

WITSML ETP: Real-Time Drilling Data Assurance and Big Data Analytics

Jay Hollingsworth

Energistics CTO

Nigel Deeks, Pascal Hochart, Sam Marcuccio, Michael Sturm

Schlumberger



What's Next?

SIS Global Forum 2017

September 13-15

Le Palais des Congrès de Paris

Schlumberger

A Little About Energistics



What's Next?

SIS Global Forum 2017

September 13-15

Le Palais des Congrès de Paris

Schlumberger

Who are we? (Hint: we are not a vendor...)

- Energistics is a global, non-profit, membership consortium developing open data exchange standards for the upstream oil and gas industry
- Evolving from POSC, we have served the industry for more than 25 years
- Our membership is operators, oilfield service companies, software vendors, system integrators, regulatory agencies 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 short, the standards are created by the industry and for the industry

Global Influence

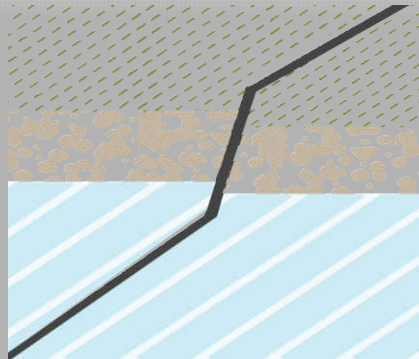


Energistics Family of Standards – 1st Generation

← UNIVERSAL INTEROPERABILITY →

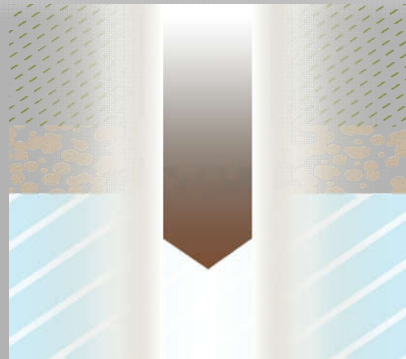
