



Energy Standards

SPE – DUPTS Webinar

Your Data...Streamlined. Faster. Easier.
Trusted... And With Less Turbulence.

Energistics

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Jay Hollingsworth - CTO

April 11, 2017



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Years of Energy Standards

Poll Question

» How many of you are familiar with Energistics and what we do?



Energy Standards

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Poll Question

» How many of you are using Energistics' standards within your companies (select one or more)



Energy Standards

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Who is Energestics?

- » We are not a vendor. As a non-profit organization, our role is to provide solutions that enable the industry to transfer and share data more efficiently and cost-effectively.
- » Evolving from POSC, we have served the industry for more than 25 years
- » Our 110+ members include leading E&P companies, oilfield service companies, software vendors, system integrators, regulatory agencies
- » Our standards are developed **by** the industry **for** the industry and are the result of collaboration between operators, service providers, software vendors, and integrators

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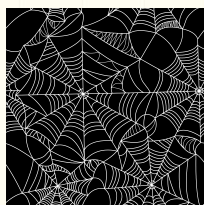
Members: Global Influence, Industry-Wide



The Cobweb of Data Complexity

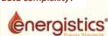
- » Energestics' standards facilitate collaboration and deliver cost savings for individual companies and for the collective industry by...

- Reducing development cost
- Reducing 'data friction'
- Reducing complexity
- Reducing errors
- Reducing NPT
- Informing data quality
- Enabling innovation
- Ensuring safety



Standards blow away the cobweb of data complexity!

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Why use Energistics' Standards?

- » Energistics' standards help to...
 - Share data easily with partners, colleagues, customers, regulators
 - Drive innovation and new solutions
 - Create a more competitive landscape, with plug-and-play capabilities
 - Allow staff to focus on value-add activities
 - Deliver data more quickly to Real Time Operating Centers
 - Provide trusted data for quick response to safety incidents
- » With support for
 - Structured Data (relational, SEG-Y, DLIS, real-time measurements, etc)
 - Semi/Unstructured Data (technical papers, morning reports, PDFs, etc)
 - Large Binary Files (SEG-Y, video, etc)



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Think of Standards Like Sheet Music

- » Standards allow companies to play together easily - sharing data, eliminating wasted time, reducing cost and complexity



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Energistics Spectrum of Standards

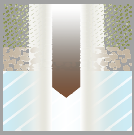
← UNIVERSAL INTEROPERABILITY →

<WITSML/>
Energistics standard

<PRODML/>
Energistics standard

<RESQML/>
Energistics standard

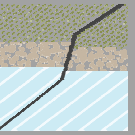
DRILLING



PRODUCTION



RESERVOIR



Energistics Transfer Protocol (ETP)

Common Technical Architecture (CTA)

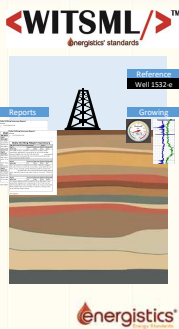


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Drilling Standards: WITSML™

» Consistent high-quality transfer of wellbore and drilling-related data

- Real-time data transfer
 - Reference objects – Well and Wellbore
 - Growing objects – Log (time, depth), Trajectory, Mud Log, etc.
 - Snapshots in time – with “report” information
- Move well-related data between applications
- Real-time availability of drilling operations
- Archival history of drilling operations



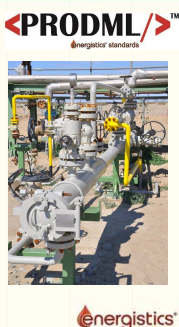
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Production Standards: PRODML™

» Consistent, high-quality transfer of production-related data

- Data transfer to production surveillance centers
 - Real-time measurements from sensor through analysis
 - Static configurations of production & surface facilities
 - Regulatory and partner reporting
 - Transfer of analyses from service company to operator
- Move production-related data among databases and applications
- Archival history of production operations



