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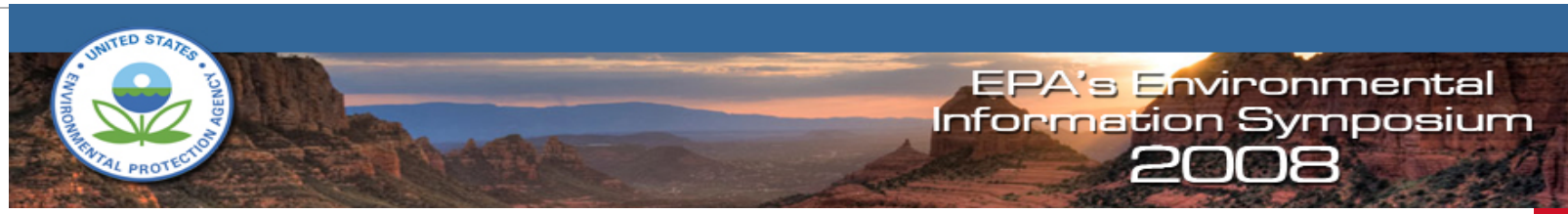


Expanding the Reference Architecture for Environmental Systems of Systems

Carroll Hood
GEOSS Chief Architect

OEI Environmental Information Symposium 2008
Integrated Modeling Workshop
Collaborative Approaches to Integrate Modeling:
Better Integration for Better Decision Making

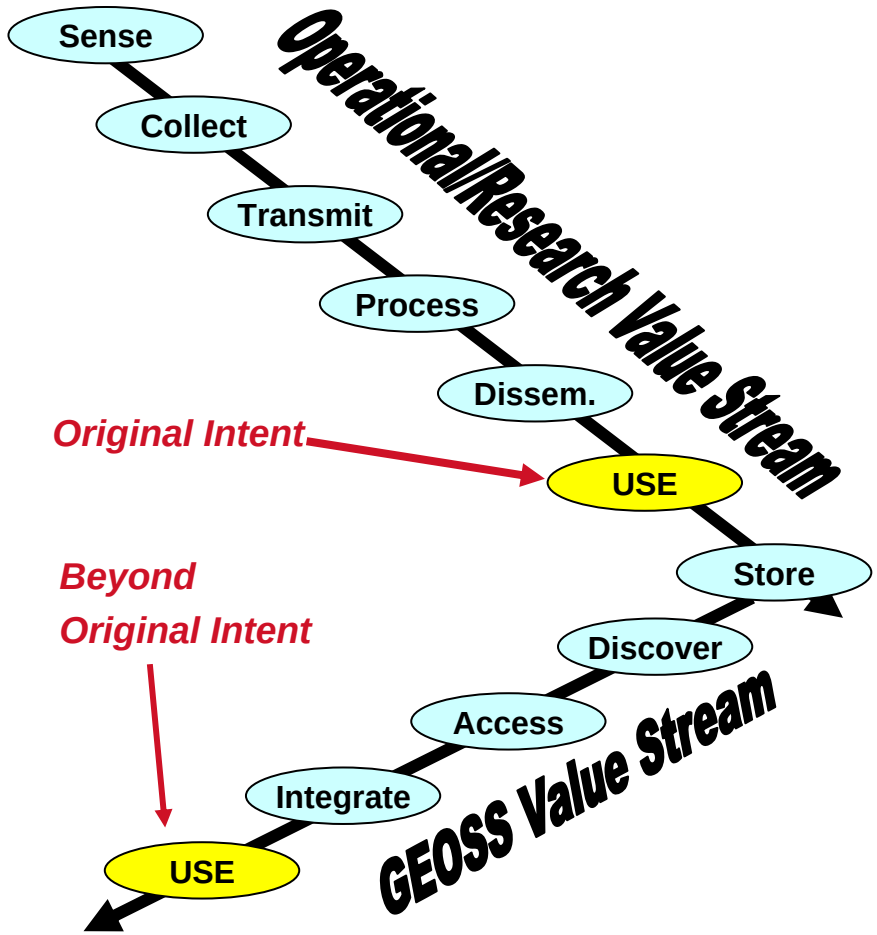
Phoenix, AZ
11 Dec 2008

Outline

- The GEOSS Value Proposition
- Quality Attributes
- GEOSS and Dimensions of Interoperability
- Strategies
  - Common data model approach
  - Syntactic/semantic data services approach
- Comparisons/Conclusions
- The Way Forward for an Environmental LOB

