The changing role of WITSML and now ETP in managing drilling data.

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With thanks to

Jana Schey & Jay Hollingsworth

Energistics

Welcome to productive drilling

energistics® Energy Standards

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A little about Energistics

» Energistics is a global, non-profit, membership consortium focused on developing open data exchange standards for the upstream oil and gas industry

» Evolving from POSC, it has served the industry for more than 25 years

» Membership consists of E&P companies, oilfield service companies, software vendors, system integrators, regulatory agencies and the global standards community

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

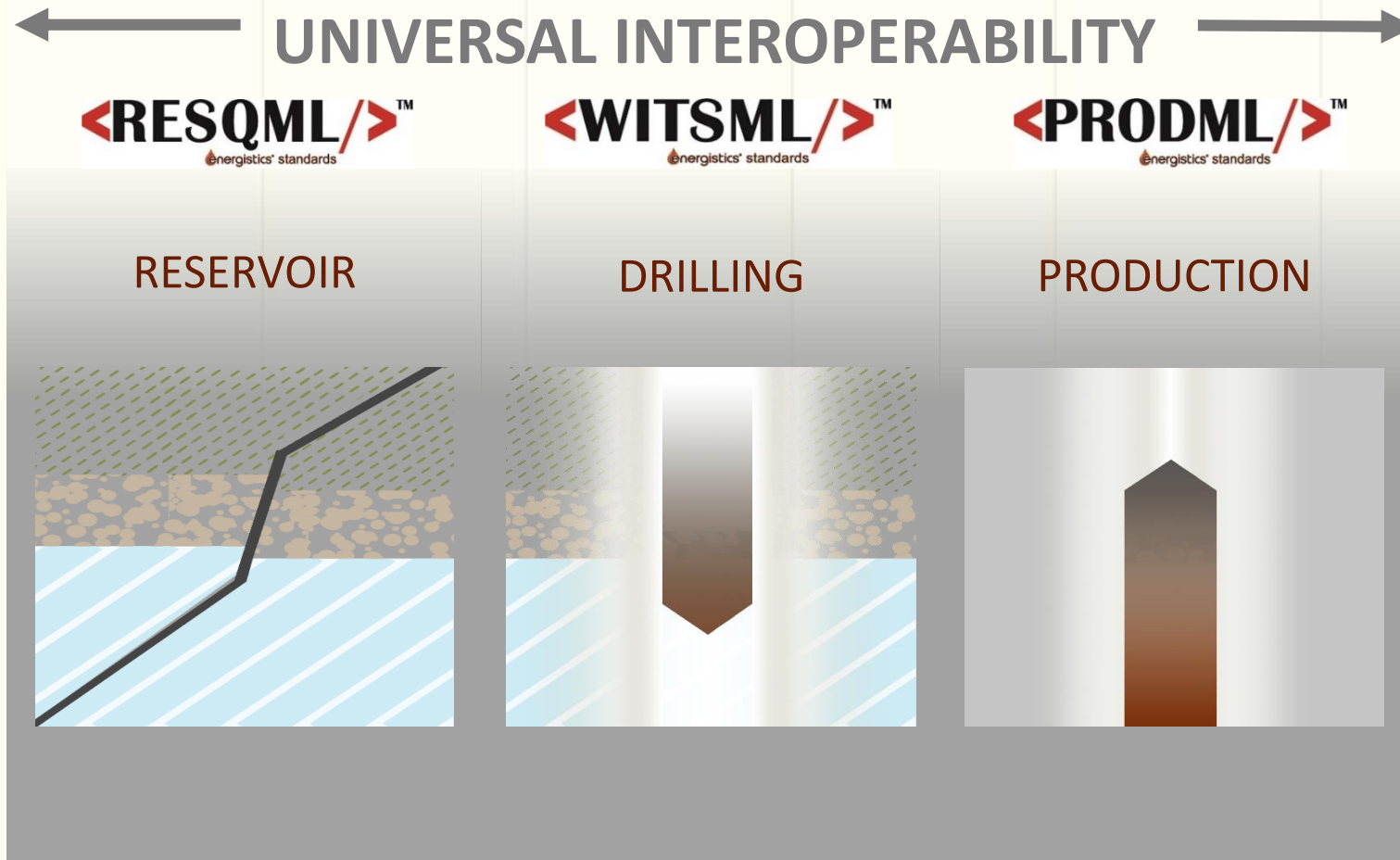» In short, the standards are created **by the industry** and **for the industry**
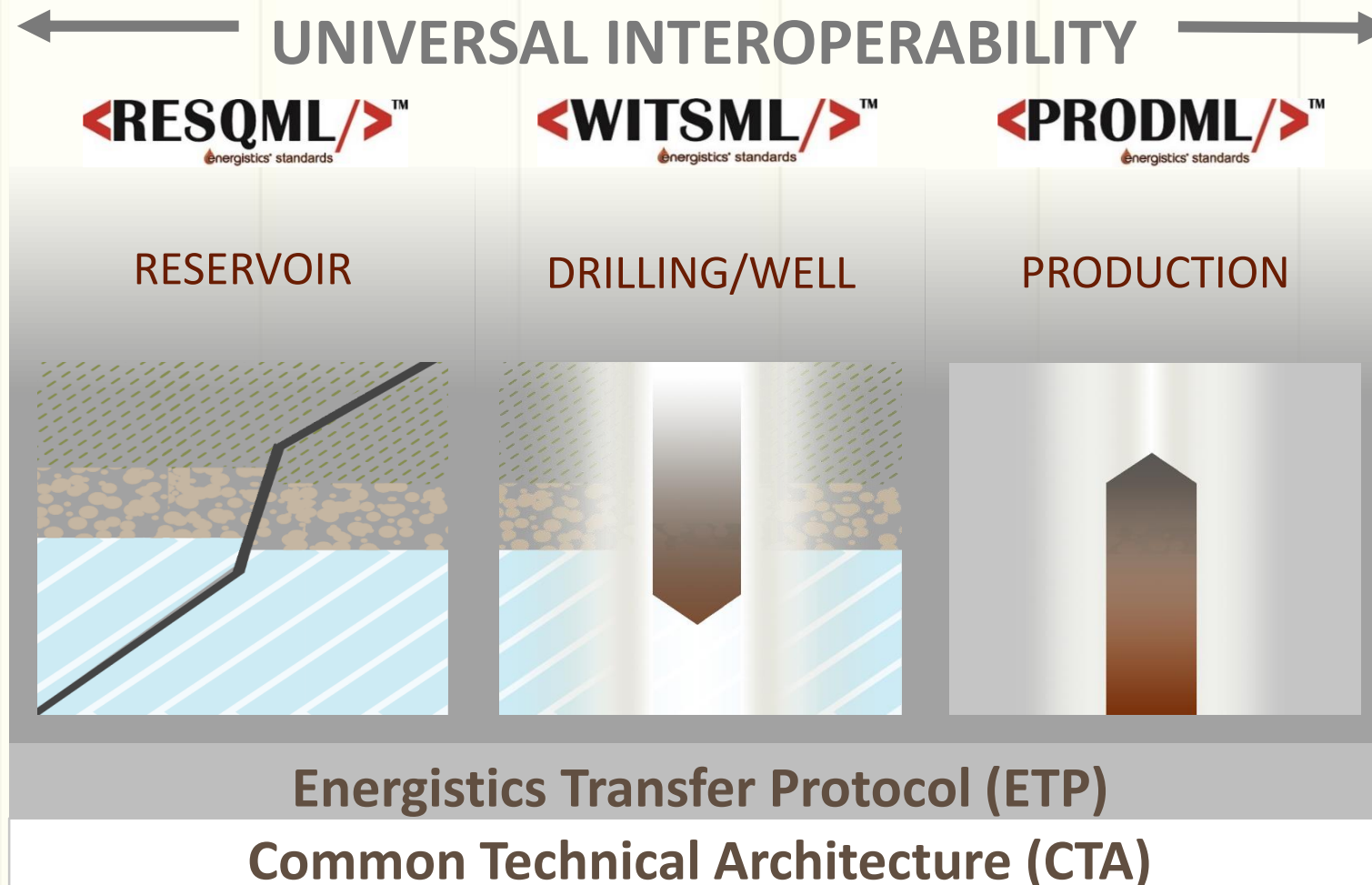
Global Influence

