

# **DIGITAL STANDARDS COLLABORATION:**

**Key to Unlocking Intelligent  
Energy's Potential**

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Robin Beckwith, Senior Staff Writer

**JPT**

Late June in Houston, Texas, senior executives from the Standards Leadership Council's (SLC) nine member organizations hosted a forum, whose goal was to encourage collaboration on open digital standards for the benefit of the upstream oil and gas industry. More than 125 industry representatives attended the all-day event. Formed in February 2012, the SLC's mission is to avoid duplication in oil and gas industry electronic standards development projects and to address mutual challenges, such as determining business value metrics for standards adoption, enhancing the benefits members receive from the various oil and gas digital standards, and maintaining financial sustainability of standards organizations.

Derek Mathieson, president of western hemisphere operations at Baker Hughes, delivered the keynote address. He became involved with the digital oil field in the mid-'90s. The problems then, according to Mathieson, were the result of having to deal with 50 years' worth of infrastructure. "You would have thought almost all of that would have gone away by now," he said. "But the same challenges exist today."

Looking ahead, Mathieson observed that fascinating things are going on in relation to learning and connectivity—what he referred to as "the 'wikification' of our business" to facilitate learning. Heavily influenced by social media and reliance on collaboration, the new generation of professionals in the petroleum industry appears to learn in ways that are different from "traditional" ways of learning. He said he believes, therefore, the challenge now is how to "take away the pain of major project implementation." This leads to the need for increased industry collaboration for electronic standards, said Mathieson, who encouraged forum attendees to participate in the development process.

Duncan Junor, vice president for Halliburton and the Energistics' board chair, formally closed the forum. "It was a sold-out event," he said, "which speaks volumes to the dedication and passion of this industry to work together to adopt and implement standards."

"Just to have all nine standards organizations in the same room," he continued, "is a huge accomplishment."

#### **Petroleum Information Data Exchange (PIDX)**



AMING

Anthony Aming delivered an overview of PIDX's electronic business purpose. Aming is enterprise business and applications architect at Baker Hughes as well as president of PIDX. PIDX, he said, "spans the whole industry, from well to filling station."

PIDX [pronounced "pie-dex"] first operated as an American Petroleum Institute (API) standards committee, beginning in 1987. According to its website, its purpose was and is to develop and publish standards "to facilitate adoption of electronic business [e-business] in the oil and gas industry." Substantial efficiencies and cost savings continue to accrue for petroleum industry e-business participants. These are achieved through the implementation of e-business standards available free to all industry participants.

API decided to stop hosting PIDX committee operations in 2010. A new corporation formed by members of the PIDX committee, called Petroleum Industry Data Exchange, Inc. (PIDX, Inc.), was selected by API to continue the PIDX committee mission. PIDX, Inc. now is a standalone corporation controlled by its members and not an API committee. PIDX, Inc. has obtained 501(c)6 status as a trade association so it may perform independently the same tax-exempt mission formerly carried out when it was part of API.

PIDX serves both the upstream and downstream oil and gas industry segments. According to the PIDX website, these energy industry segments, "operating all over the world in multitudes of languages, environments, and cultures, involve highly complex business processes and practices, which makes the implementation of uniform electronic business standards so important to the industry yet very difficult and time consuming." Bringing solutions to those problems is the purpose of PIDX.

The mission of PIDX is to develop and publish technology, information, and business process standards that allow the implementation of e-business in the energy industry on a worldwide basis. PIDX provides a forum for all industry participants to participate in the development of business processes and technology standards that facilitate seamless, efficient e-business within the petroleum industry and its trading community. These actions promote the common business interests of its members and the petroleum industry as a whole by developing and making such standards available to all, improving the capability of each member of the petroleum industry and its trading community to do business with each other.

With a global reach, PIDX's membership includes petroleum industry operators, oilfield suppliers, technology providers, governments, and other organizations with a material interest in the development of oil and natural gas electronic business standards.

PIDX develops standards through the use of committees, called work groups. A work group is formed when a business need project is identified and supported by the volunteer groups who want to address that need.

