Exposing Web Services

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http://sf.us.agentcities.net/

Problem

- How to expose a Web Service (WS) in a FIPA Agent environment

- Three options:
  1. Map all WS information (SOAP, WSDL, UDDI) into a `df-agent-description`
  2. Map a reference to the WS into a `df-agent-description`
  3. Build a WS ⇔ Agent Service gateway

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Option 1: Complete Mapping/1

- Map all WS information to a `df-agent-description`

1. SOAP Interface
   - Transport binding = AID address
   - Method call = FIPA action

2. WSDL information
   - Parameters = Property information

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Option 1: Complete Mapping/2

```
(df-agent-description
  :name (agent-identifier
    :name ws1@foo.com
    :address (sequence http://foo.com/))        SOAP URL
  :protocol (set ws-soap-action)
  :language (set ws-xml)
  :ontology (set ws-xml-soap-wsdl)
  :services (set
    :service-description (
      :name ws-buy                              SOAP method
      :type web-service
      :ontology ws-purchasing                   SOAP/WSDL
      :properties (set                            parameters
        :property (
          :name product-id
          :value 1000)))))
```

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Option 1: Complete Mapping/3

- Issues:
  - What about additional parameters not modelled in `df-agent-description`?
    - `:X-ws-xxx`
  - Agent must know how to process `:ontology`, `:protocol`, `:language` and `:service-description` parameters:
    - Must be defined somewhere
    - This is as complicated as writing code to invoke the WS directly!
  - Ad hoc format of `:properties` parameter:
    - Parameter ordering?
    - Could be defined in recommendation document
  - Who builds the `df-agent-description` and registers it?

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Option 2: Referential Mapping/1

```
(df-agent-description
  :name (agent-identifier
    :name ws1@foo.com)
  :services (set
    :service-description (
      :name ws-buy                          SOAP method
      :type web-service
      :X-ws-URN urn:xxx.yyy.zzz))           WSDL URN
```

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Option 2: Referential Mapping/2

- Issues:
  - More natural fit for WS in an FIPA agent environment
    - Minimal intrusion
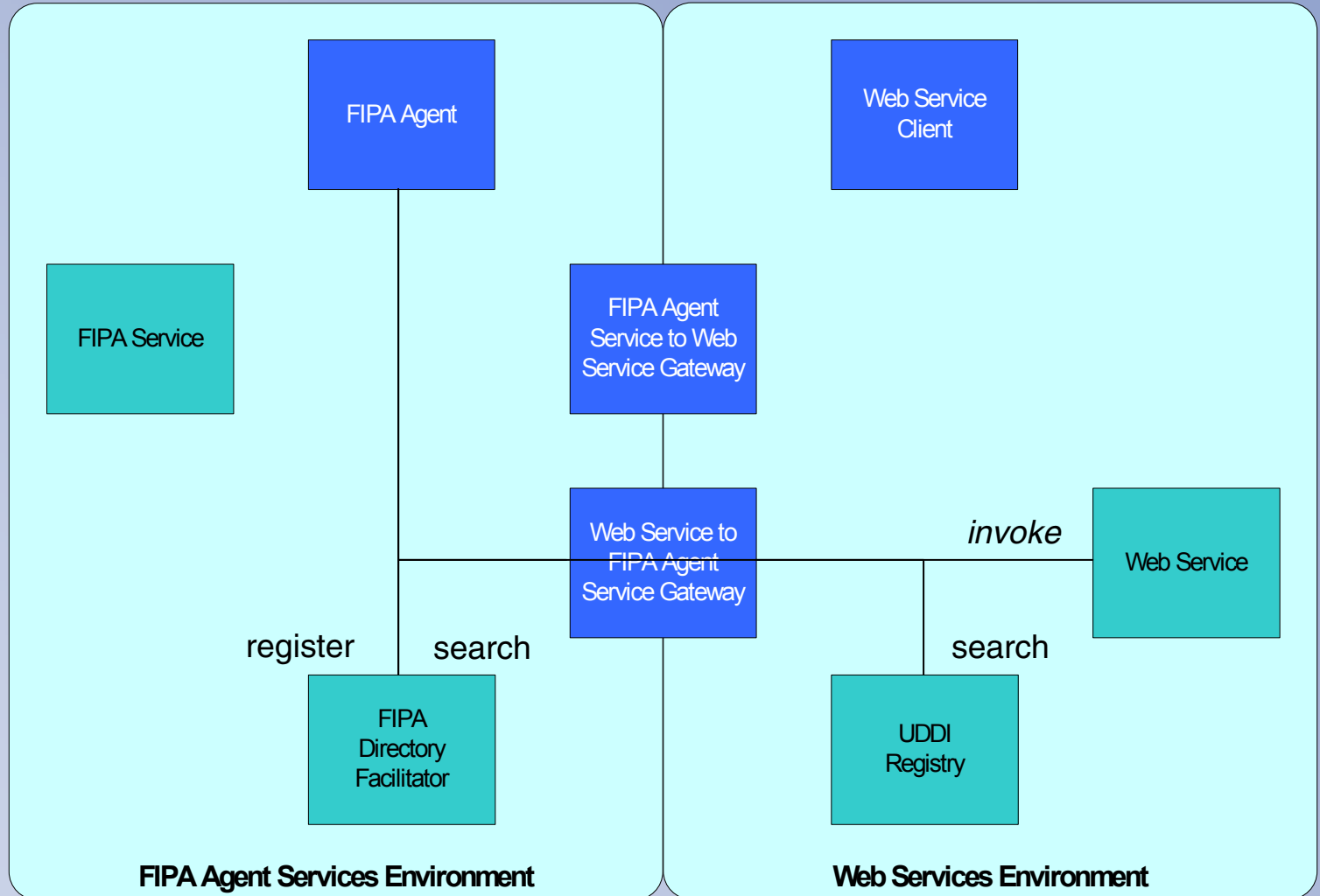 - Who builds the `df-agent-description` and registers it?

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Option 3: Gateway/1

Gateway provides mapping and translation between WS and FIPA Agent Services

FIPA Agent

Web Service Client

FIPA Service

FIPA Agent Service to Web Service Gateway

Web Service to FIPA Agent Service Gateway

invoke

Web Service

register   search

search

FIPA Directory Facilitator

UDDI Registry

FIPA Agent Services Environment

Web Services Environment

http://sf.us.agentcities.net/

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Option 3: Gateway/2

- Issues:
  - Transparent to agents
    - Allows agents to interact with FIPA Agent Services and WS using only FIPA protocols
    - Gateway is technically complex
    - How is it possible to program/configure the gateway?
  - Functionality mismatch (Web Services masquerading as Agent Services and vice-versa?)
  - Gateway is responsible for building and registering the `df-agent-description`

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Questions for Discussion

- How should an Agent interact with a WS?
    - Registration
        - Web Services: UDDI t-model
        - FIPA: `df-agent-description`
        - ***Who does this?***
    - Access
        - Web Services: SOAP/WSDL
        - FIPA: FIPA ACL
        - ***Should an agent know that it is interacting with a WS?***
    - Search