TECNOLOGIAS DE MIDDLEWARE

Introdução ao WSDL.
Concretização num Projecto de LBS.

André Barbosa

INTRODUÇÃO AO WSDL:

- Introdução ao WSDL
- Descrição e Utilização

UMA CONCRETIZAÇÃO EM LBS:

- Um projecto para o GJU (ESA/CE)
- Interface Middleware - Serviços
- Especificação em WSDL

CONCLUSÕES:

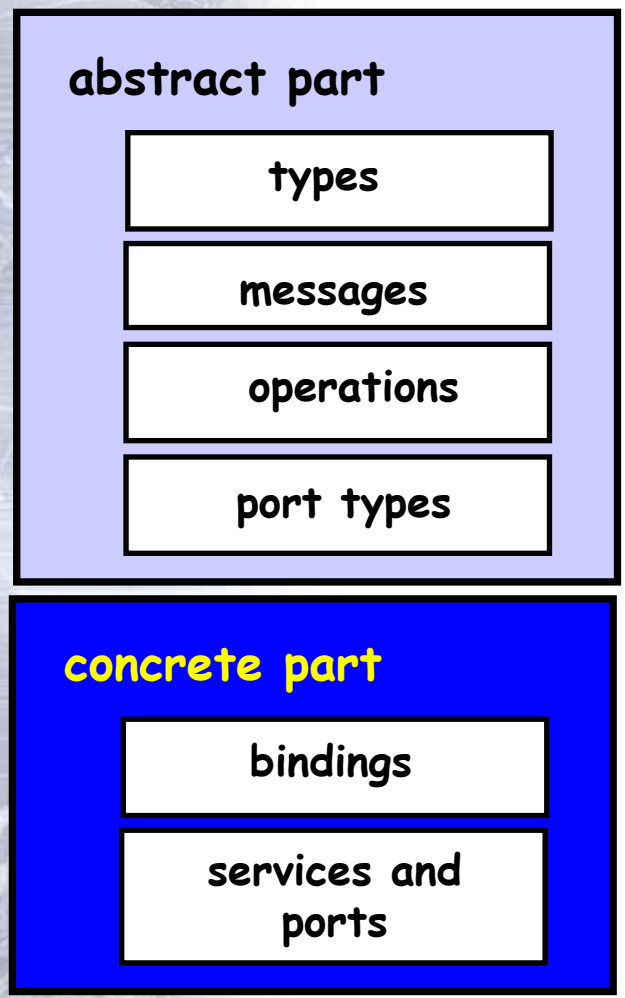
- Desafios de Futuro
- .... partindo para o UDDI

WSDL-SPEC

- WEB-SERVICES DESCRIPTION LANGUAGE
  - Interface Specifications are XML documents describing Web-Services.
  - These descriptions address Interfaces and Bindings.
  - IDL is bound to specific middleware, WSDL is not, hence it must also describe access mechanisms.
  - WSDL adopts a standard for registering services, since a common framework is not available (UDDI).
  - Diverse interaction paradigms: asynchronous, synchronous, request-response & notifications.

WSDL-SPEC

WSDL specification



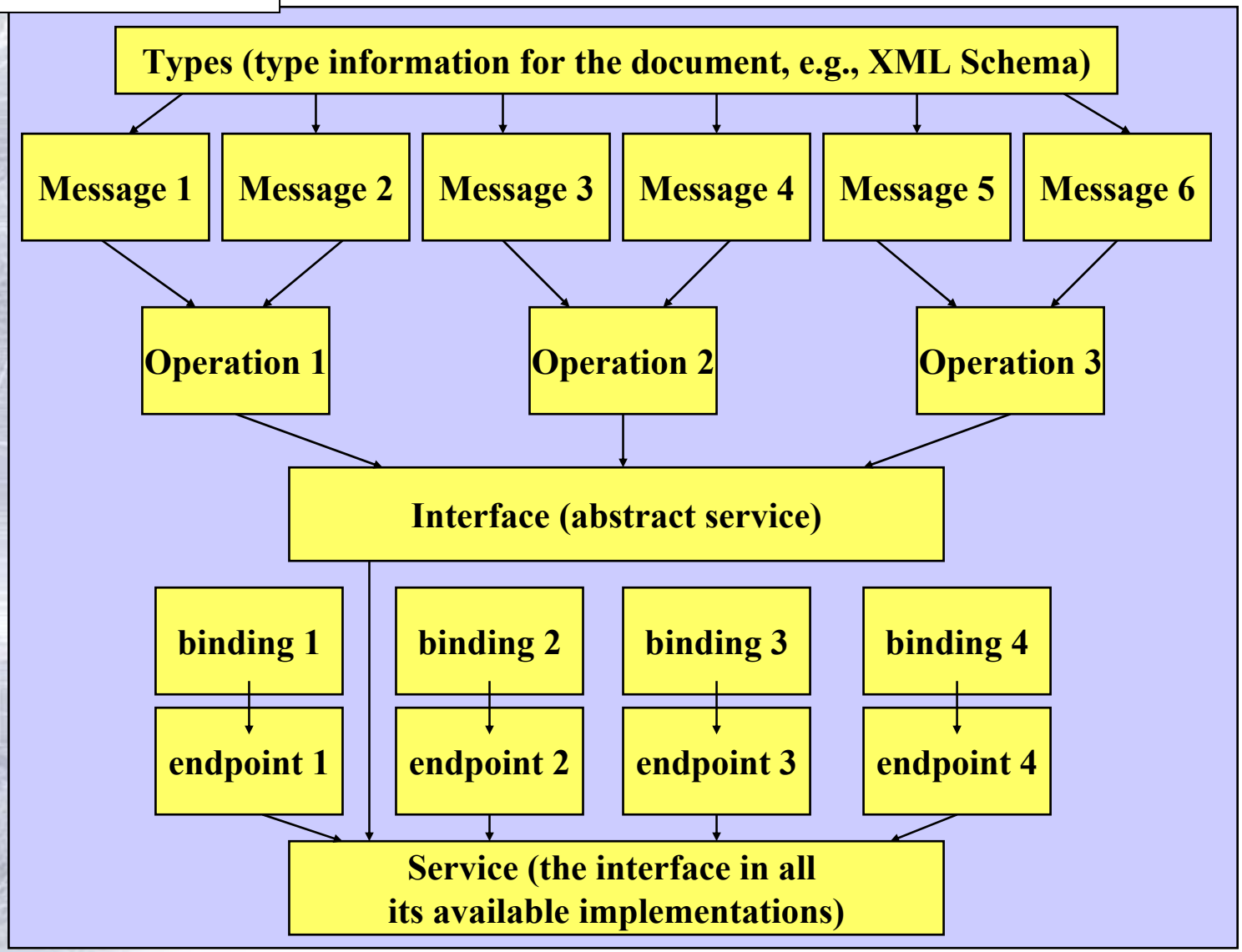
The types element describes all the data types used between the client and server. WSDL is not tied exclusively to a specific typing system, but it uses the W3C XML Schema specification as its default choice. If the service uses only XML Schema built-in simple types, such as strings and integers, the types element is not required.

The message element describes a one-way message, whether it is a single message request or a single message response. It defines the name of the message and contains zero or more message part elements, which can refer to message parameters or message return values.

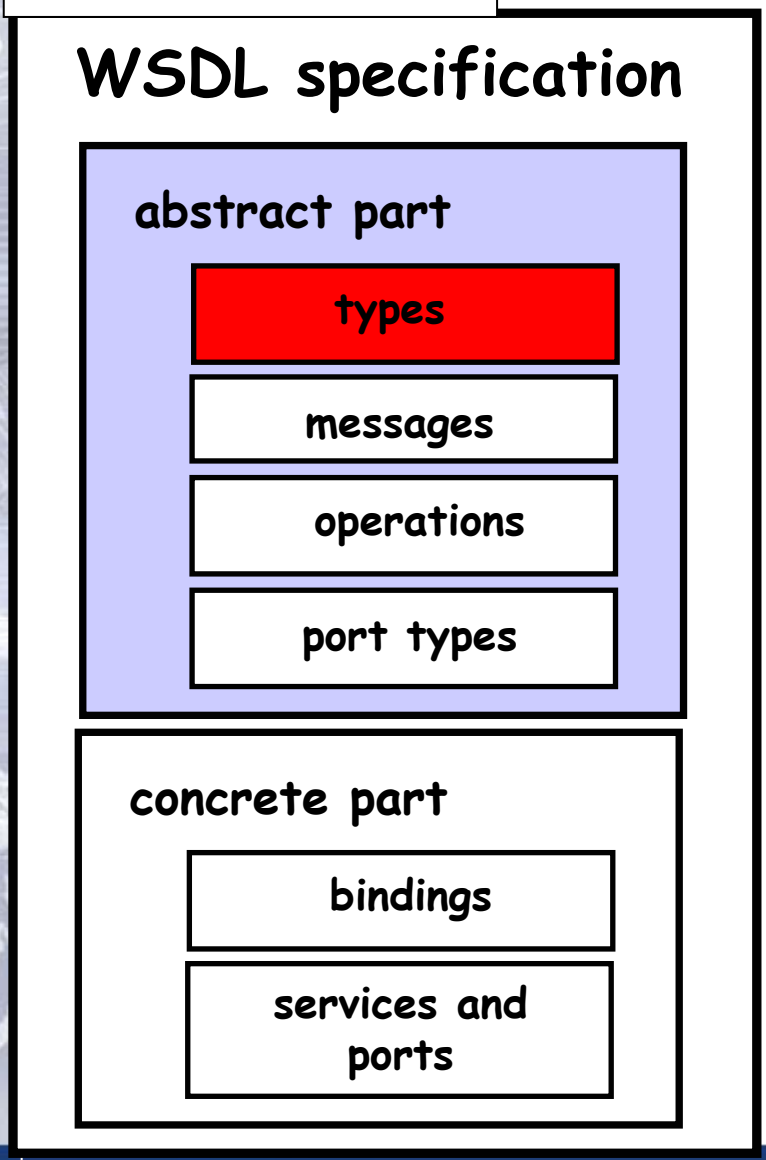
The portType element combines multiple message elements to form a complete one-way or round-trip operation. For example, a portType can combine one request and one response message into a single request/response operation, most commonly used in SOAP services. Note that a portType can (and frequently does) define multiple operations.