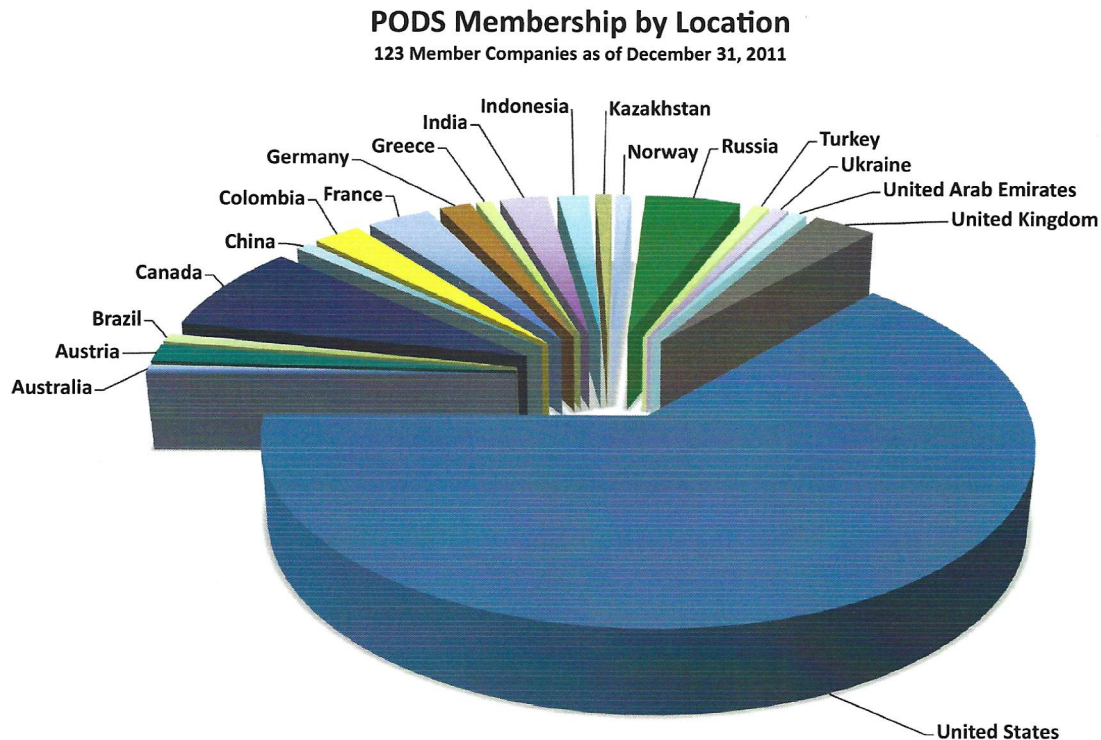


Fig. 1—Pipeline Open Data Standard (PODS) membership by location, as of yearend 2011.

PIDX standards can be downloaded at [www.pidx.org/standards.htm](http://www.pidx.org/standards.htm). Standards are available for invoicing, purchasing, supplier price sheets, field tickets, and many other aspects of the quote-to-cash cycle. In addition, PIDX has developed an open standard dictionary, taxonomy, and schema to classify and describe products and services, as well as provide industry definitions. One available standard, identifying PIDX Downstream Product Codes, names more than 2,300 types of refined petroleum products, such as heating oil; commercial and military jet fuel; kerosene; ethanol; liquid natural gas; butane; propane; biodiesel; regular, midgrade, and premium fuels; and liquid asphalt.

## Pipeline Open Data Standard (PODS)



SINCLAIR

Janet Sinclair, PODS executive director, spoke about how PODS has become the recognized industry standard for pipeline data storage and interchange. PODS is used for a vast array of pipelines, including onshore and offshore; regulated and unregulated; and those carrying all types of products, including natural gas, crude oil, and natural gas liquids. "It is widely used in the US," she said, "and, internationally, its use is growing."

"Literally, data for hundreds of thousands of miles of pipelines is stored in PODS databases," Sinclair said.

The PODS Association was created in 1998 to develop and support open data storage and interchange standards to meet the specific data management needs of pipeline companies. The nonprofit organization's more than 100 member companies (**Fig. 1**) include pipeline operators; software, service, engineering, and data providers; government agencies; and industry associations. The following is PODS' stated purpose: "The PODS pipeline data model provides pipeline operators a highly scalable database architecture to integrate critical records and analysis data with geospatial location for each component of its pipeline system in a vendor-neutral platform."

Member companies populate their own PODS database, within which they store such data as pipeline geographic locations, asset specifications, inspections, integrity management information, regulatory compliance reports, risk assessments, operational information, and historic data to support the visualization, analysis, and systematic decision-making required for responsible pipeline management. According to Sinclair, "PODS thus provides its users with a definitive and comprehensive view of their pipeline systems."

Pipeline operators use PODS to manage, verify, analyze, maintain, and deliver relevant information quickly and reliably to end users and applications. This enables competent pipeline integrity management, improved pipeline safety and reliability, and compliance with pipeline regulations.

### THE PURPOSE OF OIL AND GAS INDUSTRY DIGITAL STANDARDS ORGANIZATIONS

Basically, standards organizations related to information technology (IT) in the oil and gas industry are devoted to ensuring the seamless, efficient transfer of digital information from its point of origin, within one context, to other points, within other contexts. A standard can also refer to the medium on which data is stored, such as a tape or disk, which includes how it is stored on that medium.

- ▶ Standards ensure older geophysical data can be accessed and incorporated into new data even if it was generated two or three decades before.
- ▶ Standards help ensure knowledge and lessons learned can be transferred from one project and set of personnel to another.
- ▶ Standards ensure sensor data generated in real time downhole during drilling by a service company can be used scant seconds later hundreds of miles away to alert the operating company that an emergency situation is developing.
- ▶ Standards ensure maintenance and repair occur in plants and facilities or pipelines before a problem develops.
- ▶ Standards ensure physical assets' whereabouts can be tracked remotely.
- ▶ Standards ensure a consistent invoicing format from company to company that complies with agreed-upon definitions of physical items and job tasks.

