Industry and Regulatory Cooperation for Better Information

Trudy Curtis
CEO, PPDM Association
The PPDM Association is a not for profit professional society dedicated to

- Recognition of data as a critical asset for industry
- The creation of useful data management standards
- Recognition of data management as a professional discipline

Founded 1991
CAPABILITY IMMATURITY MODEL

- Undermining
- Contemptuous
- Obstructive
- Negligent
ALIGN CMMI AND INDUSTRY

- **Level 1** Initial: Processes unpredictable, poorly controlled and reactive
- **Level 2** Managed: Processes characterized for projects and is often reactive.
- **Level 3** Defined: Processes characterized for the organization and is proactive. (Projects tailor their processes from organization's standards)

- **Individual Practices**
- **Group Procedures**
- **Company Policies**
CAPABILITY MATURITY IS FRACTAL

Initial
Managed
Defined
Quantitatively manage
Optimize

Initial
Managed
Defined
Quantitatively manage
Optimize

Initial
Managed
Defined
Quantitatively manage
Optimize
WHAT INDUSTRY STANDARDS BODIES DO

• Gather industry experts together in an open, vendor neutral environment to communicate and share ideas

• Facilitate the development of best practices that benefit industry as a whole

• Encourage the adoption of best practices for the benefit of industry

• Best practices are recognized as standards because the development process creates trust in industry

A standard is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose. (ISO)
O&G DATA IS A COMPLEX, VALUABLE ASSET!

Lots of kinds of data

Through a complex life cycle

In many regulatory environments

Over a period of decades.

Used by many different groups of people

Drilled August 16, 1861
McClintock Well No. 1
WHAT ABOUT INDUSTRY AND REGULATORS: DO WE HAVE ANY COMMON CHALLENGES?

- Words mean different things
- Process are different
- Representation is different
- Rules are different Possibly out-dated
- Communication challenges
- Long Learning Curves People are less portable
- Mistakes Misinterpretation
- Risk of non-compliance Risk of liability
COLLABORATE? AGREE? SHARE?

Planning
Drilling
Regulators
Reporting
Geology
Petro physics
Vendors
Land rights
Financial
Completions
Partners
Work-overs
Production
Reservoir
A BIG CHALLENGE (WITH REAL WELLS)

What -- exactly -- is a well?

Does everyone identify the same component?

How does each user over the life cycle find and use his data?
How many wellbores are there? How many completions are there?

1. The initial well set producing through the tubing string.
2. As a later date, the well is abandoned and completed in shallower formations.
3. The lower perforations are squeezed off and the well is completed in shallower formations.
4. The original well is abandoned due to junk down the hole. A whipstock is set above the junk and a sidetrack is added to the original target.
5. A pilot hole is started (not completed) and a whipstock is set at the point that the lateral (horizontal) wellbores are initiated along the target formation.
6. A pilot hole is drilled (not completed) and a whipstock is set at the point that the dual lateral (horizontal) wellbores are initiated along the separate target formations. The well is produced through a single tubing string.
TERMINOLOGY: WHAT IS A WELL?

Does the kind of identifier change regionally?

Who identifies "it"?

What happens when the identifier is changed by the regulator?

Do wellbores matter?

What does the identifier represent?

How many "wells" is this?

TERMINOLOGY: WHAT IS A WELL?

1. Well Origin (WO)
   A Well Origin is a point on the surface of the earth where the drill bit is
   planned to penetrate or does penetrate the earth to establish or rework a Well.

2. Wellbore (WB)
   A Wellbore is a path of drilled footage, from the Well Origin (top/start) to a
   terminating point (bottom/end).

3. Wellbore Segment (WS)
   A Wellbore Segment is a unique section of a Wellbore from the Well Origin to the
   terminating point containing additional footage from a point in an existing Wellbore to a
   new terminating point.

4. Wellbore Contact Interval (CI)
   A Wellbore Contact Interval is a measured depth range within a Wellbore that is
   intended to put the Wellbore into contact with one or more stratigraphic zones for the
   purpose of production, injection or service.