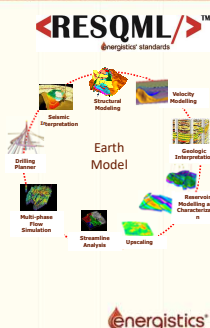
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Reservoir Standards: RESQML™

» High fidelity transfer of earth model data across applications and vendors

- Sharing earth model data across asset teams
- Movement of data through the seismic to simulation workflow
- All kinds of grids
- Traceability via metadata
- File-format-neutral archival of earth model at key decision points



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Exciting New Capabilities

» The latest evolution of the Energestics' standards (released in Dec 2016) offers a number of important new capabilities:-

- Dramatically faster real-time streaming of data using Energestics Transfer Protocol (ETP)
- Support for cross-functional work-flows
- Data Assurance to ensure that data is fit-for-purpose and increased confidence that data can be trusted
- Audit trail capabilities to show what has been done to the data

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Energestics Transfer Protocol (ETP)

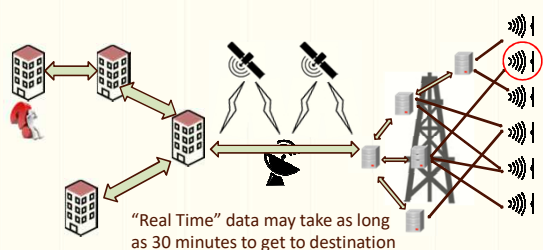
- » ETP is a game-changing technology
 - A key element in the common technical architecture (CTA)
 - Leveraged by all v2.x Energestics XML standards
- » Enables **true** real-time data streaming transfers
 - Initial testing suggests an order of magnitude reduction in latency delays
- » ETP can be used
 - For any kind of data transfer
 - From the field to the office
 - Between applications in the office
- » Potential application for any sensor-based M2M application (IIoT)

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"Real Time" really isn't...



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A New Transfer Protocol - ETP

Streaming data delivered in seconds
= True Real Time Data

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Impact of True Data Streaming with ETP

» Information latency with ETP is as good as “being there”
 » Impact can extend beyond improved real-time monitoring
 • One operator plans to reduce staff sent to rig, thereby lowering personnel risk and cost

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Standards & Digital Transformation...

» NONE of these initiatives will be meaningful unless you have trust and confidence in the underlying data
 » Standards are **an essential foundation** for Digital Transformation
 » You want a Data Lake – not a Data Swamp

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Trusted Data – Fit for Purpose

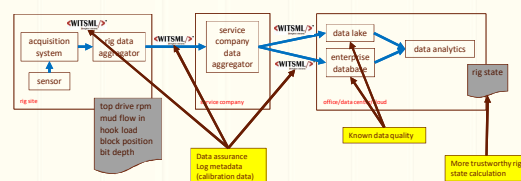
- » A key element of Energestics' latest standards
 - Can be applied to any information
- » Data Assurance is a data governance process for data analytics
 - Ensure that data is fit for purpose for analytics
 - Eliminate "GIGO", untrusted-in, trusted-out
- » Data Producer and Data Consumer agree set of validation rules
 - Data Assurance then checks for conformance
 - Result is higher level of trust and confidence that data is fit for purpose
 - Data does not need to be perfect or complete
- » Improved metadata on Log objects in WITSML v2.0

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Example: Improved Rig State Computation



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Example: Log Data

Comment = All sensor calibration completed by company xyz

OpCo #200 – Curves should all have a calibration tag related to the sensor
 OpCo #201 – RT Curve X is never above curve y
 OpCo #202 – RT Curve X is never below Z
 OpCo #203 – RT Curve X delivered every 10ft or 5 secs (larger)
 OpCo #204 – RT Curve X must have 4 sig digits
 OpCo #205 – RT Curve R must have defined units
 OpCo #206 – RT Curve R (rotation) shows direction, + = clockwise
 OpCo #207 – Calibration of sensor is still valid

