismatches

making semantics **real.**

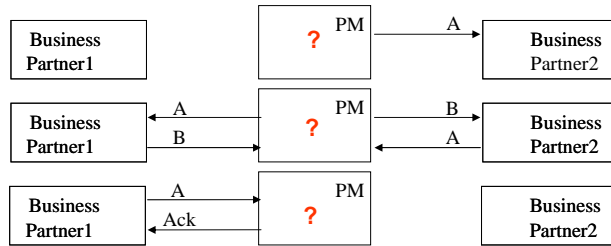


Unresolvable Mismatches



Digital Enterprise Research Institute

www.deri.org



making semantics **real.**

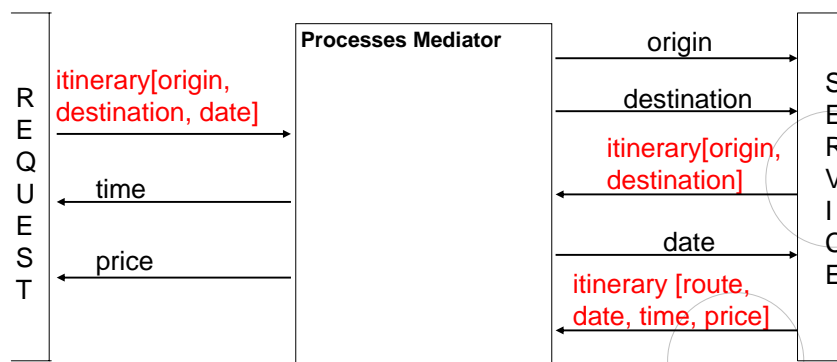


Process Mediation Example

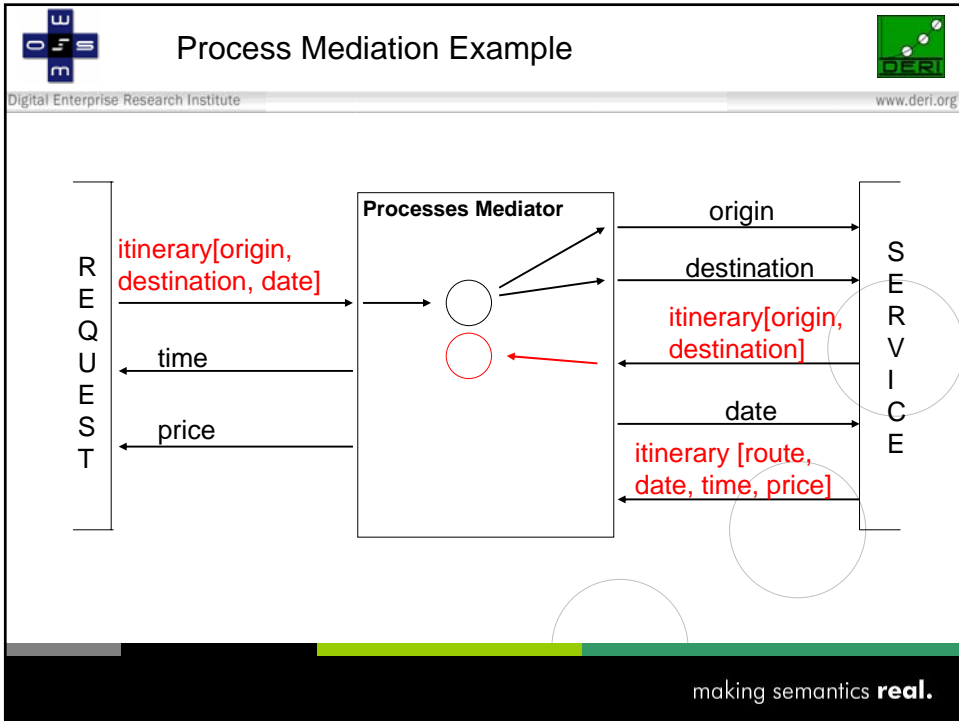
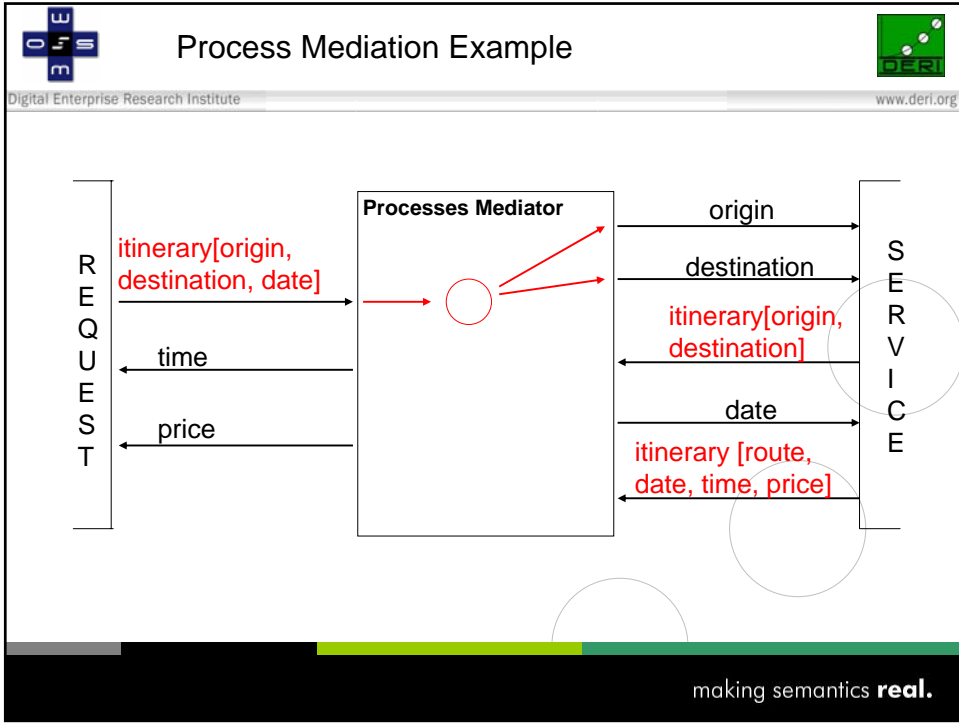