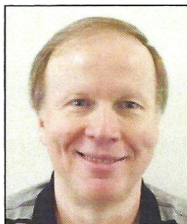
All these standards prevent bottlenecks from occurring, due to data description, storage, and transmission incompatibilities, and promote the timely flow of electronic data over time and space. This helps ensure the highest level of asset quality, optimum hole placement during drilling, maximum safety for people living or working near oil-and-gas-related sites, minimum adverse environmental impact, optimum decision-making, accurate flow measurement, up-to-date reservoir characterization models, and accurate, documented, timely cash flow.

Digital standards break down barriers to data access, preventing the development of digital programs that force rigid reliance on any one entity's product or system while, at the same time, securing the proprietary nature of information that could give other companies an unfair competitive advantage.

Key data stored in the PODS data model includes the following: construction records, physical inspections, close interval surveys, crossings, stress corrosion cracking potential, leak surveys, offshore facilities, equipment maintenance, repairs, offline events, site facilities such as compressor and pump stations, land ownership and right-of-way, pipeline damage, cathodic protection facilities and inspections, inline inspection results and mitigations, in-service dates, and maximum operating pressure/maximum allowable operating pressure (MOP/MAOP) records and analysis data.

Later this year, Sinclair said, "the release of PODS 6.0 will be a significant step forward in simplifying PODS for new implementations. In PODS 6.0, the data model will be divided into logical groupings or 'modules,' which can be implemented independently." She stated that "PODS 6.0 will provide the association with the ability to release targeted modules with functions specific to regional or industry segment needs, and give pipeline operators the option to implement only those modules applicable to their operational and business needs."

#### MIMOSA: An Operations and Maintenance Information Open System Alliance



JOHNSTON

Alan Johnston, president of MIMOSA (Machinery Information Open Systems Alliance), said it is a nonprofit trade association dedicated to developing and encouraging the adoption of open information standards in manufacturing, fleet, and facility environments—with a focus on enabling sustainable interoperability in

what is called a "system of systems" environment. A "system of systems" environment is a big platform, such as a ship, rig, platform, refinery, or manufacturing plant, that has from dozens to thousands of complex and separate systems within it.

"All these subsystems need to fit together like a supplier-neutral version of Lego blocks," said Johnston, "not only mechanically, electrically, and structurally, but also at the IT level."

In collaboration with its OpenO&M Initiative partners, MIMOSA enables an IT system of systems, whereby a plant's myriad subsystems can plug into one overall digital system that can filter out a constant and massive flow of unremarkable data to focus attention only on meaningful information. This is also known as "management by exception."

MIMOSA members come from process and discrete manufacturing companies, facility management companies, military organizations, capital equipment original equipment manufacturers (OEMs), and suppliers

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## STANDARDS LEADERSHIP COUNCIL MEMBER ORGANIZATIONS

**Energistics** serves as facilitator, custodian, and advocate for the development and adoption of technical open data exchange standards in the upstream industry. [www.energistics.org](http://www.energistics.org)

**MIMOSA**, an operations and maintenance open systems alliance, is a nonprofit trade association dedicated to developing and encouraging the adoption of open information standards for operations and maintenance in manufacturing, fleet, and facility environments. [www.mimosa.org](http://www.mimosa.org)

**PIDX International** provides a global forum for delivering the process, information, and technology standards that facilitate seamless, efficient electronic business within the oil and natural gas industry and its trading community. [www.pidx.org](http://www.pidx.org)

**POSC Caesar Association [PCA]** is an independent, global member organization developing, enhancing, and promoting methodology, technology, and solutions for data interoperability, with special focus on ISO 15926 and W3C recommendations. [www.posccaesar.org](http://www.posccaesar.org)

**The Open Geospatial Consortium [OGC]** is an international industry consortium of more than 450 companies, government agencies, and universities participating in a consensus process

to develop publicly available geospatial encoding and interface standards. [www.opengeospatial.org](http://www.opengeospatial.org)

The **OPC Foundation** is dedicated to ensuring interoperability in automation by creating and maintaining open specifications that standardize the communication of acquired process data, alarm and event records, historical data, and batch data to multivendor enterprise systems and between production devices. [www.opcfoundation.org](http://www.opcfoundation.org)

The **Pipeline Open Data Standard Association [PODS]** was created to develop and support open data storage and interchange standards to meet the specific data management needs of pipeline companies. [www.pods.org](http://www.pods.org)

The **Professional Petroleum Data Management Association [PPDM]** is a global nonprofit organization within the petroleum industry to promote professional petroleum data management through the development and dissemination of best practices. [www.pppdm.org](http://www.pppdm.org)

The **Society of Exploration Geophysicists [SEG]** is a nonprofit organization that promotes the science of applied geophysics and the education of geophysicists. [www.seg.org](http://www.seg.org)

of engineering design, asset management, and enterprise information management software systems.