The binding element describes the concrete specifics of how the service will be implemented on the wire. WSDL includes built-in extensions for defining SOAP services, and SOAP-specific information therefore goes here.

The service element defines the address for invoking the specified service. Most commonly, this includes a URL for invoking the SOAP service.


Types (type information for the document, e.g., XML Schema)
Message 1
Message 2
Message 3
Message 4
Message 5
Message 6
Operation 1
Operation 2
Operation 3
Interface (abstract service)
binding 1
binding 2
binding 3
binding 4
endpoint 1
endpoint 2
endpoint 3
endpoint 4
Service (the interface in all its available implementations)
Abstract description of the service
Concrete description of the service

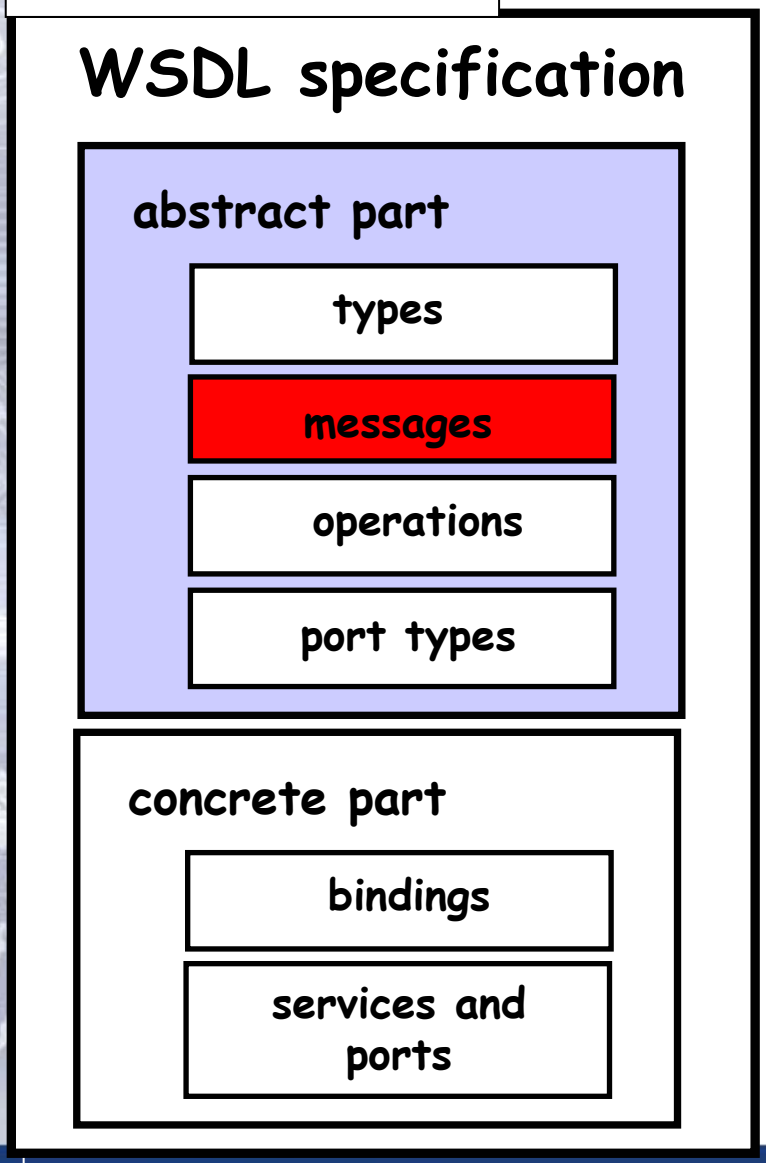
WSDL em LBS



The **types** element encloses data type definitions that are relevant for the exchanged messages. For maximum interoperability and platform neutrality, WSDL prefers the use of XSDs as canonical types.

```
<s:complexType name="PVT">
<s:sequence>
  <s:element name="OBUId" type="s:string" />
  <s:element name="Latitude" type="s:double" />
  <s:element name="Longiude" type="s:double" />
  <s:element name="Altitude" type="s:double" />
  <s:element name="Velocity_Latitude"type="s:double"/>
  <s:element name="Velocity_Longitude"type="s:double"/>
  <s:element name="INTEGRITYFLAG"type="s:boolean"/>
  <s:element name="GNSS_FLAG" type="s:boolean" />
  <s:element name="Timestamp" type="s:string" />
</s:sequence>
</s:complexType>
```

WSDL supports the XML Schemas specification (XSD) as its canonical type system. However, since it is unreasonable to expect a single type system grammar to be used to describe all message formats present and future, WSDL allows using other type definition languages.



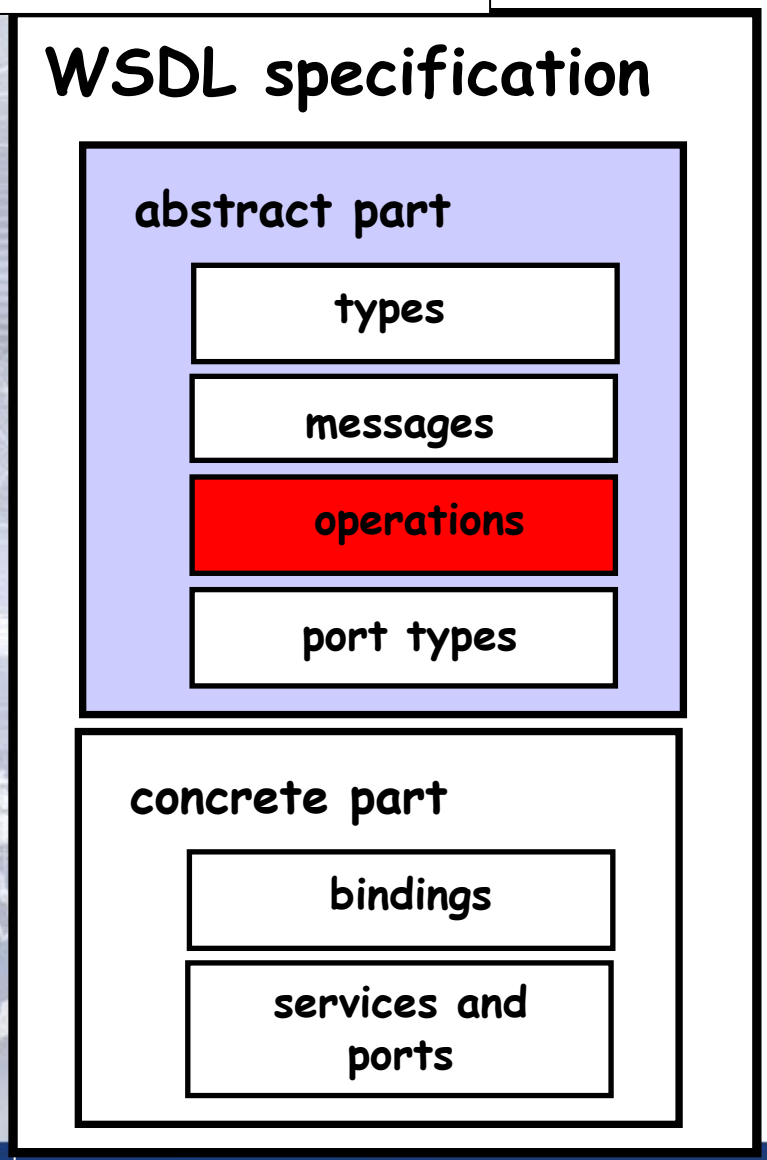
Messages consist of one or more logical **parts**. Each part is associated with a type from some type system using a message-typing attribute. The set of message-typing attributes is extensible. WSDL defines several such message-typing attributes

element. Refers to an XSD element.
type. Refers to an XSD simple or complex Type.

Other message-typing attributes may be defined as long as they use a namespace different from that of WSDL.

```
<wsdl:message name="GetPVTsSoapIn">
        <wsdl:part name="parameters"
        element="tns:GetPVTs" />
</wsdl:message>

<wsdl:message name="GetPVTsSoapOut">
        <wsdl:part name="parameters"
        element="tns:GetPVTsResponse"/>
</wsdl:message>
```