The GEOSS Value Proposition

- Enable *existing and new* Earth and environmental observations, data and information systems, products and services (components) to be used for applications and activities *beyond their original intent*
  - Enable environmental and/or geospatial perspective to be incorporated into decision making for selected social and economic issues whenever and wherever it makes sense
  - Encourage the development of a value-added market for Earth observations data and information products and services
  - Support capacity building in developing countries
- A Government Environmental LOB would share elements of this Value Proposition

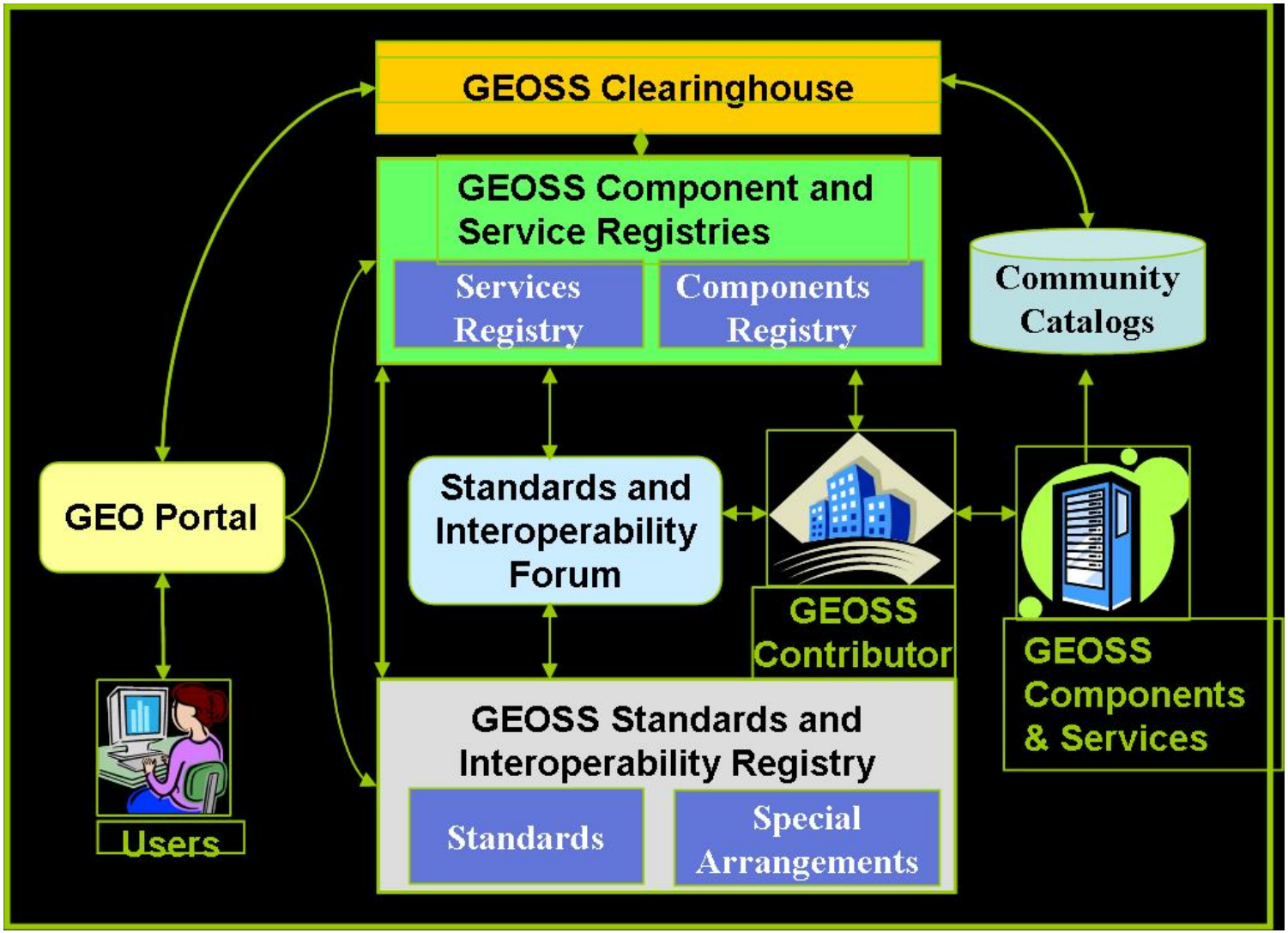


The underlying architecture needs to support this Vision!

