Agenda

8:00 am  Welcome & logistics
8:15  Introductions
8:30  Background; Proposed vision & scope
- Use cases & examples
9:15  Breakout exercise
- Identify important use cases and associated resource types

9:45  Break

10:00  Review of ISO 19115 & relatives
10:30  Development, adoption & maintenance process
- Building on previous & recent work
- Future directions: Industry domain values
11:15  Industry participation: timeline, levels & time comment
11:30  Breakout exercise
- Identify important metadata attributes

12:00 pm  Questions & Answers (What issues should we be sure to address?)
12:15  Adjourn
Introductions

Participants

- AAPG
- Arizona State Geol. Survey
- BHP Billiton
- Chevron
- ConocoPhillips
- Devon Energy
- Energistics
- ESRI
- ExxonMobil

* Organizer

- Fugro Robertson
- GEMS, Inc.
- Gimmal Group
- Hess
- IHS Energy
- Landmark
- Schlumberger
- Shell
- Spatial Energy
- Wood Mackenzie
Workshop Objectives

- Build awareness of this industry metadata standards development effort.
- Solicit input on the proposed vision and scope.
- Attract participation from industry organizations and individuals.
Background

Proposed Vision & Scope
2006 PUG Metadata Workshop

- Anadarko
- APSG/OGP
- BHP Billiton
- BP
- Chevron
- ConocoPhillips
- Deloitte & Touche
- ESRI

*Presented position papers*

- ExxonMobil
- Geodynamics
- Hess
- New Century Software
- EnSoCo
- Petrosys
- Schlumberger IS
- Shell E&P
Previously ...

The Vision:

Realize **metadata standards and applications** necessary within the petroleum industry to enable effective and efficient **discovery and retrieval** of geospatial information.

These standards and tools will **support both proprietary uses of geospatial data, and the exchange of geospatial data between companies.**

*Expectation*: leverage existing standards specifications, such as FGDC and/or ISO 19115.
2006 Objectives

1. Identify a minimum set of geospatial metadata attributes that should be populated for -
   - efficient data search & retrieval,
   - adequate characterization of the data set for audit purposes.

2. Identify a set of industry-standard metadata keyword “facets” (dimensions, categories) and associated vocabularies needed to realize the goal of metadata as a “routine component of information delivery and exchange.”

3. Work with ESRI as they begin development of post-9.2 applications to enhance maintenance and use of geospatial metadata.
The Vision Now...

Realize metadata exchange standards and applications necessary within the petroleum industry to enable effective and efficient discovery, evaluation, and retrieval of geospatial information resources.

These standards and tools will support both proprietary uses of geospatial data, and the exchange of geospatial data between companies.

Leverage existing standards to encourage adoption within the industry and integration into the business, and to exploit existing processes and resources needed for governance and long-term maintenance.
Scope

- **User community:**
  - Anyone cataloging, searching, evaluating or accessing information with value to the upstream (E&P) petroleum community:
  - Upstream petroleum companies, and related ...
    - *Data providers*
    - *Software vendors*
    - *Government agencies*

- **Resource types:**
  - Initial focus on structured and unstructured information resources with associated spatial coordinates. For example,
    - *GIS vector and raster data sets*
    - *Subsurface application data sets*
    - *CAD maps*
  - Long-term vision is to include resources with location specified using place names
**Scope Implications**

- **Deliverables**
  - Metadata standards and guidelines supporting discovery, evaluation, and access
    - Attributes with assigned obligation level/optionality (*Mandatory, Conditional, Optional*)
    - Domain values for selected attributes (*Standard, Recommended*)
  - Identified custodian & process to maintain the standards and guidelines

- **Expanded Scope =**
  - Increased diversity of desired attributes and obligation levels
  - Greater breadth and number of required domain values
  - Slowed development of initial version

- **Allow Future Scope Expansion using ...**
  - Long-term vision to anticipate where flexibility is needed
  - Standards and guidelines versioning
2006 Objective #1

- Focused on FGDC metadata specification
- Proven, U.S. Gov’t standard
- Top-level organization: Example attributes

