University of Twente

ON THE STANDARDIZATION OF WEB SERVICES MANAGEMENT OPERATIONS

AIKO PRAS

University of Twente
The Netherlands

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Jeroen van Sloten, Aiko Pras, Marten van Sinderen

pras@cs.utwente.nl
http://wwwhome.cs.utwente.nl/~pras

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WHY WEB SERVICES?

EVOLUTION OF SNMP FAILED

NEW TECHNOLOGIES ARE NEEDED

WEB SERVICES MAY BECOME THE MOST IMPORTANT
MIDDLEWARE TECHNOLOGY

WILL BECOME AVAILABLE ON ALL FUTURE PLATFORMS

WILL BE APPLIED FOR MANY KINDS OF APPLICATIONS

IMPLEMENTATION OF WS APPLICATIONS IS RELATIVELY SIMPLE

MANY SKILLED DEVELOPERS

MANY TOOLS

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FUTURE MANAGEMENT EXPERTS
CAN CONCENTRATE ON MANAGEMENT APPLICATIONS
INSTEAD OF MANAGEMENT TECHNOLOGY

WHAT ARE WEB SERVICES?

CLIENT

UDDI
REPOSITORY

SOAP/WSDL

Web
service

Web
service

Web
service
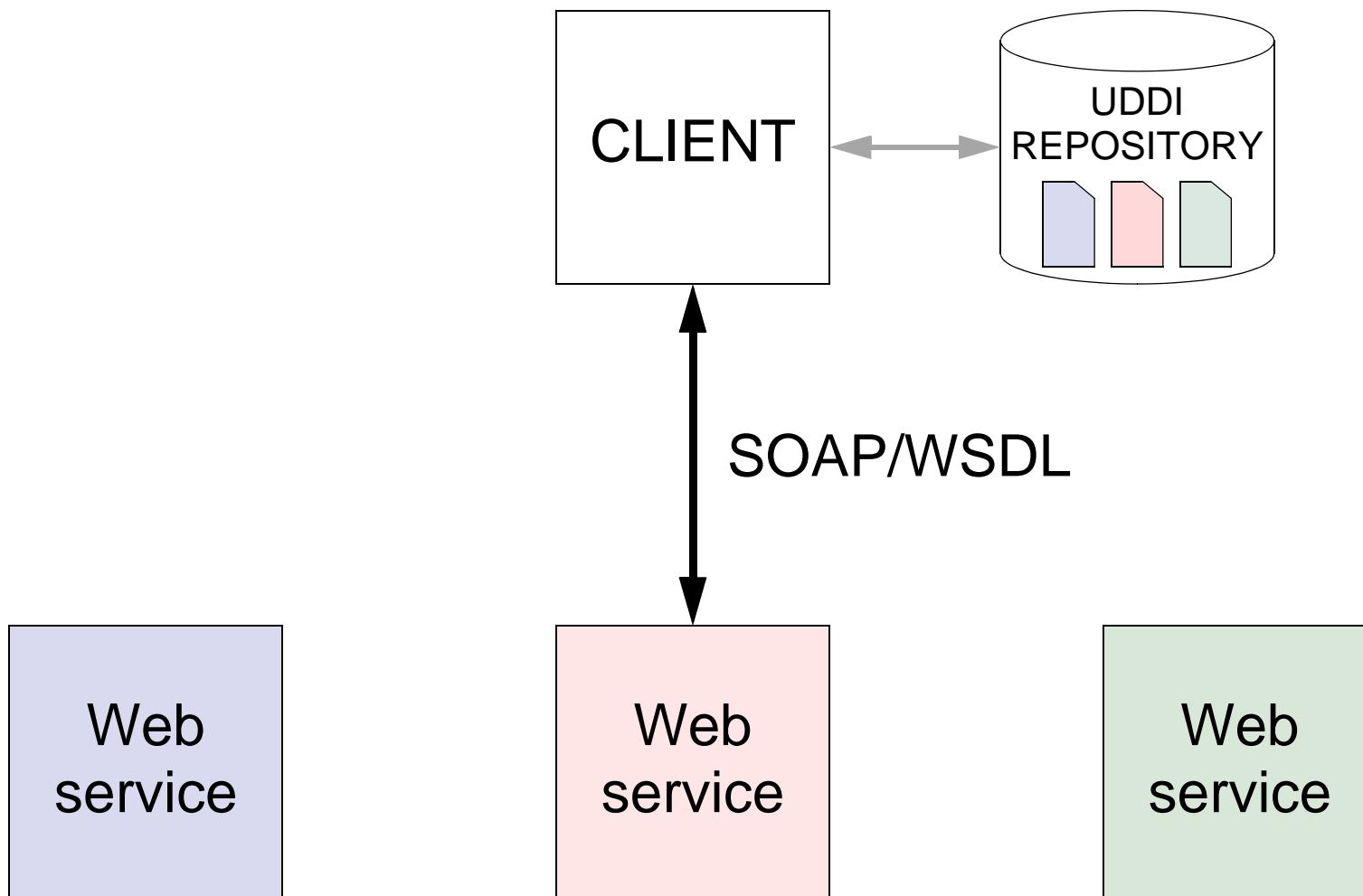
STRUCTURE OF A WSDL DEFINITION