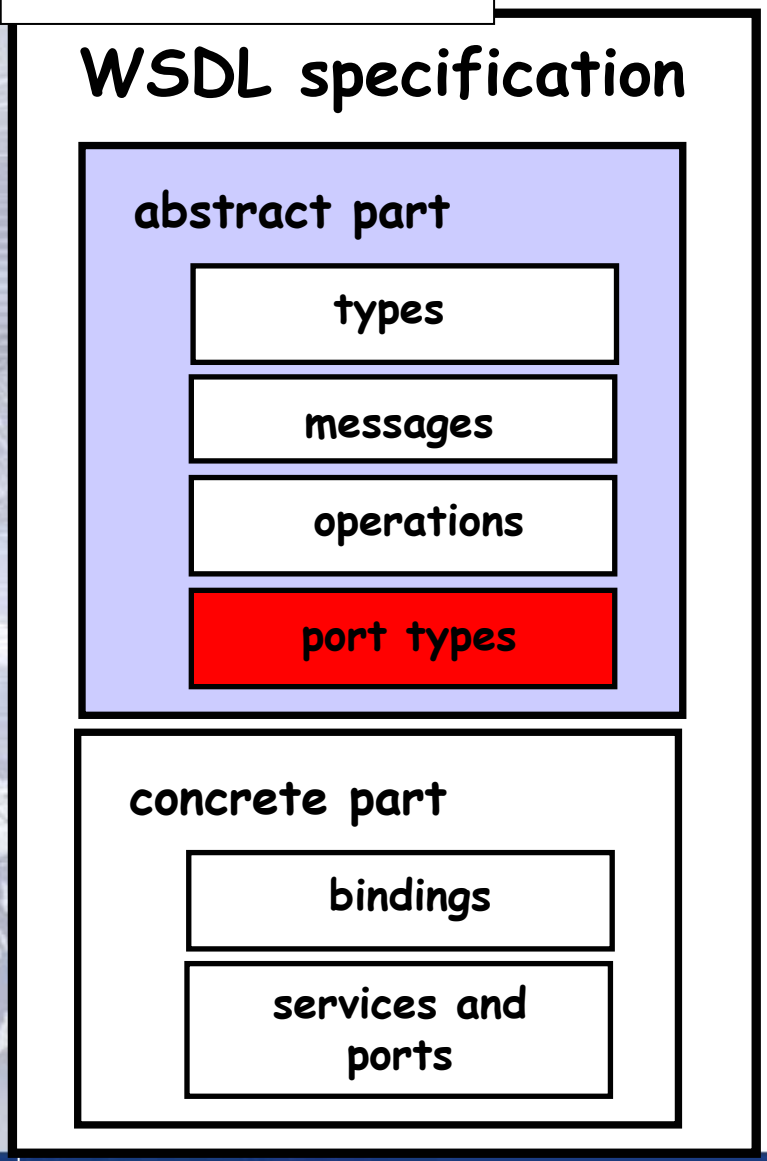


One-way. The endpoint receives a message.
Request-response. The endpoint receives a message, and sends a correlated message.
Solicit-response. The endpoint sends a message, and receives a correlated message.
Notification. The endpoint sends a message.

```
<wsdl:operation name="GetPVTs">
  <wsdl:input
message="tns:GetPVTsSoapIn"/>
  <wsdl:output
message="tns:GetPVTsSoapOut"/>
  </wsdl:operation>

<wsdl:operation name="NotifyClient">
  <wsdl:output
message="tns:NotifyClient"/>
  </wsdl:operation>
```

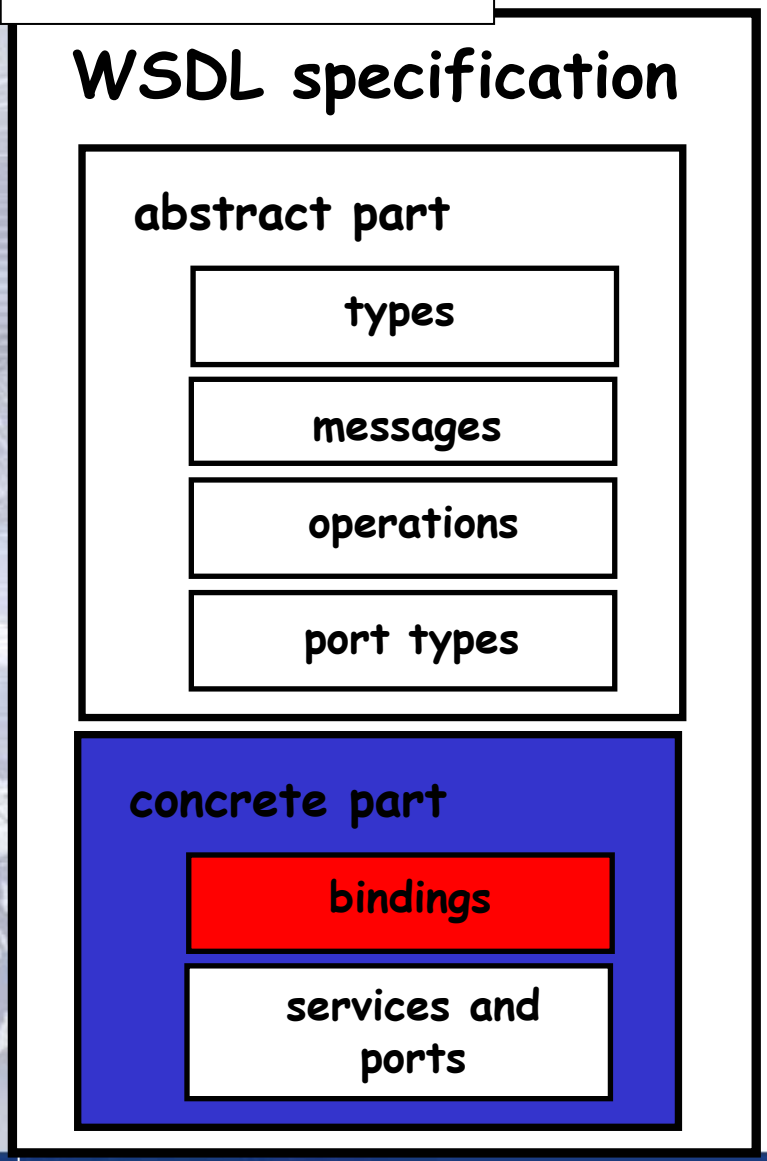
WSDL em LBS




```
<wsdl:portType name="WebServiceSoap">
<wsdl:operation name="GetPVTs">
 <wsdl:input message="tns:GetPVTsSoapIn" />
 <wsdl:output message="tns:GetPVTsSoapOut" />
 </wsdl:operation>
<wsdl:operation name="Subscribe">
 <wsdl:input message="tns:SubscribeSoapIn" />
 <wsdl:output message="tns:SubscribeSoapOut" />
 </wsdl:operation>
<wsdl:operation name="UnSubscribe">
 <wsdl:input message="tns:UnSubscribeSoapIn" />
 <wsdl:output message="tns:UnSubscribeSoapOut" />
 </wsdl:operation>
</wsdl:portType>

<wsdl:portType name="NotificationService">
<wsdl:operation name="NotifyClient">
<wsdl:output message="tns:NotifyClient" />
</wsdl:operation>
</wsdl:portType>
```

A port MUST NOT specify more than one address.
A port MUST NOT specify any binding information other than address information.

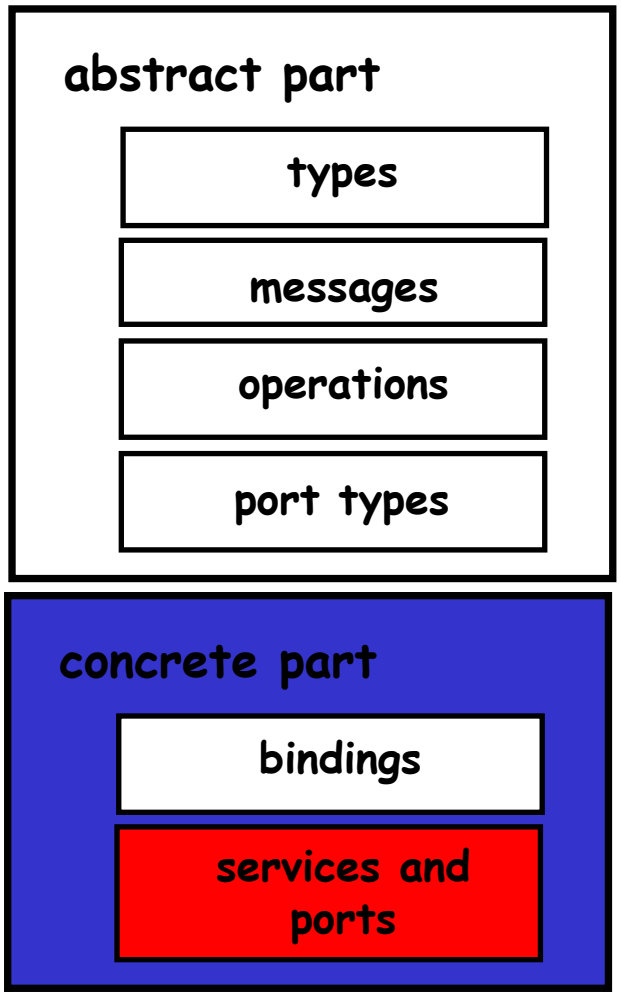



```
<wsdl:binding name="WebServiceSoap"
type="tns:AdvantisWebService">
  <soap:binding transport="http://schemas.xmlsoap.org/soap/http"
style="document" />
<wsdl:operation name="GetPVTs">
  <soap:operation
soapAction="http://localhost/AdvantisWebService/GetPVTs"
style="document" />
  </wsdl:operation>
<wsdl:operation name="Subscribe">
  <soap:operation
soapAction="http://localhost/AdvantisWebService/Subscribe"
style="document" />
  </wsdl:operation>
<wsdl:operation name="UnSubscribe">
<soap:operation
soapAction="http://localhost/AdvantisWebService/UnSubscribe"
style="document" />
</wsdl:operation>
</wsdl:binding>

<wsdl:binding name="NotificationService.NET"
type="tns:AdvantisWebService">
  <binding transport=".NET_Remoting" style="document"/>
- <wsdl:operation name="NotifyClient">
  <soap:operation
soapAction="http://localhost/AdvantisWebService1/NotifyClient"
style="document" />
- <wsdl:output>
  <soap:body use="literal" />
  </wsdl:output> </wsdl:binding>
```