Architecture Quality Attributes

Value Component	Related Quality Attributes
Enable environmental and/or geospatial perspective to be incorporated into decision making for selected social and economic issues whenever and wherever it makes sense	▪ ease of discovery, transport, access ▪ tailorable interface ▪ ease in integration, analysis
Encourage the development of a value-added market for Earth observations data and information products and services	▪ extensible to new data types and applications ▪ ability to support diverse business models
Support capacity building in developing countries	▪ low barrier to entry, participation ▪ maintainability

GEOSS Architecture Framework

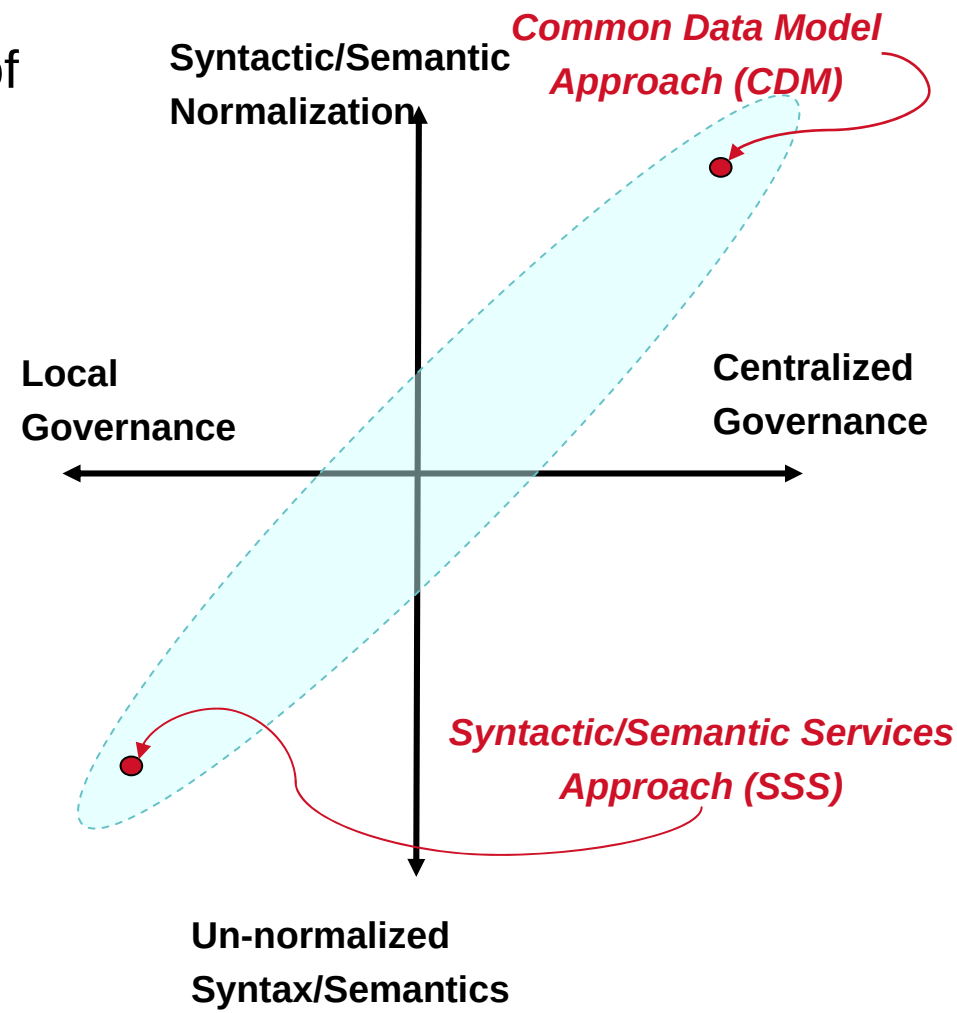


http://geossegistries.info

(as of 2 Dec 08: 165 components, 153 services, 98 standards 5 special arrangements)

Dimensions of Interoperability

- Barriers to interoperability
  - Syntactic: Format and structure of data (intrinsic to data)
  - Semantic: Meaning of data (intrinsic to data)
  - Service Interfaces, Transport and Access, etc. (infrastructure)
- Barriers can be mitigated through use of standards
  - The ability to effectively apply standards within a domain or across disparate domains is related to level and extent of Governance



