Services Breakout:

Expressiveness Challenges

&

Industry Trends

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DAML-S: Some Current Challenges

- Expressiveness of DAML+OIL
- DAML-S ←→ Industry Trends
  - ✓ complementary
  - ✓ compatible
  - ✓ influential

Breakout Objectives

1. Identify requirements for “Semantic” Service Description Language.
2. a) Based on requirements, id desiderata for languages.
   b) Which languages meet which desiderata?
3. Are rules enough? Are they the best solution?
4. How do we align “DAML-S” with emerging industry standards?
   a) What to accomplish?
   b) How?
5. Address specific DAML+OIL challenges for DAML-S

Breakout Action Items

1. Identify requirements for “Semantic” Service Description Language (“SSDL”).

1 (cont'd.) Requirements

Automation of:

- Web service discovery

  Find me a shipping service that will transport frozen vegetables from San Francisco to Tuktoyuktuk.

- Web service invocation

  Buy me "Harry Potter and the Philosopher's Stone" at www.amazon.com

- Web service selection, composition and interoperation

  Make the travel arrangements for my WWW11 conference.

- Web service execution monitoring

  Has my book been shipped yet?

Web service simulation and verification

[McIlraith, IEEE01]

1 (cont'd.) Requirements

- Discovery & Selection
  - Support for yellow pages
  - Preconditions/effects sufficiently expressive
- Invocation/interoperation
  - Input/outputs (invocation)
- Execution model
  - Asynchronous messaging
  - Disconnected operation
- Transactions & integrity
  - Error recovery
  - Rollback vs. "fix"

1 (cont'd.) Requirements

- Composition
  - Sufficiently expressive preconditions/effects
- Pervasive computing
  - Dynamic binding
- User constraints & preferences
- Semantic brokering
- Compatibility with existing standards
  - WSDL, uPnP, Corba?, …

1 (cont'd.) Requirements

- "Web of Services"
  - Compositional architecture
  - API mechanisms supporting modularity, reuse
  - Distinguish API from implementation
  - 1-way reference (via URIs)
- Business Rules
- Security
  - Compatibility with existing standards
  - Support composition of multiple approaches

Breakout Action Items

1. Identify requirements for “Semantic” Service Description Language (“SSDL”).

Issues/Conclusions:

- Broad, compelling set of requirements to guide DAML-S’ evolution.
- Make sure SSDL is compatible with industry standards.

Actions:

- Analyze requirements: impact on language, architecture (DC)
- Incorporate requirements into Joint EU Committee language agenda (Martin, 10/02)
- Talk to Agents people who were not able to attend. (DC, Finin, 11/02)
- DC provide better outreach to users for input (DC, 10/02)

Breakout Action Items

2. a) Based on requirements, identify desiderata for language.
   b) What type of language meets these desiderata?

Issues/Conclusions:

- One language is not enough.
- OWL great for ontological needs to date. Not great for process modeling.
- Process language good for representing processes.
- Use a suite of languages with OWL for the description of types/objects.

Actions:

- Translate requirements from task 1 into desiderata (DC, 10/02)
- Further analyze language – desiderata match (DC, 10/02)

Breakout Action Items

3. What role do Rules play?

Issues/Conclusions:

- Rules definitely plays a role.
- Good for pre-, post-conditions, executable spec, business rules, etc.
- Provides more compelling syntax & further expressive power for non-classification oriented info.
- Open question: Is rules enough?
  - Is expressive power sufficient for identified desiderata?
  - Even if so, is it most attractive approach in other ways?
    - Ease-of-use, mainstream familiarity, tool support, …