Energistics Family of Standards

UNIVERSAL INTEROPERABILITY

<RESQML/>™
energistics' standards

<WITSML/>™
energistics' standards

<PRODML/>™
energistics' standards

RESERVOIR

DRILLING

PRODUCTION

Energistics Family of Standards

UNIVERSAL INTEROPERABILITY

RESQML/>™
energistics' standards

WITSML/>™
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PRODML/>™
energistics' standards

RESERVOIR

DRILLING/WELL

PRODUCTION

Energistics Transfer Protocol (ETP)

Common Technical Architecture (CTA)

13th Feb 2017

Energistics announces the highly anticipated next generation, coordinated release of its exploration and production data standards:

WITSML™ v2.0 (drilling), PRODML™ v2.0 (production), RESQML™ v2.1 (reservoir) in conjunction with ETP v1.1.

energistics®
Energy Standards

A little about WITSML .....

"The 'right-time' seamless flow of well-site data between operators and service companies to speed and enhance decision-making"

- WITSML is an **Energistics** standard
- Born out of "DART" evolving into a multi company effort (Statoil, BP, Baker Hughes, Halliburton, Schlumberger) to create a new standard, to replace WITS.
- WITSML allows electronic exchange of information about well construction operations
- WITSML is both a protocol and a data format
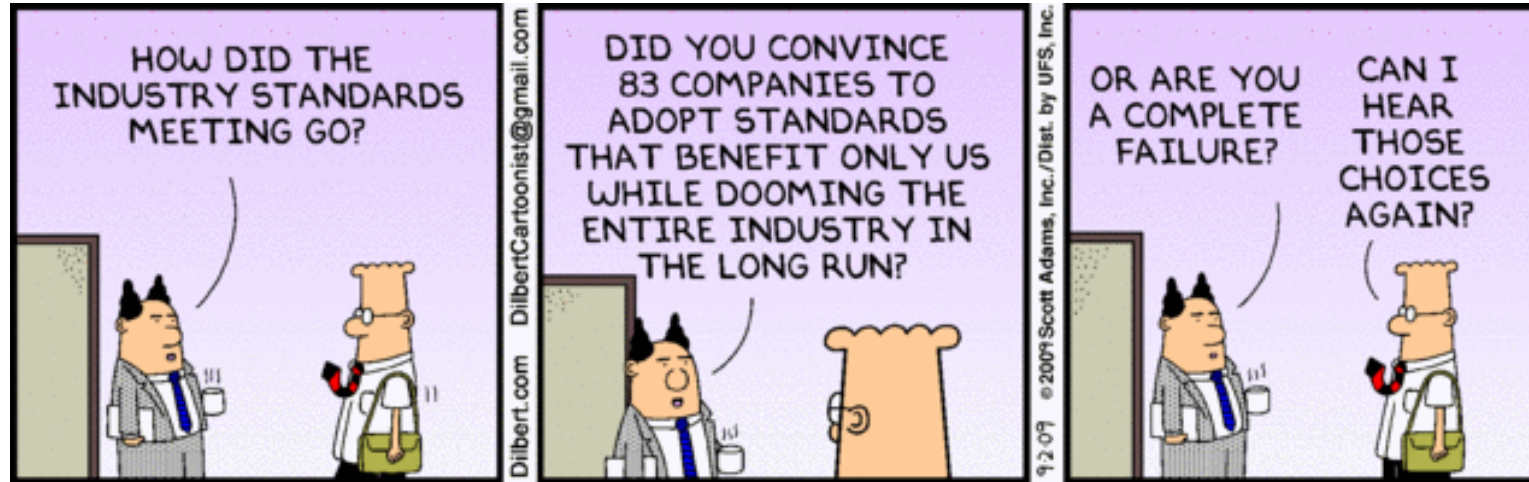- WITSML covers not only real-time data, but also contextual data
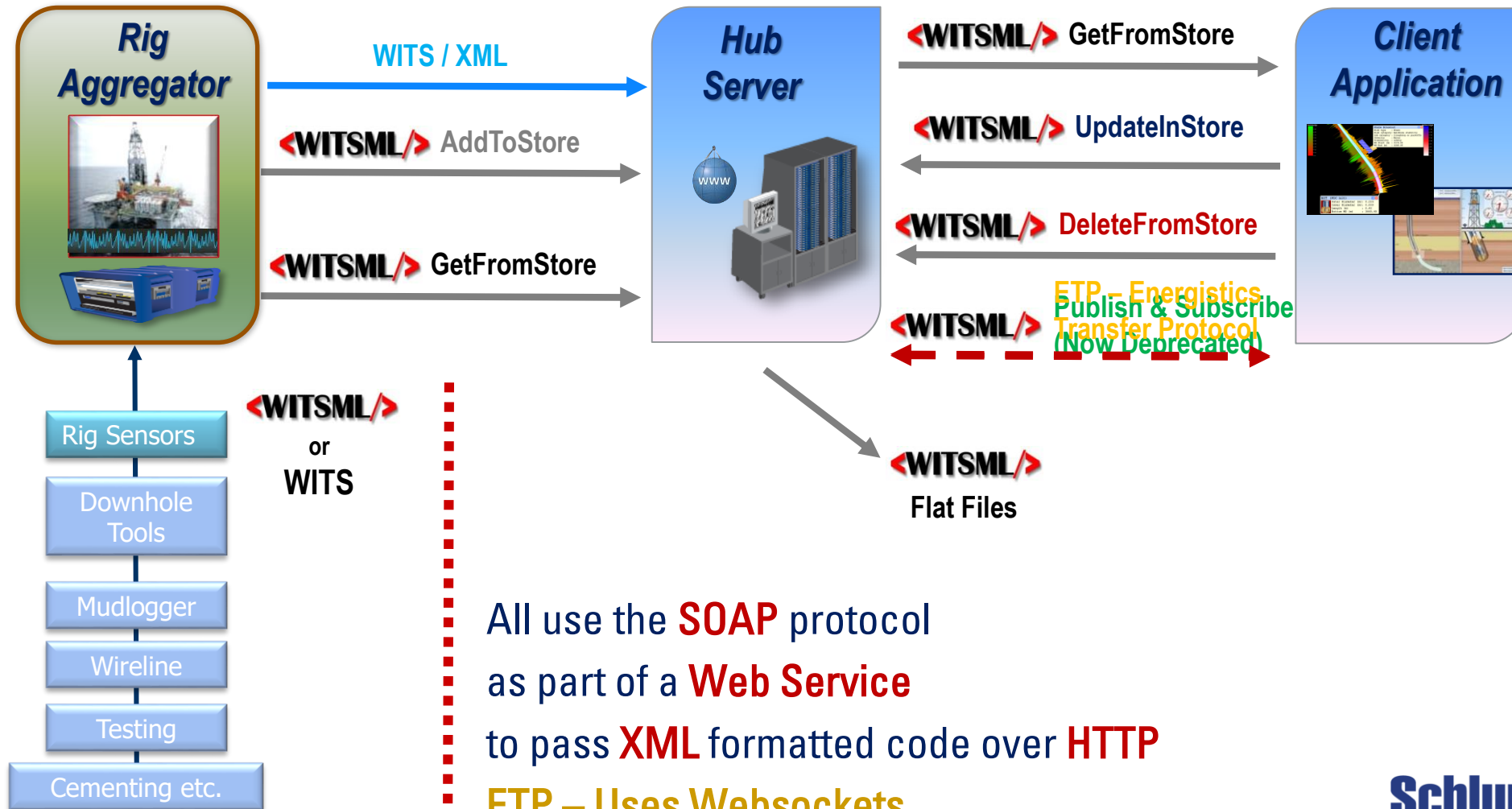

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A little about WITSML .....