Common Data Model (CDM) Approach

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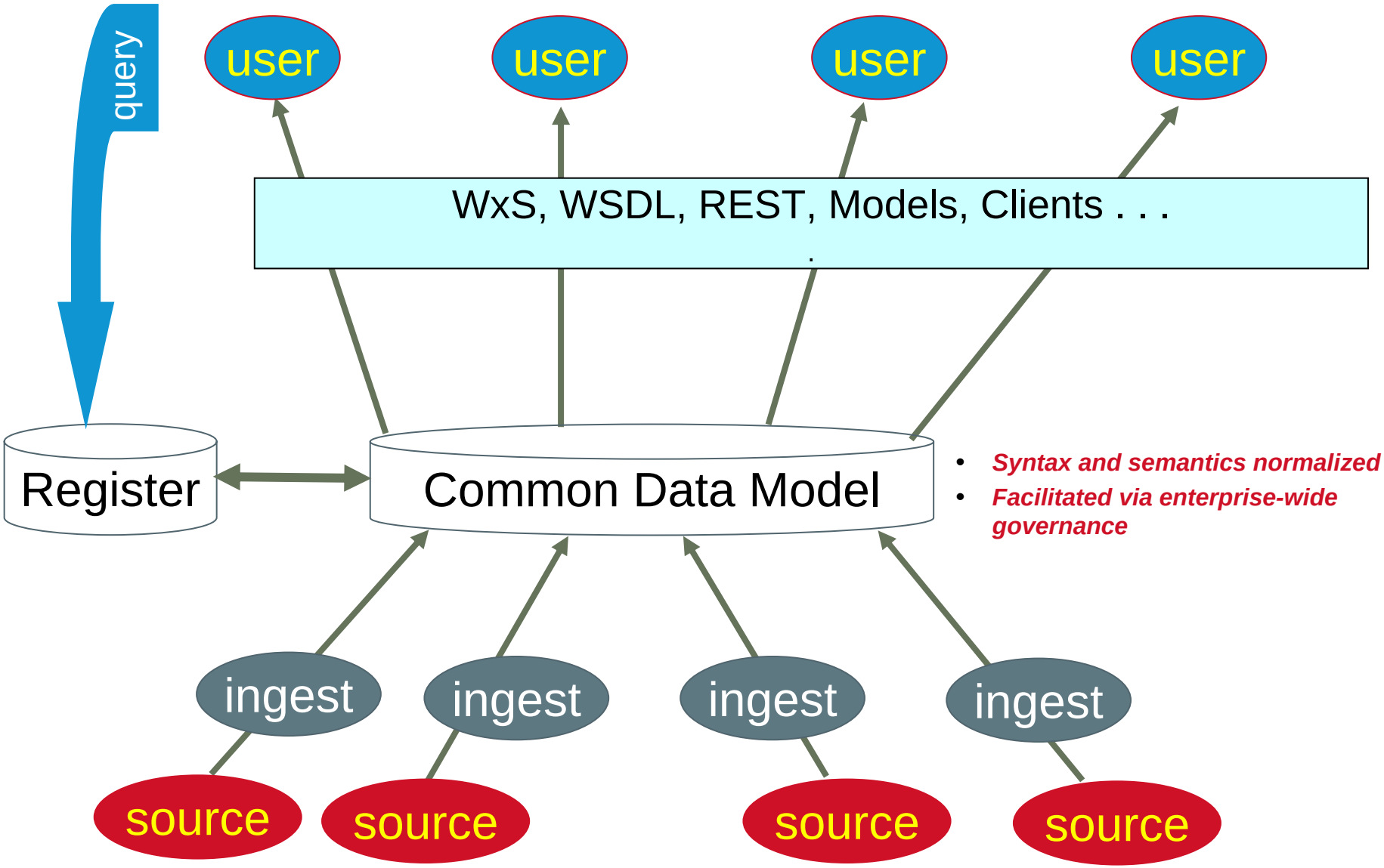

- ***Syntax and semantics normalized***
- ***Facilitated via enterprise-wide governance***

Common Data Model Approach (AWIPS-2)