5. Wellbore Completion (C)
   A Wellbore Completion is a set of one or more Wellbore Contact Intervals that
   function as a unit to produce or inject fluids.

6. Wellhead System (WHS)
   A Wellhead System is a row of funds through a conduit determined by an
   installed wellhead configuration.
PROBLEMS WITH “COMPLETIONS”
VERY AMBIGUOUS, OFTEN UNCLEAR

Scenario 1
- Completion = Production volume reporting

Variations on this theme
- Commingle by pool
- Commingle by wellbore

Scenario 2
- Completion = Location in a Wellbore

Variations on this theme
- Base on length, time, activity, angle of deviation
- Contact interval
- Wellbore Completion interval(s)

Scenario 3
- Completion = Activity in a Wellbore

Activities part of this theme
- Plugbacks, Treatments, fracturing, perforations, workovers…
- Many activities over time!

Scenario 4
- Completion = Regulatory filing event

Elements of this theme
- Documents
- Inspections
- Specific permissions granted…

Some regulators assign this a new identifier
When we identify a well, what does the identifier mean? Does it contain embedded meaning?

What happens if important well components are not identified?

What happens when identifiers change over time?
WELL IDENTIFICATION: A GLOBAL FRAMEWORK

GLOBAL WELL IDENTIFICATION FRAMEWORK

The Global Framework is a set of guiding principles for any Well Identification System and best practices for their application.

The Global Framework defines all of the components and protocols of a Well Identification System and specifies standards and best practices for identifying wells uniquely and unambiguously.

Well Identification System
A Well Identification System (WIS) is the structured assembly of criteria, methodology, and facilities that enable an authority to administer well identities. "Administrator" includes assignment, dispensation, cross-referencing, and maintaining a history of changes. A Well Identification System is a combination of the following:

1. Well Identification System Standard (WISS) - the specifications and best practice recommendations for creating each of the parts of any Well Identification System that follows that standard.
2. Well Identification System Implementation (WISI) - a documented process for creating well identities within a specific business or regulatory entity.
3. Well Identification System Repository (WISR) - the master list of identifiers and their supporting attributes and metadata created by a specific Well Identification System Implementation.

7 GUIDING PRINCIPLES FOR DESIGNING THE FRAMEWORK

The Global Framework is based on the following seven guiding principles, which incorporate the essential business requirements for a Well Identification System.

Guiding Principle 1
A Well Identification System must be capable of assigning an identifier to every Well Origin, Wellbore, or Wellbore Completion in its scope.

Guiding Principle 2
All identifiers assigned by a Well Identification System must be permanent.

Guiding Principle 3
All identifiers assigned by a Well Identification System must be unique within that system.

Guiding Principle 4
A Well Identification System must relate every identified Wellbore to the Well Origin where it begins.

Guiding Principle 5
A Well Identification System must relate every identified Wellbore Completion to the Well Origin and/or Wellbore(s) from which it was created.

Guiding Principle 6
The Global Framework must define the information required for each part of the Well Identification System. The information must be detailed enough to allow users of the Well Identification System to find and exchange well information unambiguously.

Guiding Principle 7
Each part of the Well Identification System must have an identified owner (Authority) and documented processes for the management of change.

Example of the Well Identification Standards

- Well Identification System Standard (WISS)
- Well Identification System Implementation (WISI)
- Well Identification System Repository (WISR)
- United States
- Canada
- State Implementation
- Provincial Implementation
- State Database
- Provincial Database

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**WELL IDENTIFICATION:**

**UPDATE THE US API SPECIFICATION**

<table>
<thead>
<tr>
<th>US Well Identification Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unique County</strong></td>
</tr>
<tr>
<td><strong>Unique Wellbore</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Positions:</th>
<th>1-2</th>
<th>3-5</th>
<th>6-10</th>
<th>11-12</th>
<th>13-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code Name:</td>
<td>State</td>
<td>County</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Example:</td>
<td>31</td>
<td>101</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Only digits are allowed in positions 1 – 12.