ABSTRACT INTERFACE TO THE WEB SERVICE

Independent of a specific
transport protocol
and Web address

BINDING

To associate the abstract interface
with a transport protocol

SERVICE

To associate the abstract interface
with a Web address

STRUCTURE OF A WSDL DEFINITION
ABSTRACT INTERFACE - EXAMPLE

```xml
<message name="getIfInOctetsRequest">
    <part name="password" type="xsd:string"/>
    <part name="interfaceNumber" type="xsd:unsignedInt"/>
</message>

<message name="getIfInOctetsResponse">
    <part name="value" type="xsd:unsignedInt"/>
</message>


<interface name="IfDataServiceInterface">
    <operation name="getIfInOctets">
        <input message="myns:getIfInOctetsRequest"/>
        <output message="myns:getIfInOctetsResponse"/>
    </operation>
</interface>
```

STRUCTURE OF A WSDL DEFINITION
BINDING TO A PROTOCOL - EXAMPLE

```xml
<binding name="ifDataServiceBinding"
        interface="myns:IfDataServiceInterface">

    <soap:binding style="rpc" transport="http://schemas.xmlsoap.org/soap/http"/>

    <operation  name="getIfInOctets">
        <soap:operation soapAction=""/>
        <input>
            <soap:body use="encoded" namespace="urn:..."
              encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"/>
        </input>

        <output>
            <soap:body use="encoded" namespace="urn:..."
              encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"/>
        </output>

    <operation>
</binding>
```

STRUCTURE OF A WSDL DEFINITION
SERVICE AT A WEB ADDRESS - EXAMPLE

```
<service name="ifDataService" interface="myns:IfDataServiceInterface">

    <endpoint name="ifDataServiceEndpoint"
              binding="myns:ifDataServiceBinding"
        <soap:address location="http://my.webservice.com/ifData/"/>
    </endpoint>

</service>
```

