



2017 Energistics Orientation

February 15, 2017

Jana Schey, Chief Operating Officer
Jay Hollingsworth, Chief Technology Officer



Introductions

- » Presenter/Moderator: Jana Schey, COO
- » Co-Presenter: Jay Hollingsworth, CTO



Jana Schey is responsible for strategic planning to define operational and adoption goals as well as delivery, managing execution of deliverables through appropriate staff and members, engagement with external standards organizations, and working with the CEO to ensure the continued financial viability of Energistics operations and Special Interest Groups.

Jay Hollingsworth is responsible for the technical adequacy of the standards stewarded by the organization, including WITSML™, PRODML™, and RESQML™ among others. Under Jay's leadership, Energistics has realized the goal of an integrated family of standards based on a common technical architecture. In addition to providing technical oversight, Jay is the main trainer for Energistics and represents Energistics on various technical committees of other associations and standards bodies.

Agenda

- » About Energestics
- » How We Work
- » Standards Update
- » 2017 Plans
- » Getting Engaged
- » Q&A

About Energestics



Who are we?

Energistics is a global, non-profit, membership consortium that facilitates the development and adoption of technical open data exchange standards in the upstream oil and gas industry.

Our membership consists of IOCs, NOCs, oilfield service companies, software vendors, system integrators, regulatory agencies, universities and the global standards community.

Our standards are developed by workgroups (known as Special Interest Groups, or SIGs) made up of industry experts from our member companies.

In summary, the standards are created *by* the industry *for* the industry, facilitated by Energistics.



The key messages:

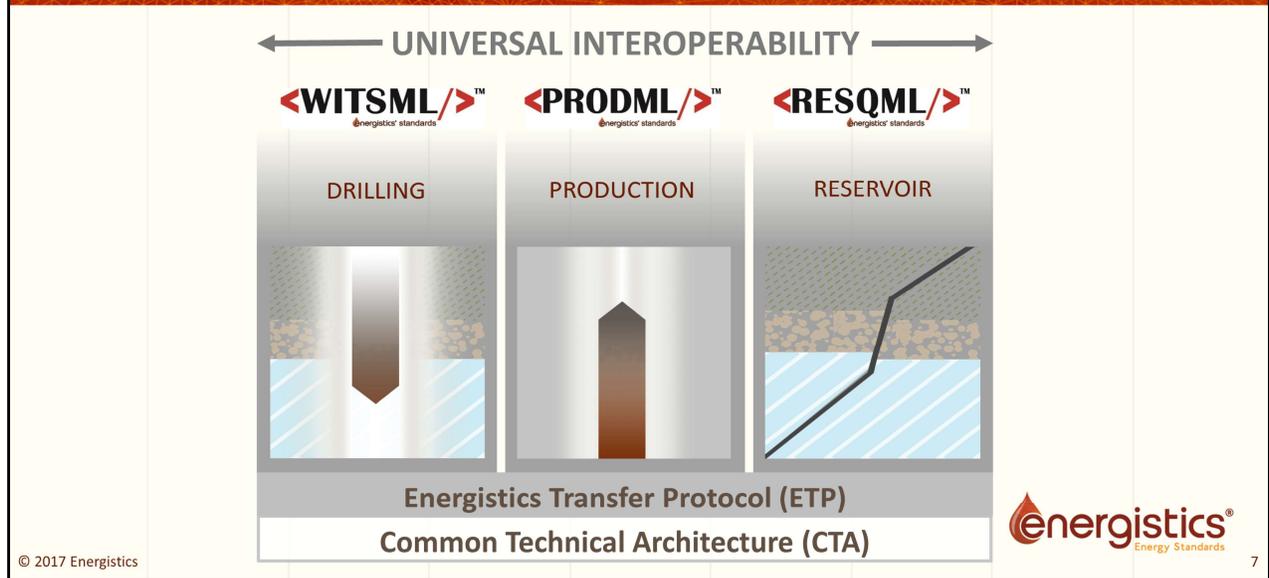
1. Energistics is a member-funded, member-resourced standards development organization.
2. The standards we steward have been developed by and for the industry. This is not an academic exercise. Development is driven by industry requirements to address real-world business challenges.