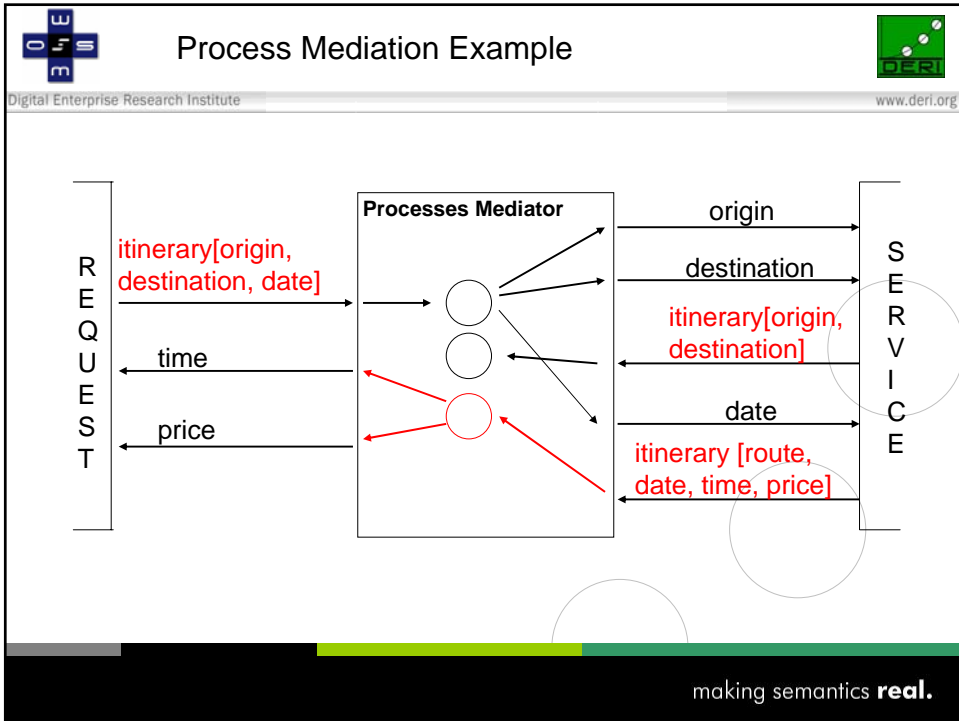
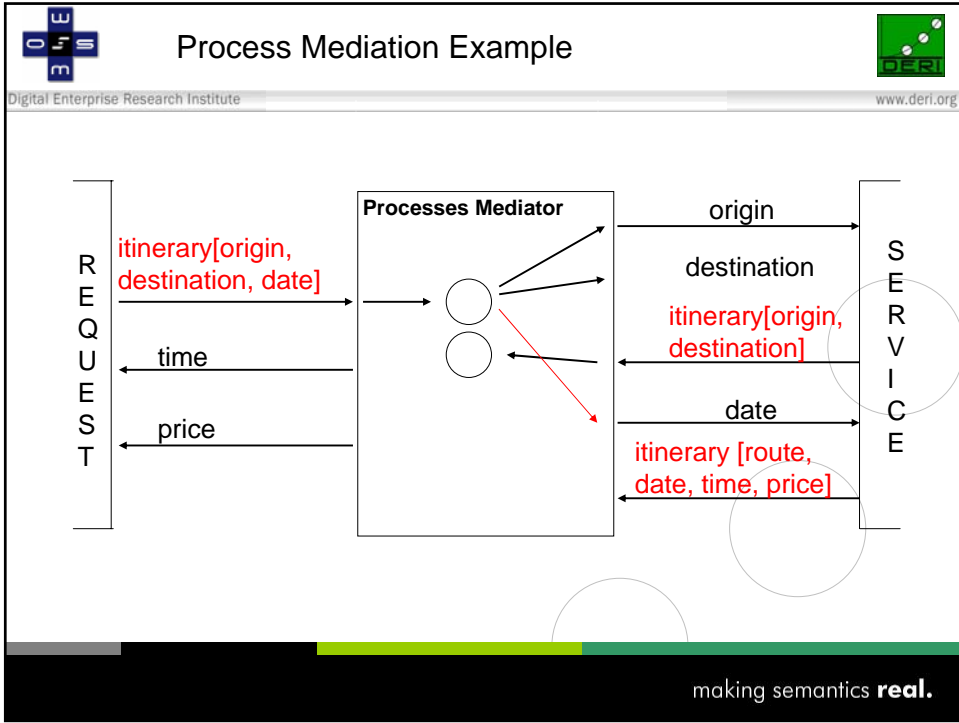
Digital Enterprise Research Institute