10-01-01	14.5000	18.0000	4.5000	30.1	+
10-01-01	14.5000	18.0000	4.5000	29.9	+
10-01-01	14.5000	18.0000	4.5000	29.7	+
10-01-01	14.5000	18.0000	4.5000	29.5	+
10-01-01	14.5000	18.0000	4.5000	29.3	+
10-01-01	14.5000	18.0000	4.5000	29.1	+
10-01-01	14.5000	18.0000	4.5000	28.9	+
10-01-01	14.5000	18.0000	4.5000	28.7	+
10-01-01	14.5000	18.0000	4.5000	28.5	+
10-01-01	14.5000	18.0000	4.5000	28.3	+
10-01-01	14.5000	18.0000	4.5000	28.1	+
10-01-01	14.5000	18.0000	4.5000	27.9	+
10-01-01	14.5000	18.0000	4.5000	27.7	+
10-01-01	14.5000	18.0000	4.5000	27.5	+
10-01-01	14.5000	18.0000	4.5000	27.3	+
10-01-01	14.5000	18.0000	4.5000	27.1	+
10-01-01	14.5000	18.0000	4.5000	26.9	+
10-01-01	14.5000	18.0000	4.5000	26.7	+
10-01-01	14.5000	18.0000	4.5000	26.5	+
10-01-01	14.5000	18.0000	4.5000	26.3	+
10-01-01	14.5000	18.0000	4.5000	26.1	+
10-01-01	14.5000	18.0000	4.5000	25.9	+
10-01-01	14.5000	18.0000	4.5000	25.7	+
10-01-01	14.5000	18.0000	4.5000	25.5	+
10-01-01	14.5000	18.0000	4.5000	25.3	+
10-01-01	14.5000	18.0000	4.5000	25.1	+
10-01-01	14.5000	18.0000	4.5000	24.9	+
10-01-01	14.5000	18.0000	4.5000	24.7	+
10-01-01	14.5000	18.0000	4.5000	24.5	+

Policy = OpCo #201
Compliant = Failed
Comment = Curve X is above Curve Y

Policy = OpCo #202
Compliant = Failed
Comment = Curve X is below Curve Z

Policy = OpCo #203
Compliant = Failed
Comment = Delay in data delivery

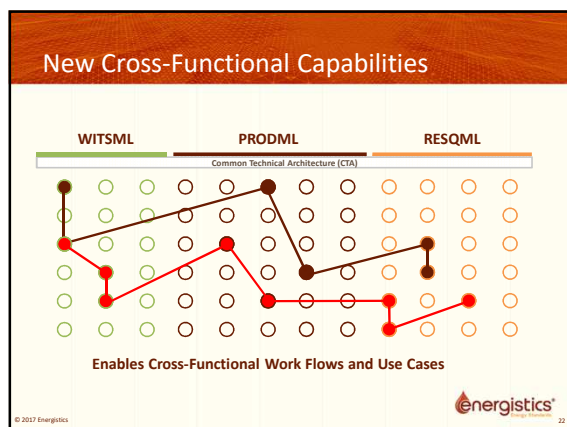
Policy = OpCo #204
Compliant = Failed
Comment = Missing Unit of Measure

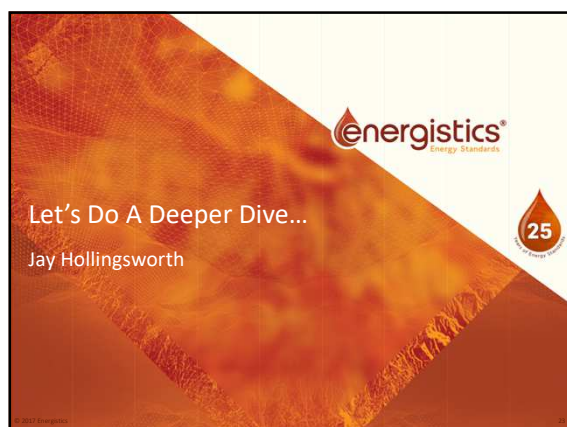
Policy = OpCo #205
Compliant = Failed
Comment = Missing rotation directionality