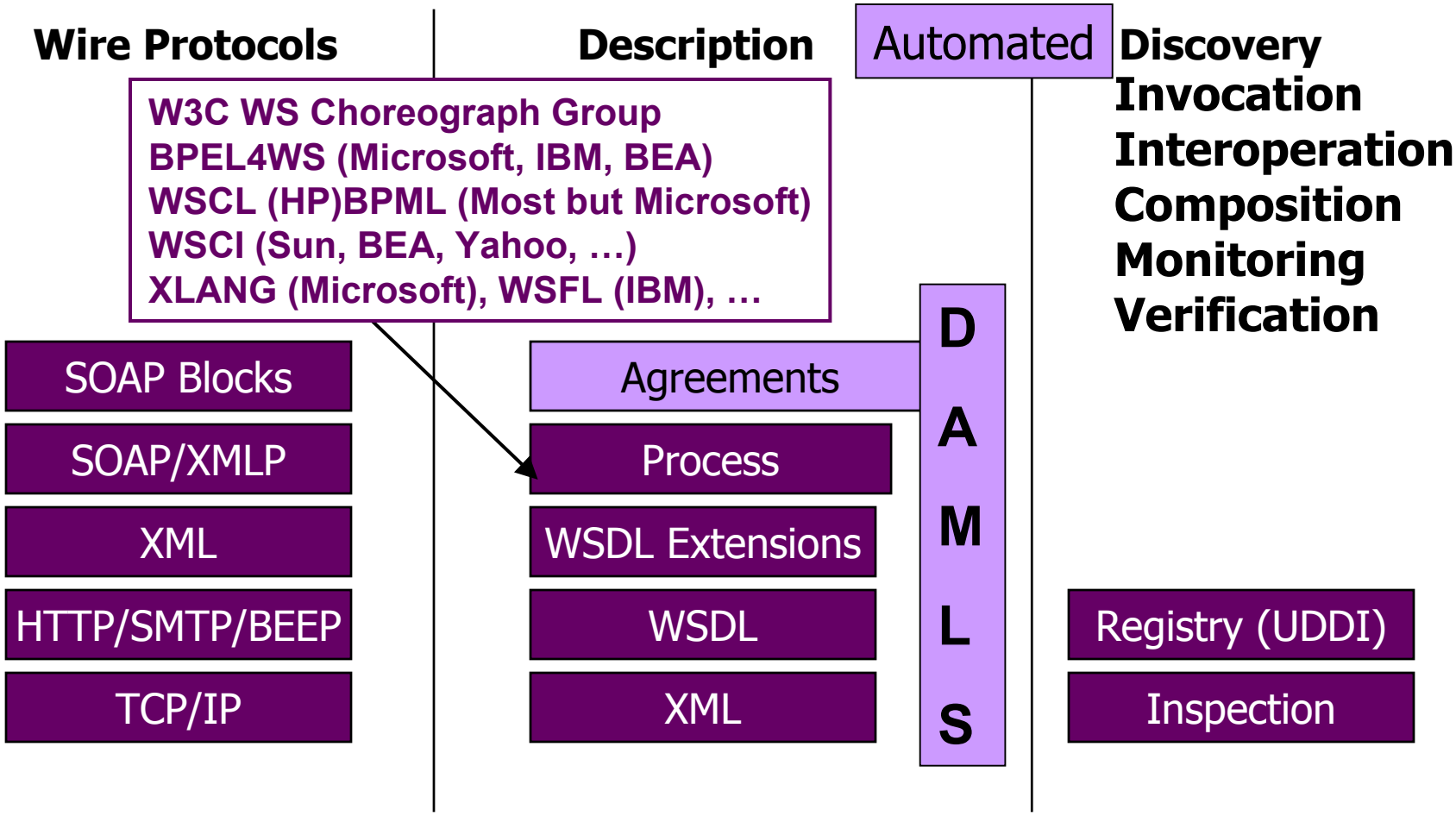
Actions:

- Take DAML-S representation and try to represent more convincingly using rules (Rules folks).
- Work with Rules committee to better articulate role of Rules in Services (Grosof, DC, 01/03)

Breakout Action Items

4. How do we align “DAML-S” with emerging industry standards?
   a) What to accomplish?
   b) How?

Industry Trends: The Web Services Stack



[Modification of slide by James Snell (IBM)]

Breakout Action Items

4. How do we align “DAML-S” with emerging industry standards?
   a) What to accomplish?
   b) How?

Issues/Conclusions:

- We want to be compatible, complementary and influential.
- We want to have impact.
- Industry is motivated to move quickly to establish standards for process modeling. These efforts will likely be inadequate for SWSs.

Action:

- Request RDF compatibility for W3C Choreography group. (DC)
- Provide requirements input to W3C Choreography group. (DC)
- Develop motivating examples for SW value-added. (McIlraith, DC)
- Create W3C interest group on SWS (Sycara, 01/03)

Breakout Action Items

5. Address specific DAML+OIL challenges for DAML-S

Issues/Concerns: Next slide

5 (cont.) Espressiveness challenges

- Classes of classes
  - E.g., powerset(C) as range of a property
- Properties of properties, property as range
- Grounding mappings
  - Need path language, classes of classes, properties of properties
- Parameter bindings
  - Need path language (for one thing)
- Processes as classes (not instances)
- Conditions & effects!
  - Variables, quantifiers, scope
- State
- listOfInstancesOf

Breakout Action Items

5. Address specific DAML+OIL challenges for DAML-S

Issues/Concerns:

Action:

- DC meet with Patel-Schneider to discuss issues further (DC,PS, 11/02)

The End