1. Identification
   - Title
   - Author
   - Publication date
   - Version
   - Abstract
   - Bounding coordinates
   - Keywords
   - Access constraints
   - Use constraints
   - Point of contact
   - Online linkage (URL)
   - Native dataset environment

2. Data Quality
   - Source(s) used
   - Processing history
   - Coordinate ref. system
   - Geodetic datum
   - Distributor contact
   - Distribution liability
   - Technical prerequisites
   - Metadata date
   - Metadata contact
   - Author
   - Publication date
   - Version
   - Abstract
   - Bounding coordinates
   - Keywords
   - Access constraints
   - Use constraints
   - Point of contact
   - Online linkage (URL)
   - Native dataset environment

3. Spatial Data Organization

4. Spatial Reference

5. Entity and Attribute

6. Distribution

7. Metadata Reference
Keyword categories ("facets")

- Title
- Author
- Publication date
- Version
- Abstract
- Bounding coordinates

- Keywords
  - Access constraints
  - Use constraints
  - Point of contact
  - Online linkage (URL)
  - Native dataset environ.

- Theme thesaurus + keyword(s)
- Place thesaurus + keyword(s)
- Temporal thesaurus + keyword(s)
- Stratum thesaurus + keyword(s)
Use Cases
The New User

The New Guy needs to know where the shapefiles (or other data) are for an area of interest. He knows how to use ArcGIS (and other applications) but is not familiar with how the team has stored, edited and compiled data specific to his area of interest.

If a search/browse tool was available to find out what kind of data was available already then he could peruse the data.

For GIS data, what happens now is a fellow team mate sends the new guy an ESRI MXD format file to use.
When does the data get updated?

Users constantly ask about the vintage of the layer or other data since it is not readily date stamped into the name.

If the information was presented readily from the metadata in the application as attributes, then the question could be avoided.

For spatial data, GIS support currently answer these questions and notify users of where to locate the date of last update and update frequency.
What do we know about this area?

Users want to see a listing of all relevant data for an area of interest.

In a geographic browser, user could draw a bounded select to search for every bit of information within that polygon without keywords.

Currently we search the indexed sources with search engines with keywords like a field, basin, or region name.
What data do we have from vendor X?

Users or management wants to know what data we have acquired from a specific vendor.

If metadata was available describing the source or publisher of the data, it would be easy to identify.

Currently we look in specific directories or folders, or inspect layer names or filenames to attempt to identify the vendor or source.
What data relates to Project XYZ?

Users need to find data accumulated and/or generated as part of a specific project. This may be part of a “look-back” into a previous decision or part of a new evaluation.

If project-specific metadata was captured and maintained, the process of finding all project data would be simplified.

Currently we look in specific directories or folders, or inspect layer names or filenames to attempt to identify the project.
Breakout Session 1: Important Use Cases and Resource Types
Breakout Session #1

- **Goal:**
  - Identify important use cases and associated resource types for use to confirm / adjust the vision and scope.

- **Duration:**
  - 15 minutes – Breakouts
  - 15 minutes – Present results

- **Notes:**
  - Identify use cases for which the vision of metadata standards will deliver tangible business value.
  - For the identified high-value use cases, identify important types of resources (datasets, documents, etc.)
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Review ISO 19115 Standard & Relatives
Proposed Foundation

• ISO 19115:2003 North America Profile (NAP)
  • ... a custom implementation of ISO 19115:2003

• ISO 19115
  • Established, robust, international metadata standard
  • Supports discovery, access, evaluation, delivery, and integration

• ISO 19115:2003 NAP
  • Enables description of
    • Geospatial data sets
    • Non-geospatial resources
    • Services: portals, data catalogs, web mapping services, ...
  • Applies to multiple levels of information (e.g., datasets, records, attributes)
ISO 19115:2003

- Defines metadata elements;
- Provides a schema (UML);
- Establishes a common set of metadata terminology, definitions (data dictionary);
- Provides extension procedures
ISO 19115:2003 - Scope