Global Influence

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Logos displayed on the map include: accenture, CDA, energySYS, HALLIBURTON, NATIONAL OILWELL VARCO, OILWARE, roxar, Statoil, AZG, EPIM, geological services, Navita Origo, OSIsoft, petroLink, Aggnauil gSajj Saudi Aramco, Tech Mahindra, BAKER HUGHES, CoreLogiQ, ExxonMobil, ifp Energies Nouvelles, NEW ZEALAND PETROLEUM, P2, PETRONAS, Schlumberger, TIBC, BARDASZ, Digital Horizon, GEOLOG, Infocys, Paradigm, pds petrotechnical, Scientific Drilling, TNO Innovation for life, bp, devon, Geologix, KAPPA, pason, PIONEER NATURAL RESOURCES, Shell, TOTAL, CNSOPB, CGG, DIGIDRILL, Petroleum Commission Ghana, KONGSBERG, ISDIA, peloton well focused, PARS Global Systems LLC, sskmigas, Weatherford, Chevron, DYNAMIC GRAPHICS, INC., GROUNDWATER PROTECTION COUNCIL, L&T Infotech, OS Portal, BR PETROBRAS, Radmond, STAATSOLIE, WellSite SOFTWARE, E+Tech, Logtek, Oil & Gas Authority, and Energistics Energy Standards.

Energistics Family of Standards



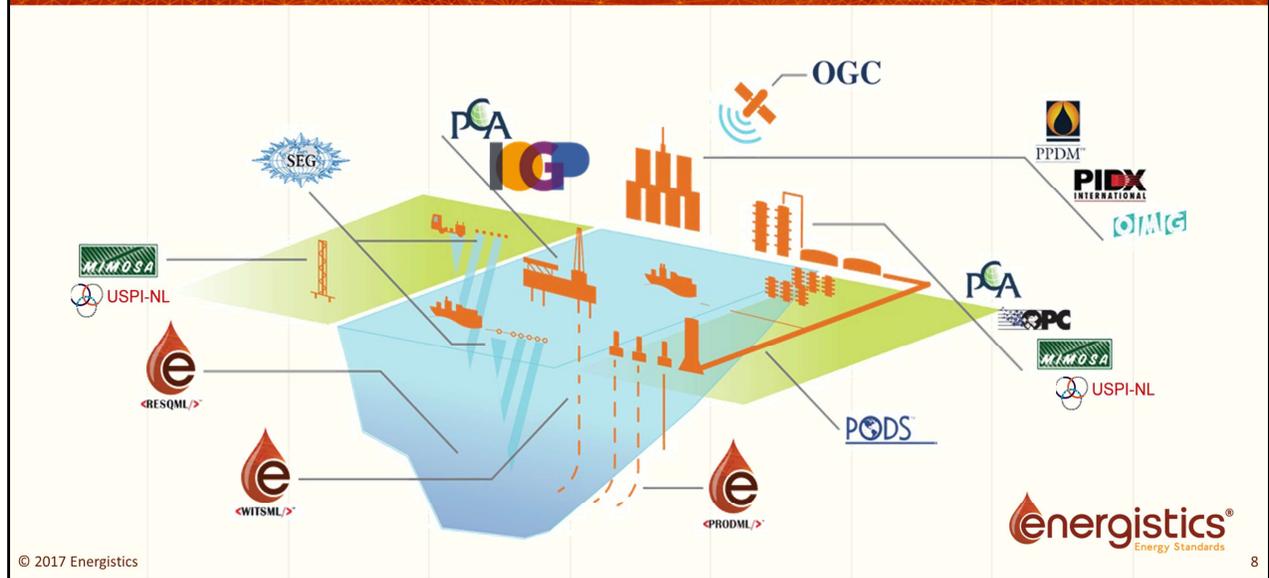
Our flagship family of standards include RESQML (reservoir & earth models), WITSML (drilling) and PRODML (production).

As of the end of 2016, next generation versions of all 3 standards have been issued; all are based on our Common Technical Architecture which means the standard schemas may be used in any combination and with our Energistics Transfer Protocol (ETP) to address a variety of integrated operations use cases and workflows.

Collect data once, use in all three verticals

Seamless integration of subsurface data

Oilfield Standards Landscape



Work together under the umbrella of the Standards Leadership Council to help us avoid overlaps, identify gaps and identify collaboration opportunities.

All work in upstream but in different areas:

Energistics: data exchange

PIDS: procurement/supply chain

PODS: pipeline

MIMOSA: facilities

PPDM: master data management, etc.