www.deri.org



making semantics **real.**





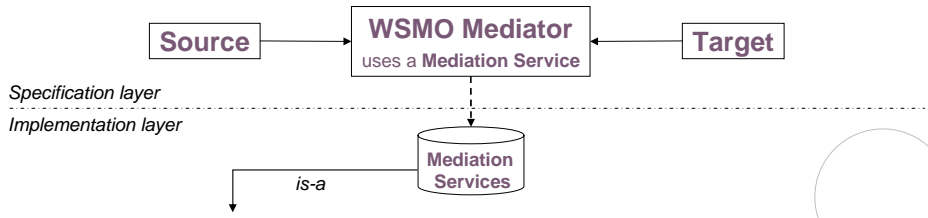


Process Level Mediation in WSMO Mediators



Digital Enterprise Research Institute

www.deri.org



Process Mediation Service

design time

- analyzes formal interface descriptions
- defines process mediation schema

runtime

- executes process mediation
- integrated with data mediator

Properties

- implemented for WSMO interface description language (ontologized Abstract State Machines)
- computationally very expensive
 - EXP time
 - many reasoning steps

making semantics **real**.

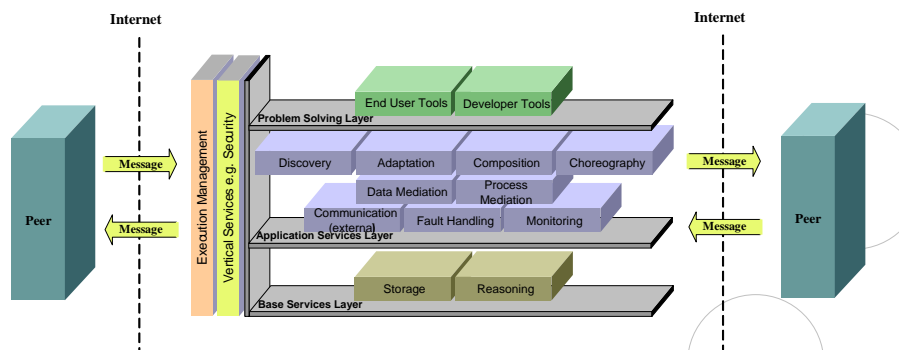


WSMX (WSMO Reference Implementation)



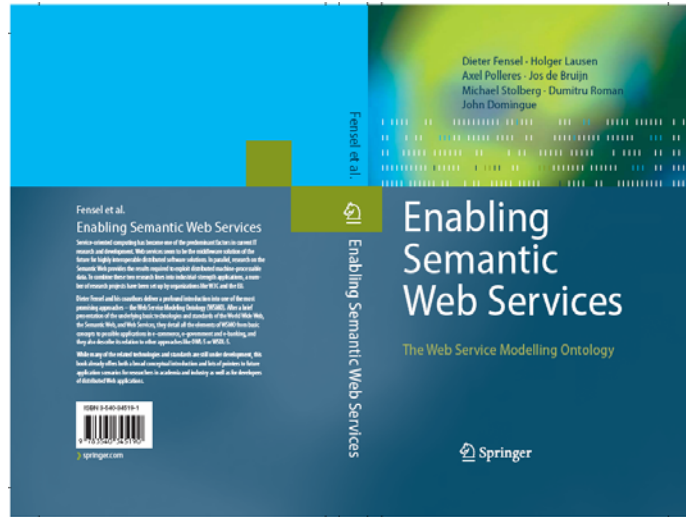
Digital Enterprise Research Institute

www.deri.org



Open source code base at SourceForge: <http://sourceforge.net/projects/wsmx/>

making semantics **real**.



making semantics **real.**



The **WSMO working groups** are funded by the European Commission under the projects **DIP, Knowledge Web, SEKT, SWWS, ASG, and SUPER**; by **Science Foundation Ireland** under the **DERI-Lion** project; and by the Vienna city government under the **FIT-IT Programme** in the projects **RW² and TSC**.

making semantics **real.**