• ...the schema required for describing geographic information and services.
• ...information about the identification, the extent, the quality, the spatial and temporal schema, spatial reference, and distribution of digital geographic data.
• ...applicable to the cataloguing of datasets, clearinghouse activities, and the full description of datasets for a wide range of geographic applications.
• ...applicable to geographic datasets, dataset series, and individual geographic features and attributes
• ...may be used for other forms of geographic data such as map, charts, textual documents
Metadata is composed of information chapters (packages)
## Metadata data dictionary

<table>
<thead>
<tr>
<th>Name/Role Name</th>
<th>Short Name</th>
<th>Definition</th>
<th>Obligation/Condition</th>
<th>Maximum occurrence</th>
<th>Data type</th>
<th>Domain</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 MD_Identification</td>
<td>ident</td>
<td>basic information required to uniquely identify a resource</td>
<td>Use obligation from referencing object</td>
<td>Use maximum occurrence for referencing object</td>
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<td>brief narrative summary</td>
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<tr>
<td>32 purpose</td>
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<td>summary of the intentions with which the resource was developed</td>
<td>O</td>
<td>1</td>
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<td>1</td>
<td>CharacterString</td>
<td>Free text</td>
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<td>34 statusCode</td>
<td>idStatCode</td>
<td>status of resource</td>
<td>O</td>
<td>N</td>
<td>Class</td>
<td>MD_ProgressCode &lt;&lt;CodeList&gt;&gt; (B.6.26)</td>
</tr>
</tbody>
</table>
ISO 19115 Community Profiles

- An ISO 19115 Profile is a custom implementation of the base standard tailored to a specific “Community”

<table>
<thead>
<tr>
<th>Standard</th>
<th>Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad/complex</td>
<td>Narrow focus/often simpler</td>
</tr>
<tr>
<td>Generic</td>
<td>Specific</td>
</tr>
<tr>
<td>Optional</td>
<td>Mandatory</td>
</tr>
<tr>
<td>Undefined domains</td>
<td>Explicit Domains – codelists</td>
</tr>
<tr>
<td></td>
<td>Easier implementation</td>
</tr>
</tbody>
</table>
ISO 19106 - Standardized Profiles

“...set of one or more base standards or sub-sets of base standards...that are necessary for accomplishing a particular function.”

Conformance to profile = conformance with base standard(s) (Conformance Level 1, Strict Conformance)

- Registered Profiles
  - Internationally Registered (ISP)
  - Nationally Registered

- Published Profiles
  - Formally within Community
  - Informally within Organization
Profiles with extensions

- Standards balance needs of interoperability with needs that exceed requirements of the standard
  - Higher interoperability = lower functionality
  - Higher functionality = lower interoperability

- Extensions lower interoperability outside the community

- Extensions are “out of scope” with respect to base standard

- ISO 19106 - Conformance level 2 – ”conforming”
Extension examples

• **Attribute extension**
  change attribute to class, add attributes

<table>
<thead>
<tr>
<th>Standard</th>
<th>Extension</th>
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</thead>
<tbody>
<tr>
<td>Fee: characterString ($100)</td>
<td>Fee: Currency type: codelist (SAR) Amount: decimal (500,00)</td>
</tr>
</tbody>
</table>

• **Code list extension**
  add “East Timor”

• **Package extension**
  add “Biological Taxonomy section”
Communities with a common need for metadata

Regional & organizational profiles

ISO Standard 19115 Geographic Information - Metadata

Profiles Enable Interoperability Between Communities
North American Profile of ISO 19115:2003

The Goal

Canada: CAN/CGSB 171.3-95

USA: FGDC CSDGM

North American Profile
Geospatial Metadata
Based on ISO 19115/19139
ISO 19115:2003 NAP