<RESQML/>[™]
energistics standards

RESERVOIR



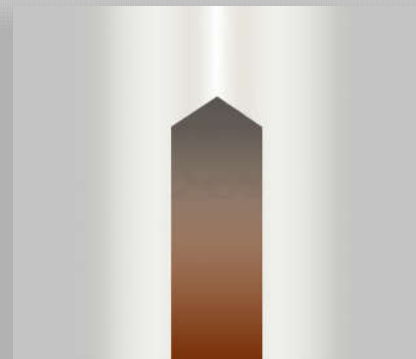
<WITSML/>[™]
energistics standards

DRILLING



<PRODML/>[™]
energistics standards

PRODUCTION



Energistics Family of Standards – 2nd Generation

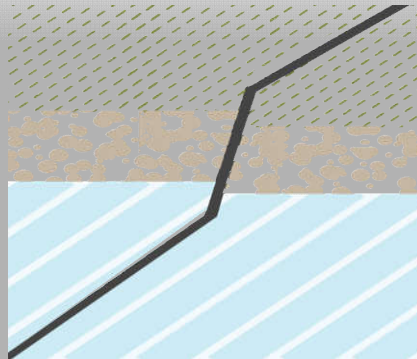
← UNIVERSAL INTEROPERABILITY →

<RESQML/>TM
energistics standards

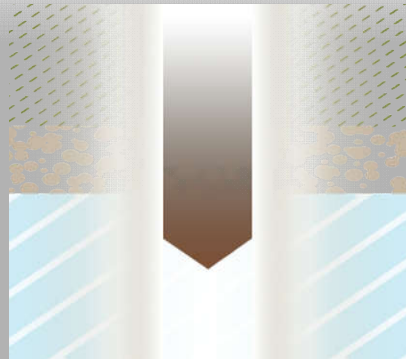
<WITSML/>TM
energistics standards

<PRODML/>TM
energistics standards

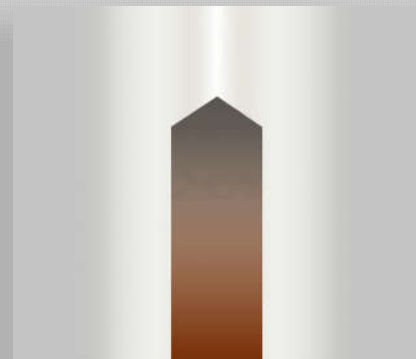
RESERVOIR



DRILLING/WELL



PRODUCTION

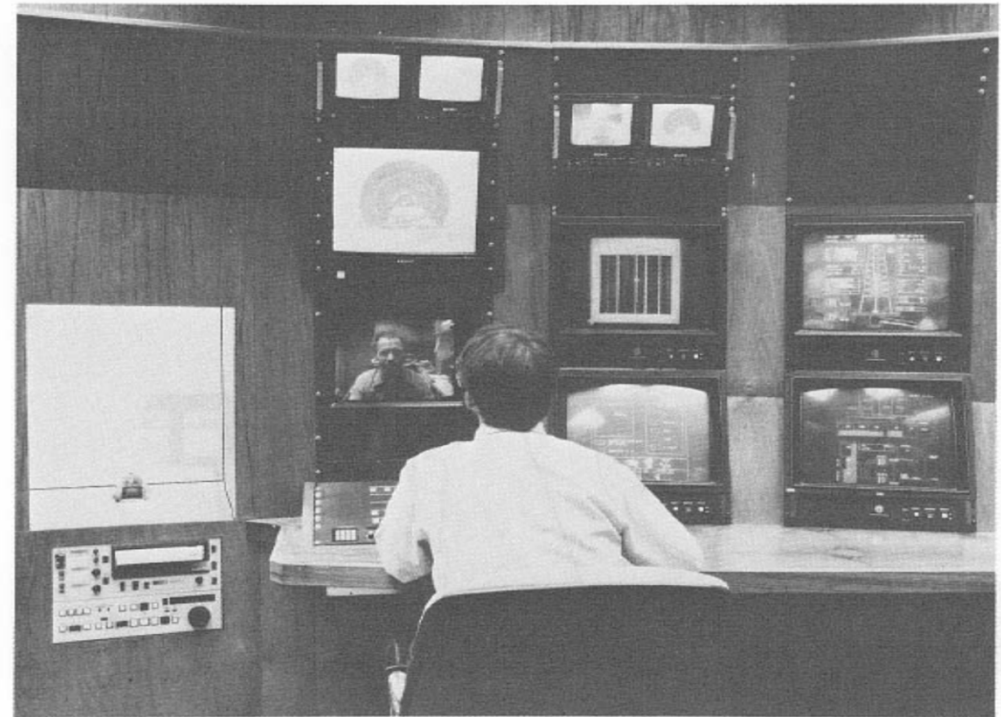


Energistics Transfer Protocol (ETP)

Common Technical Architecture (CTA)

Real-time Drilling (up to year 2001)

- Real-time Data Centers
 - Superior/XOM – 1981-present
 - Amoco/BP – 1984-1989
 - Tenneco/CVX – 1983-1990
- Proprietary Systems
- WITS - Wellsite Info Transfer Std
 - Pre-Internet, poor interoperability
 - Level 0 [Other levels rarely used]
 - 25 Record Types - 1991
- Statoil & BP (late 1990s)
 - DART - Drilling Automation Real Time



From SPE-14387

Real-time Drilling (2001 – 2016)