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WITSML Evolution

Historical Deployment	Recent
» 1.1 – 12/2001, 1.2 – 1/2003	» New challenges:
» Version 1.3.1 still supported and in wide use – 12/2005	• Higher bandwidth/lower latency
» Version 1.4.1.1 is the current deployed solution – 7/2010	• Higher frequency data
• 32 defined objects (27 + 4 + 1)	• Integration/DM workflows
• Majority of use leverages the growing objects + well/bore	• Archival workflows
» 1000's deployed and in daily use	» Energistics Transfer Protocol
	» WITSML v2.0 objects 12/2016

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WITSML 2.0 Data Types vs 1.4.1

» attachment	» message	» toolErrorTermSet
» bhaRun	» mudLog	» trajectory
» cementJob	» objectGroup	» tubular
» changeLog	» opsReport	» wbGeometry
» convCore	» rig	» well
» coordinateRefSystem	» risk	» wellbore
» drillReport	» sidewallCore	» downholeComponent
» fluidsReport	» stimJob	» wellboreCompletion
» formationMarker	» surveyProgram	» wellCMLedger
» log	» target	» wellCompletion
» depthRegImage	» toolErrorModel	

Color Key **Rewritten**
Not carried forward



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WITSML 2.0 – 42 Data Types

» Attachment	» MudLogReport	» Well
» BhaRun	» OpsReport	» Wellbore
» CementJob	» Rig	» WellboreGeometry
• CementJobEvaluation	• Rig Utilization	» WellboreGeology+6
» CRS moved to common	» Risk	» WellboreMarkerSet
» DataAssurance: common	» StimJob	• WellboreMarker
» DrillReport	• StimJobStage +1	» WellCompletion
» FluidsReport	» SurveyProgram	• WellboreCompletion
» Log	» Trajectory	• DownholeComponent
• ChannelSet	• ToolErrorModel	• WellCMLedger
• Channel	• ToolErrorTermSet	» And 3 part_ wrappers
• DepthRegImage	» Tubular	



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WITSML 2.0 – New Functionality

- » Well, Wellbore, Trajectory, Risk, etc. stable but in new 2.0 style
- » WellboreGeology, WellboreGeometry now growing
- » Log completely rewritten
 - To support real-time (ETP) and historic transfer
 - Includes recommendations for consistent log organization
- » StimJob (SLB), Cementing (HAL), MudLog (BHI, Geologix) rewritten
- » Introduced Data Assurance domain
- + All objects have consistent metadata per Rome SPE workshop



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Data Assurance

- » “Data quality” too hard to universally define
- » Data Quality workgroup renamed itself Data Assurance
- » High priority use cases
 - Conformance to policies/rules
 - Traceability of data through users, servers, versions
 - Traceability through measurement, derivation, parameters
 - Calibration – when, how

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Data Quality in WITSML v2.0

- » Data quality measures can be transferred in WITSML v2.0
 - “Quality” is not calculated or guaranteed by the transfer
- » The quality conveyance mechanisms introduced in WITSML v2.0 are
 - Arbitrarily complex “metadata” about a measurement or other data
 - The DataAssurance object – a special explicit carrier for data quality measures
 - Use of the Activity model to describe in detail how an data value was
 - Created (who did it using what program with what settings using what input data)
 - Inferred from a sensor via calibration (including the calibration activity, apparatus, etc.)