>50 Companies in SIG, Hosted and facilitated by **Energistics**

"WITSML is like blood....
You don't normally need to see it.
If you do..... things may get complicated,
but if its not there ... you'r dead !"

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A little about WITSML ..... The API interfaces

Rig Aggregator

WITS / XML

<WITSML/> AddToStore

<WITSML/> GetFromStore

Hub Server

<WITSML/> GetFromStore

<WITSML/> UpdateInStore

<WITSML/> DeleteFromStore

<WITSML/> ETP – Energistics
Publish & Subscribe
Transfer Protocol
(Now Deprecated)

Client Application

Rig Sensors

Downhole Tools

Mudlogger

Wireline

Testing

Cementing etc.

<WITSML/>
or
WITS

<WITSML/>
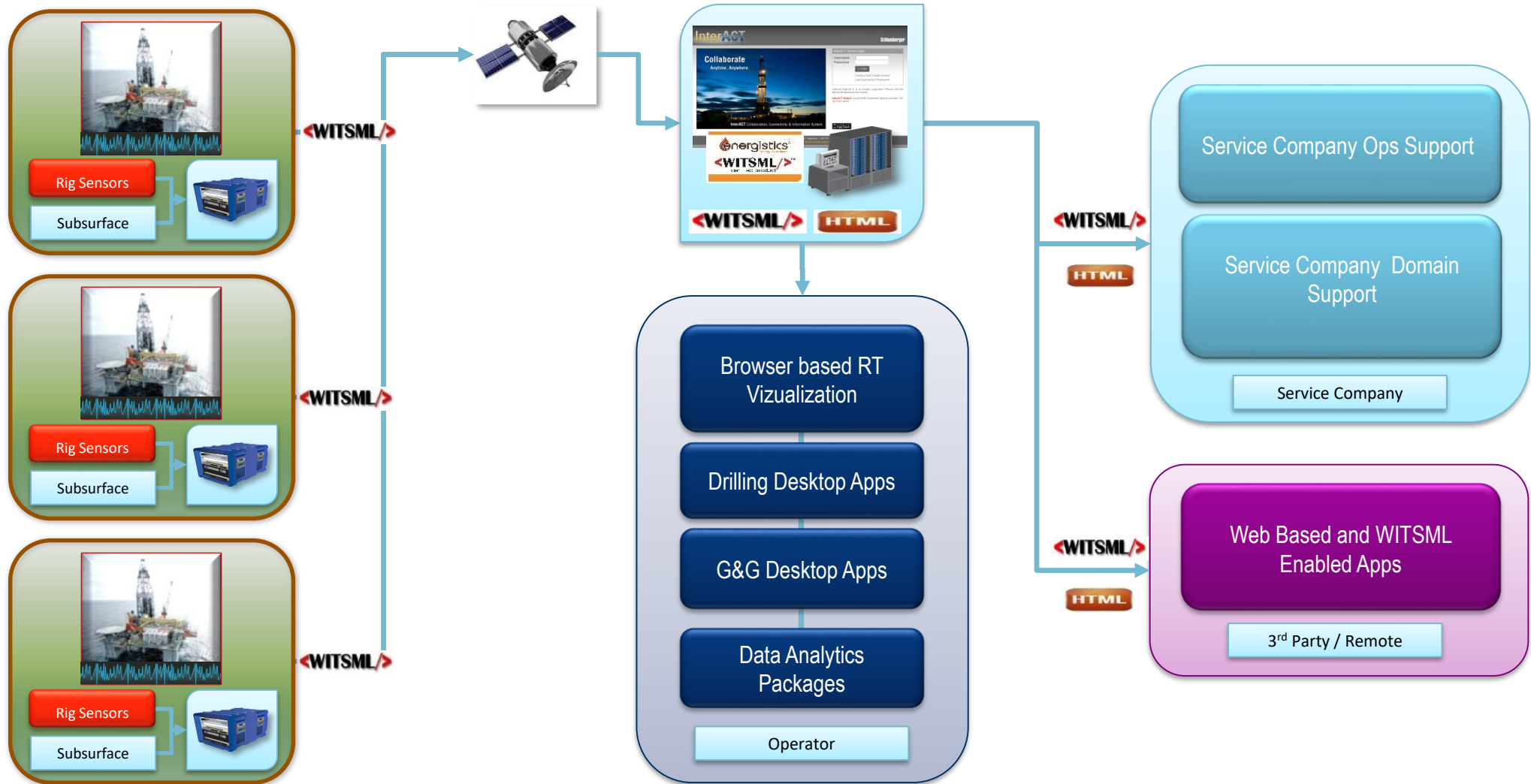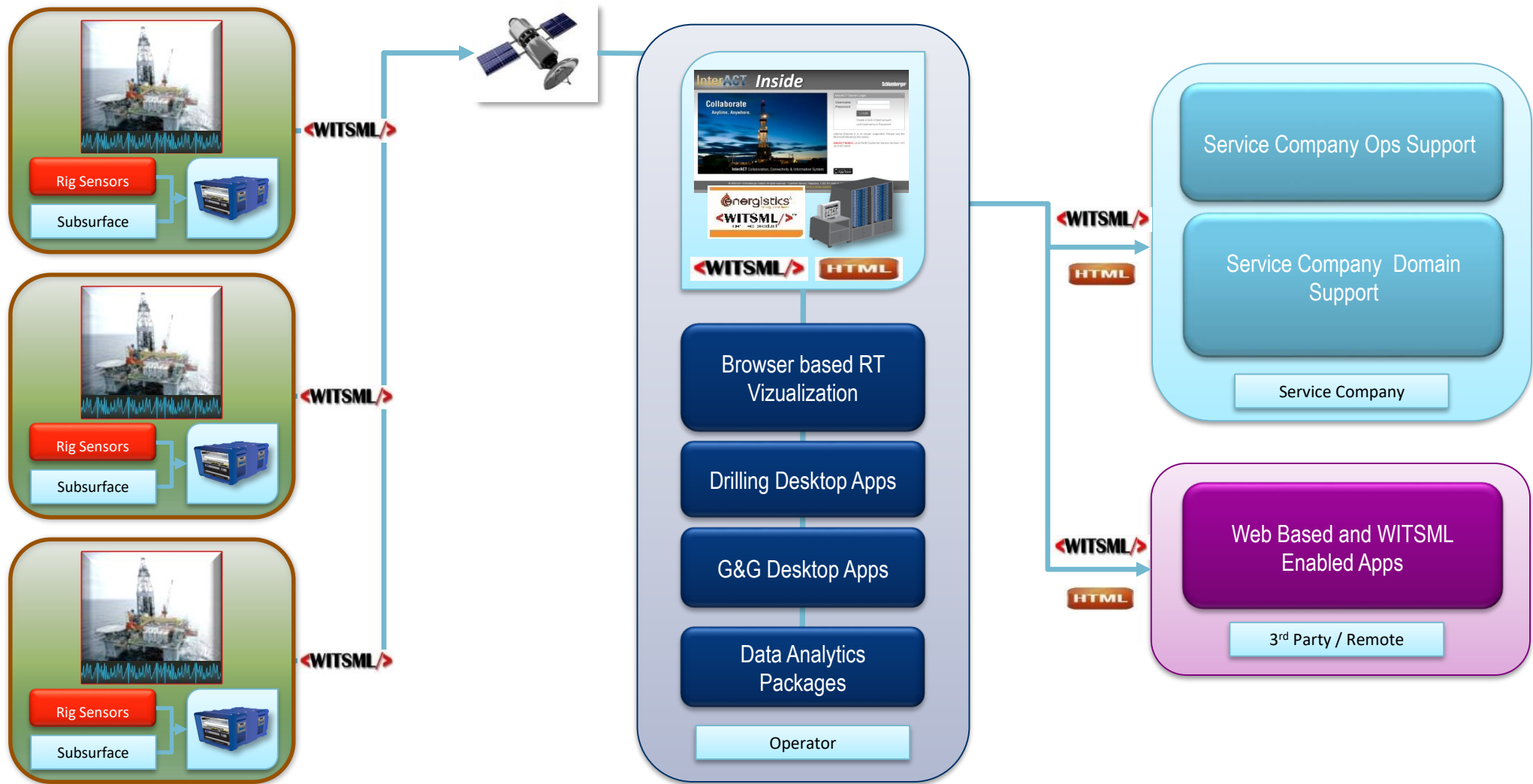Flat Files