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**PPDM Industry GWPC**
Well Status helps us to find wells

They are used by every user

And help us to create meaningful maps and reports.
## IHS WELL STATUS CODES (OVER 300)


<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10&amp;3G</td>
<td>1 OIL &amp; 3 GAS WELL</td>
</tr>
<tr>
<td>10&amp;3GW</td>
<td>1 OIL &amp; 3 GAS WELL WORKOVER</td>
</tr>
<tr>
<td>10&amp;3WI</td>
<td>1 OIL &amp; 3 WATER INJECTION WELL</td>
</tr>
<tr>
<td>10&amp;4G</td>
<td>1 OIL &amp; 4 GAS WELL</td>
</tr>
<tr>
<td>10&amp;4GW</td>
<td>1 OIL &amp; 4 GAS WELL WORKOVER</td>
</tr>
<tr>
<td>10&amp;5G</td>
<td>1 OIL &amp; 5 GAS WELL</td>
</tr>
<tr>
<td>10&amp;5GW</td>
<td>1 OIL &amp; 5 GAS WELL WORKOVER</td>
</tr>
<tr>
<td>10&amp;6G</td>
<td>1 OIL &amp; 6 GAS WELL</td>
</tr>
<tr>
<td>10&amp;6GW</td>
<td>1 OIL &amp; 6 GAS WELL WORKOVER</td>
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<tr>
<td>10&amp;7G</td>
<td>1 OIL &amp; 7 GAS WELL</td>
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<tr>
<td>10&amp;7GW</td>
<td>1 OIL &amp; 7 GAS WELL WORKOVER</td>
</tr>
<tr>
<td>10&amp;9G</td>
<td>1 OIL &amp; 9 GAS WELL</td>
</tr>
<tr>
<td>10&amp;9GW</td>
<td>1 OIL &amp; 9 GAS WELL WORKOVER</td>
</tr>
<tr>
<td>1&amp;1S</td>
<td>1 UNDESIgnATED INJECTION &amp; 1 SERVICE WELL</td>
</tr>
<tr>
<td>1W&amp;1S</td>
<td>1 WATER INJECTION &amp; 1 SERVICE WELL</td>
</tr>
<tr>
<td>1W1S</td>
<td>1 WATER INJECTION &amp; 1 SERVICE WELL WORKOVER</td>
</tr>
<tr>
<td>1W1S0W</td>
<td>1 WATER INJECTION &amp; 1 SERVICE WELL WORKOVER WITH OIL SHOWS</td>
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<tr>
<td>1W1SO</td>
<td>1 WATER INJECTION &amp; 1 SERVICE WELL-OIL SHOWS</td>
</tr>
<tr>
<td>2G&amp;1S</td>
<td>2 GAS &amp; 1 SERVICE WELL</td>
</tr>
<tr>
<td>2G&amp;1WI</td>
<td>2 GAS &amp; 1 WATER INJECTION WELL</td>
</tr>
<tr>
<td>2G&amp;2WI</td>
<td>2 GAS &amp; 2 WATER INJECTION WELL</td>
</tr>
<tr>
<td>2G&amp;3WI</td>
<td>2 GAS &amp; 3 WATER INJECTION WELL</td>
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<tr>
<td>2GAS</td>
<td>2 GAS MULTIPLE PRODUCER</td>
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<tr>
<td>201G1W</td>
<td>2 OIL &amp; 1 GAS INJECTION WELL WORKOVER</td>
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<tr>
<td>20&amp;1G</td>
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</tr>
<tr>
<td>20&amp;1GW</td>
<td>2 OIL &amp; 1 GAS WELL WORKOVER</td>
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<tr>
<td>20&amp;1I</td>
<td>2 OIL &amp; 1 INJECTION WELL</td>
</tr>
<tr>
<td>20&amp;1W</td>
<td>2 OIL &amp; 1 INJECTION WELL WORKOVER</td>
</tr>
<tr>
<td>20&amp;1S</td>
<td>2 OIL &amp; 1 SERVICE WELL</td>
</tr>
<tr>
<td>20&amp;1SW</td>
<td>2 OIL &amp; 1 SERVICE WELL WORKOVER</td>
</tr>
<tr>
<td>20&amp;1WI</td>
<td>2 OIL &amp; 1 WATER INJECTION WELL</td>
</tr>
<tr>
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</tr>
<tr>
<td>20&amp;2G</td>
<td>2 OIL &amp; 2 GAS WELL</td>
</tr>
<tr>
<td>20&amp;2GW</td>
<td>2 OIL &amp; 2 GAS WELL WORKOVER</td>
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<tr>
<td>20&amp;2WI</td>
<td>2 OIL &amp; 2 WATER INJECTION WELL</td>
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<td>20&amp;3G</td>
<td>2 OIL &amp; 3 GAS WELL</td>
</tr>
<tr>
<td>20&amp;3GW</td>
<td>2 OIL &amp; 3 GAS WELL WORKOVER</td>
</tr>
<tr>
<td>20&amp;3WI</td>
<td>2 OIL &amp; 3 WATER INJECTION WELL</td>
</tr>
<tr>
<td>20&amp;4G</td>
<td>2 OIL &amp; 4 GAS WELL</td>
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</tbody>
</table>
### WELL STATUS VALUES ARE INTERNALLY INCONSISTENT