Formed as 501(c)6 nonprofit in 1997, MIMOSA is an alliance of operations and maintenance (O&M) solution providers and end-user companies focused on developing consensus-driven open data standards to enable open-standards-based O&M interoperability. Built on an industry-specified foundation architecture, MIMOSA combines systems engineering models with event-oriented O&M information flows that help ensure the timely flow of O&M information up the organization's chain of command in the systems engineering context of the platform or plant.

Johnston cautioned that, while not wanting to "drown decision-makers in data," MIMOSA's aim is to help member organizations identify problem areas such that "action can be taken before a crisis occurs by sustainably enabling the key information flows through standards-based interoperability." MIMOSA wants to help ensure "the uninterrupted flow of information that should follow the chain of accountability," Johnston said. "This may mean I'm exposing my warts before I want anyone to see them," he added. "However, we want to help ensure we aren't putting lipstick on a pig."

This uninterrupted information flow is vital for enabling improved management of operational and enterprise risk

that involves complex platforms, plants, and facilities throughout their lifecycle.

MIMOSA leverages the International Organization for Standardization [ISO] 15926 standard as the basis for a "reference information environment." MIMOSA also leverages the OpenO&M Initiative, which includes the International Society of Automation [ISA], MIMOSA, Open Applications Group [OAGi], Open Platform Communications [OPC], and Business to Manufacturing Markup Language [B2MML] and provides the architecture whereby these standards have an interoperable "execution environment." These standards follow plant design from its capital projects engineering phase through procurement and construction through the operations and maintenance phase all the way to remediation.

Accurate plant information handover from capital projects is vital to enterprise profitability, according to a MIMOSA white paper. Plant information should be treated as a valuable asset as important as the physical plant itself. Following handover, plant information should be kept accurate and accessible for the lifetime of the facility, which typically spans 30 to 50 years. Inaccurate or missing plant information causes lost revenue due to missed project deadlines, unnecessary material purchases, design rework, start-up delays, production cutbacks, and unplanned shutdowns. This handover activity is critical for bringing a



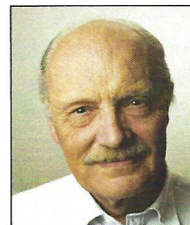
Apache's North Sea Bravo platform. After Apache purchased BP's 96% share in the Forties field in 2003, it reanalyzed and re-evaluated old geophysical data and found a further 800 million bbl. Mining this data was possible with SEG's open data storage standards allowing upward compatibility from old media to a new medium. *Photo courtesy of Apache Corporation.*

new plant on line within time and budget because it drives the compilation and validation of the records necessary to pass into and support the operational life of the plant, together with their transfer of ownership from the project team and acceptance by the plant owner.

"It's extremely difficult to manage a system with different silos," said Johnston. The oil and gas industry stands to gain from cross-industry expertise, he said, with systems and lessons learned from aerospace and military O&M operations, for example.

Interconnectivity of the silos, or islands, of engineering, maintenance, operations, and reliability information is embodied in MIMOSA's Open System Architecture for Enterprise Applications Integration (OSA-EAI) specifications. Previously, these separate information islands were built using specialized proprietary systems that gave value because they were optimized for a specific task or tasks, and they provided best results and value for those purposes. "In conjunction with our colleagues in the OpenO&M Initiative and POSC Caesar Association," said Johnston, "MIMOSA enables all these systems to interoperate in a 'system of systems' architecture. The result is a compounding of the value delivered by the individual systems."

### POSC Caesar Association



SANDSMARK

Nils Sandmark, general manager of the POSC Caesar Association, said the independent, nonprofit organization "develops, enhances, and promotes methodology, technology, and solutions for data interoperability, with special focus on ISO 15926 and W3C [World Wide Web Consortium] recommendations."

The Caesar Offshore Program started in 1993 as an oil-and-gas-industry-driven research and development project. It was sponsored by the Norwegian Research Council, Aker, DNV, Kværner, Norsk Hydro, Saga Petroleum, and Statoil. The purpose of the project was to benefit the oil and gas industry by developing a product model for lifecycle information. The focus was on standardizing the technical data definitions for facilities and equipment associated with onshore and offshore oil and gas production facilities.

From 1994 to 1996, the Caesar Offshore Program was defined as a project of the Petrotechnical Open Software Corporation (POSC), Houston, and changed its name to the POSC Caesar Project.

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The technical work of POSC Caesar was increasingly related to the ISO Standard for the Exchange of Product Model Data [STEP] standard and influenced by similar work in European standardization organizations, such as Process Industries STEP [PISTEP] in the UK and USPI in the Netherlands through the virtual European Process Industries STEP Technical Liaison Executive [EPISTLE] organization.

POSC Caesar Association was founded in 1997 as a global, nonprofit member organization to promote the development of openly available specifications to be used as standards for enabling the integration and interoperability of data, software, and related matters for e-engineering and e-commerce.

POSC Caesar has a special responsibility for the maintenance and enhancement of ISO 15926—"Integration of lifecycle data for process plants including oil and gas production facilities." However, the organization has a mandate to be flexible and at all times align its activities with the needs of its membership.