WSDL em LBS

WSDL specification



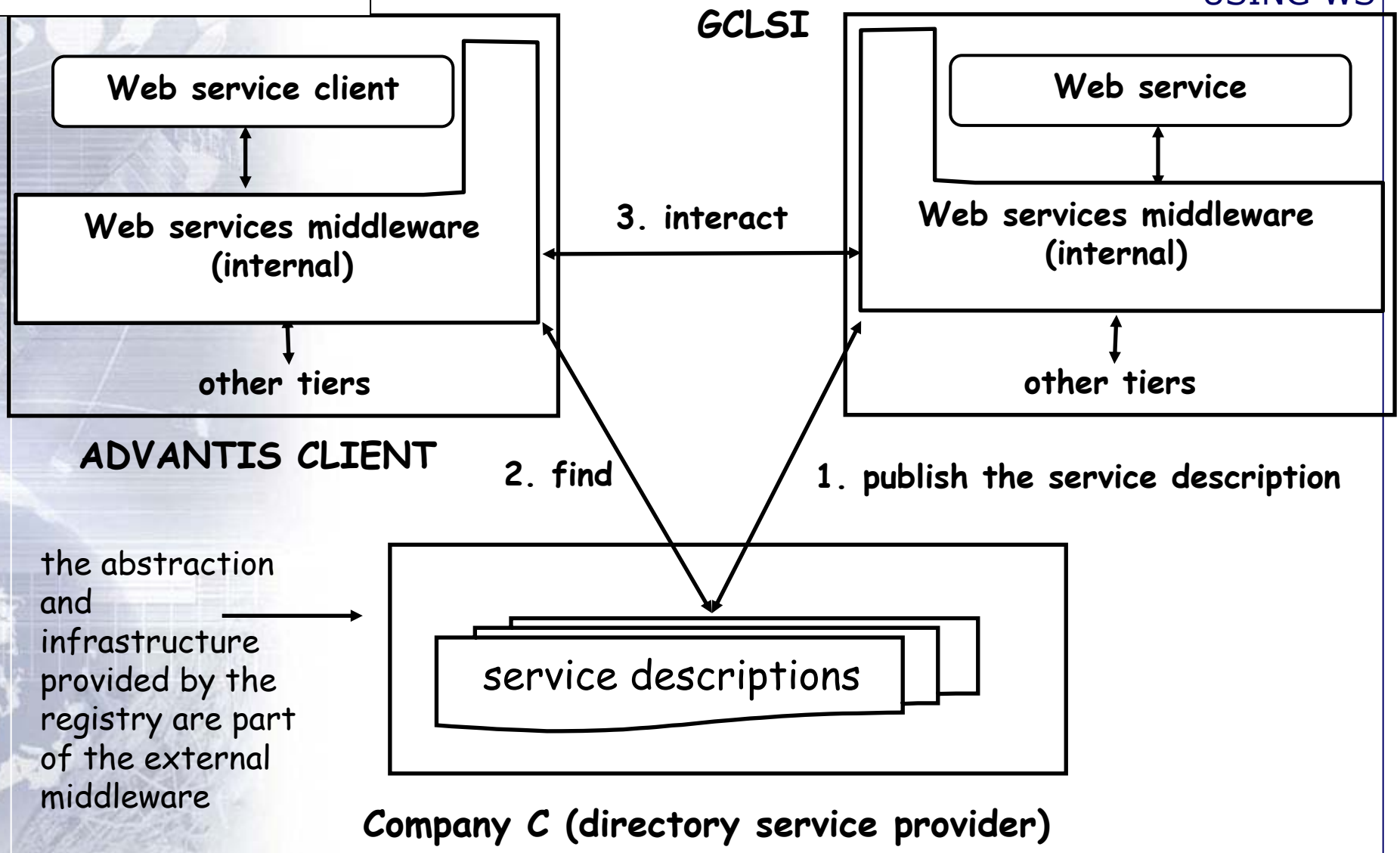

```
<wsdl:service name="AdvantisWebService">
<documentation
xmlns="http://schemas.xmlsoap.org/wsdl/" />
<wsdl:port name="WebServiceSoap"
binding="tns:AdvantisWebService">
  <soap:address
location="http://localhost/AdvantisWebService/Advantis
WebService.asmx" />
  </wsdl:port>

<wsdl:port name="NotificationService"
binding="tns:NotificationService.NET">
  <soap:address
location="http://localhost/AdvantisWebService/Advantis
WebService.dll" />
  </wsdl:port>
  </wsdl:service>
```

If a service has several ports that share a port type, but employ different bindings or addresses, the ports are alternatives. Each port provides semantically equivalent behavior (within the transport and message format limitations imposed by each binding). This allows a consumer of a WSDL document to choose particular port(s) to communicate with based on some criteria (protocol,distance,etc)

- WSDL provides a mechanism to define the interface to Web services in terms of messages exchanged with that Web service
  - it allows for several forms of interaction (single message, request-response)
  - it allows for several bindings (several implementations of the same interface)
- WSDL plays a similar role as Interface Definition Languages in conventional middleware platforms:
  - describe a service
  - can be used to automatically generate code to invoke the service
  - can be used by the infrastructure to enforce well formed interactions
- Like other IDLs, WSDL does not contain information about
  - semantics
  - business protocols and conversations

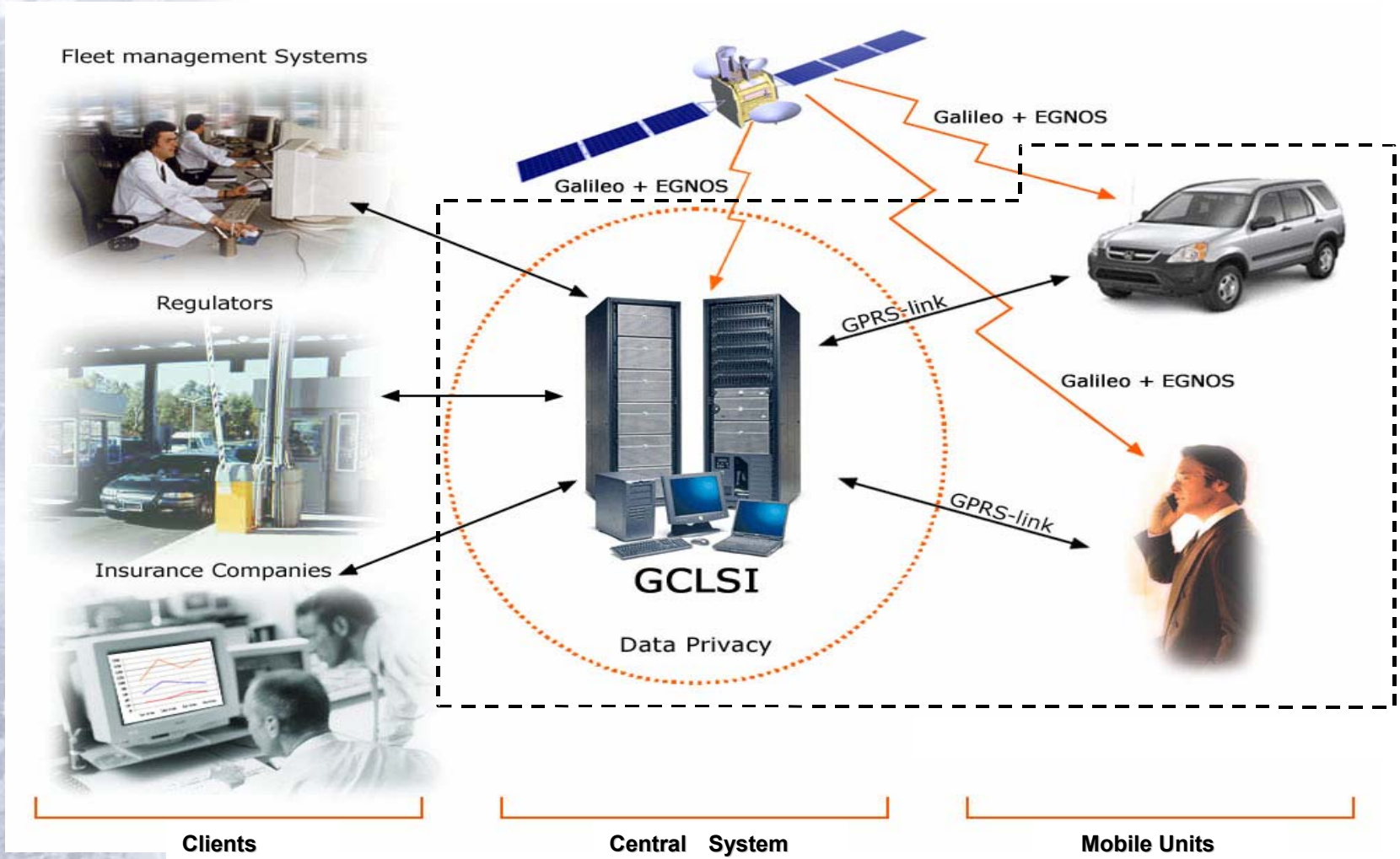
WSDL-SPEC


GCLSI
Web service client
Web services middleware (internal)
other tiers
ADVANTIS CLIENT
3. interact
Web service
Web services middleware (internal)
other tiers
2. find
1. publish the service description
the abstraction and infrastructure provided by the registry are part of the external middleware
service descriptions
Company C (directory service provider)

ALGUNS DESAFIOS PARA O FUTURO DO WSDL:

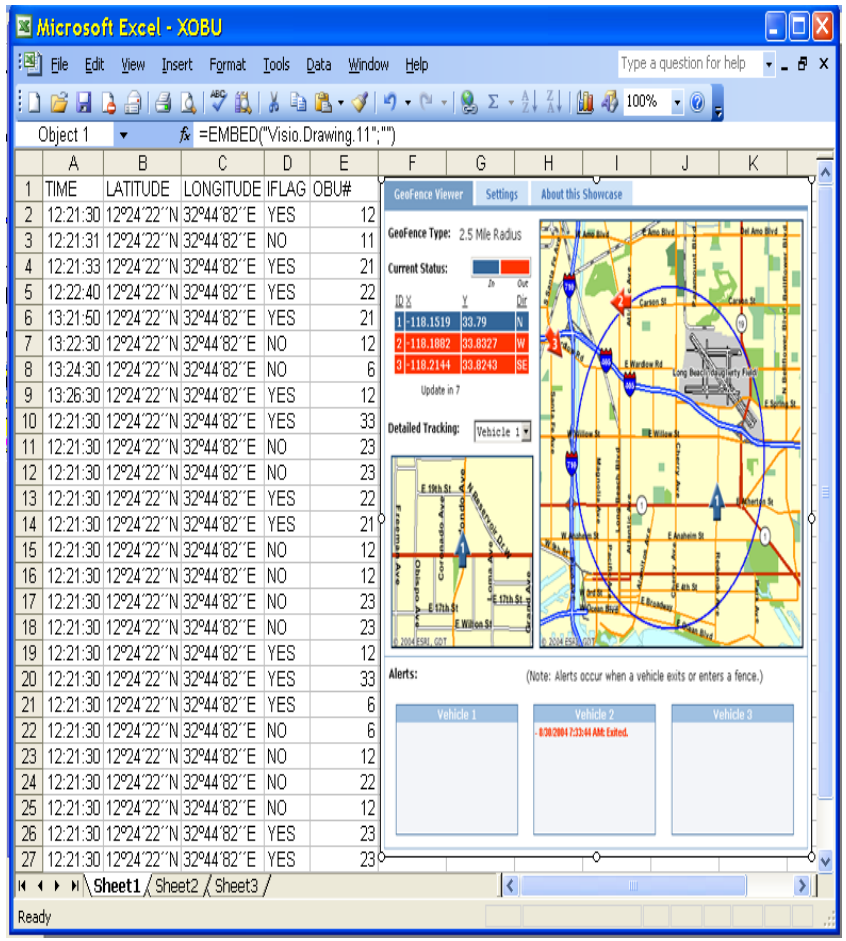
- Web service messaging systems (on top of SOAP but providing all the features needed in a real messaging system, namely asynchronous message notifications!) WS-EVENTING
- The existing standard is not yet fully encompassed by any existing middleware technologies: J2EE or .NET. Some workarounds must be implemented in order to fully comply.
- Integration between WS and CORBA - danger of over-simplification. WS as middleware atop CORBA, and CORBA atop WS as in the SIP. Hence, CORBA&WS are not mutually exclusive but complementary: automatic mapping between CORBA-IDL and WSDL is needed.

UM PROJECTO ESPECÍFICO EM LBS para o GJU (ESA/CE)...

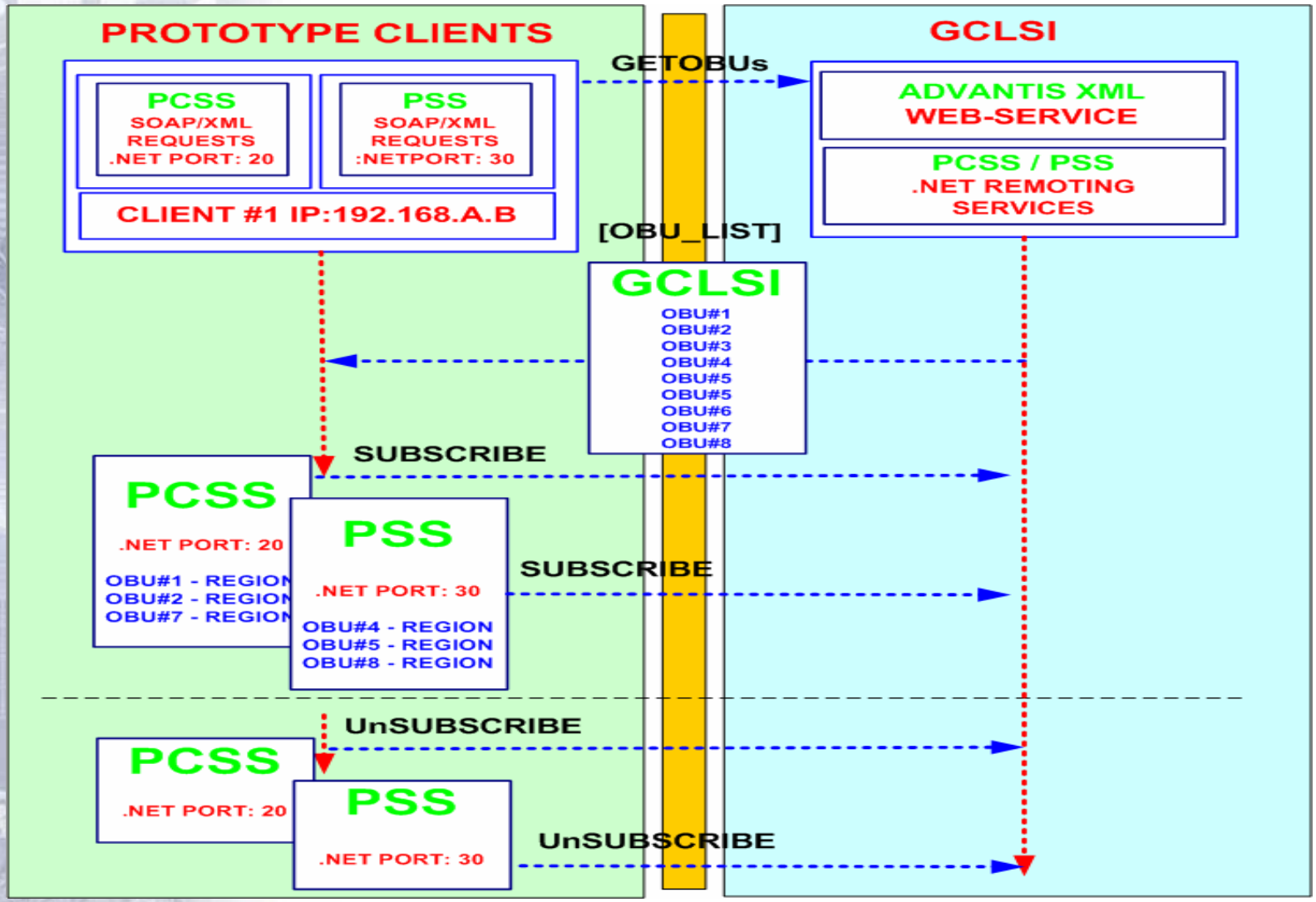


...BASEADO NUM SISTEMA (muito) DISTRIBUÍDO

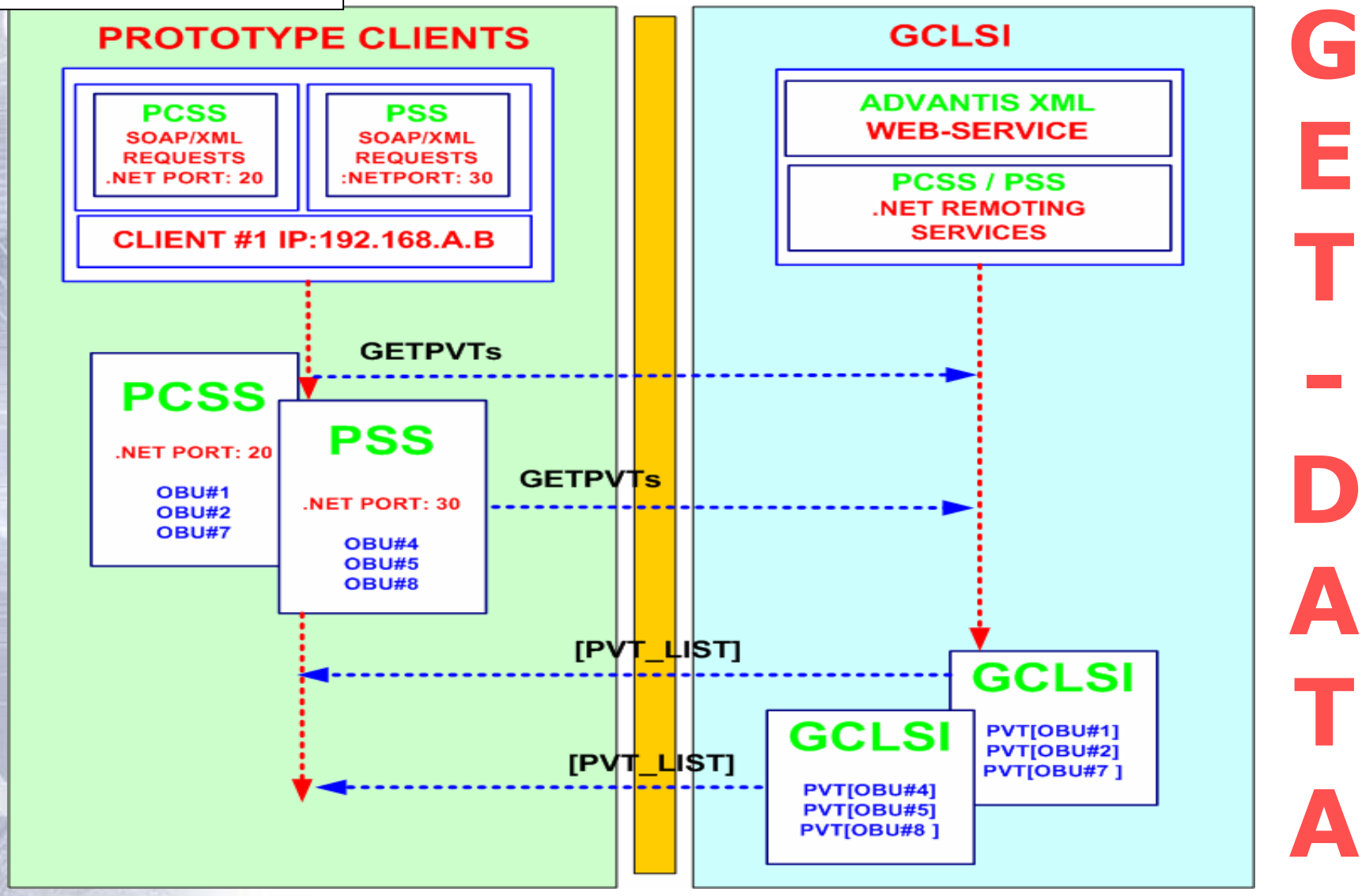

GeoFence Viewer
Settings
About this Showcase
GeoFence Type: 2.5 Mile Radius
Current Status:
In
Out
ID X Y Dir
1 -118.1519 33.79 N
2 -118.1882 33.8327 W
3 -118.2144 33.8243 SE
Update in 7
Detailed Tracking:
Vehicle 1
PSS
Alerts:
(Note: Alerts occur when a vehicle exits or enters a fence.)
Vehicle 1
Vehicle 2
- 8/30/2004 7:33:44 AM: Exited.
Vehicle 3