MODULAR WSDL STRUCTURE

ABSTRACT
INTERFACES

IF MODULE

<message ...
<operation ...
getIfTable

IP MODULE

<message ...
<operation ...
getRouteTable

IF BINDING

<import IF MODULE
<binding ...
SOAP

IP BINDING

<import IP MODULE
<binding ...
SOAP

STANDARDIZED

SITE/DEVICE SPECIFIC

MY MGT. SERVICE

<import IF BINDING
<import IP BINDING

<service
http://...
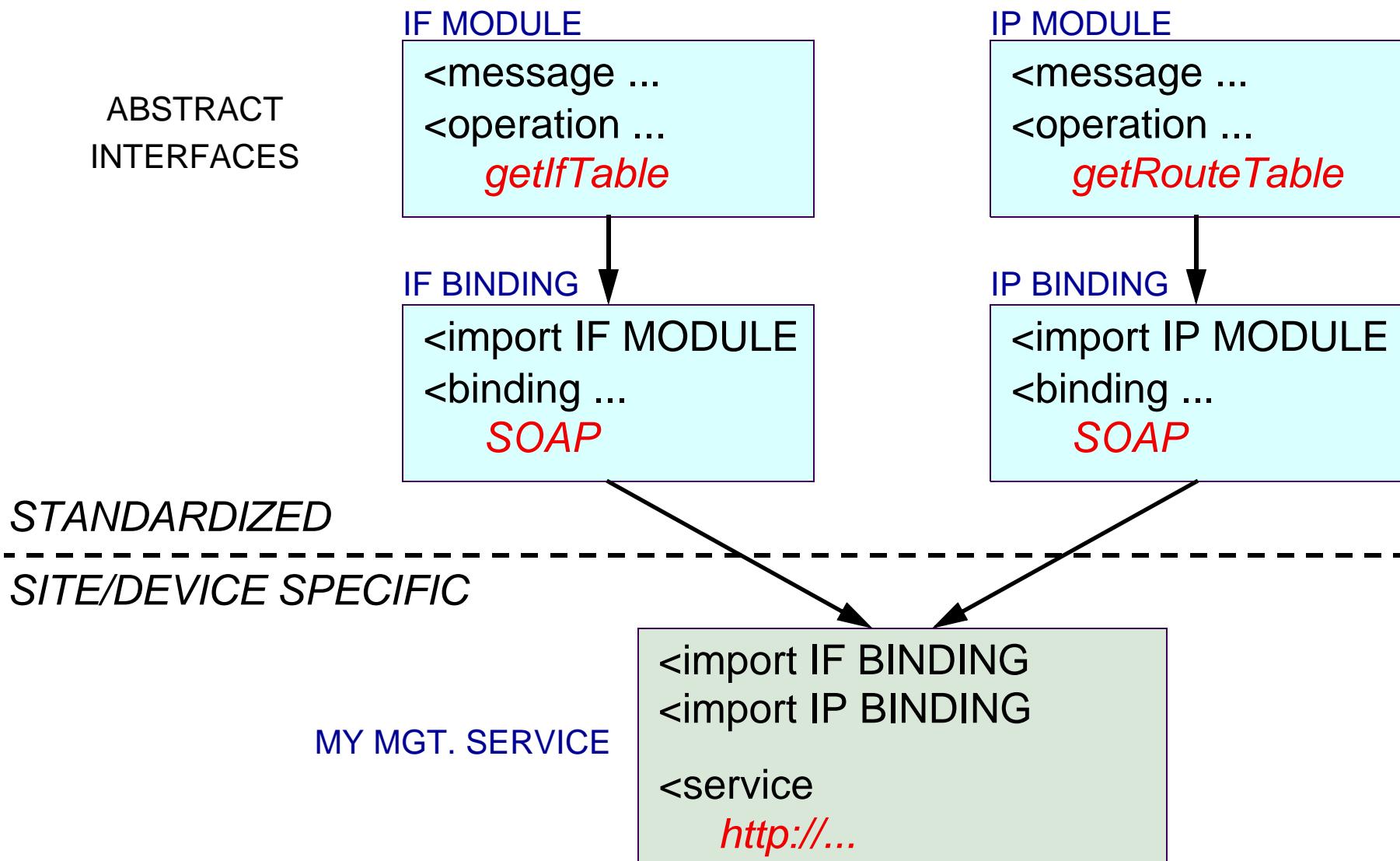
TRANSPARENCY AND GRANULARITY
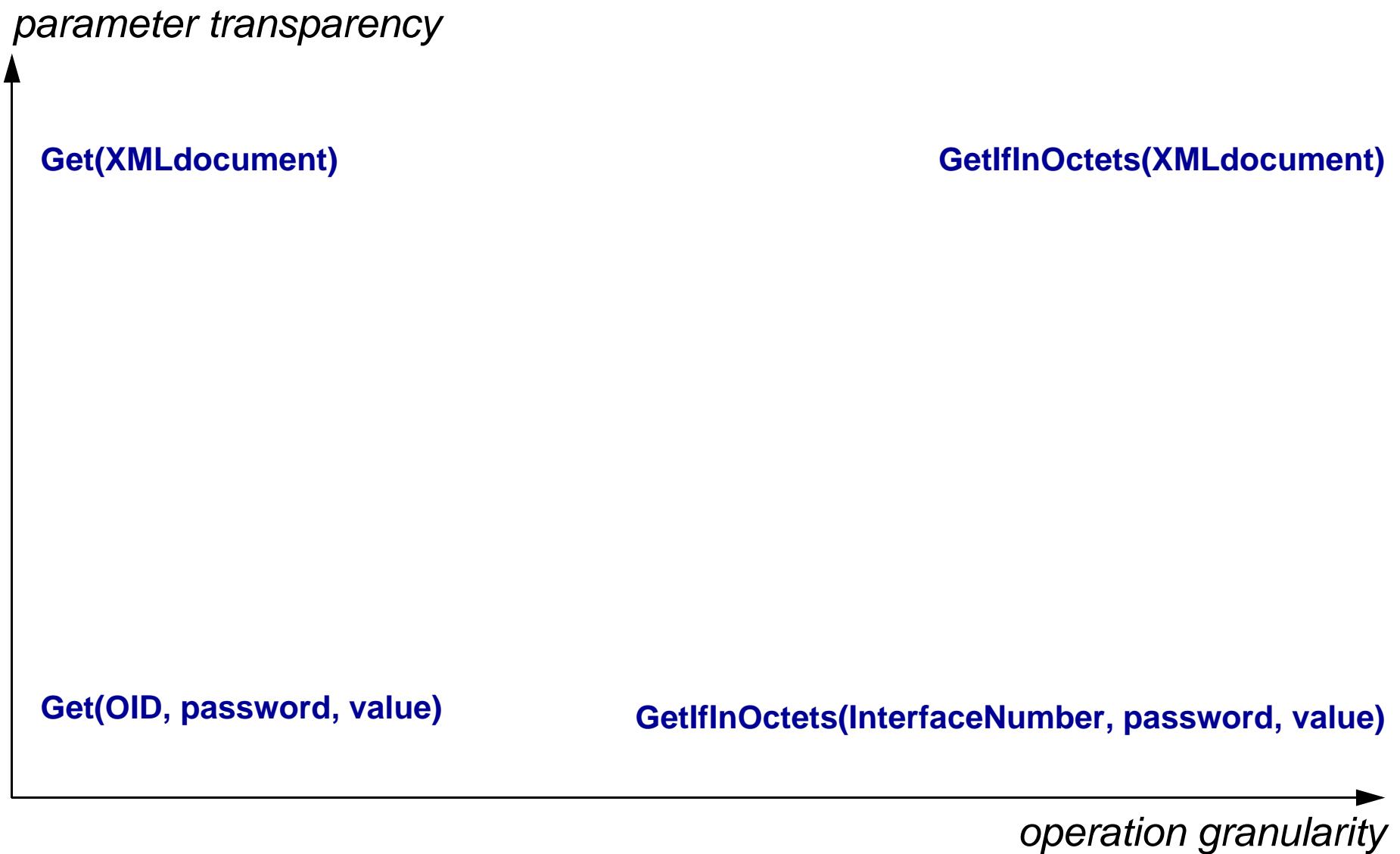
parameter transparency

