Service Oriented Architecture (SOA)

An Interoperable Web Services Architecture for a better Access & Diffusion of Geospatial Information

Map Middle East 2007 - Dubai
Company Profile
Corporate Profile

Creation | 1999

Offices | Belgium – USA – France

Core business | Software editor

Staff | 45 persons

Competency | Leadership in enterprise interoperable geospatial software
Keywords

- Enterprise COTS for Geospatial technology
- Service Oriented Architecture
- Open Standards (OGC, ISO, OASIS, W3C, OMG)
- Java based technology (J2EE)
- High level of expertise & consulting
- Successful experience of operational systems
- Partner / Integrator strategy
Commitment to Standards

ISO

- Editor / Project Leader of **ISO-19000** specifications (TC211) (19128, 19139, 19134, ...)
- Head of **Belgium delegation** at ISO TC211 (Vincent Dessard, Ionic Software)
- **Liaison officer** between ISO TC211 and United Nations (Vincent Dessard, Ionic Software)

Open Geospatial Consortium (OGC)

- **Technical Member** since 1999
- **Co-author of multiple OGC specifications** (WMS, WFS, WCS, Catalog, Context, GML, ...)
- **Seat at OGC Management & Planning Committee** since 2002 (Vincent Dessard, Ionic Software)
- **Chair of the OGC Europe** Group since 2003 (Vincent Dessard, Ionic Software)
- **Member of the OGC Board Of Directors** since 2005 (Chris Tucker, Ionic Enterprise)
- **Member of the OGC Board Of Architecture** since 2006 (Bernard Snyers, Ionic Software)
Markets
Positioning

Defense
- Geospatial Intelligence
- Security / Surveillance
- Homeland Security

Space
- Ground Segment Application
- Earth Observation
- Imagery Libraries

Government
- Spatial Data Infrastructures
- E-Gov & Geo-Portals
- Disaster management
- Public Safety

Enterprise
- Geo-enabled Systems
- Location Based Services
- New Mobility
- Geo Business Component
Vision
Foundation Vision

Interoperable
Geospatial
Services

(1999)

Software Components – Leadership
No escape...

Different data Models ?

New applications ?

New Services ?

New versions ?

New technologies ?

Quality of exchanges ?

New vendors ?
Whatever the source and format of the geospatial information, standard-based SOA allows the integration of data through interoperable services producing decision support information as integrated results, reports, views or maps.
SOA & Web Services
If we were in the pizza business...
But we are in the geospatial business.
Distributed Mapping or geo-enabled services to present and analyze information from “Geo-Servers” using different vendors technology and rendering methods.

- RDBMS / GIS / ‘non-GIS’
  - = Features Servers
  - Objects ➔ GML/XML ➔ Rendering

Web Geo-Services

Clients

Imagery = Map Server

BaseMap = Map Server

Topo = Map Server

Network = Map Server

Distributed Mapping or geo-enabled services to present and analyze information from “Geo-Servers” using different vendors technology and rendering methods.
Exemple : Presentation Service

- Presentation Service (portrayal) is a rendering engine that should support different types of rules and delivers a map as result:
  - These rendering rules are customisable via the StyleEditor.
  - The output formats JPEG, PNG, GIF, BMP, WBMP, GeoTIFF and SVG are supported.
Portrayal Process

1. **Data Source**
   - WFS / Filter

2. **Display Element Generator**
   - WFS / Filter

3. **Image**
   - Image Constraints

4. **Render**
   - Image Constraints

5. **Convert**
   - Device Characteristics

6. **Display**
   - Image Format

7. **Image Format**
   - Image : GIF, PNG,
   - VG : SVG, other XML, HTML...
   - FC : Feature Collection (GML)

8. **OpenGIS Specification For Features**
   - Raster / Vector Descriptions

9. **Display**
   - Rules & Style

10. **Display Element**
    - Features

11. **OpenGIS**
    - Data Source

12. © 2007 - IONIC Software
OGC Presentation Service
(WMS/WFS or CPS/WCS)