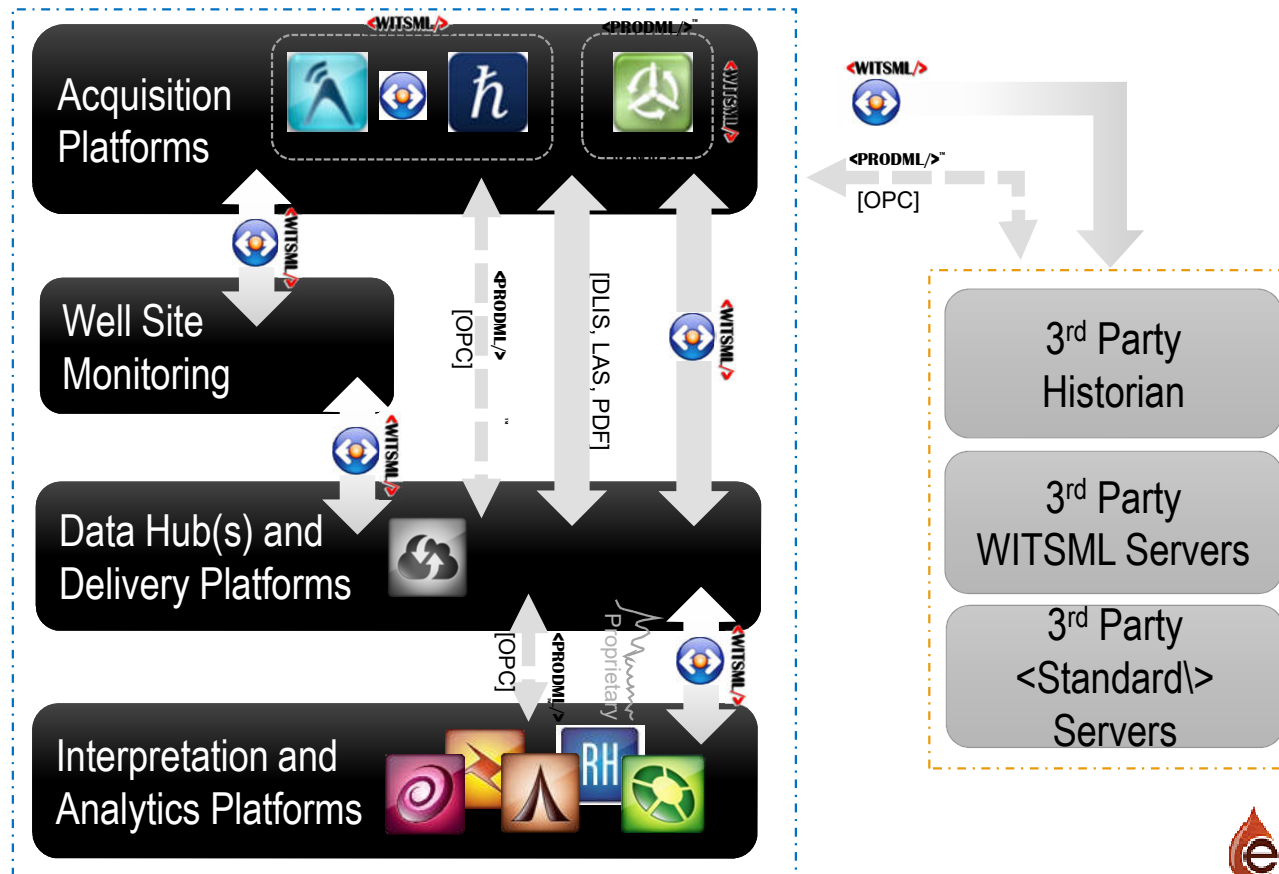
- WITSML the dominant standard
 - Some lingering WITS Level 0
- Data is near real-time
- Transfer uses simple XML
- A client program polls a server
 - Rig-site, service co. or internal
- Commercially very successful
- Desire for a technology refresh