The Enhancements

1. Selection of items from ISO 19115:2003
2. Promotion of selected optional fields to mandatory
3. Extension of code lists
   - Addition of values to existing code lists
   - Addition of code lists
4. Introduction of a multilingual register
   - Compliant to ISO 19135:2005 on registers
   - English and French (and potentially Spanish)
   - Metadata items
   - Code lists
5. Register will be accessible on the Web
   - XML document
   - Web Services
   - Web Browser
Title: NAP – Metadata
1. Preface (Introduction)
   1.1. About Metadata
   1.2. Using Metadata
2. Scope
3. Normative References
4. Terms and Definitions
5. Symbols and Abbreviated Terms
6. Metadata Content
   6.1. Best Practices
7. Cultural and Linguistic Adaptability
8. Code Lists
9. NAP Metadata Registry
Annexes
   Data Types
   Metadata schemas Differences/UML
   (normative)
   Conformance Clauses
   Metadata implementation
   FGDC to NAP Metadata
NAP Code lists

(From ISO 19115)

<table>
<thead>
<tr>
<th>&lt;&lt;CodeList&gt;&gt;</th>
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<tbody>
<tr>
<td>CI_DateTypeCode</td>
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<tr>
<td>+ creation</td>
</tr>
<tr>
<td>+ publication</td>
</tr>
<tr>
<td>+ revision</td>
</tr>
</tbody>
</table>

Extended

<table>
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</thead>
<tbody>
<tr>
<td>NAPMD_DateTypeCode</td>
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<tr>
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<td>+ publication</td>
</tr>
<tr>
<td>+ revision</td>
</tr>
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<td>+ notAvailable</td>
</tr>
<tr>
<td>+ inForce</td>
</tr>
<tr>
<td>+ adopted</td>
</tr>
<tr>
<td>+ deprecated</td>
</tr>
<tr>
<td>+ supercedeed</td>
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</tbody>
</table>

New – replacing FGDC free text

<table>
<thead>
<tr>
<th>«CodeList»</th>
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<tr>
<td>NAPMD_FileFormatCode</td>
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<tr>
<td>+ bil</td>
</tr>
<tr>
<td>+ bmp</td>
</tr>
<tr>
<td>+ bsq</td>
</tr>
<tr>
<td>+ bzip2</td>
</tr>
<tr>
<td>+ cdr</td>
</tr>
<tr>
<td>+ cgm</td>
</tr>
<tr>
<td>+ cover</td>
</tr>
<tr>
<td>+ csv</td>
</tr>
<tr>
<td>+ dbf</td>
</tr>
<tr>
<td>+ dgn</td>
</tr>
<tr>
<td>+ doc</td>
</tr>
<tr>
<td>+ dwg</td>
</tr>
<tr>
<td>+ dxf</td>
</tr>
</tbody>
</table>

...
Proposed Development, Adoption, Maintenance Process
Development, Adoption, & Maintenance Process

- Development
  - Capability focused (use cases, stakeholders)
    - Avoid becoming self-absorbed
  - Iterative and Progressive
    - Road map, liaisons, openness, resilience
  - Maximal input and participation
    - Layered participation model, multi-level communication modes
  - Strongly seek consensus
    - Test, demonstration, and communicate throughout
  - Keep to announced scheduled milestones
  - Use Energistics methods and means
Development, Adoption, & Maintenance Process

- **Adoption**
  - Plan for adoption from the outset
  - Develop material to reach stakeholders and users
    - Lead, but federate activities with groups and organizations
  - Organize for adoption
  - Use various approaches to building awareness and usage
    - Collaboration (Sharepoint)
    - Web
    - Conference papers, presentations, and exhibit stands
    - Demonstrations, tutorials, toolkits
  - Try to keep everyone’s expectations ahead of us and in the right direction
Development, Adoption, & Maintenance Process

- **Maintenance**
  - Use Energistics standards life cycle methods
    - Cycles
    - Stages
    - Version / release management
    - Change requests and issues management
    - Collaboration tools
    - Certification: software, services, professionals
  - **Mappings**
    - External usage – standards, de facto, etc.
    - Version-to-version
    - Taxonomy horizons
Building on Previous & Recent Work
2006 Follow-up:

- Existing taxonomy/keyword lists collected and compiled from Shell and BHP
- Published dictionaries for:
  - Capture method
  - Data quality
  - Data source
  - Proj/Datum/Elipsoid
  - Format
  - Scale
  - Status
  - Use constraints