The Value of Energestics' Standards

Cost Savings

- » **Save time** when exchanging data between users, partners, service companies, operators and regulators
- » **Eliminate time lost** resolving data quality issues due to incompatible formats and manual entry
- » **Minimize time** spent loading and moving data from application to application
- » Standards help drive innovation and **greater competition**

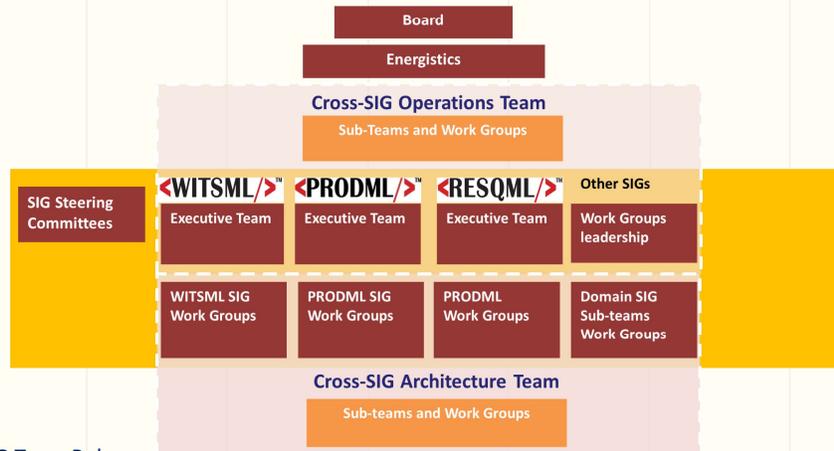
Improved Productivity

- » Consistent and trusted data, using standards defined by the industry, **increases efficiency**
- » Standards allow legacy data to be **re-used and re-analyzed** using existing or newer tools and models
- » Standards ensure that trusted and accurate information is available for a **rapid response** to any safety incident

How We Work



Organizational Structure



Cross-SIG Team Roles:

- Communication & process oversight
- Work common issues that cross traditional boundaries (e.g., CTA)

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SIG representation in graphic is only illustrative and is not limited to the SIGs shown



11

Small Energistics team of 8 to support Energistics membership of 100+ companies and 150-200+ volunteers in any given year.

3 ML SIGs each elect Executive Teams annually to oversee daily operations.

Cross SIG teams are composed of significant contributors who have the big picture and can guide architectural, process and other deliverables that impact all SIGs.