POSC Caesar works now as a global standardization organization in close collaboration with other standardization organizations in Europe and the US. Its membership includes universities and research institutes, oil and gas operators, engineering and consulting firms, digital solutions providers, associations, and control systems companies.

### OPC Foundation



BURKE

"The students of today are the engineers of tomorrow," said Thomas J. Burke, OPC Foundation president and executive director. The upcoming generation's expectations for the speed at which information is spread in an industrial environment are driven by their experience of how consumer information proliferates. With this in mind, "this [SLC

forum] event is a step forward," he said. "Interoperability is built on the success of a technical collaborative vision."

The OPC Foundation has close to 500 members from around the world, including nearly all the world's major providers of control systems, instrumentation, and process control systems. The foundation's forerunner—a task force composed of Fisher-Rosemount, Rockwell Software, Opto 22, Intellution, and Intuitive Technology—developed a basic, workable, OPC specification after only a single year's work, which was released in August 1996.

The name OPC stood for OLE [Object Linking and Embedding] for Process Control, quickly changing as its membership recognized the opportunity for standardization in industrial automation.

As of November 2011, the OPC Foundation's acronym was changed to mean "Open Platform Communications." According to Wikipedia, "The change of name reflects the applications of OPC technology in process control, discrete manufacturing, building automation, and many others. OPC has also grown beyond its original OLE implementation to include other data transportation technologies, including extensible markup language [XML], Microsoft's .NET Framework, and even the OPC Foundation's binary-encoded transmission control protocol [TCP] format."

The OPC standard specifies the communication of real-time plant data between control devices from different manufacturers. Production devices include sensors, instruments, programmable logic controllers [PLCs], remote terminal units [RTUs], distributed control systems [DCSs], human/machine interfaces [HMIs], historians, trending subsystems, alarm subsystems, and more as used in the process industry, manufacturing, and in acquiring and transporting oil, gas, and minerals.

Previously, interoperability was chancy—"plug and pray," said Burke. That changed with OPC, which is all about open productivity and connectivity in industrial automation and the enterprise systems that support industry. "Plug-and-play" interoperability is assured through the creation and maintenance of open standards specifications. There are currently seven standards specifications completed or in development.

According to its website, "Members have a unique opportunity to take advantage of the significant marketing and technical tools the OPC Foundation provides to enable rapid deployment and certification of products based on the technology." Almost 3,500 companies use OPC standards within 22,000 products. OPC's worldwide member distribution is as follows: China, 3%; Europe, 48%; Japan, 6%; North America, 35%; other, 8%.

OPC's latest development is called OPC Unified Architecture [UA]. It is a new set of specifications not based on Microsoft component object model [COM] that will provide standards based on cross-platform capability. "UA is complicated but simple to adopt," said Burke. "It has to support multiple platforms, solving the problem of platform independence."

### Open Geospatial Consortium [OGC]



REED

Carl Reed, OGC chief technology officer and executive director, Standards Program, pointed out that "every piece of data we collect has a location, either implicit or explicit." Tracking the geographic whereabouts of specific data has emerged as a matter of great interest to public and private organizations worldwide.



Apache's North Sea Charlie platform, located in the Forties field, along with its Alpha, Bravo, Delta, and Echo platforms. Rejuvenation of the Forties field relied on plumbing old geophysical data, which was possible with SEG's open data storage standards allowing upward compatibility from old media to a new medium. *Photo courtesy of Apache Corporation.*

By the mid-'80s, geographic information system [GIS] software was heavily used in the natural resources and defense domains, especially within government agencies. State and local government, civil engineering, transportation, and business marketing sectors were seriously exploring the technology. But, despite the power and potential of the new mapping and spatial tools, there were serious drawbacks. The software was expensive, limited in extent, lacked flexibility, and lacked the ability to share geospatial data between systems. Users were forced to use inefficient, time-consuming, and error-prone data-transfer methods.

The OpenGIS Project, which preceded the formal launch of the current Open Geospatial Consortium [OGC], defined a vision of diverse geoprocessing systems communicating directly over networks by means of a set of open interfaces based on the Open Geodata Interoperability Specification [OGIS].

Founded in 1994 with eight charter members, OGC grew to more than 250 government, academic, and private

sector organizations in its first 10 years—with current membership topping 450. OGC has continued its standards development progress, from the Standards Program's first approved implementation standard in 1997 and the first interoperability program testbed [Web Mapping Testbed] in 1999 to today's broad array of standards and initiatives, with 37 free and publicly available adopted standards and hundreds of product implementations.

Many of these standards have direct applicability to the oil and gas industry, such as for portrayal, simulation, and modeling; data content modeling; coordinate reference systems; and sensor systems. An example is Geoscience Markup Language [GeoSciML], which is an OGC GML application schema that can be used to transfer information about geology, with an emphasis on the "interpreted geology" that is conventionally portrayed on geologic maps. Its feature-type catalog includes the following: geologic unit, mapped feature, earth material, geologic structure, and specializations of these, as well as borehole and other observational artifacts.