Microsoft Excel - XOBU
File Edit View Insert Format Tools Data Window Help
Object 1
=EMBED("Visio.Drawing.11","")
TIME LATITUDE LONGITUDE IFLAG OBU#
12:21:30 12°24'22"N 32°44'82"E YES 12
12:21:31 12°24'22"N 32°44'82"E NO 11
12:21:33 12°24'22"N 32°44'82"E YES 21
12:22:40 12°24'22"N 32°44'82"E YES 22
13:21:50 12°24'22"N 32°44'82"E YES 21
13:22:30 12°24'22"N 32°44'82"E NO 12
13:24:30 12°24'22"N 32°44'82"E NO 6
13:26:30 12°24'22"N 32°44'82"E YES 12
12:21:30 12°24'22"N 32°44'82"E YES 33
12:21:30 12°24'22"N 32°44'82"E NO 23
12:21:30 12°24'22"N 32°44'82"E NO 23
12:21:30 12°24'22"N 32°44'82"E YES 22
12:21:30 12°24'22"N 32°44'82"E YES 21
12:21:30 12°24'22"N 32°44'82"E NO 12
12:21:30 12°24'22"N 32°44'82"E NO 12
12:21:30 12°24'22"N 32°44'82"E NO 23
12:21:30 12°24'22"N 32°44'82"E NO 23
12:21:30 12°24'22"N 32°44'82"E YES 12
12:21:30 12°24'22"N 32°44'82"E YES 33
12:21:30 12°24'22"N 32°44'82"E YES 6
12:21:30 12°24'22"N 32°44'82"E NO 6
12:21:30 12°24'22"N 32°44'82"E NO 12
12:21:30 12°24'22"N 32°44'82"E NO 22
12:21:30 12°24'22"N 32°44'82"E NO 12
12:21:30 12°24'22"N 32°44'82"E YES 23
12:21:30 12°24'22"N 32°44'82"E YES 23
Sheet1 Sheet2 Sheet3
Ready

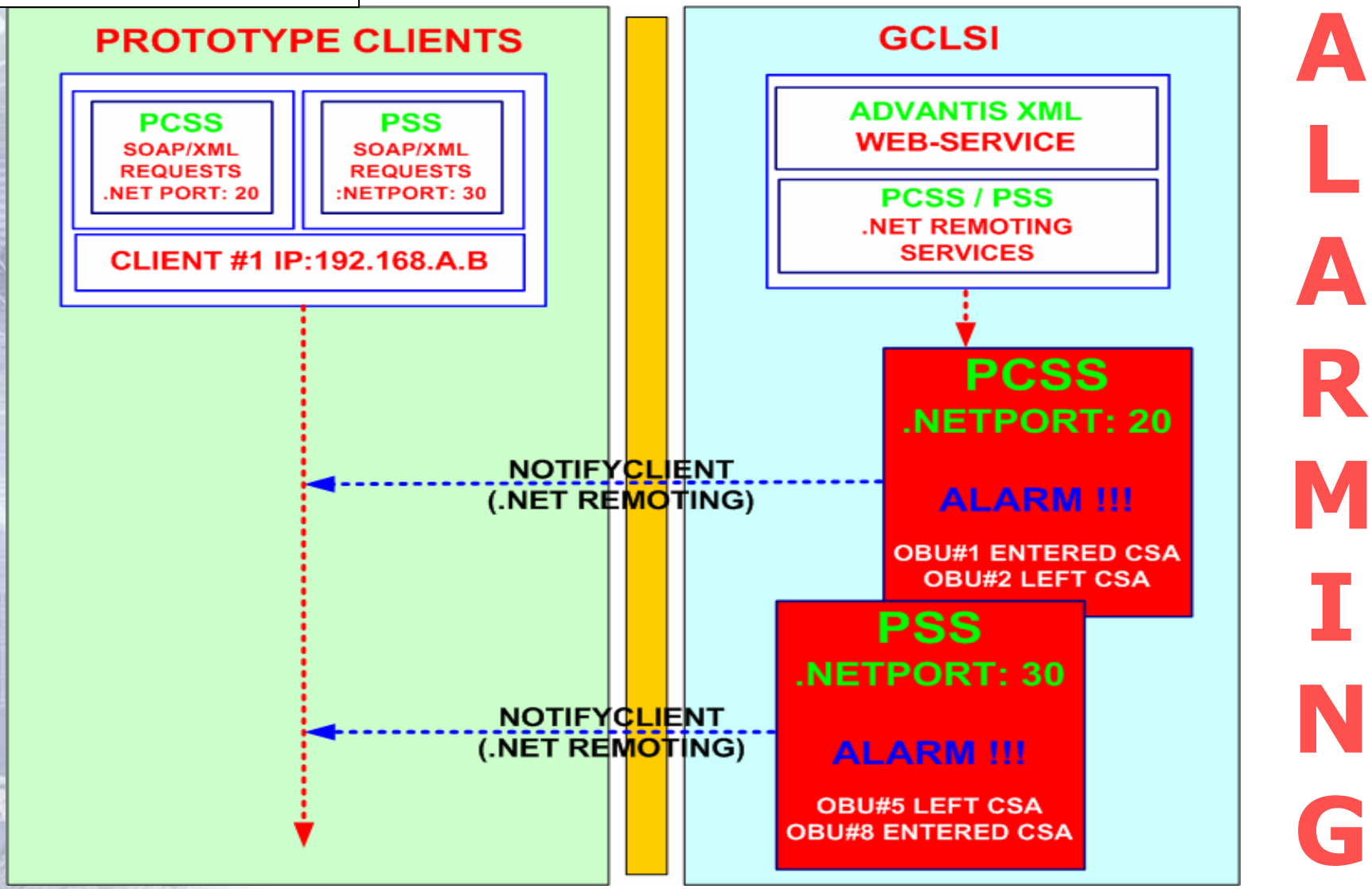
WSDL em LBS

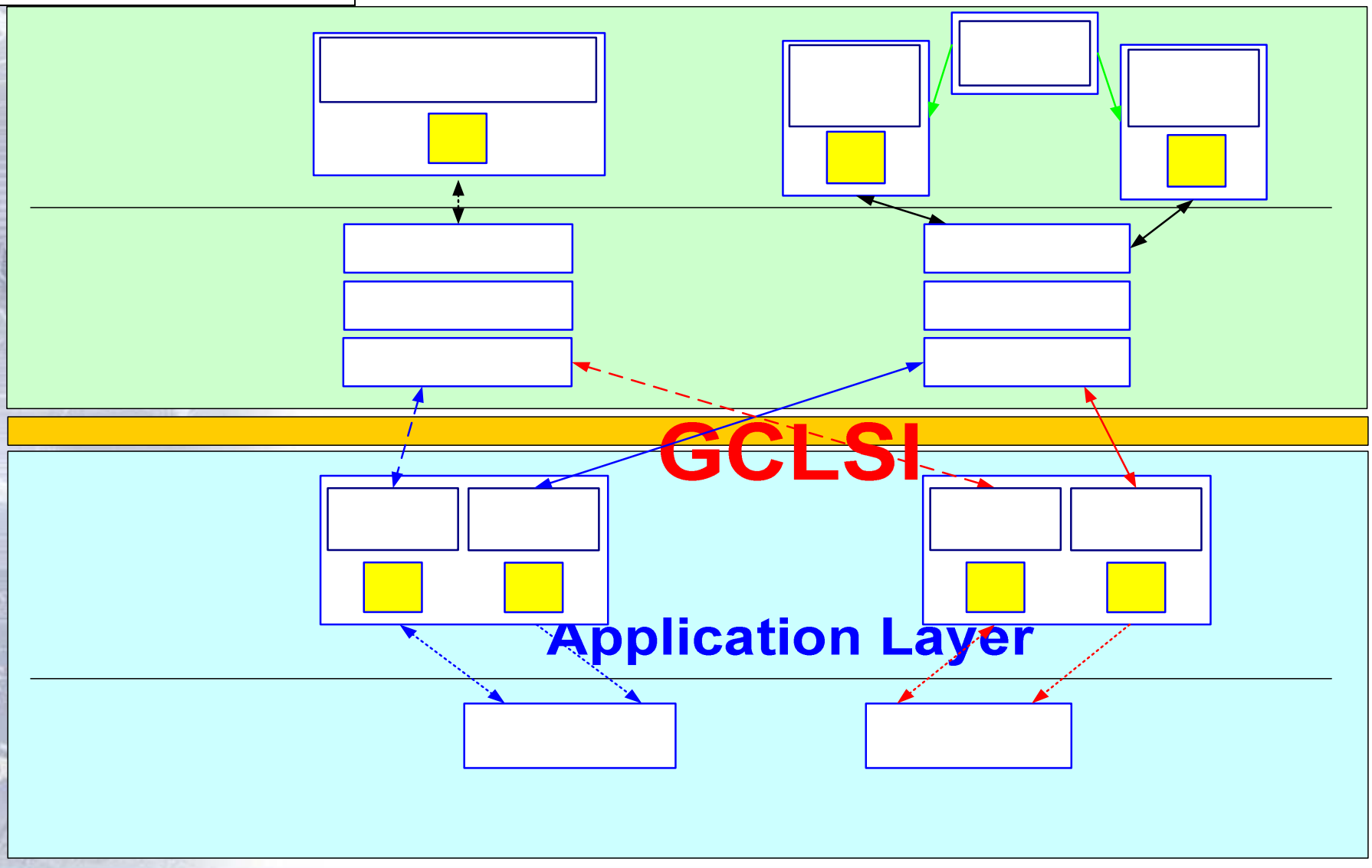

PROTOTYPE CLIENTS
PCSS
SOAP/XML
REQUESTS
.NET PORT: 20
PSS
SOAP/XML
REQUESTS
:NETPORT: 30
CLIENT #1 IP:192.168.A.B
GETOBUs
GCLSI
ADVANTIS XML
WEB-SERVICE
PCSS / PSS
.NET REMOTING
SERVICES
[OBU_LIST]
GCLSI
OBU#1
OBU#2
OBU#3
OBU#4
OBU#5
OBU#5
OBU#6
OBU#7
OBU#8
SUBSCRIBE
PCSS
.NET PORT: 20
OBU#1 - REGION
OBU#2 - REGION
OBU#7 - REGION
PSS
.NET PORT: 30
OBU#4 - REGION
OBU#5 - REGION
OBU#8 - REGION
SUBSCRIBE
UnSUBSCRIBE
PCSS
.NET PORT: 20
PSS
.NET PORT: 30
UnSUBSCRIBE
SUBSCRIBE