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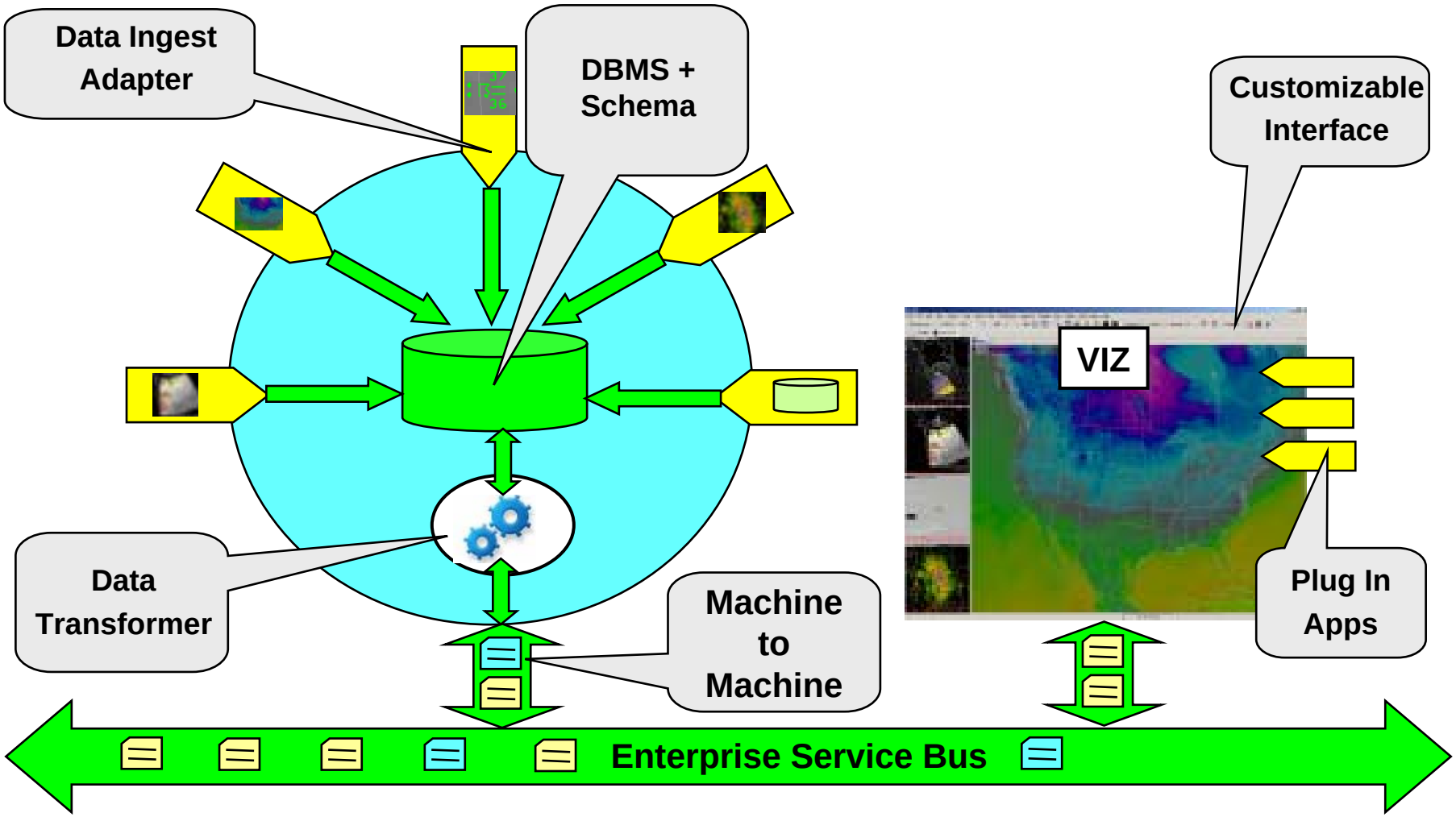