## DIGITAL STANDARDS

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OGC's vision is the "realization of the full societal, economic, and scientific benefits of integrating electronic location resources into commercial and institutional processes worldwide." Its stated mission is "to serve as a global forum for the collaboration of developers and users of spatial data products and services, and to advance the development of international standards for geospatial interoperability."

"Location permeates every domain," said Reed. Sensors, for example, are widely used throughout many industries, including oil and gas. Growth in OGC membership is most pronounced in the Middle East and Asia—not, however, in the oil and gas industry, but in security, law enforcement, and spatial data infrastructures. OGC members cross a wide range of sectors, including energy, geosciences, e-government, infrastructure, transportation, education and research, sustainable development, emergency services/disaster management, and consumer services.

For those interested, said Reed, "OGC just formed a new Energy and Utilities domain working group." The group is focused on supporting geospatial standardization collaboration activities in the broad energy and utilities industry around the world. He can be reached at [creed@myogc.org](mailto:creed@myogc.org).

### Society of Exploration Geophysicists (SEG)



LEWIS

In 1930, 29 men and women met in Houston to found the Society of Economic Geophysicists. The name was changed to the Society of Petroleum Geophysicists in 1931. Then, in 1937, its final name was decided: the Society of Exploration Geophysicists. As of 2008, SEG had more than 28,000 members working in more than 130 countries.

SEG's Technical Standards Committee develops and maintains specifications for recording, exchanging, and archiving geophysical data. The SEG Y file format is one of several open standards available online in portable document format (PDF) and Microsoft Word document format ([www.seg.org/tsc](http://www.seg.org/tsc)). A total of 26 standards, developed between 1967 and 2011, can be found.

Standards generally relate to how to code seismic data such that, after it is acquired, processed, and stored on some sort of medium, it will be easily accessible across a wide range of storage media and, therefore, its useful life will span decades. "The lifecycle of geophysical data is so long," said Jill Lewis, CEO and managing director at Troika International and former chair and current member of the SEG Technical Standards Committee. "This points to the need to have long-lasting standard formats."

With every seismic shot as a separate file, she noted, you can end up with many millions of files in one survey.

By adopting the new SEG-D standard, one can vastly reduce data delivery times and increase data management efficiency and thereby, with a small amount of programming, save immense amounts of computing time devoted to trying to access data.

After Apache purchased BP's 96% share in the Forties field in the North Sea in 2003, it reanalyzed and re-evaluated old geophysical data and found a further 800 million bbl. "It wouldn't have been possible," Lewis said, "had Apache not figured there was valuable information to be plumbed from old data." And mining the data would not have been possible without SEG's open data storage standards allowing upward compatibility from old media to a new medium.

Lewis's motto, as it applies to geophysical data, is, "Do it once. Do it right."

### Professional Petroleum Data Management (PPDM) Association



CURTIS

In 1991, the PPDM Association was incorporated as a nonprofit society in Alberta, Canada. The PPDM Association defines and creates standards to help oil and gas companies manage exploration and production (E&P) data. Now with more than 110 member companies worldwide, its PPDM Data Model standard has gone through 13 revisions,

reaching what the PPDM website terms a critical-mass stage, whereby it covers most major E&P functions.

PPDM members—including operators, governments, service companies, regulatory agencies, associations, geological survey organizations, consultants, and software companies—provide critical input and help set PPDM's strategic direction. The organization has been instrumental in developing and introducing oil and gas data management standards built around business rules and best practices. The latest model—PPDM 3.8—covers 52 subject areas, including data management; equipment and facilities management; records management; health, safety, and environment; spatial descriptions; well activities and operations; and classification systems. There is also a version called PPDM Lite, which is a simple data model structure that collects information most important to users of geographic information systems.

The PPDM Association is home to the API D12a Well Numbering standard, and is working with regulators around the world to create recommendations for well identification practices that will help all stakeholders accurately and consistently identify wells and their components.

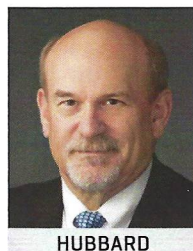
In addition, Trudy Curtis, CEO of the PPDM Association, pointed to the importance of the "What Is a Well?" [Figs. 2 and 3] and "What Is Well Status?" projects. "Over the years," she said, "the business entity we call a 'well'

has become increasingly complicated." All over the world, corporate and regulatory processes have evolved to manage this increased complexity in different ways. The end result has been a mixture of systems and data sources that are difficult to integrate and use effectively.

PPDM members have created a set of baseline definitions that map to entity definitions and business rules used by various organizations and departments in the oil and gas industry. According to the PPDM "What Is a Well?" booklet, "These definitions provide a baseline to analyze your use of a term or concept and explain any difference. This should improve communication and may prevent errors during activities such as acquiring or exchanging data. In the same way, the baseline definitions help in analyzing the meanings used by regulators, partners, data vendors, and so forth."