- Published three-tier taxonomy for:
  - Place
  - Theme
PUG Metadata Working Group

2006 Follow-up:

- Place taxonomy focused on geopolitical features
- Revealed need for additional parallel facets
  - Geologic, Physical Geography, and Administrative places:
    - Gulf of Mexico
    - Mobile Bay
    - Green Canyon
    - Permian Basin
PUG Metadata Working Group

2006 Follow-up:

- Theme taxonomy focused on a narrow range of GIS features
- Revealed need for additional orthogonal facets
- Revealed a need to support “aliases”
- Progress stalled due to lack of participation
Alignment & integration with the IT portfolio
Shell Exploration & Production

Shell Metadata Standard

- Based on ISO 19115 – International support
- Minimize user impact
  - 12 mandatory fields
  - 8 recommended fields
  - Standard taxonomy where not defined by ISO
- Custom metadata editor
  - Smart defaults
  - Pick lists
  - All other ISO fields optional
- Custom metadata toolbox
  - Programmatic population through Python & Model Builder
<table>
<thead>
<tr>
<th>Field name</th>
<th>ISO</th>
<th>SHELL</th>
<th>ISO Tag</th>
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<tbody>
<tr>
<td>Dataset Title</td>
<td>M</td>
<td>M</td>
<td>ResTitle</td>
</tr>
<tr>
<td>Abstract</td>
<td>M</td>
<td>M</td>
<td>idAbs</td>
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<tr>
<td>Supplemental Information</td>
<td>O</td>
<td>R</td>
<td>suppInfo</td>
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<tr>
<td>Lineage Statement</td>
<td>R</td>
<td>R</td>
<td>dataLineage - statement</td>
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<td>M</td>
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<td>dataLang</td>
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<td>R</td>
<td>M</td>
<td>dataChar – CharSetCd</td>
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<tr>
<td>Status of the dataset</td>
<td>O</td>
<td>R</td>
<td>status – ProgCd</td>
</tr>
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<td>RefDate</td>
</tr>
<tr>
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<td>M</td>
<td>idPOC - details</td>
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<tr>
<td>Online resource</td>
<td>R</td>
<td>R</td>
<td>onLineSrc, geometObjs</td>
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<tr>
<td>Maintenance Frequency</td>
<td>O</td>
<td>R</td>
<td>MaintFreqCd</td>
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<tr>
<td>Metadata Point of Contact</td>
<td>M</td>
<td>M</td>
<td>MdContact: rpIndName and/or rpOrgNamerpCntInfo, cntAddressRole, cntPhone…</td>
</tr>
<tr>
<td>Metadata date stamp</td>
<td>M</td>
<td>M</td>
<td>mdDateSt</td>
</tr>
<tr>
<td>Data usage</td>
<td>O</td>
<td>R</td>
<td>SecConsts - useLimit ClasscationCd</td>
</tr>
<tr>
<td>Geographic Reference System</td>
<td>R</td>
<td>R</td>
<td>refSysID - identCode</td>
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<tr>
<td>Bounding box</td>
<td>R</td>
<td>M</td>
<td>westBL, eastBL, northBL, southBL</td>
</tr>
<tr>
<td>Place Keyword</td>
<td>O</td>
<td>M</td>
<td>Keyword</td>
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<td>Metadata language</td>
<td>O</td>
<td>R</td>
<td>mdlang, languageCode</td>
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<td>Metadata character set</td>
<td>O</td>
<td>R</td>
<td>mdChar, CharSetCd</td>
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<td>O</td>
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<td>O</td>
<td>R</td>
<td>BgFileType</td>
</tr>
</tbody>
</table>

M: mandatory, R: recommended, O: optional
Shell Exploration & Production

System Architecture - The Big Picture

- It’s not just GIS
Standard Taxonomy – Starting Point

- Compiled historical theme keywords from all operating units
- Resolve variations in:
  - Terminology/Culture
  - Granularity
  - Business processes
  - Ambiguity
- Identify equivalent terms – “aliases”
Mandate to align with other search initiatives – EP Catalog