Optimized for performance

Semantic/Syntactic Services (SSS) Approach

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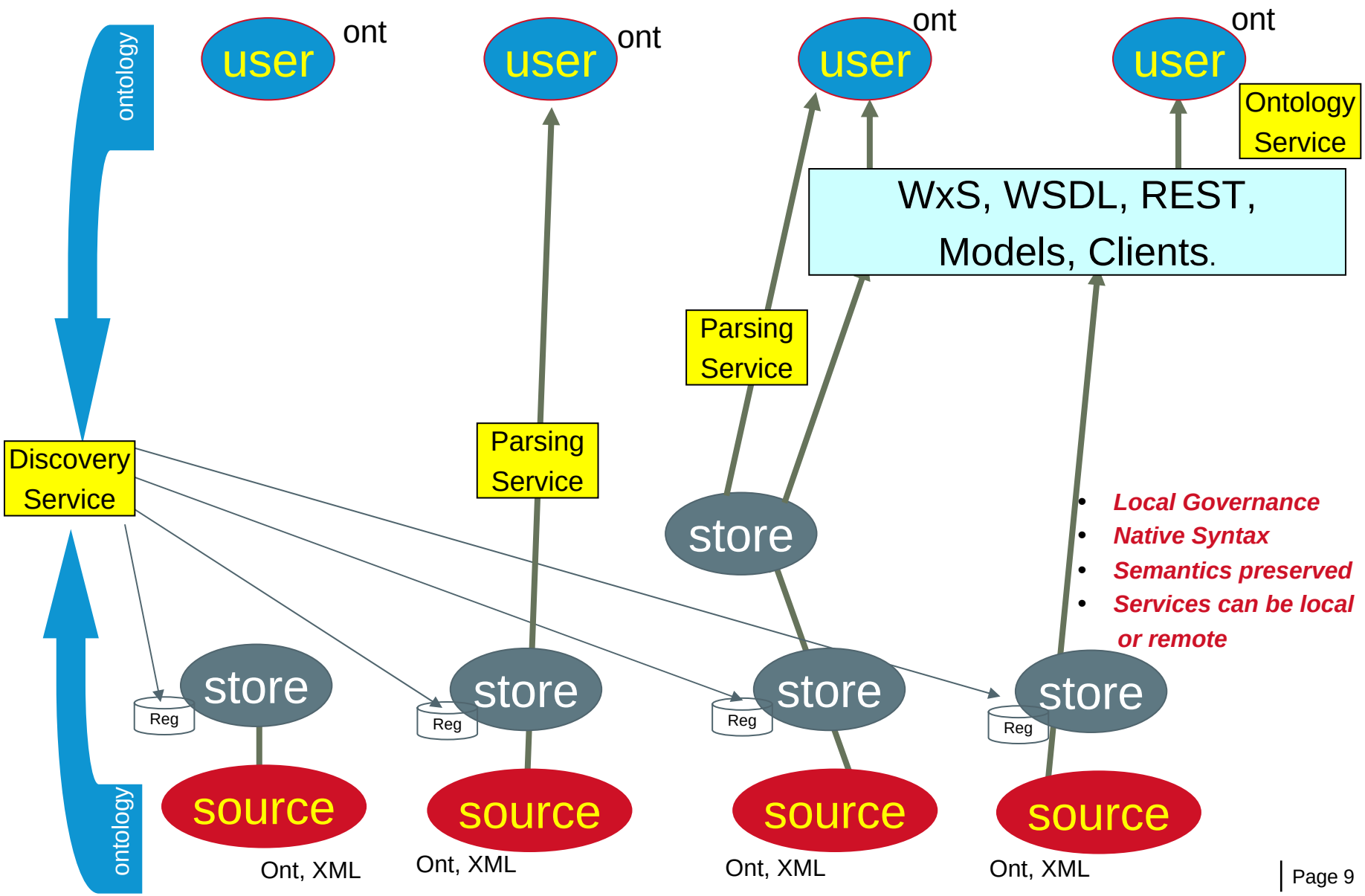