WSDL em LBS


PROTOTYPE CLIENTS
PCSS
SOAP/XML
REQUESTS
.NET PORT: 20
PSS
SOAP/XML
REQUESTS
:NETPORT: 30
CLIENT #1 IP:192.168.A.B
GCLSI
ADVANTIS XML
WEB-SERVICE
PCSS / PSS
.NET REMOTING
SERVICES
GETPVTs
PCSS
.NET PORT: 20
OBU#1
OBU#2
OBU#7
PSS
.NET PORT: 30
OBU#4
OBU#5
OBU#8
GETPVTs
[PVT_LIST]
GCLSI
PVT[OBU#1]
PVT[OBU#2]
PVT[OBU#7]
[PVT_LIST]
GCLSI
PVT[OBU#4]
PVT[OBU#5]
PVT[OBU#8]
GET-DATA

WSDL em LBS


PROTOTYPE CLIENTS
PCSS
SOAP/XML
REQUESTS
.NET PORT: 20
PSS
SOAP/XML
REQUESTS
:NETPORT: 30
CLIENT #1 IP:192.168.A.B
GCLSI
ADVANTIS XML
WEB-SERVICE
PCSS / PSS
.NET REMOTING
SERVICES
PCSS
.NETPORT: 20
ALARM !!!
OBU#1 ENTERED CSA
OBU#2 LEFT CSA
NOTIFYCLIENT
(.NET REMOTING)
PSS
.NETPORT: 30
ALARM !!!
OBU#5 LEFT CSA
OBU#8 ENTERED CSA
NOTIFYCLIENT
(.NET REMOTING)
ALARMING


GCLSI
Application Layer

WSDL em LBS

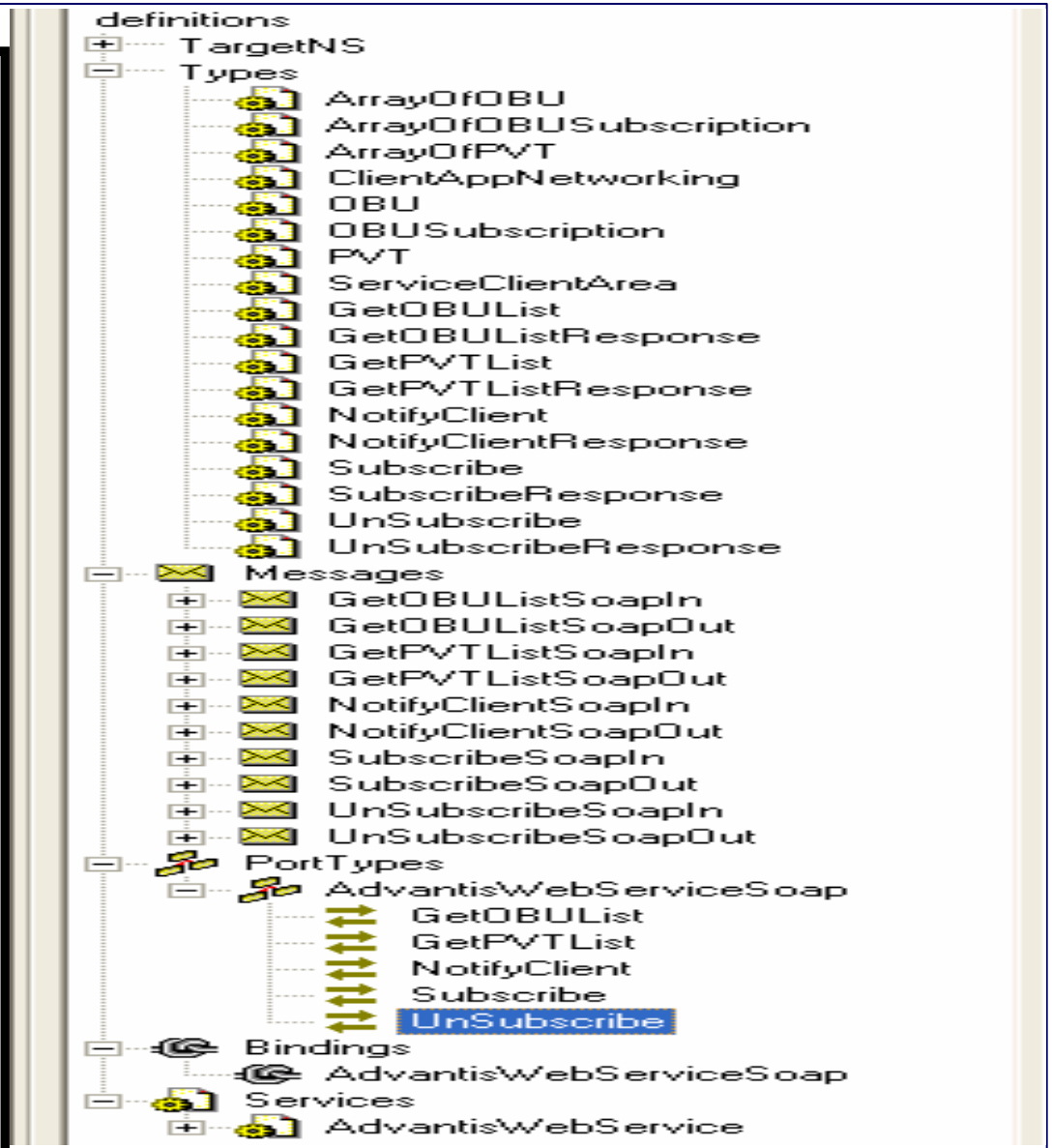
WSDL specification

abstract part

- types
- messages
- operations
- port types

concrete part

- bindings
- services and ports



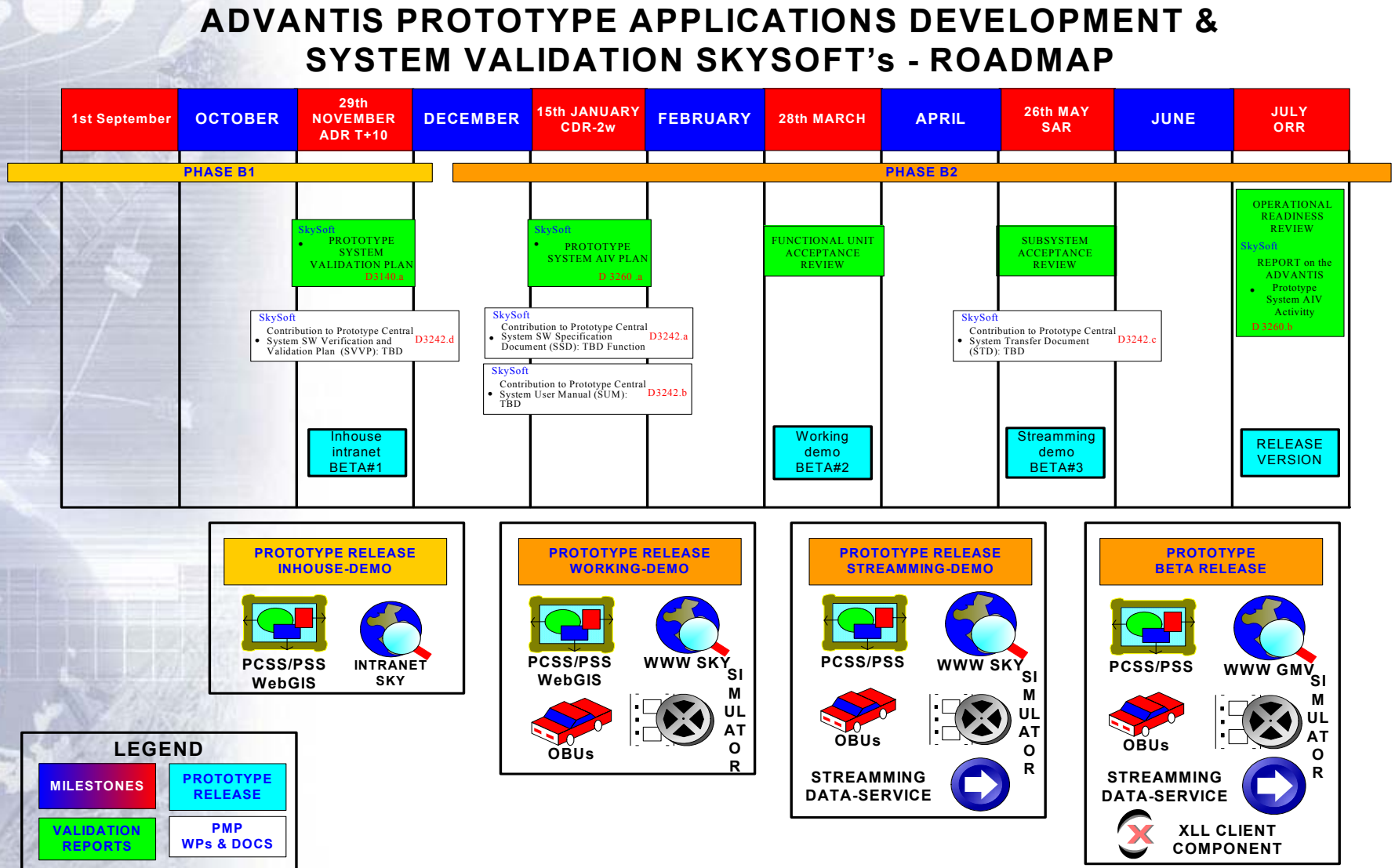
JUSTIFICAÇÃO TECNICA (WS):