4600 hierarchical keywords and growing

Includes a wide variety of business processes and non-spatial concepts

Resolves ambiguities
Standard Taxonomy – Implementation

- Requires compromise
  - Changes to resolve existing variations
  - Additions to EP Catalog taxonomy
  - Change in workflows
- Lots of work to translate existing metadata
- Software components for
  - Editing
  - Translation
  - Synchronization
Future Directions:
Industry Domain Values
Industry Domain Values

- Energistics – relevant other activities
  - Web Services / Data Exchange (XML) Standards Families
    - WITSML – Drilling, completions, and interventions
    - PRODML – Production operations, optimization, and reporting
    - RESQML – Earth models and reservoir models
    - energyML – Overarching foundation
    - Others pending
  
- E&P Catalog Standards
  - Universal scope – structured, semi-structured, unstructured
  - Universal scope – data, information, knowledge
  - Originally published stand-alone
    - Adaptable for other contexts: Dublin Core, FGDC, ISO 19115, etc.
WITSML “cs_documentInfo”

- **documentName**
- **documentAlias**
- **documentDate**
- **documentClass**
- **fileCreationInfo**
  - **date**
  - **softwareName**
  - **creator**
  - **Comment**

- **documentSecurityInfo**
  - **class**
  - **system**
  - **endDate**
  - **comment**
- **extensionNameValue**
- **disclaimer**
- **auditTrail**
  - **Event**... [date, type, party, ...]
- **owner**
- **comment**

- *Standard metadata included in all WITSML, PRODML, and RESQML data object schemas*
The ‘Information Item Class’ has a unifying role as the composition of the orthogonal dimensions (blue),
E&P Catalog Context Attributes

- Information [KID] Item Class (or Business Item Class)
  - A composition of the following
    - Producer Business Process Class \{Energistics EPBPRM\}
    - Producer Discipline Class \{taxonomy\}
    - Information [KID] Item Role (or Business Item Role) \{taxonomy\}
    - Asset Class \{taxonomy\}
    - Information [KID] Class \{taxonomy\}
  - The composition fosters ease of use and understanding
    - Standardized titles, templates, etc.
    - Selection by Business Process
  - The individual classification dimensions are orthogonal and fosters effective searching

KID = knowledge, information, and/or data
Industry Participation: Timeline, Commitment Levels
Industry Participation

- Participants
  - Energy companies
  - Industry vendors
  - Government agencies

- Commitment
  - Roles
    - “Owner”
    - Contributor & Reviewer
    - User

Steering Group (4-6)
Active Working Group (6-10)
Interested Parties
Proposed Timeline

2009
- Develop Position Paper
  - Status Report @ ESRI UC 2009

2010
- Develop Industry Metadata Profile
  - Status Report @ PUG 2010
  - Stakeholder Reviews
  - Early Adoption Support
  - Status Report @ UC 2010
Breakout Session 2: Most Important Attributes
Breakout Session #2

- **Goal:**
  - Develop initial list of most important metadata attributes

- **Duration:**
  - 15 minutes – Breakouts
  - 15 minutes – Present results

- **Notes:**
  - List important attributes
  - Try to include a brief description or definition
  - Try to include example domain values or references to an existing list domain values (aka code lists)
Questions & Answers?
What issues should we be sure to address?
# Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
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<tbody>
<tr>
<td><em>Alan Doniger</em></td>
<td>Energistics</td>
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<tr>
<td>Alejandro Mateos</td>
<td>Schlumberger</td>
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<td>Andy James</td>
<td>Landmark</td>
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<td>Bob Warford</td>
<td>ESRI</td>
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<td>Crystal Carreon</td>
<td>Wood Mackenzie</td>
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<td>Doug Gregory</td>
<td>Chevron</td>
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<tr>
<td>Grant Tucker*</td>
<td>Shell</td>
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<td>James Cokinos</td>
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<td>ConocoPhillips</td>
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* Workshop organizer