

# ECHO, Web Services and the EO Enterprise



**ESIP Federation Meeting**  
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## NASA's ESDIS - Serving the EO Community

- **Providing access to EO data and Services**
- **(R)evolving user community**
- **Resources**
  - Data resources
    - Petabytes of data
    - Multiple locations
  - Service resources
    - Providing functions to manage and optimize of that data and computing resources
      - Publishing, Discovery, Assessment, Transformation, Access, Models, Decision Support Systems



## Overview

**ECHO is a NASA program which supports the Earth Observing community in sharing and discovering Earth Observing related resources.**

### ■ Resources

- Data
- Clients
- Services

### ■ ECHO Offers

- Standards-based Service API
- Tools
- Documentation
- Operations Team





# ECHO's role in the enterprise

## ■ ECHO as Middleware

- Services with programmatic interfaces
- Metadata and Service Registries

## ■ Provides an SOA platform

- Publish, Find, Understand, Access (online and ordering)
- Security, Governance

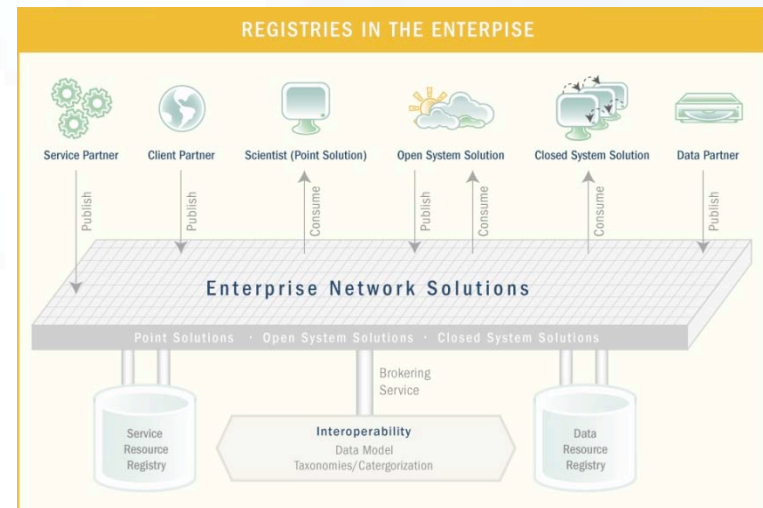
## ■ Supporting Providers and Consumers

## ■ Multiple Providers

- Legacy Systems
- Multiple provider types
  - Data, Service, Client

## ■ Enabling

- More efficient data usage
- Innovation of client application
- Partner organizations to focus on their mission





## Enabling...

**By supporting the publication and discovery of resources from a wide range of providers, ECHO enables:**

- Broader Discovery
  - You can find resources from multiple sources
  - Spatial, Temporal and Parametric Queries
- Uniform Access to data
  - Common Ordering mechanisms
  - Direct Access to Data
- Integration of resources
  - Service Oriented Architecture
  - Loose coupling
  - Service Brokering



# ECHO's Service Interface

## ■ Services for

- Participation
- Publication
- Discovery
- Ordering
- Brokering
- Eventing

## ■ ECHO Services

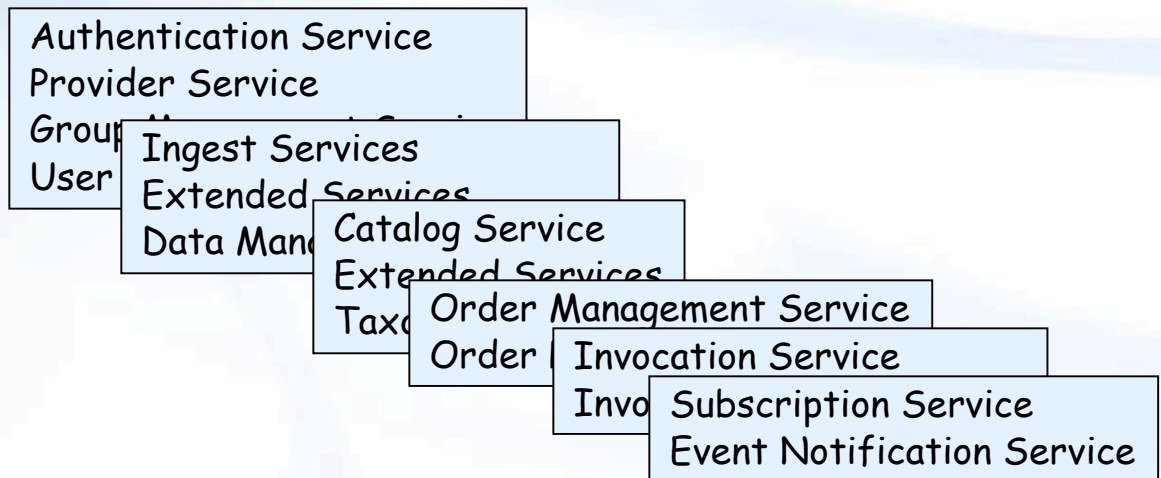
- Web Services
  - WSDL available:

- <http://api.echo.nasa.gov/echo-wsdl/v10/<SvcName>.wsdl>

## ■ Documentation

- <http://www.echo.nasa.gov/reference/index.shtml>

**ECHO** <http://www.echo.nasa.gov/reference/reference.shtml>





## Current Status

- **ECHO has been operational since 2003**
  - Current Version is 10.12
- **Over 110 million resources published in ECHO's registries**
- **Operations team in place to support new participants**
- **Data partners include**
  - NASA DAACs
  - Non-DAACs
  - extra-NASA centers
  - International Partners
- **Alpha Testbed Program open for business**
  - Home page: <http://testbed.echo.nasa.gov/echo/index.html>.
- **ECHO Clients**
  - Currently under development
  - NASA funded