All use the **SOAP** protocol
as part of a **Web Service**
to pass **XML** formatted code over **HTTP**
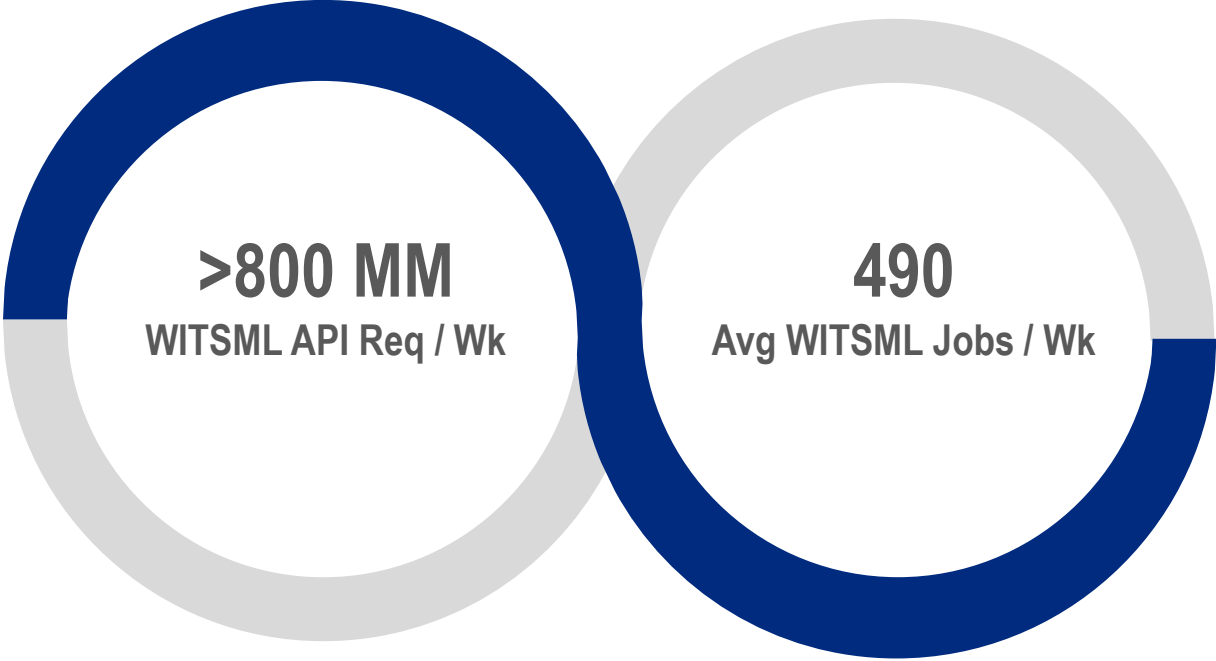ETP – Uses Websockets

