THE SOCIETY OF HPC PROFESSIONALS

Real Time Well Data Analysis in the Cloud

with

Subsurface Data Engineering

April 23rd 2020

Presented by Sashi Gunturu

Founder & CEO, Petrabytes Corp

Presentation Overview

- Real Time Data Analysis Challenges
- Data Transmission Standards
- How to improve accuracy in Analysis
- Subsurface Data Engineering
- Architecture – Combining Real Time with Subsurface Modeling
- Example Use Cases of Real Time Modeling
    - Real Time Drilling & Geomechanics Analysis
    - Real Time Hydraulic Fracture Monitoring
- Demo
- Q&A

Extremely Low Oil Price Market

IndustryVoice®

IndustryVoice: Embracing Oilfield Digitalization to Reduce Operating Costs

As O&G faces pandemic and falling prices, operators should look to save through a digital transformation of their remote operations.

Sponsored by Infrastructure Networks Inc. (INET) Wed, 04/22/2020 - 03:00 PM

Source - https://www.hartenergy.com/industry-voice/industryvoice-embracing-oilfield-digitalization-reduce-operating-costs-187169

Real Time Data Analysis Challenges

Continuously Growing Data

Sluggish Remote Connectivity

Time Constraints for efficient analysis

Limited Staff

Logistics Costs - Do everything to reduce costs !!!

Real Time Data Analysis Challenges

Continuously Growing Data

Newer Datasets from Sensors are huge !

Distributed Acoustic Sensing (DAS) generates approximately 5GB / second.

Typical Hydraulic Fracturing Job with DAS monitoring generates 1-2TB / day

Real Time Data Analysis Challenges

Sluggish Remote Connectivity

Opinion of Industry Thinkers

“ AI, Automation, and Remote Monitoring – have not provided step change results although there has been significant gains”.

One reason is that as advanced as the oil and gas industry has become, it’s not when it comes to remote oilfield connectivity.”

Data Transmission Standards & Techniques

Data Transmission Standards

WITSML - Successfully Used in many Real Time Drilling Scenarios

PRODML – Optimizing Data Exchange during production

Extensions of WITSML & PRODML

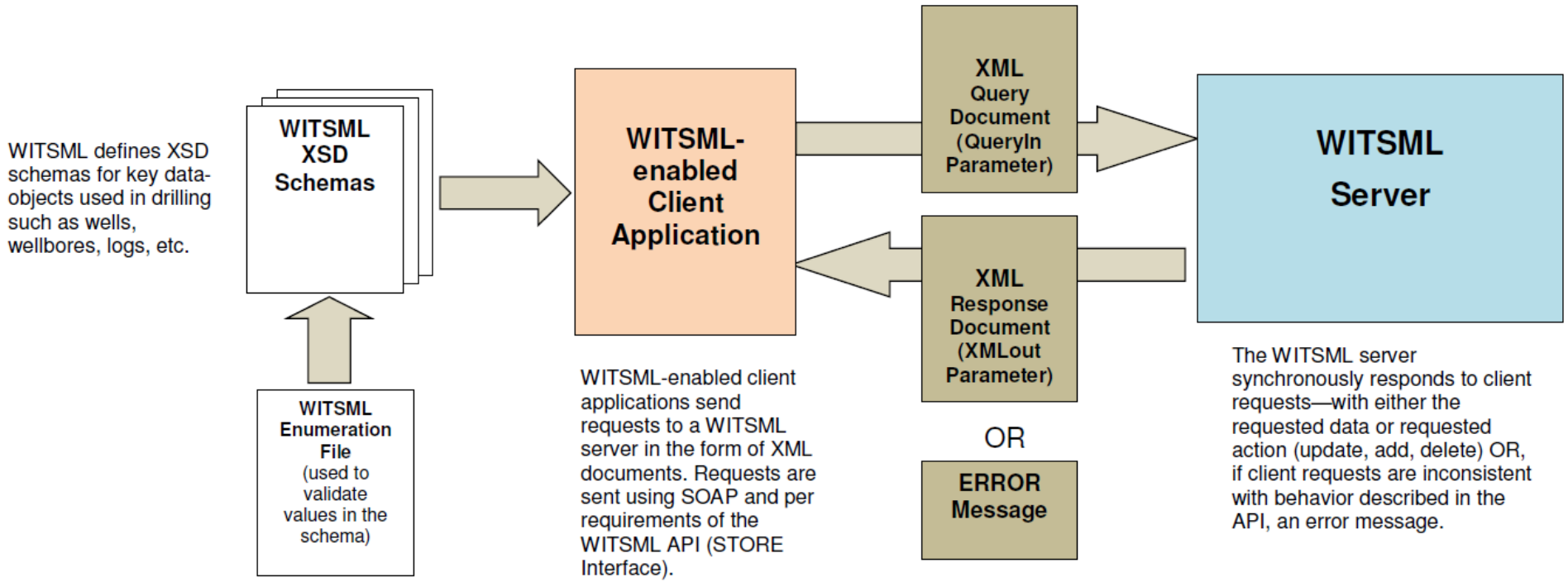
- DTS (Distributed Temperature Sensing)
- DAS (Distributed Acoustic Sensing)

