



# From Terms to Knowledge

The Potential of Semantics in Environmental Data Integration

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- Status Quo
- Ideal World
- Real World
- Possible Solutions

## Different Meanings

- Spring: The Season
- Spring: Elastic Metal
- Spring: Water Source
- Spring: To Jump

different languages

## Chemical Compounds

Carbon Dioxide

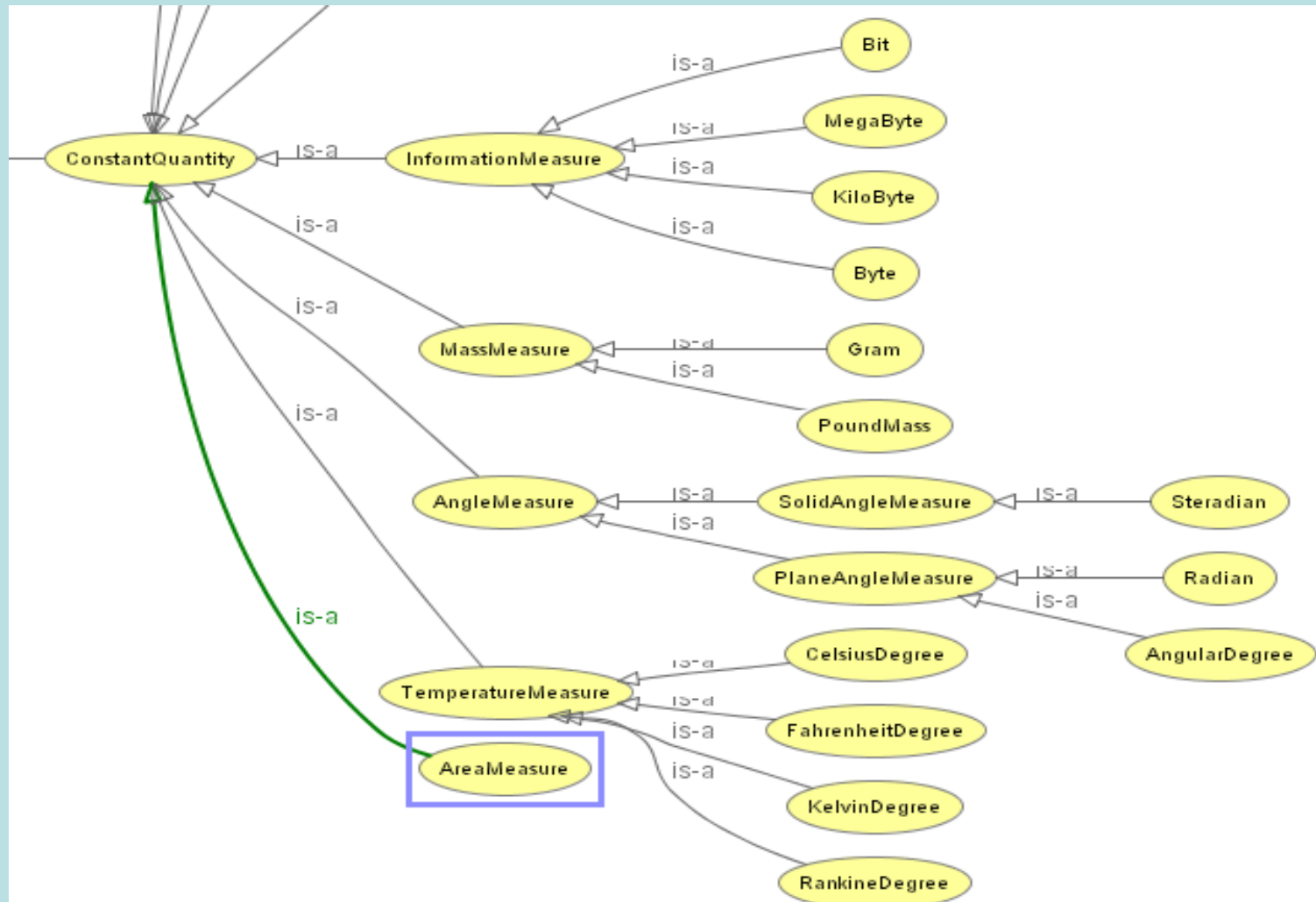


## Species Names

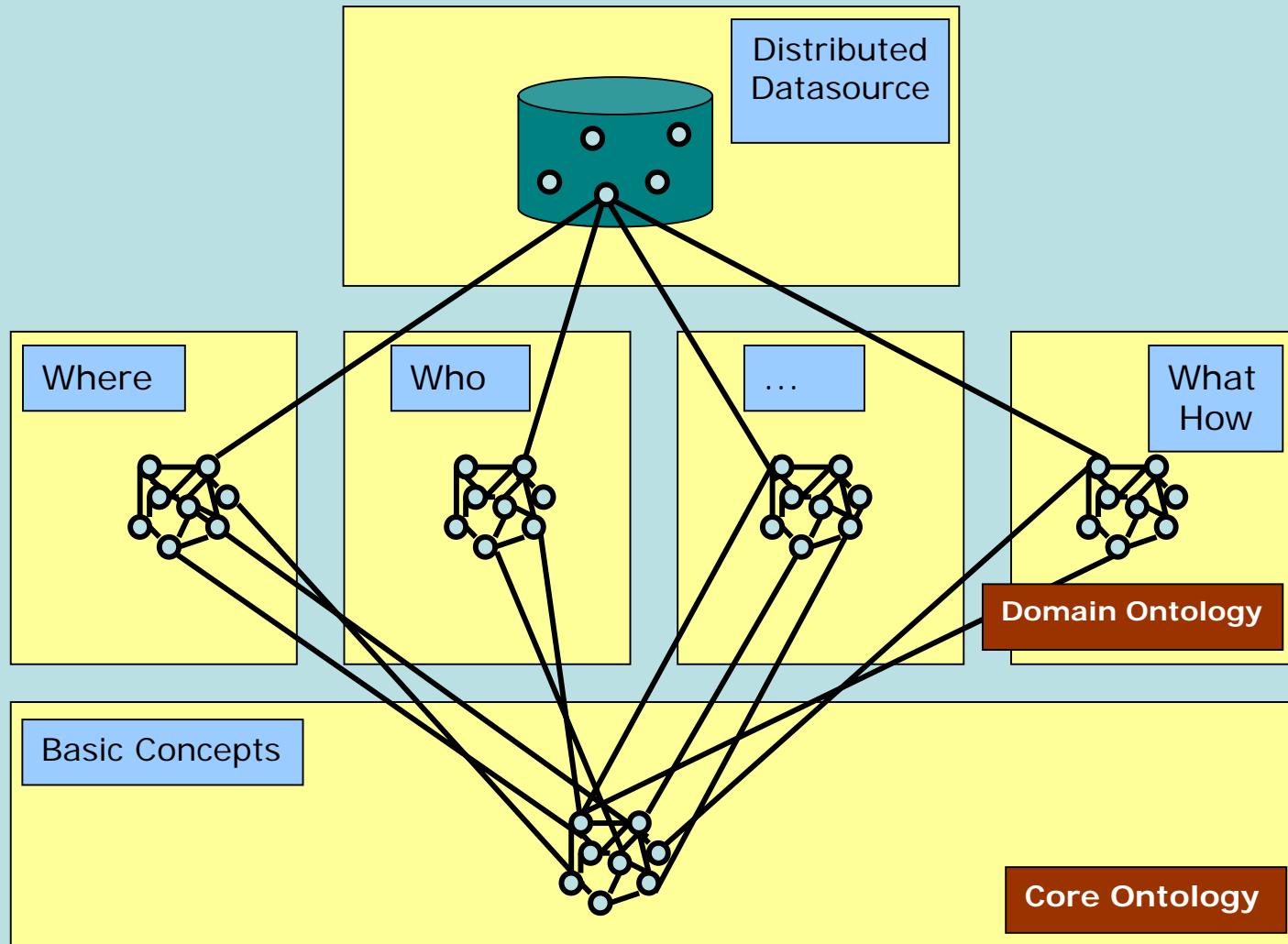
- *Ciconia ciconia* (L., 1758)
- *Ciconia ciconia* (Linnaeus)
- *Ciconia ciconiai* (Linnaeus 1758)
- *Ciconia ciconia* (Linné 1758)