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A little about WITSML .....

Rig Sensors
Subsurface

Rig Sensors
Subsurface

Rig Sensors
Subsurface

InterACT
Collaborate
Anytime, Anywhere.

Browser based RT Vizualization

Drilling Desktop Apps

G&G Desktop Apps

Data Analytics Packages

Operator

Service Company Ops Support

Service Company Domain Support

Service Company

Web Based and WITSML Enabled Apps

3rd Party / Remote

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A little about WITSML …..

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How much data are we talking about ?

>800 MM
WITSML API Req / Wk

490
Avg WITSML Jobs / Wk

WITSML API Access **WITSML Jobs**

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ETP (Energistics Transfer Protocol)

» Project to develop a new data transmission method for the oilfield

- High-frequency, low-latency
- Firewall / Internet friendly
- Cross SIG applicability.

» Built on current technologies and standards
- HTML5 – ubiquitous support
- WebSocket's – full duplex transfer via TCP 80/443
- Apache Avro serializer with JSON schema encoding
- JWT (Java Web Tokens)– used for security

» From the business... 'We need this *NOW*'

WITSML v2.0 Supporting Data Analytics

» WITSML has been re-designed to reflect data assurance principles which support big data analytics

- A special Data Assurance object

- Enhanced metadata on the redesigned Log object

- Support for PWLS

- WITSML 2 provides assurance that your data is fit for purpose.
  - The assurance process utilizes business defined policies and rules to verify that the data meets business requirements and can be trusted.

- Once trusted, the data is readily available for generating actionable insight without the additional need for costly data wrangling and data validation.

WITSML v2.0 Data Assurance Object

Attaches to anything

Describes conformance to predefined policies

Examples:

- How long since calibration?
- Has the site been surveyed?
- Is value within expected range?

Data Assurance policies from Operating Company

OpCo #101 –
- Location verified by service provider

OpCo #102 –
- Location certified by US Land Survey Co within 3 weeks of site prep

Data Assurance Record

Wellbore Object

Name = "Wellbore A"
Location = 10156, 34562
Target Depth = 13000
MD = 11956

Policy = OpCo #101
Origin = Patterson 270, John Falkner
Compliant = Good
Date = May 14, 2014
Comment =

Policy = OpCo #102
Origin = Land Survey Co
Compliant = Bad
Date = May 16, 2014
Comment = Discrepancy by 28' from plan

WITSML v2.0 Data Assurance Object

Growing object (Log) implementation example.

Data Assurance policies from Operating Company

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 X must have defined units
OpCo #206 – RT Curve R (rotation) shows direction, + = clockwise
OpCo #207 – Calibration of sensor is still valid

Callibration Record: Policy = OpCo #200
Compliant = Good
Expiry Date = May 14, 2014 10:03:00AM
Comment = All sensor calibration completed by company xyz

Policy = OpCo #201
Origin = auto generated by application XYZ
Compliant = Failed
Date = May 14, 2014 10:00:30 AM
Comment = Curve X is above Curve Y

Policy = OpCo #202
Origin = auto generated by application XYZ
Compliant = Failed
Date = May 14, 2014 10:01:15 AM
Comment = Curve X is below Curve Z

Policy = OpCo #203
Origin = auto generated by application XYZ
Compliant = Failed
Date = May 14, 2014 10:02:13 AM
Comment = Delay in data delivery

Policy = OpCo #205
Origin = auto generated by application XYZ
Compliant = Failed
Date = May 14, 2014 10:02:28 AM
Comment = Missing Unit of Measure

Policy = OpCo #206
Origin = auto generated by application XYZ
Compliant = Failed
Date = May 14, 2014 10:02:58 AM
Comment = Missing rotation directionality

Index	Curve X UOM = lb/ft	Curve Y UOM = lb/ft	Curve Z UOM = lb/ft	Curve R UOM = hz	sign
10:00:00	16.4567	18.0000	4.5000	30.6	+
10:00:15	17.9997	18.0000	4.5000	30.5	+
10:00:30	18.234	18.0000	4.5000	30.3	+
10:00:45	14.5000	18.0500	4.5000	30.1	+
10:01:00	3.2490	18.1000	4.5000	29.7	+
10:01:15	9.3178	18.1500	4.5000	22.0	+
10:02:13	16.4567	18.1350	4.5000	18.7	+
10:02:28	16.4567	18.1200	4.5000	17.3	+
10:02:43	16.4567	18.1050	4.5000	13.5	+
10:02:58	16.4567	18.0900	4.5000	16.9	
10:03:13	16.4567	18.0750	4.5000	21.0	+
10:03:28	16.4567	18.0600	4.5000	22.7	+
10:03:43	16.4567	18.0450	4.5000	24.5	+

WITSML 2.0 – Log Object Enhancements

Log has undergone significant changes – Primarily to enable streaming via ETP.
Logs are now built from collections of **Channels** and **Channel Sets**.