• GML
• ESRI Shape

OGC WFS Interfaces

• JPG, GIF, PNG
• WBMP
• GeoTIFF
• SVG

OGC WMS Interfaces

Portrayal

GetMap

GetFeature

RedSpider Web

Oracle Spatial
8i, 9i, 10g

ArcSDE
8.x, 9.x

PostGIS

Shapefiles

GML

Simple Framework API

MIF/MID

Your format
From GIS to Services: SDI

Fusion Diffusion
Publication Integration
Catalog Discovering Viewing

Interoperability

Update/Transactions

Geo Data

Management & Maintenance GIS

Acquisition & Production GIS

Distributed Access, Portals, Diffusion, e-Business, e-Gov, Catalogs, mobile devices, ...

your business

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In SOA Architecture...

- Everything is a Service
  (data, metadata, access, functions, catalogs, ...)
- Every service describes itself, exposing its semantic
- Content & services are registered in a Catalog
- Services can be easily found, with semantic
- User understand what the service is offering
- When found, binding to service is automatic
  (subject to security check)
- User expected result is delivered
  ("certified or trusted" service)
- Optionally, User pay to use a service
SOA, Web Service & Interop Rules

- Define semantic of data and of data types
- Design or map to an interoperable data model / schema
- Adopt standard encoding (XML-based)
- Define semantic of services
- Respect Interfaces (standard!!!)
- Expose interfaces & semantic of services
- Use metadata to describe:
  - Service interface & protocol,
  - Service characteristics,
  - Data served,
  - Usage & semantic,
  - ...
- Register in a Catalog Service

In geospatial, hundreds of man-years have been necessary to define interop standard and achieve consensus ➔ Use it!
Advantages of SOA - Costs & Effectiveness

- Distributed Architecture, subject to security check (dynamic “publish – find – bind”)
- Facilitate organizational decisions: clear responsibility
- Optimize information exposure and decision support
- Avoid data replication, costly and easy-outdated = huge optimization of data conversion costs
- Reduction of integration costs
- Save time: access faster to right information
- More applications possible as more views on information
- Same access method inside and outside the Enterprise, based on open interfaces (abstraction vs implementations)
From GIS to SDI to...
“Geospatial SOA”

Decision Support & Applications

SOA - Services Platform

OGC Bus

- WMS
- WFS - gml
- WCS
- SLD
- FE

- OLS
- Geocoding
- Routing
- Directory
- Gateway

- SensorML
- SCS
- SPS
- WNS
- GML

- CS-W
- DublinCore
- ebRIM
- ISO19119
- ISO19115

- CS-W2
- WMC
- Ontology
- Symbol cat
- SLD

- ebXML
- geoDRM
- WSS
- ...

Others

Services
Network centric Vision...

...through interoperable Service Oriented Architecture
From desktop to distributed architecture

HTTP or Enterprise bus

Model

Data

Client 2

Server 2

Client 3

Server 3

Client 4

Server 4

Client 5

Server 5
From desktop to interoperable distributed architecture

HTTP or Enterprise bus

Expose *interop* Data Model to consumers & application developers

Map internal Data Model to *interop* Data Model

Data Conversion / Migration
(propietary to proprietary)
.shp,.dwg,.dxf,.mid/mif,...
Use Cases
Use Cases

- (2006) EC-EUSC
- (2003) EC-ACE/GIS
- (2004) Luxembourg ACT
- (2005) Danemark KMS
- (2007) Norway KSAT
- (2005) Holland AGI
- (2002) EC-NGIS
- (2004) UK OS
- (2000) France BRGM
- (2001) Eurocontrol
- (2002) Hutch Telecom
- (2006) Mercedes
- (2006) GEOSS
“Implementation of GIS and GIS Integration”
Data input / Data Conversion work

Base Map Data / Planning Data / Utility data / Master Plan Data

Portals & Remote Interoperable Apps

5 Specific Area of Expertise

- Sewerage Utility Detection & Survey
- Digital 3D Model of Abu Dhabi (incl. buildings)
- Road DB for asset mgt
- Air Quality Information System
- Geotechnical Information System

Internet/Intranet/Extranet

Link to other remote OGC WMS/WFS Services, other Catalogs,…
DaimlerChrysler - Call center
Customer Presentation
Ex: Connexion WFS GeoMedia + thematic map
Interop Spatial Operation (intersection) from GeoMedia Client
Shapefile output by WFS extraction seen in a GIS client (GeoMedia, ESRI, ...)