- Forested Swamps
  - Bottomland Hardwoods
- Shrub Swamps
  - Mangrove Swamps
- Bogs
  - Northern bogs
  - Pocosins \*Classification (EPA)
- Fens

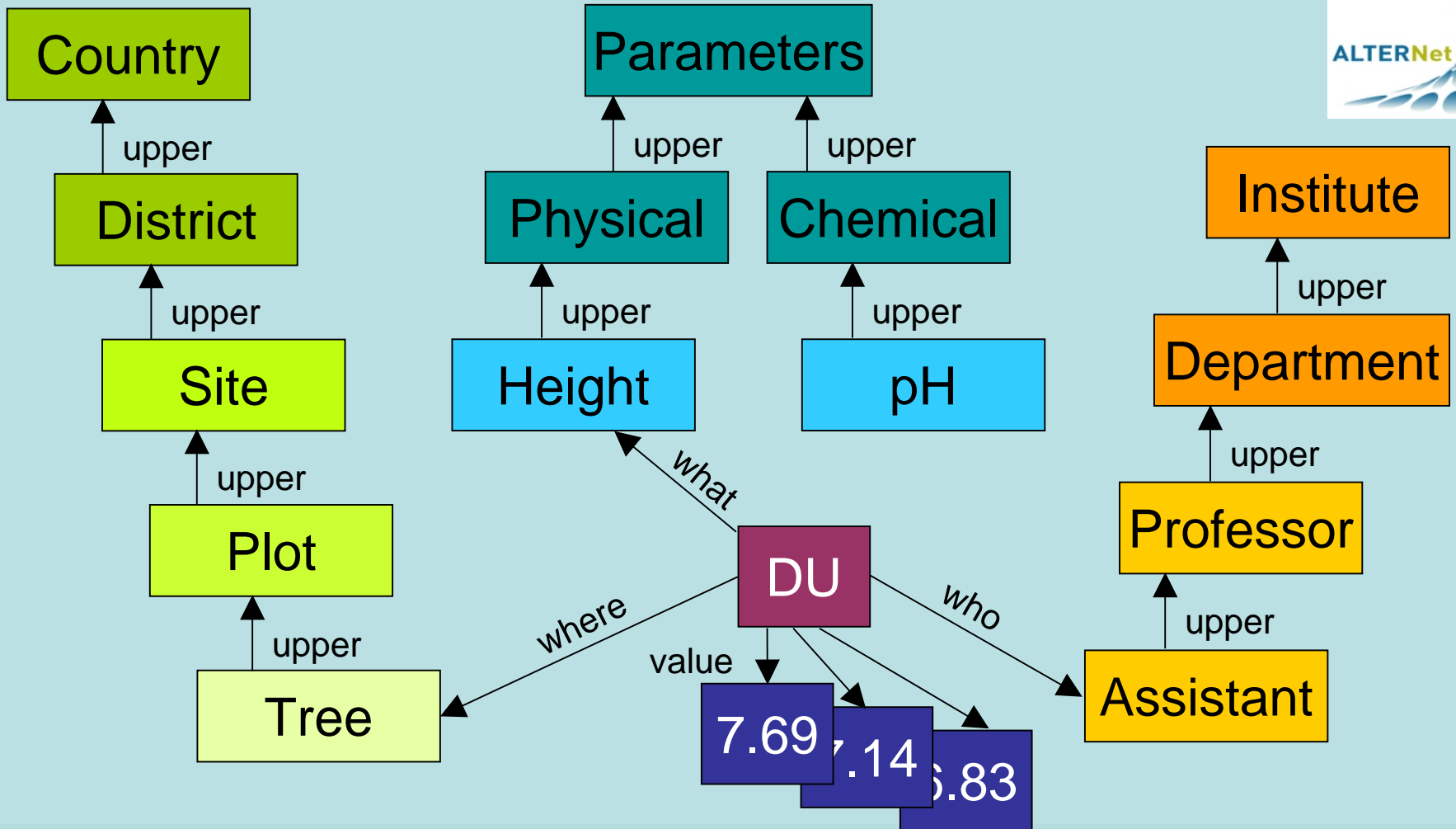
# Ideal World - Core Ontology



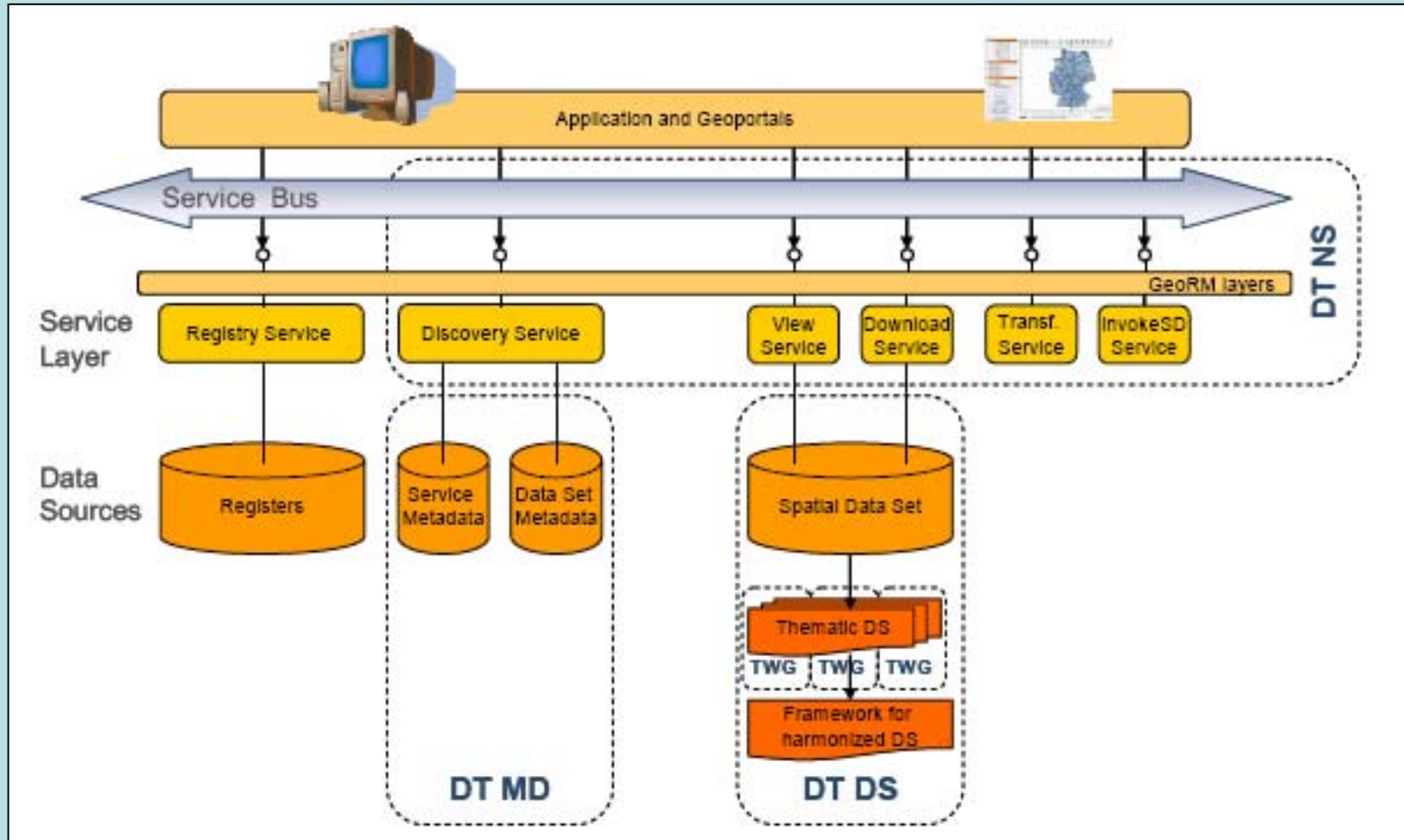