- **Channel** :-
  - Now a "top level" object
  - Fundamental components of ChannelSet and Log.
  - Analogous to a "Tag" in historians / DBs
  - Corresponds to **ChannelMetaDataRecord** in ETP
  - Each channel corresponds to a curve Mnemonic
  - Each channel has a unique UID

Depth	2140.5	2140.6	2140.7	2140.8	2140.9	2141.0	2141.1	2141.2	2141.3	2141.4	2141.5	2141.6	2141.7
GRAX	25.7	29.6	37.5	42.1	39.1	46.8	47.2	49.7	56.3	50.8	57.`2	49.4	53.7

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WITSML 2.0 – Log Object Enhancements

Log has undergone significant changes – Primarily to enable streaming via ETP.
Logs are now built from collections of **Channels** and **Channel Sets**.

- **Channel Set** :-

    Group of Channels with a compatible index (usually time, depth or both)
    Essentially grouped based on activity or data type e.g. Lagged Gas data
    Can carry aggregated ChannelSet Metadata

- **Log**:-

    Container for one or more Channel Sets
    Can carry aggregated Log Metadata

Individual Channels can be grouped into **one**,
many or **no** Channel Sets
Channel Sets can exist in **one** or **many** Logs

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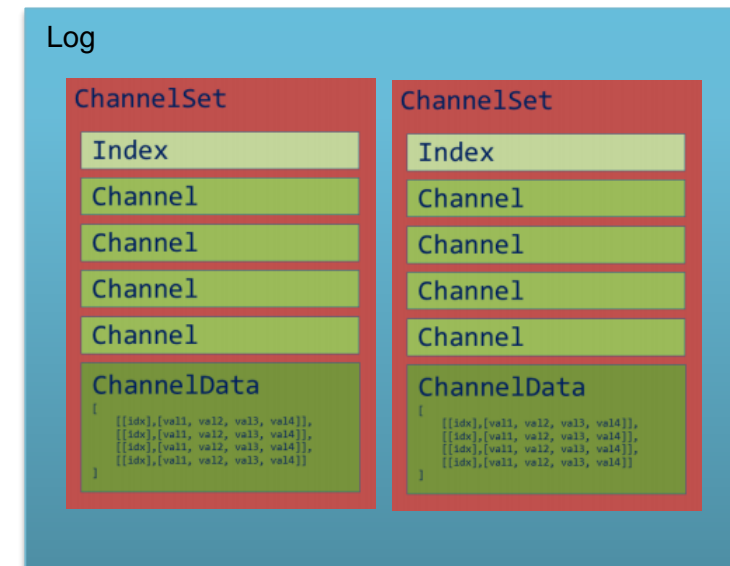
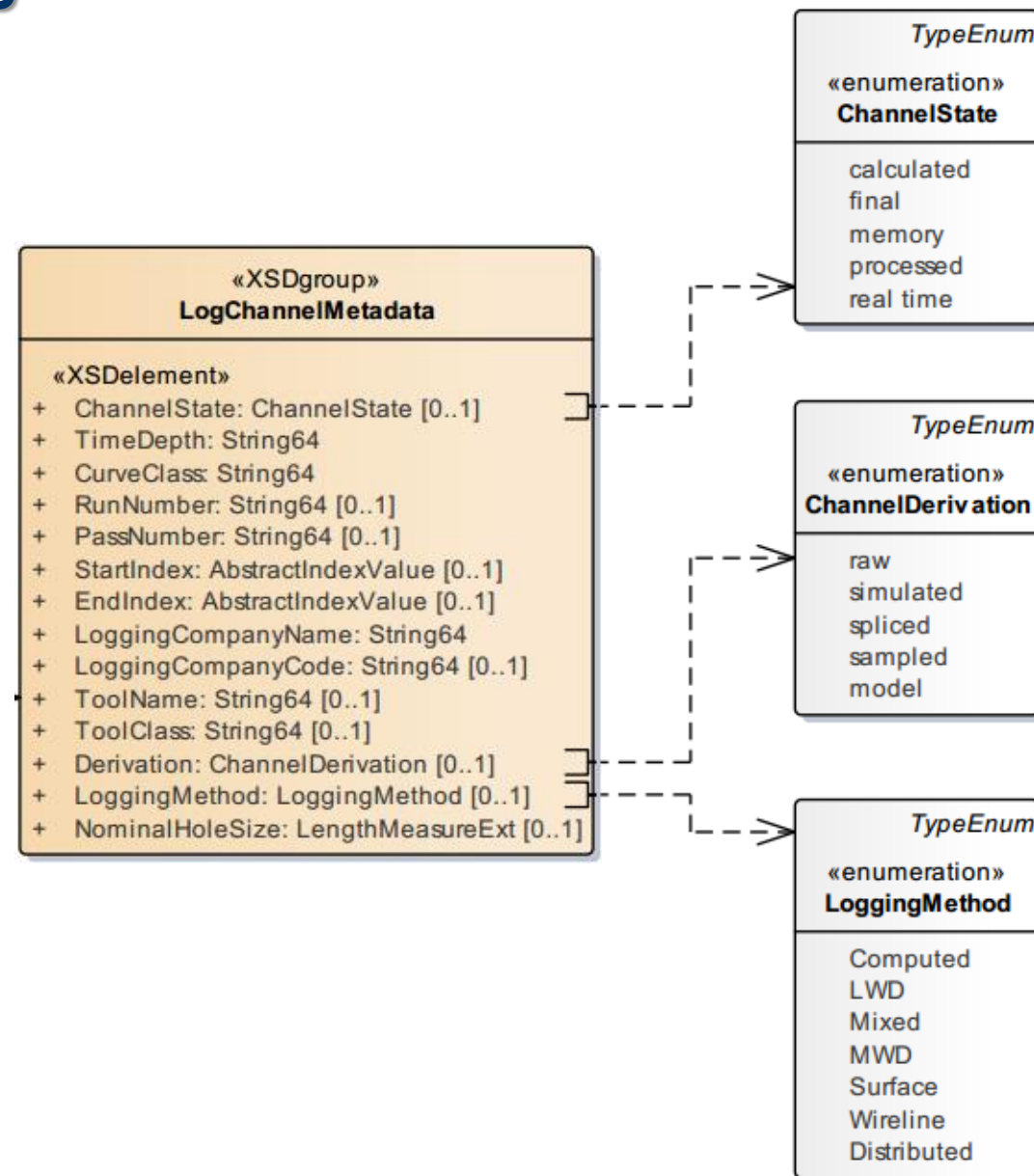# WITSML 2.0 – Metadata Enhancements