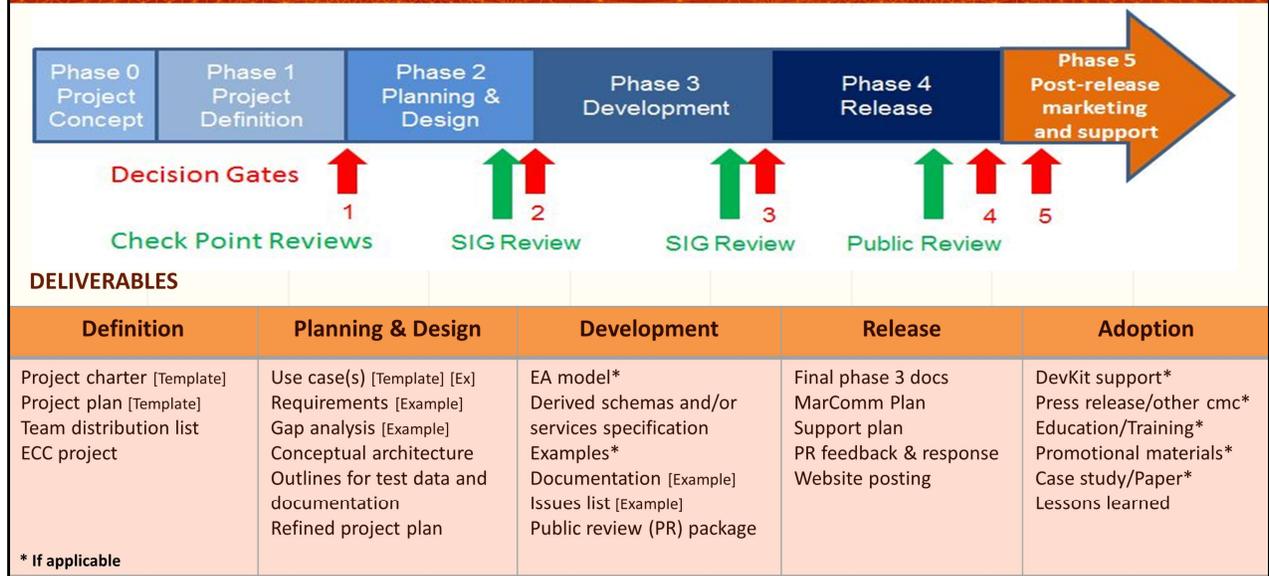
2017 SIG Executive Teams

WITSML	PRODML	RESQML
Pete Morrison, Baker Hughes	Kanwal Gupta, Chevron	Lisa Towery, BP
Keith Modesitt, BP	Peter Westwood, EnergySys	Matthias Imhof, ExxonMobil
Shaddick Keagy, Chevron	Brandon Sokol, ExxonMobil	Philippe Verney, F2I-Consulting
James Jerry, Halliburton	Shaji John, Halliburton	Beiting Zhu-Colas, Geosiris
Ted Abramsen, Kongsberg	Terry Kite, P2 Energy Solutions	Jean-Francois Rainaud, IFP Energies nouvelles
Lee Geiser, Petrolink	Daniel Lucas-Clements, Schlumberger	Laurent Deny, Paradigm
Nigel Deeks, Schlumberger	Wilfred Berlang, Shell	Jerre Parker, Shell
Yash Gidh, Shell (Deputy Chair)	Philippe Laussucq, Total	Francis Morandini, Total
Lars Olav Grøvik, Statoil (Chair)	Jana Schey, Energistics	Jana Schey, Energistics
Carlos Nunez-Perez, Total	Open Seat	Open Seat
Jana Schey, Energistics	Open Seat	Open Seat
Advisors (Invited)	Advisors (Invited)	Advisors (Invited)

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2 openings each for PRODML and RESQML teams; each team invites other contributors to advise on a variety of topics.

Standards Development Process



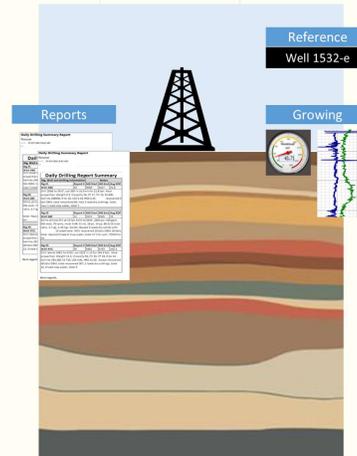
Traditionally we have focused on the DEVELOPMENT aspects of what we do and have a robust process with associated deliverables. Now we are focusing on the orange tip – ADOPTION – with the intention to develop robust processes and standard deliverables to support the industry and enable successful deployment and use of our standards.

Standards Update



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



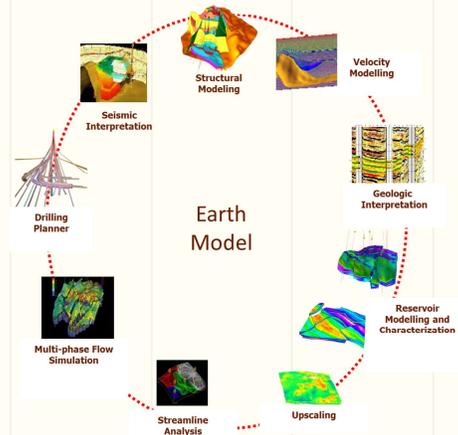
Production Standards: PRODML™

- » 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 and surface facilities
 - Regulatory and partner reporting
 - Movement of analyses from service company to operator
 - Move production-related data among databases and applications
 - Archival history of production operations



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



Energistics Transfer Protocol (ETP)

- » ETP is a game-changing technology
 - A key element in the common technical architecture (CTA)
 - Leveraged by all v2.x Energistics 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)



Companies immediately saw the benefits of ETP as they were working on it and adopted it for use with WITSML v1.4.1.1 to realize the real time benefits. Statoil, Baker Hughes and Kongsberg presented their work in this area at our October WITSML SIG meeting and we will soon publish a success story. We hope to work with other members to promote the work they are doing throughout the year.

Key Developments in 2016

- » CTA allows data objects from different MLs to be combined seamlessly to support cross-functional workflows
- » Synchronized release of new versions of WITSML, PRODML, RESQML, ETP
 - WITSML v2.0 – Common Technical Architecture, plus data assurance and other improvements
 - PRODML v2.0 – Common Technical Architecture, plus DAS and PVT and other improvements
 - RESQML v2.1 – Bug fixes
- » Training, webinars and other activities to help drive standards adoption
- » Fostering an open-source community around Energistics solutions
 - ETP (C++, C#, Java, JavaScript), updated XOM DevKit, PDS donated ETP DevKit, free WITSML server

2017 Plans



Main Objectives for 2017

- » Focus on ADOPTION to broaden use of Energistics standards within Member companies and across the industry
- » Development that will leverage member donations that add capabilities, expand use of ETP, and address issues found during testing and implementation pilots

Vision: Energistics standards will be ubiquitous in the upstream oil & gas industry across the entire E&P domain