"Hopefully," said Curtis, "this project will have a positive impact on the reliability and consistency of well data worldwide."

### Energistics



HUBBARD

Energistics' predecessor organization was formed in October 1990 by five founding sponsor oil companies—BP, Chevron, Elf, Mobil, and Texaco—under the name Petrotechnical Open Software Corporation (POSC). The mission of the new organization was defined as developing, supporting, evolving, and promoting open standards for the scientific, engineering, and operations aspects of the oil and gas E&P industry.

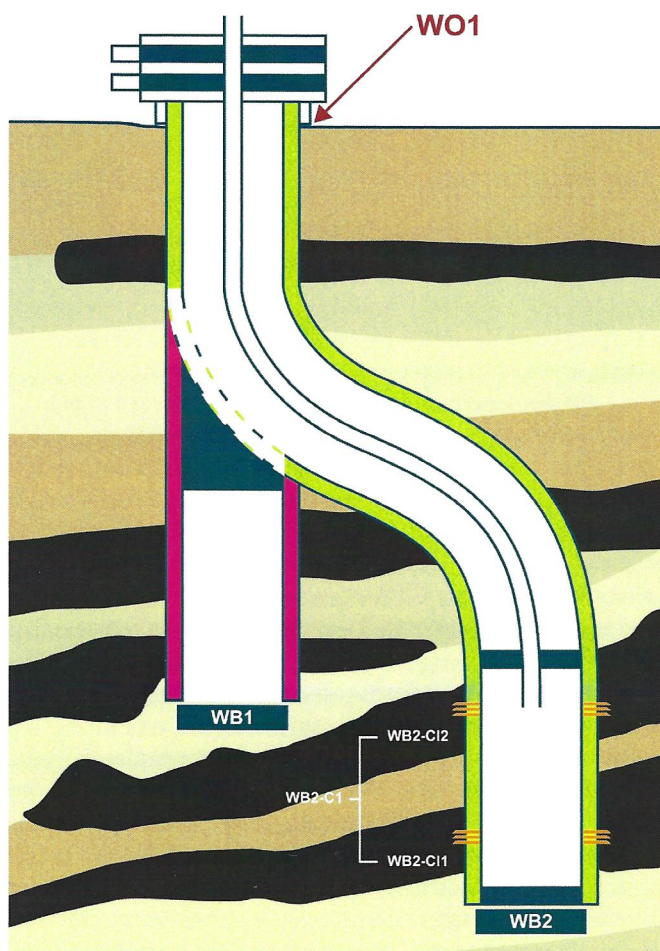


Fig. 2—This diagram shows multiple well components, including the following: one active well origin (WO1), one plugged wellbore (WB1), one active wellbore (WB2), one active wellbore completion (WB2-C1), and two active wellbore contact intervals (WB2-C1, WB2-C12). Art courtesy of PPDM Association. Both Figs. 2 and 3 appear in PPDM's "What Is a Well?" booklet.

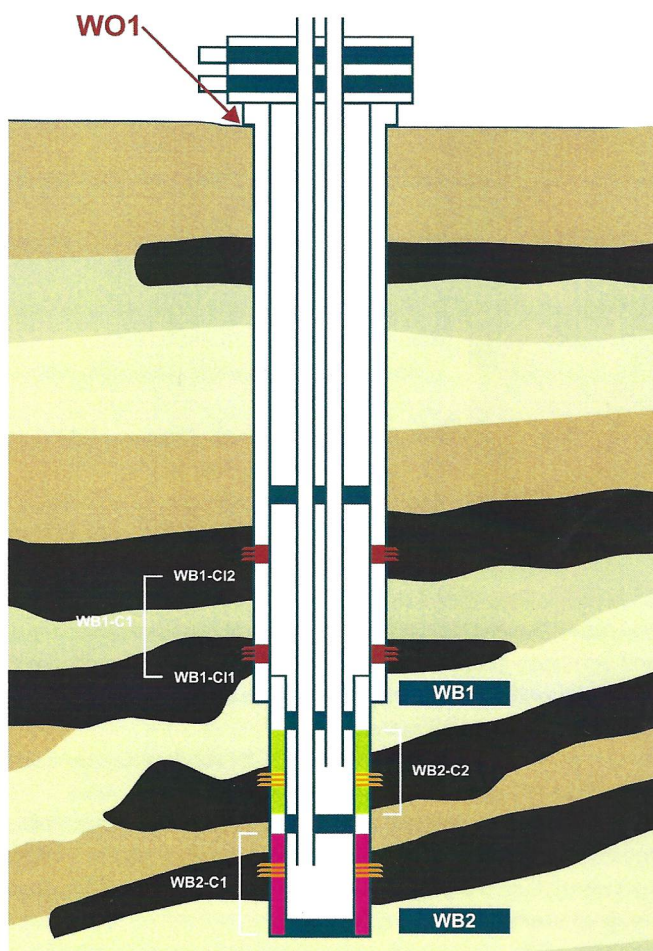


Fig. 3—A wellbore completion is a set of one or more wellbore contact intervals that function as a unit to produce or inject fluids. WB=wellbore; C=wellbore completion; WB1-C1=wellbore #1 and completion #1; WB2-C1=wellbore #2 and completion #1; WB2-C2=wellbore #2 and completion #2. Art courtesy of PPDM Association.

