Framework for Semantics in Web Services
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• Context/Vision

• Success Factors

• Challenge

• What should the W3C do? Now?
Observations on Web Services

- A Web Service Interface provides a means to interact with a Service Provider.

- A WSDL description does not say:
  - WHAT a provider DOES.
  - WHAT an interaction DOES.
  - HOW to sequence operations.

- Multiple different Web Service Interfaces to equivalent Services.

- Multiple reinvention – trading community, geography...
  - isolated trading communities.
Web Analogy

- B2C eCommerce Web Sites
  - Near ubiquitous Catalogue, Cart, Checkout conceptual model.
  - Human UI contains ongoing Process Description
    - Options for moving forward.
    - Consequences of action.
  - Significant differences between Providers:
    - ‘presentation’,
    - factoring of information gathering.
    - Message exchanged on the wire.

- WS Toolkits and Platforms lead to similar creativity and diversity for Web Services.
  - Alt. view is that there will be a smaller number of standardised WS interfaces.
  - Service and Interface Evolution, Differentiation
Service Delivery Lifecycle

- Advertising and Discovery
  - Matching potential providers with potential consumers

- Negotiation
  - Reaching agreement on Service to be provided (and compensation).

- Fulfilment and Monitoring
  - Delivery of service
  - Monitoring for contractual compliance.
  - Handling contingencies.

- All phases may involve Web Service Interactions

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What is a Service?
We think of a service as “an occurrence of an exchange of value.” likely subject to the terms of a contract.

eg. Specific goods delivered to your door in exchange for payment.

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Vision

- Enable an ‘open’ economy of Service Providers and Consumers.
  - Open in the sense that providers and consumers can come and go freely and freely form business relationships.
  - Reduce technology friction to the formation and maintenance of business relationship.

- Value proposition: Reduced integration costs and time.
  - Adapability – Increasingly automated adaptation with semantic account.

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Pragmatically possible

- Static, Pair wise Design Time Integration
- Dynamic Run Time Integration
- Dynamic Substitution

Increasingly Explicit Semantic Account

- Interface Signatures Implicit Semantics (WSDL)
- Abstract Actions Concrete Mechanism (Semantic equivalence of action)
- Explicit Operational Semantics (Preconditions and Effects)
- Dynamic Process Composition (Planning)
- Deliver existing value on new ways

Nirvana

- Explicit Operational Semantics
- Synthesize New Services
- Opportunistic Service Synthesis

Unrealistic extreme
Why Bother?


**Annual Grand Challenge Cost**

- **Integration's costs**: $500 BN/year worldwide
  - 24% of IT budgets $180 BN/year US (InfoWorld, January 2002 survey of 500 IT leaders)
  - 13% of IT spend $100 BN of $752 BN/year US (Giga estimate based on May 2002 report)
  - 25-40% of all IT projects (various)
  - 8% of US IT spending $84 BN of $610 BN/year US (IDC, May 2002)
  - 7% of IT spending $90 BN of $1.3T/year worldwide (IDC, May 2002)
  - 28% of all consulting $160 BN/year worldwide (Gartner March 2002)
  - 43% of e-businesses consulting $53 BN/year worldwide (Gartner)
  - 1.75% to annual IT budget on EAI and B2Bi (Forrester, Dec 2001)
  - 10-30% of IT budgets (David Sink, IBM quoted in InformationWeek, May 27, 2002)

- **Data Quality's costs**: $600 BN/year US
  - Data Warehouse Institute, 2002

- **Worldwide Annual Integration + Data Quality Costs**: $1 Trillion/year
Success Factors
(for W3C activity on SWS)

• Engage enthusiasm from mainstream Web Services community. (Pull not Push)
  _ Address **significant** problems faced by or anticipated by WS community.
  _ **Proof-of-concept demonstration of utility**.
  _ WS Community is requirements driven and will (re)-invent
    _ eq. WS-Policy – another resource description framework?
    _ May ‘borrow’ from Semantic Web Community without subscribing wholesale.

• Maturity:
  _ The technology needs to be out of the research phase… beyond the ‘bleeding-edge’.
  _ May still be too early to standardise.
  _ Need growing consensus on direction – convergent paths.

• Accessible
  _ Solutions need to be accessible to majority of web service developers.
  _ Tooling and understanding.

• Build on both WS and SW technologies
  _ Invent new things ONLY where necessary.
A Challenge

To find and ‘buy’ a book:

• Discovery with Google™ Web APIs http://www.google.com/apis/
• Add a sprinkle of mediation magic
• ‘Negotiate’ a price with Amazon Web Services
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• Extra credit… generalise…
A Challenge

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What should the W3C Do?

• Assume scale of investment – 1 WG for 18 - 24 month.
  • WG focus will be an issue

• Understand relationship with WSDL, WS-CHOR and BPEL.

• We like the OWL-S high-level partitioning into:
  • Profile:
    • Focal point for advertising and discovery.
    • Should focus more on service (exchange of value) provided and less on interface and interaction.
      Our own work models service request/offers as range of acceptable contracts
  • Process Model
    • Focal point for adaptable interaction (SOA or RESTful)
    • Partial success/failure of composite processes
    • What a process ‘does’:
      • Names with implicit semantics: Processes, Actions (Communicative and Real World events)
      • Explicit Operational Semantics (IOPEs).
    • Expression language for pre-conditions and effects.
  • Grounding
    • Mediation between business concepts and message content (WSMF, WSMO, WSDL-S?).
      • Complex content.
    • Action (Communicative Intent) and protocol operations

• WG should focus on Process Modelling and Grounding in OWL and grounding into WSDL.

• Public Domain Ontologies (Concepts and Actions) will also be essential: (Maybe an SW activity)
  • Trading T’s and C’s, Contracts.
  • Shipping, Logistics, Supply Chain, MIT Process Handbook
  • Product Classification.
Concerns/Questions

- Maturity of State of the Art:
  - Academic and industrial consensus on direction?
  - Overarching conceptual framework?
    - Challenged by somewhat implicit architecture of WS world.
      - WS-Arch did a good job... Traction?
    - What needs to be described using a SWS Description Language?
      - Noun and verb things that are the subjects of SWS description?

- Risks of delaying:
  - Overtaken-by-Events: WS community address related problems as they encounter them without regard to SW solutions.
  - Motivated SWS protagonists seek other venues:
  - Window of opportunity?

- Risks of being hasty:
  - Head off in the wrong or unclear direction(s)
  - Failure to engage key stakeholders, tending toward irrelevance.