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>AB-LOC</td>
<td>ABANDON LOCATION</td>
</tr>
<tr>
<td>ABD-CB</td>
<td>ABANDONED COALBED METHANE GAS PRODUCER</td>
</tr>
<tr>
<td>ABDOGW</td>
<td>ABANDONED COMBINATION OIL &amp; GAS PRODUCER</td>
</tr>
<tr>
<td>ABD-GW</td>
<td>ABANDONED GAS PRODUCER</td>
</tr>
<tr>
<td>ABD-IW</td>
<td>ABANDONED INJECTION WELL</td>
</tr>
<tr>
<td>ABD-OW</td>
<td>ABANDONED OIL PRODUCER</td>
</tr>
<tr>
<td>ABD-SW</td>
<td>ABANDONED SALTWATER PRODUCER</td>
</tr>
<tr>
<td>AB-DW</td>
<td>ABANDONED WELL-OIL SHOWS</td>
</tr>
<tr>
<td>BRINE</td>
<td>BRINE WELL</td>
</tr>
<tr>
<td>CANCEL</td>
<td>CANCELLED PERMIT-WORKOVER</td>
</tr>
<tr>
<td>CO2INJ</td>
<td>CARBON DIOXIDE INJECTION WELL</td>
</tr>
<tr>
<td>CO2IOW</td>
<td>CARBON DIOXIDE INJECTION WELL WORKOVER</td>
</tr>
<tr>
<td>CO2</td>
<td>CARBON DIOXIDE PRODUCER</td>
</tr>
<tr>
<td>CO2-G</td>
<td>CARBON DIOXIDE PRODUCER-GAS SHOWS</td>
</tr>
</tbody>
</table>

Just the first 20 values reveals at least 9 kinds of information.
15 KINDS OF INFORMATION HAVE BEEN IDENTIFIED AND DEFINED

Business Life Cycle Phase is a collection of activities and conditions, that are grouped according to business significance, describing where an E&P asset (in this case a well) is at within its progressive history. Phases are related to business significance and are not related to time. Business Life Cycle Phase is relevant for wells that the E&P company has a Business Interest in. The value of the Business Life Cycle Phase is expected to change in a predictable manner as the well progresses through out its history and may reoccur as various operations are executed.
For each of the 15 kinds of information, a starter set of values has been created.
## WELL STATUS: COMPLEX VALUES CAN BE DECOMPOSED

### Well (general entity)
- Business Life Cycle Phase
- Operatorship
- Business Intention
- Outcome
- Lahee Class
- Play Type
- Well Structure
- Fluid Direction
- Well Reporting Class
- Fluid Type
- Well Status