The Origin of WITSML

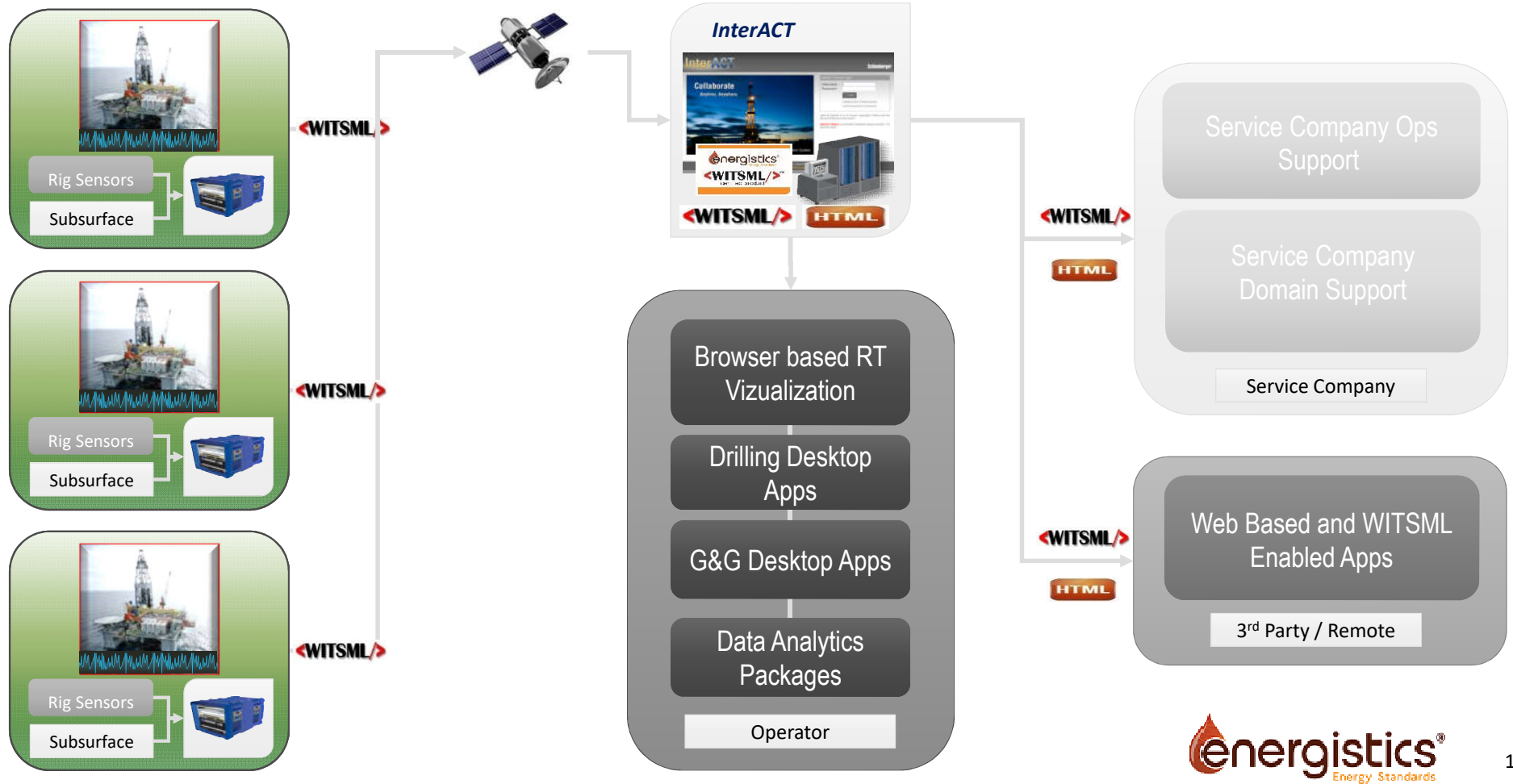
- DART evolved into a multi company effort
 - Statoil, BP, BakerHughes, Halliburton, Schlumberger
- to create a new standard, replacing WITS,
 - based on evolving internet technology,
 - with much improved functionality
 - Improves “Plug and play” approach to moving data between systems
 - For Operators, reduces costs for moving data, and improves competitiveness (Selecting vendors not driven by impact of IT changes, but on the service provided)
 - For Contractors, reduces need to support different systems for different operators
 - WITSML covers not only real-time data, but also contextual data