Get(XMLdocument)   **GetIfInOctets(XMLdocument)**

Get(OID, password, value)   **GetIfInOctets(InterfaceNumber, password, value)**

operation granularity

PARAMETER TRANSPARENCY

NON-TRANSPARENT
Get(IfInOctets, interfaceNumber=2, password=public, value=664298)

TRANSPARENT
Get(XMLdocument)

PARAMETER TRANSPARENCY

NON-TRANSPARENT

Get(IfInOctets, interfaceNumber=2, password=public, value=664298)

- Data parsed / type checked at WSDL level
- Single level of standards: WSDL
- Easy integration with standard applications (e.g. spreadsheet, database)
- Occasional managers (home environments)

TRANSPARENT

Get(XMLdocument)

PARAMETER TRANSPARENCY

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Get(IfInOctets, interfaceNumber=2, password=public, value=664298)
- Data parsed / type checked at WSDL level
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TRANSPARENT
Get(XMLdocument)
- Data parsed by higher level application
- Multiple levels of standards: WSDL operation & XML data
- Powerful (e.g. XPATH / XQUERY)
- Harder to use
- Professional managers (operators)

OPERATION GRANULARITY

FINE GRANULARITY
GetIfInOctets(interfaceNumber=2, password=public, value=664298)

COARSE GRANULARITY
Get(IfInOctets, interfaceNumber=2, password=public, value=664298)

OPERATION GRANULARITY

FINE GRANULARITY

GetIfInOctets(interfaceNumber=2, password=public, value=664298)

- Easy to understand
- Occasional managers (home environments)

COARSE GRANULARITY

Get(IfInOctets, interfaceNumber=2, password=public, value=664298)

OPERATION GRANULARITY

FINE GRANULARITY

GetIfInOctets(interfaceNumber=2, password=public, value=664298)