ETP – Energistics Transmission Protocol

- Efficient Data Transfer between Applications
- Streaming
- Discovery mechanism - No need for polling by the receivers

Data Transmission Standards

WITSML - Architecture Layout



Real Time Data Transmission Techniques

Data Compression

OpenVDS

Minimize Data Duplication while transmission

How can we make Real Time Data Analysis Efficient ?

How can we improve the accuracy of the real time calculations ?

Improving the Efficiency of Real Time Data Analysis

Large Scale Computing Capabilities at the Edge

Access to Subsurface Field Models

Workflow Updates

Ability to Perform What-if Scenario calculations quickly

Improving the Efficiency of Real Time Data Analysis

Edge to Cloud Sync

Access to many specialists across locations

Unified Web Portal

Improving the Efficiency of Real Time Data Analysis

Edge Computing Options

AWS Snowball Edge

- Storage + Compute
- Ruggedized
- Flexible Pricing

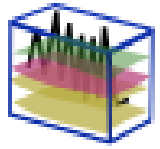
Azure Data Box

- Storage + Compute
- Ruggedized
- Flexible Pricing

IOT Edge Devices

- Low Storage & Compute
- Not meant for Large Scale Compute

Applications



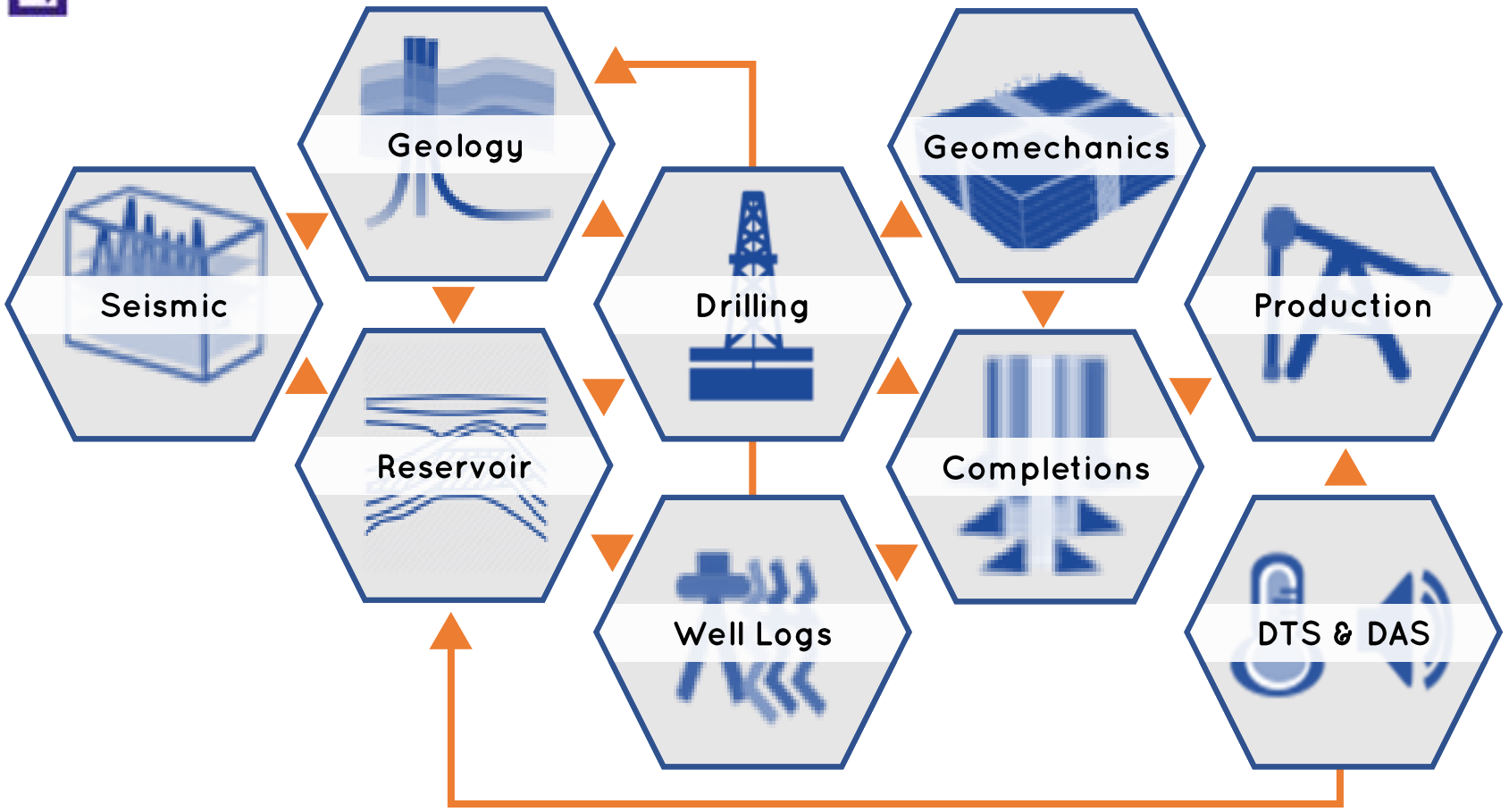
Seismic

DAS
(Acoustic Sensing)