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Civilian Crisis Response
SOA for Public Safety

Dynamic Service Chaining in a SOA!
Disaster Response
Holland – Full SOA OGC platform for National SDI
AGI – light editing in Oracle through WFS-T
The permit inspector (PI) is on site for a control. He turns on his PDA, launches the RWS PDA client, enters his user & password, and logs into the system. Let call our PI: Dirk…
After saving the change from the previous (Adding a new work on a Permit...) screen, the Map view screen shows up again with the new work just created.

Ministerie van Verkeer en Waterstaat

Rijkswaterstaat
SOA vs Portal

Enterprise Services

Portal = Access to Services
Portal <-> SOA Services

User: Submit Task request (new task)
User: Browse and Display Task content
PO: Assign Task identifier
PO: Approve Task Creation
QM: Quality Control of Product
PO: Approve and Deliver Task
TM: Submit request for data
TM: Update Task schedule
TM: Amend Task description
TM: Save Task
TM: Update Task schedule as needed
TM: Review and Pre-Approve Task
TM: Create Task
TM: Submit TAR
DM: Search, order and deliver information sources
DM: Create/Update data catalogue entries according to the data searches
DM: Insert Task into store
DM: Publish Task catalogue entry
DM: Add/update/delete feature/image/collateral data in store
Task schedule includes human/system resources
Activate SIGMA Dataset Creator (creates XML configuration file)
In the Baseline Configuration this will be just storing the tasks file system...

DM: Archive CD
DM: Copy additional data to workspace
SA: Create workspace and copy data
SA: Format Product
SA: Delete data from workspace
AL: Capture features
AL: Amend description in Task schedule

Task Management Tool 0.0 - logged in as USER since 30.06.2004 12:24:46
Welcome to the Nature GIS Network Portal Home Page

This site is under development

FAQ's
The Nature GIS Forum
Register & Find a Nature GIS Service
The Nature GIS Data Model
About the Nature GIS project

info:nature.gis@ionicsoft.com
The Catalog Client

Search, Find and Register OpenGIS WMS and WFS services
Searching for data (service)

- Search by Bounding BOX

- Search for a place (gazetteer)

- Search on basis of alphanumeric criteria (need for metadata to perform smart searches)
Use data in web viewer application

Basic metadata (name, abstract)

Get Information on the data (ISO19115 metadata) and the service (ISO19119)
ex.: URL of the service

Preview of the data (if available)
Geoviewer
Registering a Service
EC / INSPIRE SDI

Web Map viewer
Catalog Client

OGC Bus

Lulea
VUGTK
Cemagref
Prov. Liguria
Others
W- Hungary
JRC
IONIC Software
Gazetteer
Catalog (IONIC)

WFS
WMS
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WMS
A way to give public access to Protected Area information for citizens

Clic on button to highlight the place on map (red spot) and display info in the page, then highlight the related Protected Areas (green polygon)
Citizens \rightarrow Complaint \rightarrow DG-ENV \rightarrow Report

UE Parliament

Other Nature Parks? Nature2000, LIFE? Other complaints? Etc...
e-Gov Application

Servers

Layer Management

Navigation functionality

Gazetteer Service
Benefits of COTS for SOA

COTS Product Suite allows Geospatial SOA

✓ Open Architecture
✓ Interoperable Standards-Based Solution (OGC/ISO/OASIS)
✓ Direct Access to Data & Imagery via SOA / Web Services
✓ J2EE / Enterprise Components
✓ Comprehensive OGC API
✓ Scalable, Robust, Secure Software
✓ Supports High Volumes of Data
✓ Product roadmap supporting evolution of OGC/ISO standards
Conclusion

- SOA allow to develop faster more powerful applications with less costs (interchangeable & reusable)
- With SOA, Geospatial interoperability delivers more value at lower costs
- SOA opens new horizon & challenges
- SOA allows to formalize a federating framework to develop interoperable system at organization level but also across organizations
- ... and all players take benefit of it!
Contact info
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Thank you for your attention

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