# Ideal World - Distributed Ontologies



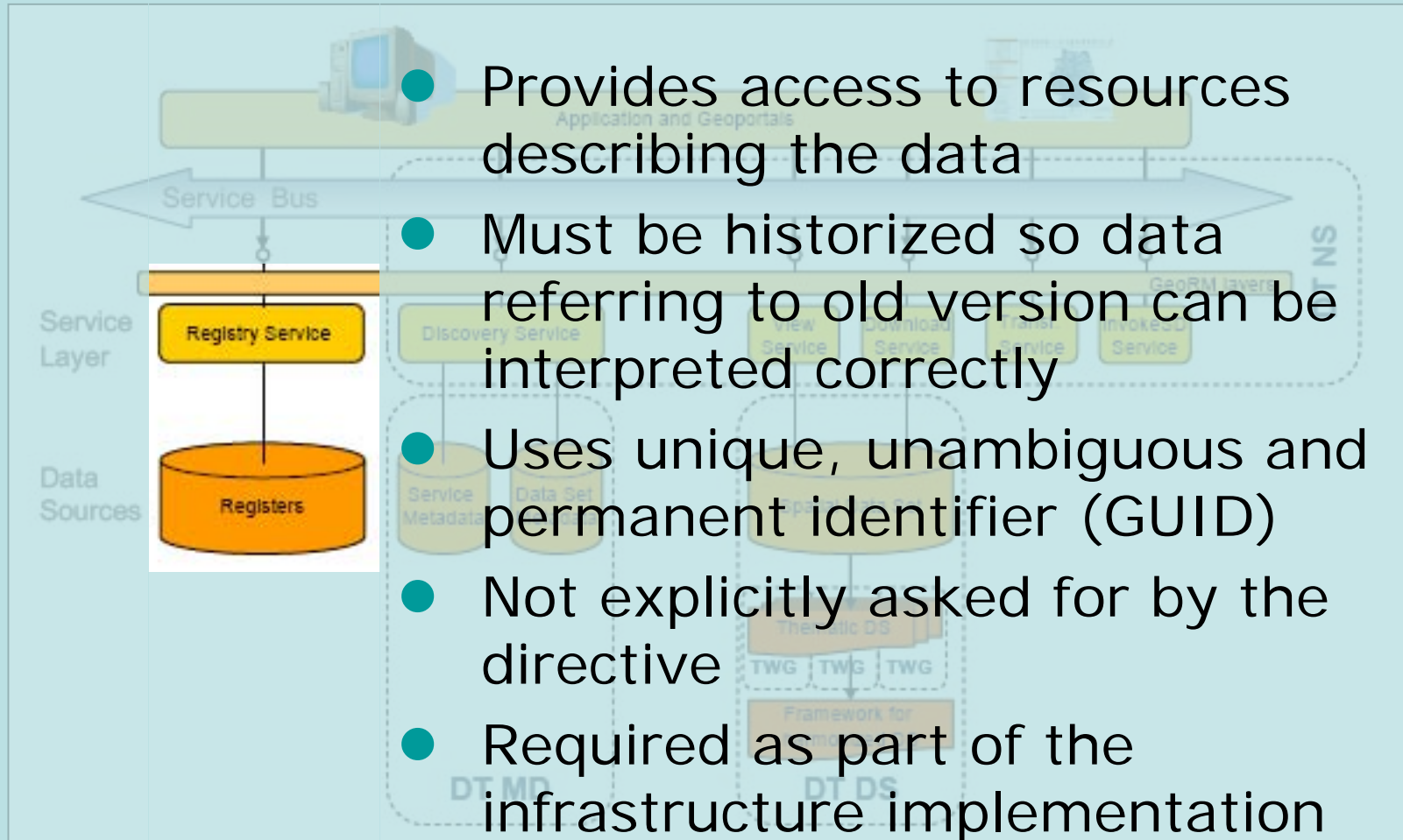
# Ideal World – Ontology Based Storage



# Real World - INSPIRE Architecture



# Real World – INSPIRE Registry Service



- Provides access to resources describing the data
- Must be historized so data referring to old version can be interpreted correctly
- Uses unique, unambiguous and permanent identifier (GUID)
- Not explicitly asked for by the directive
- Required as part of the infrastructure implementation