## Recent Developments

### ■ ASTER GDEM

- New Users
- New Orders

### ■ NESI

- Goal: Get interesting EO images in the hands of the general public
- Solution: NASA Earth Science Imagery (NESI) tool
  - Google gadget built on ECHO
- Functions: View image of the day, See more images, Request an image



- Check it out:  
[testbed.echo.nasa.gov/nesi](http://testbed.echo.nasa.gov/nesi)







# Role of Web Services

## ■ Mechanism for sharing resources

- Functional
- Data
- Hardware (including Sensors)

## ■ Isolates responsibility

- Organizationally, Location, Technology

## ■ Enables new way of assembling applications

- Less Stovepiping
- Increased reuse through shared services

## ■ Within an SOA

- Platform for Publication, Discovery, Access, Processing, Orchestration and Control



## Progress of Adoption

### ■ Commitment to using Web Service Standards many years ago

- Providing web service Infrastructure, enabling an SOA

### ■ Move to Services

- Application decomposition, de-layering is gaining strong momentum
- New capabilities are being designed with a services-view point

### ■ Hesitation on offering services

- Once a service is public, how does the organization prepare for its use? Causes services to be "hidden"



## The Need for Security

### ■ As a Service Provider, you may not know:

- Who
  - You are dealing with, who is consuming your offering
  - Potentially within the enterprise, other businesses, and end users
- What
  - They are being used for
  - Services, by design, are often agnostic to the development and evolution of end user facing applications.

### ■ In a SOA world, a poorly implemented client application has the ability to compromise the entire SOA infrastructure and potentially the enterprise itself. Without control over the usage, need to protect the resources.



# Impacts and Vulnerabilities

<i>Impact</i>	<i>Vulnerabilities</i>
<i>Disruption in ability to serve consumers</i>	Operational robustness <ul style="list-style-type: none"><li>• Disaster Recovery, Backup and Recovery, Continuity of Operations (COOP)</li></ul>
<i>Inability to meet performance expectations/requirements</i>	Resource Hogs <ul style="list-style-type: none"><li>• Legitimate and Malicious</li></ul>
<i>Improper Information exposure</i>	Information Protection <ul style="list-style-type: none"><li>• Personally Identifiable Information (PII)</li><li>• Operational data exposure/visibility</li></ul>
<i>Data integrity</i>	Destructive Use - Data
<i>System Protection</i>	Destructive Use - Services
<i>Resource misuse/destruction</i>	Destructive Use - Control
<i>Social</i>	Reputation / Good Citizenry <ul style="list-style-type: none"><li>• Man-in-the-middle: Sourcing or propagating attacks on other resources</li></ul>



## Security Summary

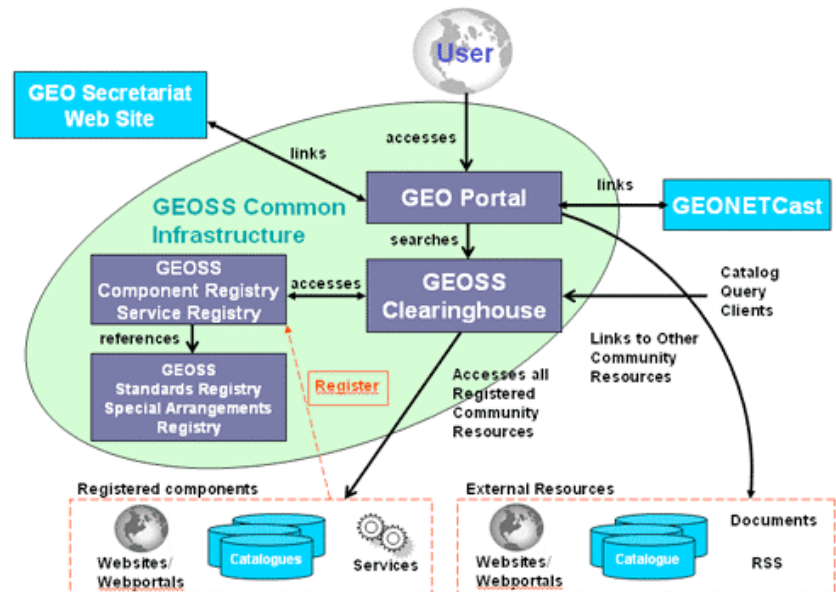
### ■ Does Security Matter?

- As we move away from stovepipes and experiments to shared services and operational infrastructure, we have different needs to protect our resources
- Socially - More popular, more vulnerable
- Need to establish and incorporate Best Practices as a part of our responsibilities
- As we get better at managing the server-side issues, exploitation moves towards the client
- Protect the information, resources, reputation



# GEOSS & Web Services

- Services are a significant part of the GEOSS approach
- GEOSS Common Infrastructure
  - Portals
  - Clearinghouse
  - Registries
    - Components & Services
    - Standards and Interoperability
- There are issues





## Lessons Learned / Observations

- **Standards aren't really mature in many cases**
  - CSW point-to-point, vice interoperability
- **Still have the challenge of categorization**
  - Facilitation of discovery, probably don't want to wait for full adoption of semantic web
- **Service interoperability is complicated**
  - Parameters, chaining, etc. Beyond hand-stitching
- **Address robustness in your plan**
  - Account for exceptions and error management
- **Perl can cause some interoperability challenges (namespace management)**
- **Still a bit of a frontier**
  - But there are very valuable lessons learned, which can be leveraged in the next generation
- **Web Services are a part of the future**
  - NASA EOS is committed to continued adoption of Web Services