Strategy

- » **Engage** member companies and industry at-large to understand business objectives and discuss how Energistics standards can help achieve them
- » **Define** high value domain-specific and cross-domain workflows
- » **Promote** and evangelize standards
- » **Publish** case studies & success stories
- » **Provide** tools to aid development and deployment
- » **Educate** business and technical users
- » **Deliver** value to our members and the industry

Leverage a range of activities to communicate value & increase adoption

- Case studies/success stories & research/publicize use of MLs in the industry
- Communicate and evangelize benefits of MLs – papers and presentations
- Training courses and webinars
- Implementation pilots
- Sample data sets
- Certification process
- Reference implementations
- Documentation and best practices
- DevKits and other tools to ease development, deployment and use – in addition to the Standards DevKit originally developed by ExxonMobil and now maintained by Energistics, PDS has developed an ETP Devkit, Geosiris a Validator/Explorer tool for RESQML and there are other companies who have developed and donated software, code, data sets, etc.
- Update website – ease of use, “findability”

Getting Engaged



Why Should You Participate?

- » 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
- » Ensure that Energistics standards address your unique business needs
- » Peer recognition in the industry for your advocacy of standards, and support for your internal technical staff
- » Gain access to code, sample data, support, certification and training
- » Potentially save 10's of million \$\$ through time saved, increased efficiency, reduced software development, etc.

What can you do?

- » Join Energistics
- » Join a SIG to contribute your development or business expertise
- » Invite Energistics to visit with your company
- » Share a success story
- » Attend a training class
- » Advocate others join Energistics – the more the merrier!

Q&A

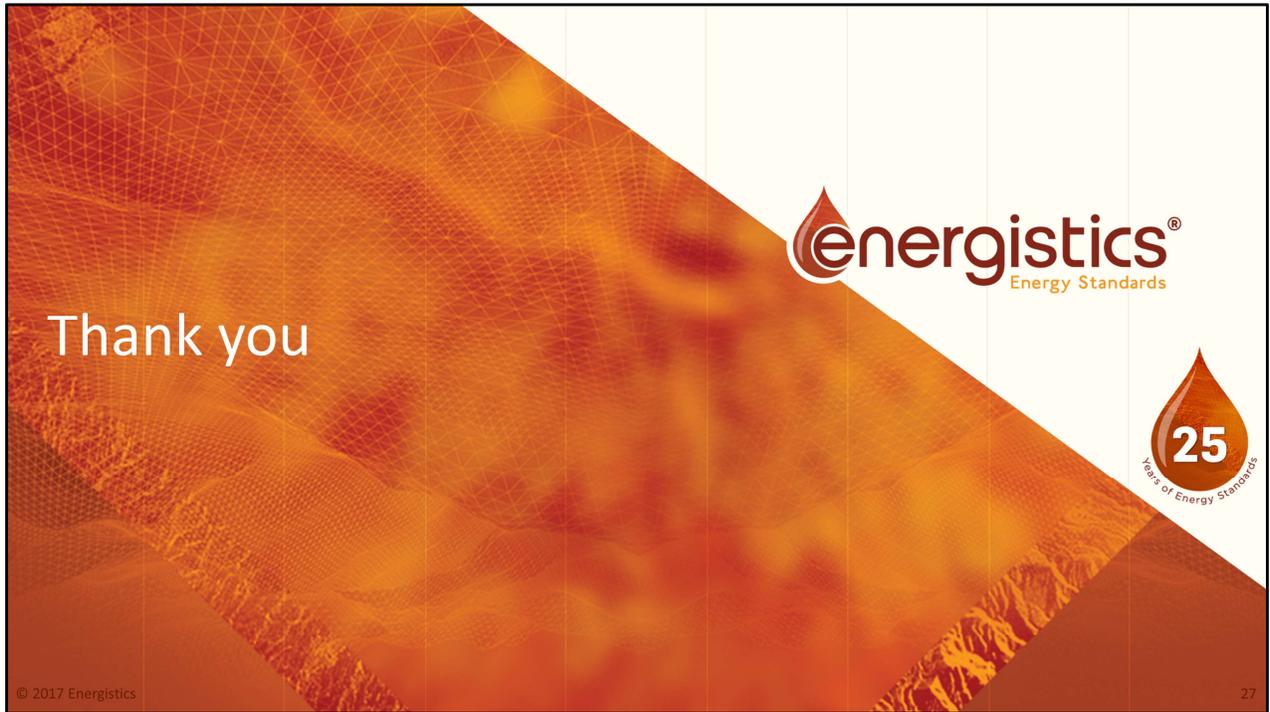
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