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In 1993, Version 1.0 of the Software Integration Platform [SIP] specifications was published as a collection of hardcover books. In 1996, the board of directors commissioned a study of the benefits of using the SIP specifications, which projected savings of from USD 1 to USD 3 per barrel of oil, gained through improvements in data quality, data accessibility, and exploitation of information and knowledge.

After several additions and enhancements to the SIP specifications were published, by 2001, the organization published the first XML data schema specifications for basic well data [WellMasterML] and well log display parameters [LogGraphicsML]. The organization's purpose was shifting from data store and middleware specifications to subject matter data exchange specifications.

In 2002, POSC became custodian of the wellsite information transfer standard markup language [WITSML]. It is a standard for transmitting technical data involving drilling, completions, and interventions. WITSML is targeted toward operating and services companies, drilling contractors, application vendors, and regulatory agencies. It is web based and built on XML technology, which is both platform- and language-independent.

The second XML and web services family of standards was initiated in August 2005, called Production XML Markup Language [PRODML]. PRODML has evolved to include such standardized objects as distributed temperature sensing

[DTS] measurements, fluid analysis, fluid samples, flow networks, production operations reports, production reports, historian data, well tests, and wireline formation tests. PRODML includes standardized web service definitions for exchanging standard data objects, managing information about the configuration of an asset, and obtaining data from models.

The organization rebranded itself to Energistics in November 2006.

In 2007, WITSML-based electronic permitting XML schema specifications were published following a multiyear collaboration with US state regulatory agencies in cooperation with API PIDX.

Jerry Hubbard, Energistics president and CEO, points also to RESQML, which addresses reservoir characterization standards development as a natural successor to the RESCUE Work Group's C++ Class Library. It contains standards for the reservoir lifecycle, from initial structural modeling, to simulation, through production surveillance.

The Standards DevKit, as designed and donated to the industry by ExxonMobil, removes the complexity of using the WITSML and PRODML standards so a developer can concentrate on integrating these standards into their business solution. An update to the Standards DevKit adding RESQML is due by the end of the year.

Energistics includes 112 active organizations and members. **JPT**

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## For further reading:

**IADC/SPE 151412** Data Aggregation and Drilling Automation: Connecting the Interoperability Bridge Between Acquisition, Monitoring, Evaluation, and Control, by *Andreas Sadlier, Moray Laing, and John Shields, Baker Hughes*

**OTC 23510** Improved Decision-Making and Operational Efficiencies Through Integrated Production Operations Solutions, by *Dave Noller, Frode Myren, Oystein Haalnad, Justin Brisco, and Ed Bryan, IBM*

**SPE 124347** WITSML "Comes of Age" for the Global Drilling & Completions Industry, by *J.G. Pickering, SPE, BP; J. Kreijger, SPE, Shell; L.O. Grøvik, SPE, Statoil Hydro; D. Franssens, SPE, IDS; N.R. Deeks, Schlumberger; and A. Doniger, SPE, and J. Schey, SPE, Energistics*

**SPE 134107** Accelerating Progress Toward Achieving Digital Oilfield Workflow Efficiencies, by *Mark L. Crawford, ExxonMobil, and Richard A. Morneau, Chevron*

**SPE 150155** From Standard Operations via Remanning and Remote Support to Automated Advisory Systems: A Stepwise Development Program for Remote Operations Over a Decade,

by *Erland Sæverhagen, Arve K. Thorsen, Jan Ove Dagestad, Inge Svensson, Baker Hughes; and Lars Olav Grøvik, Statoil*

**SPE 150245** Cross-Industry Perspectives on Remote Collaboration, Optimization, and Operations, by *Christophe Romatier, Honeywell Process Solutions*

**SPE 150278** WITSML: Laying the Foundation for Increasing Efficiency of Intelligent Wellsite Communications, by *J.G. Pickering, SPE, Digital Oilfield Solutions; J.A. Shields, SPE, Baker Hughes; Y.K. Gidh, SPE, Schlumberger; D.C. Johnson, Halliburton; M.A. AlShehry and M.M. Al-Khudiri, SPE, Saudi Aramco; M.P. Farnan, SPE, Petrolink; and J.E. Schey, SPE, Energistics*

**SPE 150382** A WITSML Enabled Workflow for Integrating Offset Well Drilling Risks and Events Into Well Planning and Execution, by *N.R. Deeks, SPE, Y.I. Arevalo, SPE, and A.J. Fernandes, SPE, Schlumberger*

**SPE 151977** Design and Implementation of a Global Solution for the Management of Real-Time Drilling Data, by *Glenn Warner, SPE, Sergio Hernandez, SPE, and Jesus Lopez, Chevron; and Jake Booth, SPE, Booth Consulting LLC*