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COARSE GRANULARITY

*Get(IfInOctets, interfaceNumber=2, password=public, value=664298)*

- Allows creation of a Containment tree
- Allows scoping and filtering (like CMIP)
- Harder to use
- Professional managers (operators)

# COARSE GRANULARITY - CONTAINMENT & SCOPING

CONTAINMENT

- get(*)

- get (IfTable.*.IfInOctets)
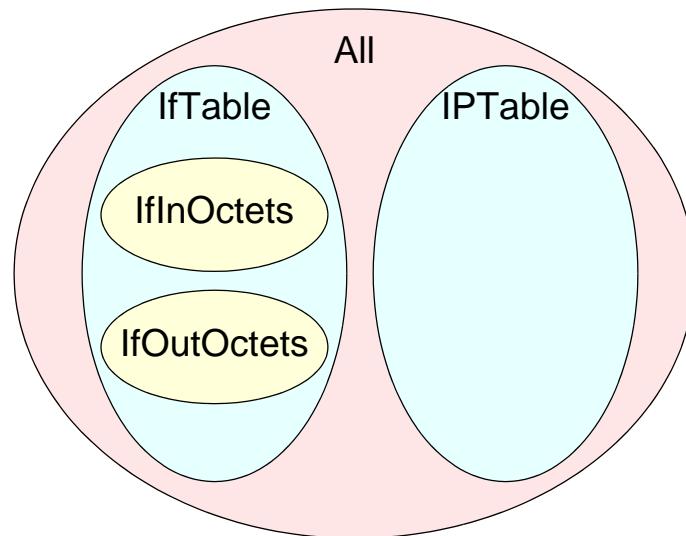
SCOPING

- get (base_element, depth)
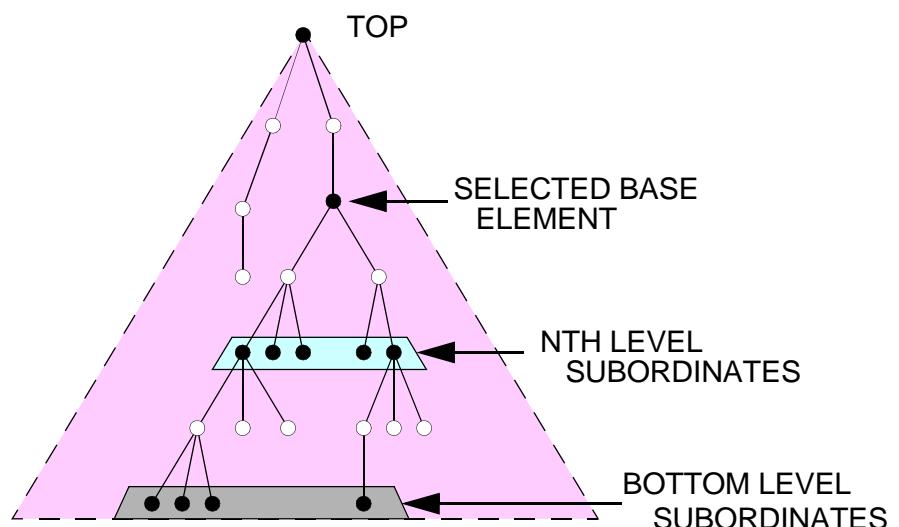
FURTHER WORK

IMPLEMENTATION EXPERIENCE

PERFORMANCE MEASUREMENTS

GET OPERATIONAL EXPERIENCE

SECURITY

TRANSACTIONS

...

CONCLUSIONS

WSDL DESCRIPTIONS CAN BE SPLIT INTO
AN ABSTRACT INTERFACE, A BINDING AND A SERVICE

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FOR PROFESSIONAL MANAGERS:
• TRANSPARENT PARAMETERS
• COURSE GRANULARITY OF OPERATIONS

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WSDL DESCRIPTIONS CAN BE SPLIT INTO
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THE ABSTRACT INTERFACE AND BINDING
SHOULD BE STANDARDIZED

FOR PROFESSIONAL MANAGERS:
• TRANSPARENT PARAMETERS
• COURSE GRANULARITY OF OPERATIONS

FOR OCCASIONAL MANAGERS:
• NON-TRANSPARENT PARAMETERS
• FINE GRANULARITY OF OPERATIONS