- Firewall-transparent Traffic (port:80)
- Definição standard de operações diversas
- Integrabilidade com aplicações 3rd-party

JUSTIFICAÇÃO COMERCIAL (.NET/ArcGIS):

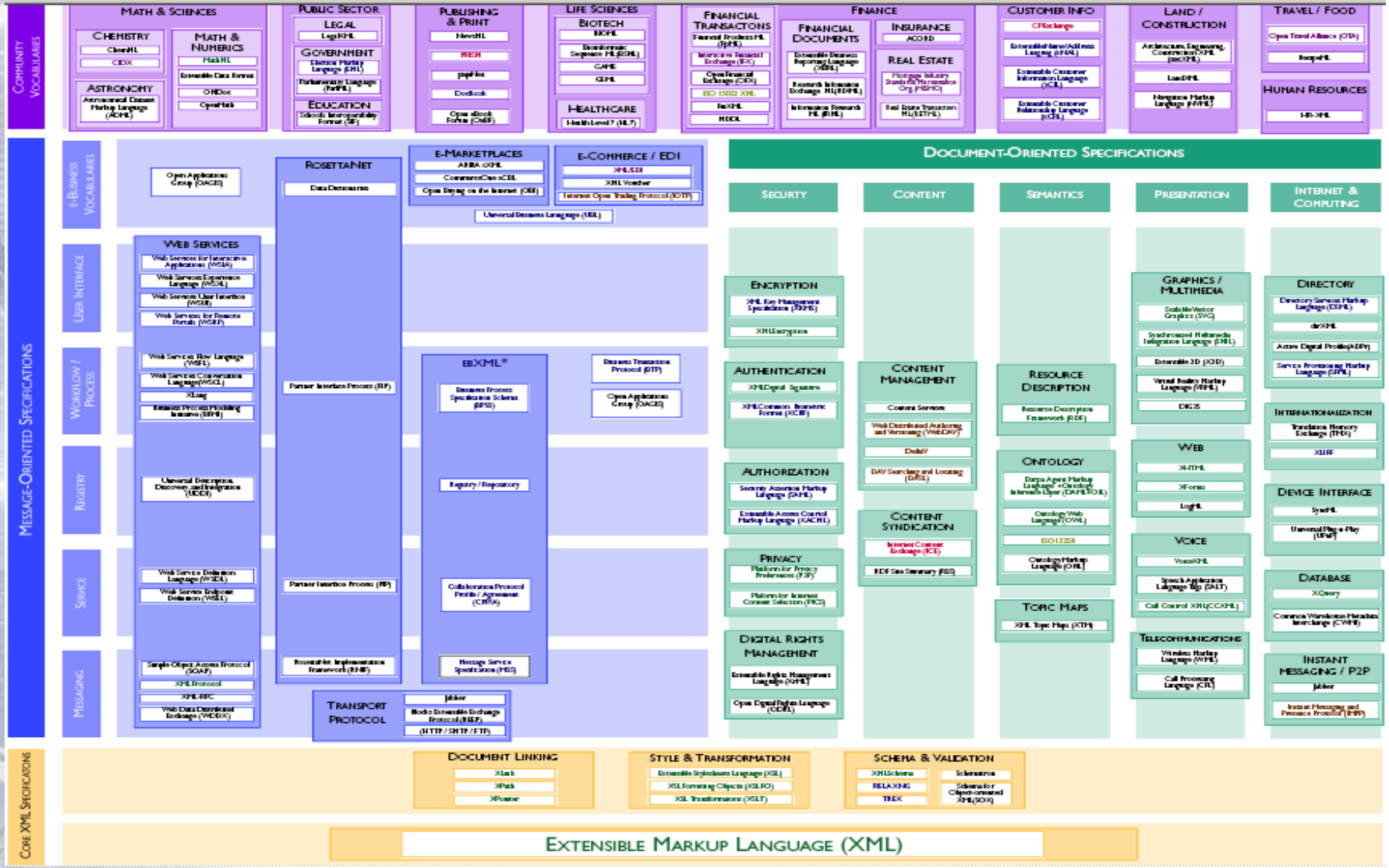
- GUIs GIS evoluídos (PCSS-2D ; PSS-3D)
- OLE em Office. (alguém usa o StarOffice?)
- SkySoft é parceiro da MS ; ESRI.

NOTA: se alguém comenta isto eu sou despedido e tenho de ir fazer data-warehousing para a NovaBase ou SysAdmin para um banco ou, pior ainda, bilhética para a Transtejo.


ADVANTIS PROTOTYPE APPLICATIONS DEVELOPMENT & SYSTEM VALIDATION SKYSOFT's - ROADMAP
1st September
OCTOBER
29th NOVEMBER ADR T+10
DECEMBER
15th JANUARY CDR-2w
FEBRUARY
28th MARCH
APRIL
26th MAY SAR
JUNE
JULY ORR
PHASE B1
PHASE B2
SkySoft
PROTOTYPE SYSTEM VALIDATION PLAN D3140.a
SkySoft
PROTOTYPE SYSTEM AIV PLAN D 3260 .a
FUNCTIONAL UNIT ACCEPTANCE REVIEW
SUBSYSTEM ACCEPTANCE REVIEW
OPERATIONAL READINESS REVIEW
SkySoft
REPORT on the ADVANTIS Prototype System AIV Activitty D 3260.b
SkySoft
Contribution to Prototype Central System SW Verification and Validation Plan (SVVP): TBD D3242.d
SkySoft
Contribution to Prototype Central System SW Specification Document (SSD): TBD Function D3242.a
SkySoft
Contribution to Prototype Central System User Manual (SUM): TBD D3242.b
SkySoft
Contribution to Prototype Central System Transfer Document (STD): TBD D3242.c
Inhouse intranet BETA#1
Working demo BETA#2
Streamming demo BETA#3
RELEASE VERSION
PROTOTYPE RELEASE INHOUSE-DEMO
PCSS/PSS WebGIS
INTRANET SKY
PROTOTYPE RELEASE WORKING-DEMO
PCSS/PSS WebGIS
WWW SKY
OBUs
SIMULATOR
PROTOTYPE RELEASE STREAMMING-DEMO
PCSS/PSS
WWW SKY
OBUs
SIMULATOR
STREAMMING DATA-SERVICE
PROTOTYPE BETA RELEASE
PCSS/PSS
WWW GMV
OBUs
SIMULATOR
STREAMMING DATA-SERVICE
XLL CLIENT COMPONENT
LEGEND
MILESTONES
PROTOTYPE RELEASE
VALIDATION REPORTS
PMP WPs & DOCS

E para quem pensa que sabe algo acerca disto.....

XML SPECIFICATIONS AND STANDARDS



SOLUÇÃO TECNICA:

- **Interoperabilidade/Flexibilidade**
- **Notificações e Alarmes (.Net Remoting)**
- **Data-Providing;Subscription (SOAP/HTTP)**

PROJECTO:

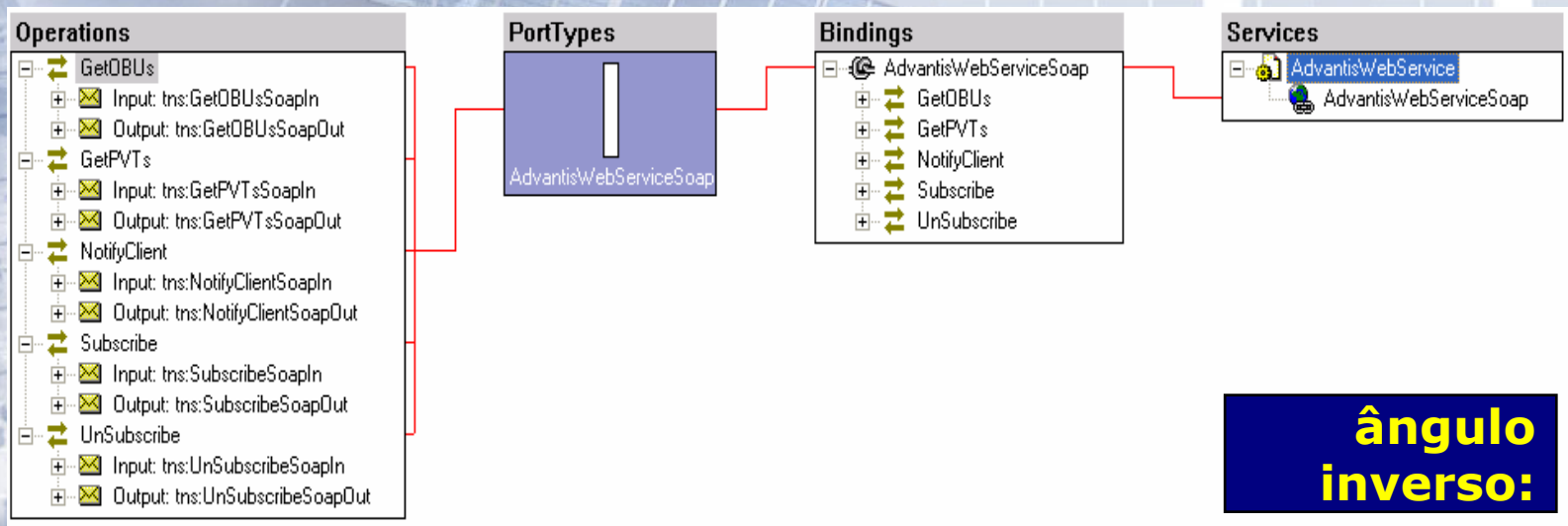
- **Complexidade (HW/MW/SW/Nav/Com)**
- **Agility: RUP - Iterative Development.**

NOTA: Não fiquei suficientemente aborrecido com esta apresentação, e quero saber mais:

www.galileo-advantis.com

Muito Obrigado.

FIM de APRESENTAÇÃO



andre.barbosa@skysoft.pt