Syntactic/Semantic Services Conopts

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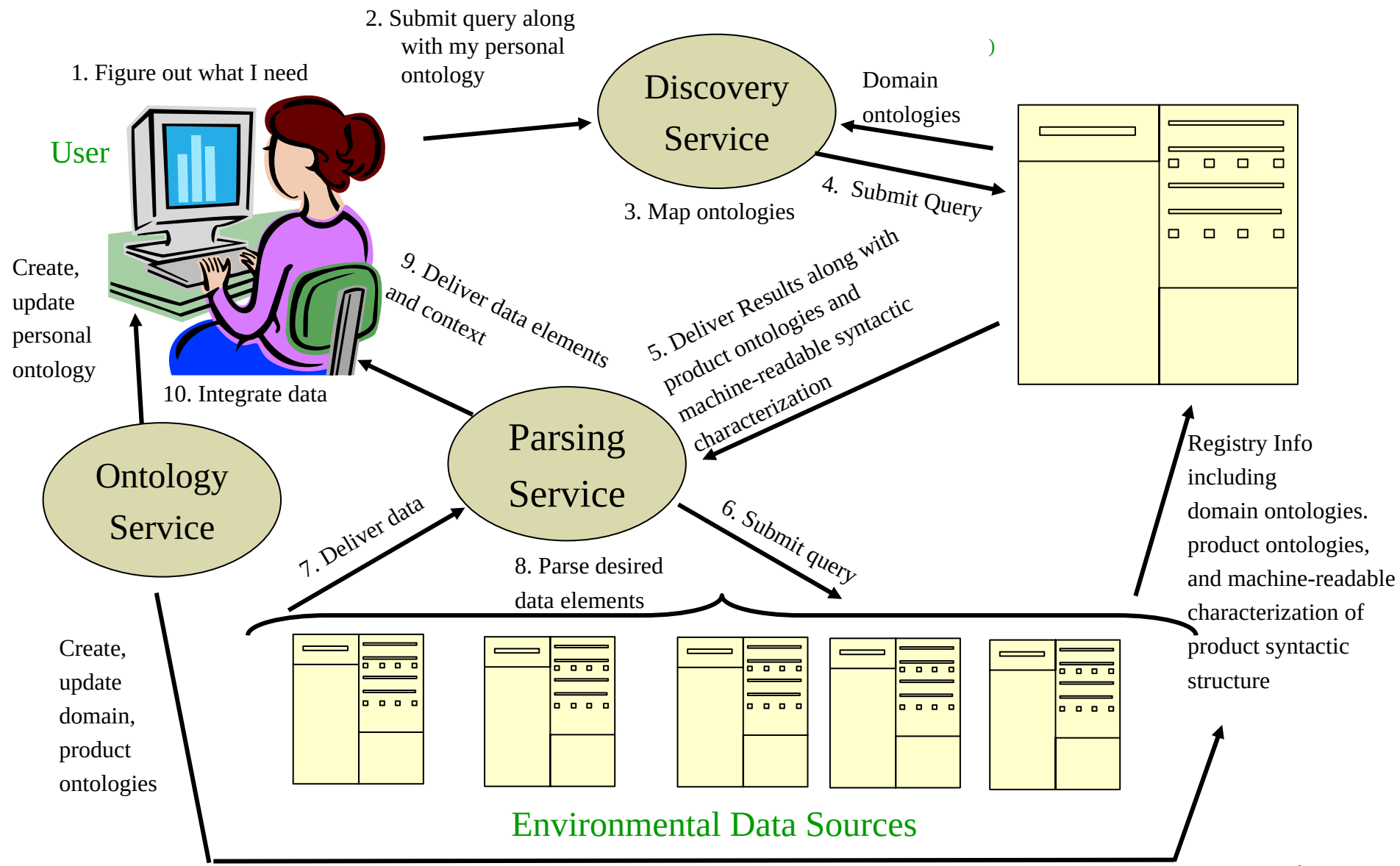

Comparison

Quality Attribute	CDM	SSS
Ease of discovery, transport access	X	
Tailorable interface	X	X
Ease of integration, analysis	X	
Extensible to new data types and applications		X
Ability to support diverse business models		X
Low barrier to entry, participation		X
Maintainability		X

Conclusions

- No value judgment intended
  - Both approaches have merit
  - Both are GEOSS-compliant
- CDM Approach
  - Most favored by IT folks (logical, simple, elegant)
  - Can be implemented now with current technology
  - Facilitated by enterprise-wide governance
  - Can be optimized for performance (i.e., reduce data latency)
  - Perhaps a more viable option for regional or domain-specific nodes/systems
- SSS Approach
  - Not as well understood or appreciated
  - Requires some maturation of ontology-based and schema–based services
  - Great flexibility in the level of integration (i.e., buy-in level can be negligible)
  - Offers potential as a useful reference architecture for cross-domain, geopolitically diverse environmental systems of systems
    - SSS Approach can include CDM Approach

SSS Approach more fully supports the GEOSS Value Proposition

The Way Forward for an Environmental LOB

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SoS reference architectures

Effective cross-agency governance

Shared/leveraged sensors, platforms, campaigns

Complete, hierarchical metadata architecture (discovery, use, store)

Shared, flexible, elastic cloud computing

Outcome-focused Centers of Excellence

Semantic-based creation/maintenance and mapping discovery services

Syntactic-based parsing/access/transport services

Model integration frameworks

Tailored user portlets