# Real World – Ontology Supported Search

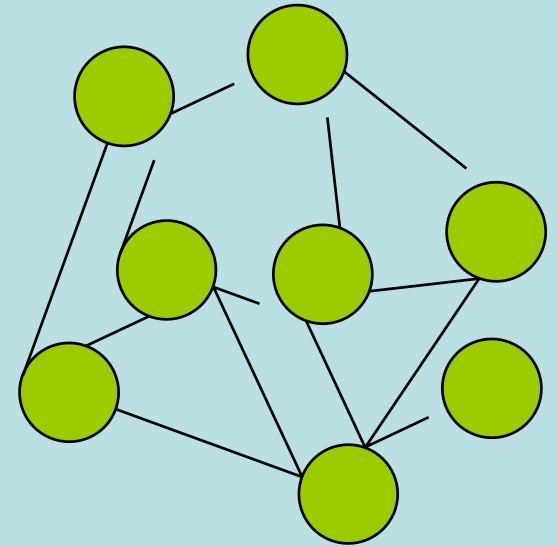
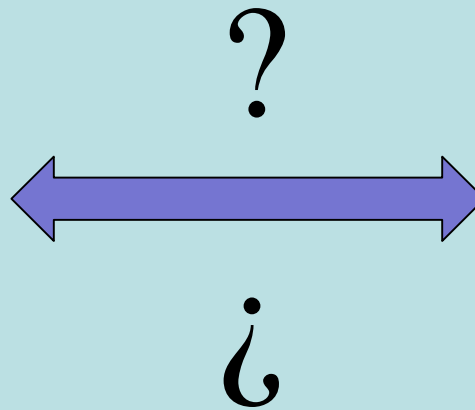
- Use Ontology to support search process
- Navigate ontology to intuitively find concepts
- Option – extend search
  - Wider Terms
  - Narrower Terms
  - Related Terms
- Structure results with ontology concepts
- Example: Orchestra Project



# Real World - Problems

- Knowledge about data best at source
- XML coded data still dependent on text strings
- XML code lists static and limited

# Linking Dreams and Reality



# Possible Solution: xlink

```
<gml:description xlink:href=  
  "http://sweet.jpl.nasa.gov/ontology/property.owl#y.owl#  
  AtmosphericPressure"  
  >  
fluid pressure exerted due to the gravitational effect on the  
column of atmosphere above the position of interest  
</gml:description>
```

```
<om:observedProperty xlink:href=  
  "http://sweet.jpl.nasa.gov/ontology/property.owl#y.owl#  
  Temperature"  
  />
```

# Possible Solution: Keywords

```
<gmd:MD_Keywords>  
  <gmd:keyword>  
    <gco:CharacterString>  
      Temperature  
    </gco:CharacterString>  
  </gmd:keyword>  
<gmd:thesaurusName>  
  <gmd:CI_Citation>  
    <gmd:title>  
      <gco:CharacterString>  
        http://sweet.jpl.nasa.gov/ontology/property.owl#property.owl  
      </gco:CharacterString>  
    </gmd:title>  
  </gmd:CI_Citation>  
</gmd:thesaurusName>  
</gmd:MD_Keywords>
```

# Possible Solution: Codelists

```
<gmd:MD_RestrictionCode
```

```
codeList=
```

```
"http://www.isotc211.org/2005/Codelist/gmxCodelists.owl#  
MD_RestrictionCode"
```

```
codeListValue= "intellectualPropertyRights" >
```

```
intellectualPropertyRights
```

```
</gmd:MD_RestrictionCode >
```