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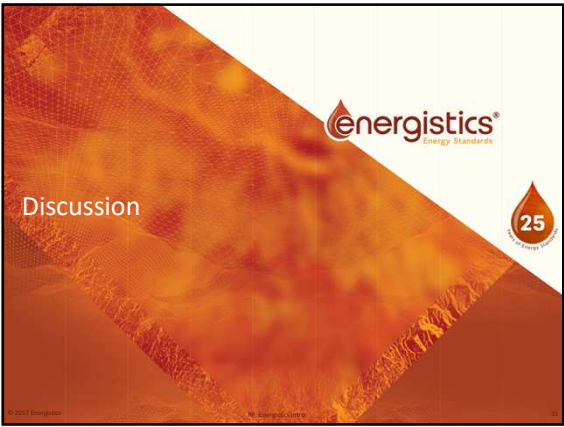
Risk in WITSML v2.0

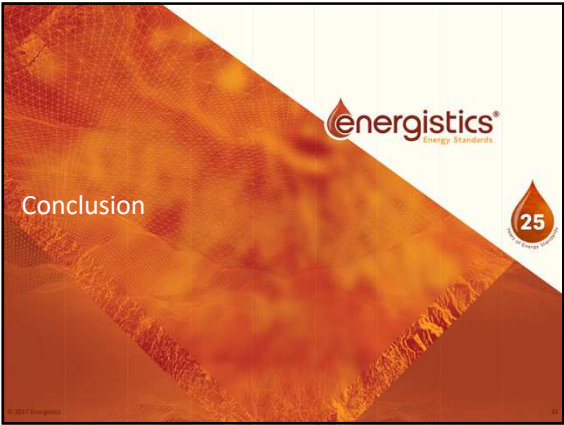
- » Largely unchanged from WITSML 1.4.1.1
- » Allows for transfer TO the wellsite of
 - Anticipated risks along the wellbore or during drilling operations
 - Risks can be associated with other objects or be independent
- » Risks transferred FROM the wellsite
 - Can be related to the anticipated risks or
 - Can be unexpected problems encountered in drilling or other operations
- » In WITSML v2.0 the associated objects could be from outside WITSML

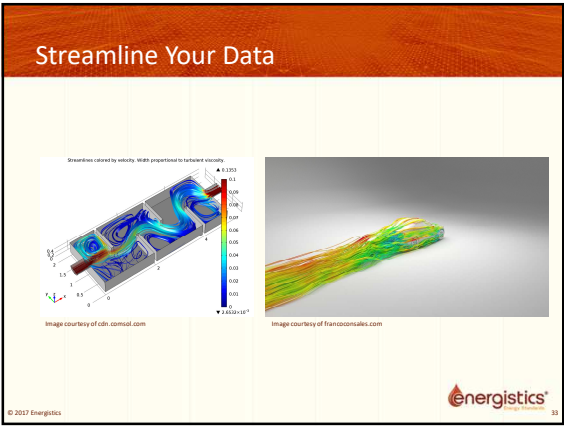
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Gain Cost Savings & Operational Efficiency

Cost Savings	Improved Productivity
» Eliminate time lost resolving data quality issues and manual entry	» Faster data transfers and more reliable data loading saves time
» Minimize time exchanging data from application to application	» Consistent and trusted data increases efficiency
» Drive innovation and encourage plug-and-play competition	» Standards 'future-proof' data so it can be easily re-used and re-analyzed
» Reduce the number and cost of proprietary interfaces	» Accurate information is available for a rapid response to any safety incident

Energistics' standards deliver cost savings for individual companies and for the collective industry

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Why Should You Participate?

- » Standards development and adoption doesn't happen in a vacuum
 - » You can help...
- » Join your peers in supporting Energistics, and gain the benefit
 - » Save \$\$\$ and time through the use of industry-recognized standards
 - » Ensure that Energistics' standards address your specific business needs
 - » Position the company for Digital Transformation
 - » Collaborate with industry leading companies in a proven anti-trust environment
 - » Help drive adoption of standards for the benefit of your company and the industry
 - » Peer recognition in the industry for your advocacy of standards, and support for your internal technical staff

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Poll Question

- » How many of you are already Members of Energistics?

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