Unified Standard Data Exchange Approach



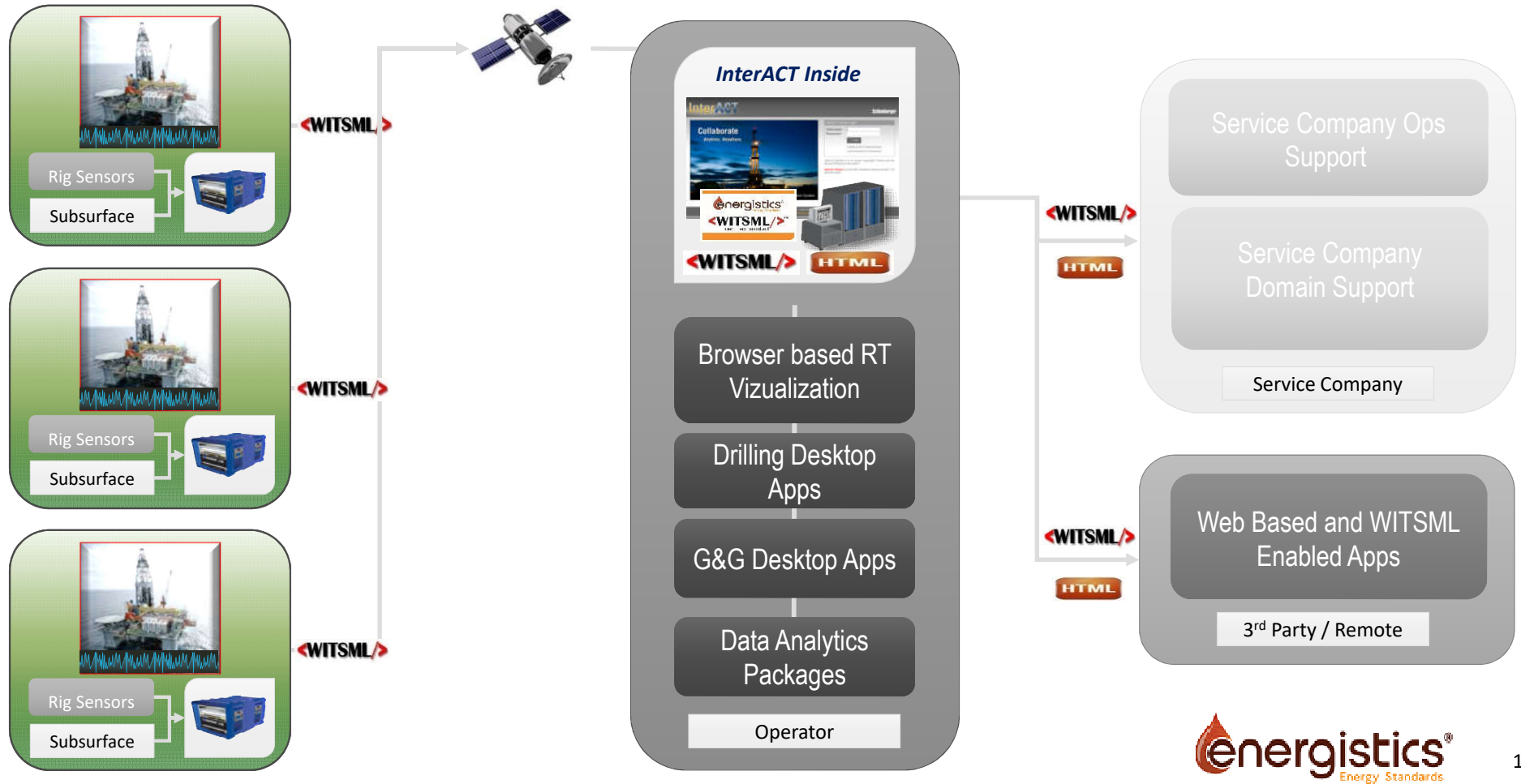


Unified Data Distribution Approach




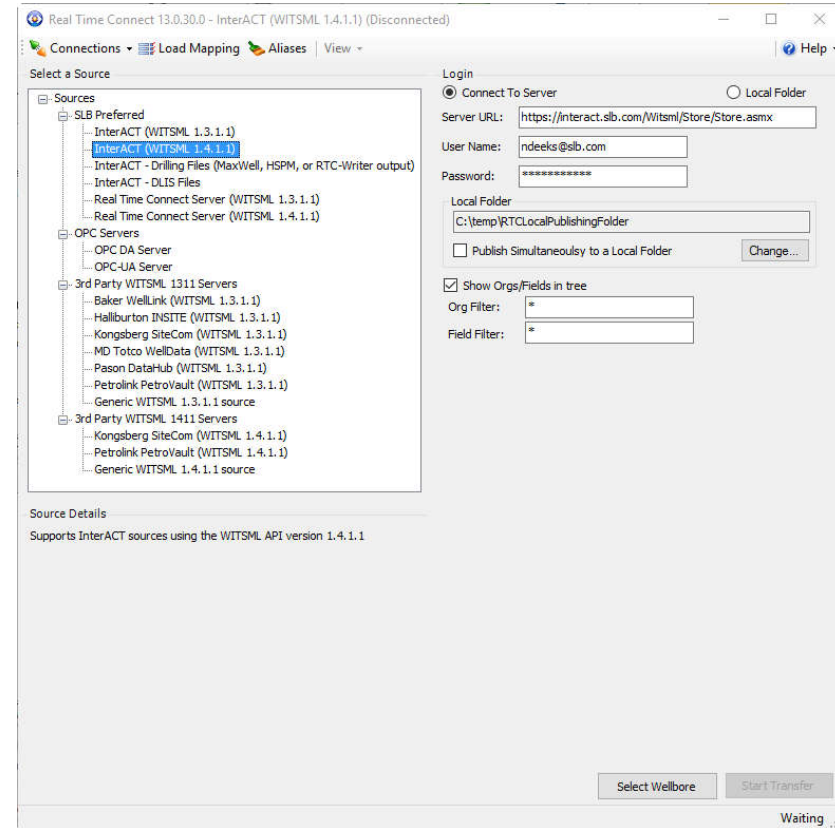


Unified Data Distribution Approach



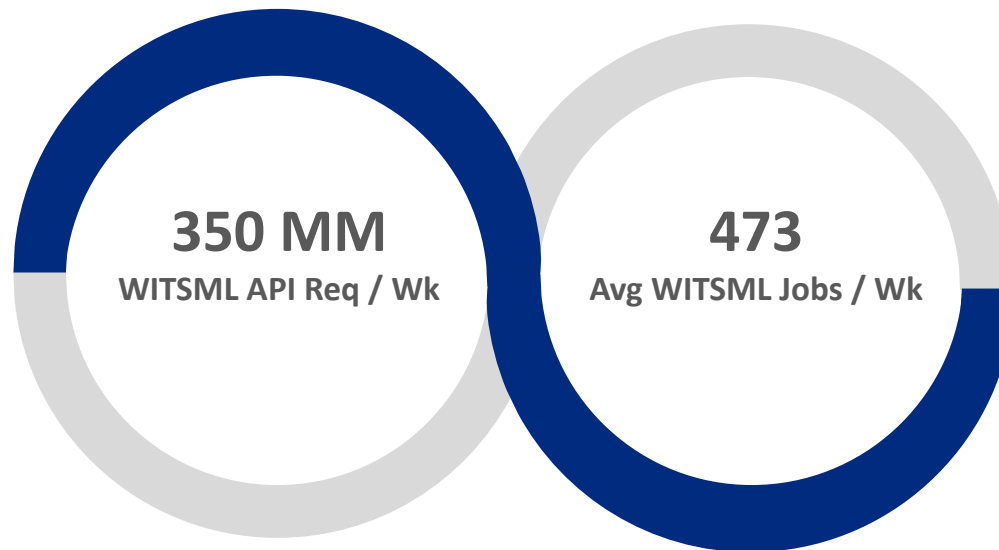
Unified WITSML Client Approach

- Real Time Connect : 
- Unified interoperability via real time standards
- Currently deployed across >30 different Schlumberger applications
 - Supports WITSML 1.3.1.1 as well as 1.4.1.1