- **LogChannelMetadata**

  Associated with all Channel objects.
  Introduced to provide consistent, repeatable searches.

Metadata types defined by real use cases.
Includes reference to key PWLS classes.

  Supports extraction of channel type rather than specific channels in channel sets, or logs.

  Example - "*Give me all the gamma ray curves in this hole section*"

Can be aggregated up to **ChannelSet**
And **Log** level where metadata is common.

«XSDgroup»
LogChannelMetadata

«XSDelement»
+ ChannelState: ChannelState [0..1]
+ TimeDepth: String64
+ CurveClass: String64
+ RunNumber: String64 [0..1]
+ PassNumber: String64 [0..1]
+ StartIndex: AbstractIndexValue [0..1]
+ EndIndex: AbstractIndexValue [0..1]
+ LoggingCompanyName: String64
+ LoggingCompanyCode: String64 [0..1]
+ ToolName: String64 [0..1]
+ ToolClass: String64 [0..1]
+ Derivation: ChannelDerivation [0..1]
+ LoggingMethod: LoggingMethod [0..1]
+ NominalHoleSize: LengthMeasureExt [0..1]

TypeEnum
«enumeration»
ChannelState

calculated
final
memory
processed
real time

TypeEnum
«enumeration»
ChannelDerivation

raw
simulated
spliced
sampled
model

TypeEnum
«enumeration»
LoggingMethod

Computed
LWD
Mixed
MWD
Surface
Wireline
Distributed

Conclusions

- A Standards based approach supports interoperability
- WITSML v2.0 is designed to support data assurance and enable big data analytics
- WITSML & ETP can handle ever growing real time data volumes
- ETP provides a true low latency, high frequency, publish & subscribe interface
- WITSML 2.0 with ETP has the potential to change the way drilling data is managed across the industry
- ETP has the Potential to replace WITS at the Wellsite

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Where to find more info ?

http://www.energistics.org

Webinar: _Energistics Transfer Protocol_
ETP Paves the Way for Remote Drilling Support Improvements at Statoil

Webinar: _2017 Energistics Orientation_
Current status of Energistics standards, what is planned. 15 Feb 2017

Webinar: _WITSML v2 0 Release Candidate Overview Webinar_
on the Value of Standards, July 2016

Webinar: RESQML Data Transfer Standard 101
RESQML facilitates data exchange for E&P subsurface workflows.

Webinar: _Why Adopt Energistics Standards?_
Business Case for Energy Standards, July 2016

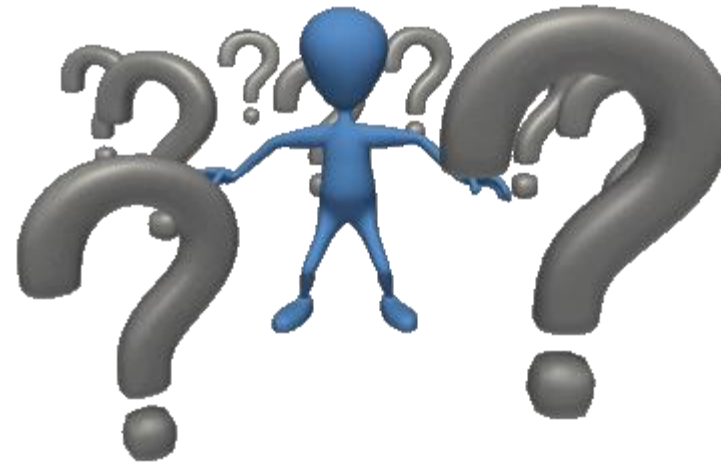Oct 2nd – 5th **WITSML SIG** working meeting and **ETP iLab**

- Hosted by Chevron in Houston

Thank You

Questions?