### Wellbore
- Business Interest
- Role
- Trajectory Type
- Wellbore Status

---

**Wellbore Status**

<table>
<thead>
<tr>
<th>Status Type</th>
<th>Status Value</th>
<th>Qualifier Type</th>
<th>Qualifier Value</th>
<th>Active?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wellbore Status</td>
<td>Abandoned</td>
<td></td>
<td></td>
<td>Y</td>
</tr>
<tr>
<td>Fluid Type</td>
<td>Oil &amp; Gas</td>
<td>Abundance</td>
<td>Primary</td>
<td>N</td>
</tr>
<tr>
<td>Role</td>
<td>Produce</td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>Well Status</td>
<td>In-Active</td>
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<td>Y</td>
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<tr>
<td>Fluid Direction</td>
<td>Static</td>
<td></td>
<td></td>
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</tbody>
</table>

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**ABANDONED COMBINATION OIL & GAS PRODUCER**

[WellStatus.PPDM.org]
<table>
<thead>
<tr>
<th>Current Status Code</th>
<th>Current Status Name</th>
<th>Primary Fluid</th>
<th>Primary Role</th>
<th>Primary Fluid Abundance</th>
<th>Secondary Fluid</th>
<th>Secondary Role</th>
<th>Secondary Fluid Abundance</th>
<th>Outcome</th>
<th>Wellbore Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1G1WIW</td>
<td>1 GAS &amp; 1 WATER INJECTION WELL WORKOVER</td>
<td>Gas</td>
<td>Produce</td>
<td>Commercial</td>
<td>Water</td>
<td>Inject</td>
<td></td>
<td>Success</td>
<td>Producing</td>
</tr>
<tr>
<td>1O&amp;1GI</td>
<td>1 OIL &amp; 1 GAS INJECTION WELL</td>
<td>Oil</td>
<td>Produce</td>
<td>Commercial</td>
<td>Gas</td>
<td>Inject</td>
<td></td>
<td>Success</td>
<td>Producing</td>
</tr>
<tr>
<td>2O&amp;5G</td>
<td>2 OIL &amp; 5 GAS</td>
<td>Oil &amp; Gas</td>
<td>Produce</td>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
<td>Success</td>
<td>Producing</td>
</tr>
<tr>
<td>2O1GIW</td>
<td>2 OIL &amp; 1 GAS INJECTION WELL WORKOVER</td>
<td>Oil</td>
<td>Produce</td>
<td>Commercial</td>
<td>Gas</td>
<td>Inject</td>
<td></td>
<td>Success</td>
<td>Producing</td>
</tr>
<tr>
<td>GAS</td>
<td>GAS PRODUCER</td>
<td>Gas</td>
<td>Produce</td>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
<td>Success</td>
<td>Producing</td>
</tr>
<tr>
<td>GI-OG</td>
<td>GAS INJECTION WELL-OIL &amp; GAS SHOWS</td>
<td>Gas</td>
<td>Inject</td>
<td></td>
<td>Oil &amp; Gas</td>
<td></td>
<td></td>
<td>Shows</td>
<td>Injecting</td>
</tr>
<tr>
<td>OIL</td>
<td>OIL PRODUCER</td>
<td>Oil</td>
<td>Produce</td>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
<td>Success</td>
<td>Producing</td>
</tr>
<tr>
<td>OSTWOG</td>
<td>OIL STORAGE WELL-OLD WELL WORKED OVER-OIL &amp; GAS SHOWS</td>
<td>Oil</td>
<td>Storage</td>
<td></td>
<td>Oil &amp; Gas</td>
<td></td>
<td></td>
<td>Shows</td>
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<td>SUS-OG</td>
<td>SUSPENDED WELL-OIL &amp; GAS SHOWS</td>
<td>No Current Role</td>
<td>Oil &amp; Gas</td>
<td></td>
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<td></td>
<td></td>
<td>Shows</td>
<td>Unsuccessful</td>
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<td>WIWO</td>
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<td>Water</td>
<td>Inject</td>
<td></td>
<td>Oil</td>
<td></td>
<td></td>
<td>Shows</td>
<td>Injecting</td>
</tr>
</tbody>
</table>
ON TO THE NEXT CHALLENGE

How do you represent on a map?

What does the symbol represent?