Plus OPC, DLIS
ETP & WITSML 2.0 support coming
 - Adapters for all major WITSML vendors
 - Reading, Writing, Serving capabilities



Schlumberger Webserver Load

InterACT WITSML Usage



01 WITSML API Access

Across our 2 servers in Europe and North America we see **350 Million req / week** – that is **579 requests per second**.

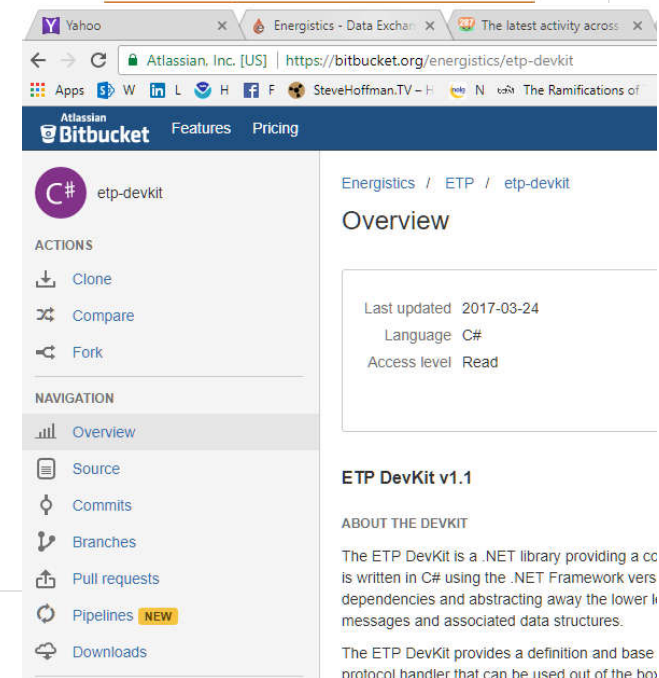
02 WITSML Jobs

Over the September-October 2015 time frame InterACT had **473 WITSML Jobs per Week**

ETP: Energistics Transfer Protocol

- ETP is a data exchange specification
- Enables real-time data transfer between applications
- Is delivered as a specification and as sample code
- Works by sending pre-defined messages
 - The messages are grouped together into “protocols”
 - The description of these protocols make up the standard
- No server required, just sender and receiver

Energistics Transfer Protocol (ETP) Specification v1.1



The screenshot shows a web browser window displaying the Bitbucket repository page for 'etp-devkit'. The page title is 'Energistics / ETP / etp-devkit Overview'. The repository is last updated on 2017-03-24, is written in C#, and has a Read access level. The page includes a navigation menu with options like Overview, Source, Commits, Branches, Pull requests, Pipelines (marked as NEW), and Downloads. The main content area is titled 'ETP DevKit v1.1' and contains the text: 'ABOUT THE DEVKIT The ETP DevKit is a .NET library providing a cc is written in C# using the .NET Framework vers dependencies and abstracting away the lower it messages and associated data structures. The ETP DevKit provides a definition and base protocol handler that can be used out of the bo'.

ETP Project

- Project to develop a new data transmission method for the oilfield
 - High-frequency, low-latency
 - Firewall / Internet friendly
 - Lead-in to future cross sig platform with reduced barrier to entry / complexity
 - Built on broadly accepted technologies and standards
 - Licensing model acceptable to all parties
- From the business ‘We need this NOW’

Original ETP Use Cases

- Sensor -> Store (Simple Producer)
 - Acquisition -> Store (Complex Producer)
 - Store -> Store (Replication)
 - Store -> Consumer (Subscriptions)
 - Store -> Mobile Display (Simple, slower data rate)
 - Consumer -> Store (Publish Processed Data)
- These addressed most cases. Other combinations were eventually added



ETP: Technology Choices

- Binary transfer – size on the wire
- HTML5 – ubiquitous support
- IETF RFC6455 WebSocket – full duplex via TCP 80/443
- Apache Avro serializer – dynamic schema, more later
- JSON schema encoding – required by Avro
- JWT – used for security
- URI as identifier
- ODATA – for query in the store protocol (future)

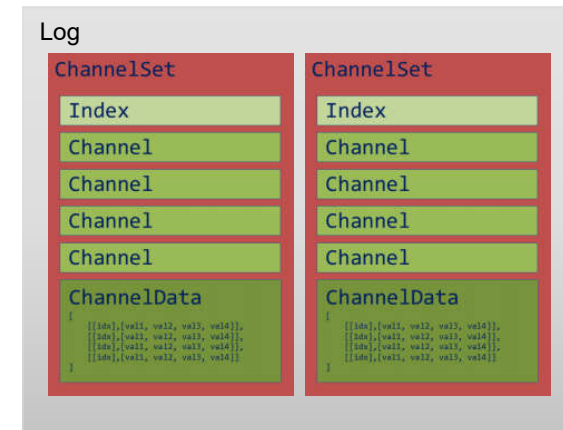


WITSML v2.0 Supporting Data Analytics

- 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 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



Conclusions

- A Standards-based approach supports commercial interoperability
- Support and use of WITSML is key in Schlumberger applications and operations globally.
- WITSML v2.0 is designed to support data assurance and enable big data analytics
- ETP provides a true low latency, high frequency data transfer
- WITSML & ETP can handle ever growing real time data volumes
- ETP has the Potential to replace WITS at the Wellsite

Q&A



What's Next?

SIS Global Forum 2017

September 13-15

Le Palais des Congrès de Paris

Schlumberger

Thank you



What's Next?

SIS Global Forum 2017

September 13-15

Le Palais des Congrès de Paris

Schlumberger