How do you aggregate status at the well origin?

Does everyone want the same symbol set?
## MAP SYMBOLS

<table>
<thead>
<tr>
<th>Map Symbols</th>
<th>Src 1</th>
<th>Src 2</th>
<th>Src 3</th>
<th>Src 4</th>
<th>Src 5</th>
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</thead>
<tbody>
<tr>
<td>Oil (Active)</td>
<td><img src="image1" alt="Symbol" /></td>
<td><img src="image2" alt="Symbol" /></td>
<td><img src="image3" alt="Symbol" /></td>
<td><img src="image4" alt="Symbol" /></td>
<td><img src="image5" alt="Symbol" /></td>
</tr>
<tr>
<td>Gas (Active)</td>
<td><img src="image6" alt="Symbol" /></td>
<td><img src="image7" alt="Symbol" /></td>
<td><img src="image8" alt="Symbol" /></td>
<td><img src="image9" alt="Symbol" /></td>
<td><img src="image10" alt="Symbol" /></td>
</tr>
<tr>
<td>Rig (Active)</td>
<td><img src="image11" alt="Symbol" /></td>
<td><img src="image12" alt="Symbol" /></td>
<td><img src="image13" alt="Symbol" /></td>
<td><img src="image14" alt="Symbol" /></td>
<td><img src="image15" alt="Symbol" /></td>
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<tr>
<td>Oil and Gas (Active)</td>
<td><img src="image16" alt="Symbol" /></td>
<td><img src="image17" alt="Symbol" /></td>
<td><img src="image18" alt="Symbol" /></td>
<td><img src="image19" alt="Symbol" /></td>
<td><img src="image20" alt="Symbol" /></td>
</tr>
<tr>
<td>Coalbed Methane (Active)</td>
<td><img src="image21" alt="Symbol" /></td>
<td><img src="image22" alt="Symbol" /></td>
<td><img src="image23" alt="Symbol" /></td>
<td><img src="image24" alt="Symbol" /></td>
<td><img src="image25" alt="Symbol" /></td>
</tr>
</tbody>
</table>
CAN WE AGREE ON A COMMON SET OF SYMBOLS?

<table>
<thead>
<tr>
<th>PPDM Wellbore Status Symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Producing</td>
</tr>
<tr>
<td>Oil</td>
</tr>
<tr>
<td>Oil Show</td>
</tr>
<tr>
<td>Oil w/ Gas Show</td>
</tr>
<tr>
<td>Gas</td>
</tr>
<tr>
<td>Gas Show</td>
</tr>
<tr>
<td>Gas w/ Oil Show</td>
</tr>
<tr>
<td>Gas &amp; Condensate</td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
</tr>
<tr>
<td>Oil &amp; Gas Show</td>
</tr>
</tbody>
</table>
Today’s competitor is tomorrow’s partner.

The benefits of sharing exceed the risk of hoarding.

We need each other if we are to succeed!
WHY BOTHER WITH STANDARDS??
THE VALUE OF COLLABORATION

Introduction

Tech studies (geochem, paleo)
Form Partnerships
Well Planning
Drilling and Completion
Facility Management
Incident Management
Well Management
Reserves Calculation
Production Tracking
Decommission / Relinquish
Seismic Exploration
Interpretation
Identify Opportunity
Acquire Land Rights
KID Management
What Is The Standards Leadership Council?

In early 2012, the executive leaders from nine of the most crucial standards organizations in the E&P industry came together to form the Standards Leadership Council. Their objectives were to work collaboratively to:

- Identify areas of intersection to avoid creating duplicate or conflicting standards.
- Identify opportunities for synergy, so we can build on our successes together.
- Better deliver the value proposition message for standards implementation. Ensure maximum member benefits through participation in standards organizations.

On June 28, 2011, the Standards Leadership Council hosted an historic event in Texas, USA to introduce the SLC and talk about what each of the organizations is doing, and discuss how we can work together to enhance the value proposition for our members.

Presentations from the February 26th, 2013 Standards Leadership Council Meeting.
Thanks for your attention

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