Improving the Efficiency of Real Time Data Analysis

Access to Subsurface Field Models

Workflows are interlinked and need to be updated



Cloud & Edge Computing Infrastructure

Essentials Services required for Subsurface Modeling

Subsurface Cloud Architecture Essentials

Cloud & Edge Computing

Data Exchange with APIs

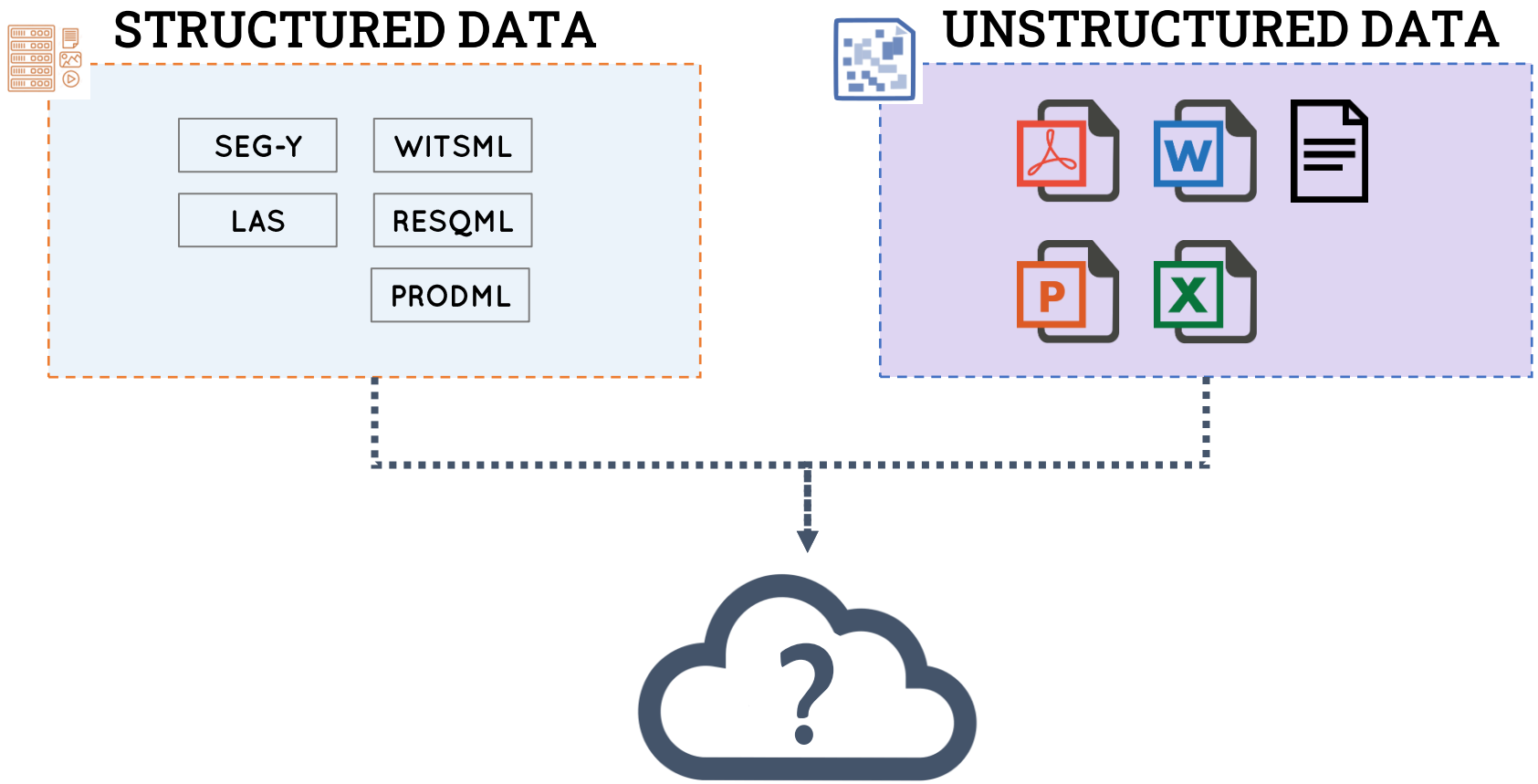
3D Visualization

Workflow Updates

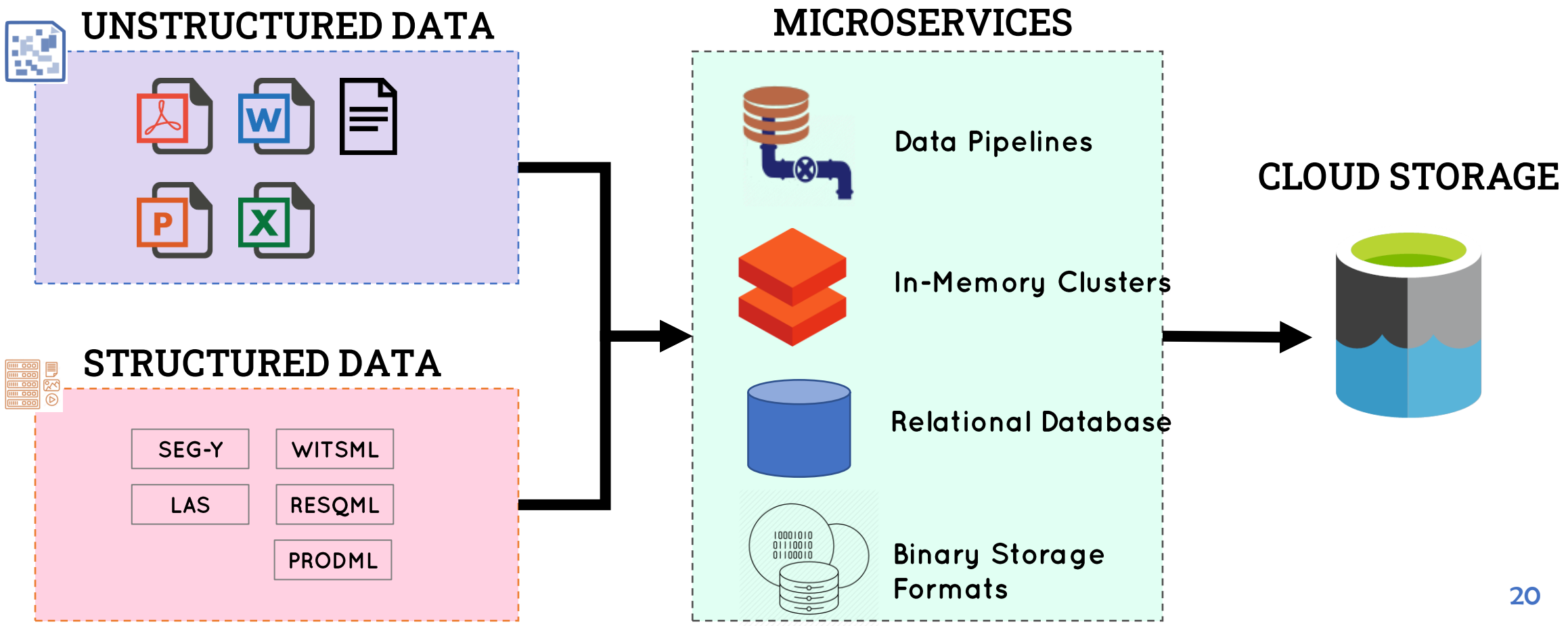
Scalable

Subsurface Data Engineering

Structured + Unstructured Data



Handling Structured + Unstructured Data

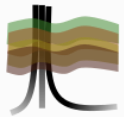


Subsurface Data

FIELD LEVEL


Seismic


Faults

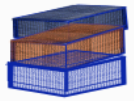

Geology


Horizons


Well Locations


DFN


GIS Objects


Volume Grids

WELL LEVEL


Core Samples


Thin Sections


Well Logs


Completion Data


Multi-Well Data

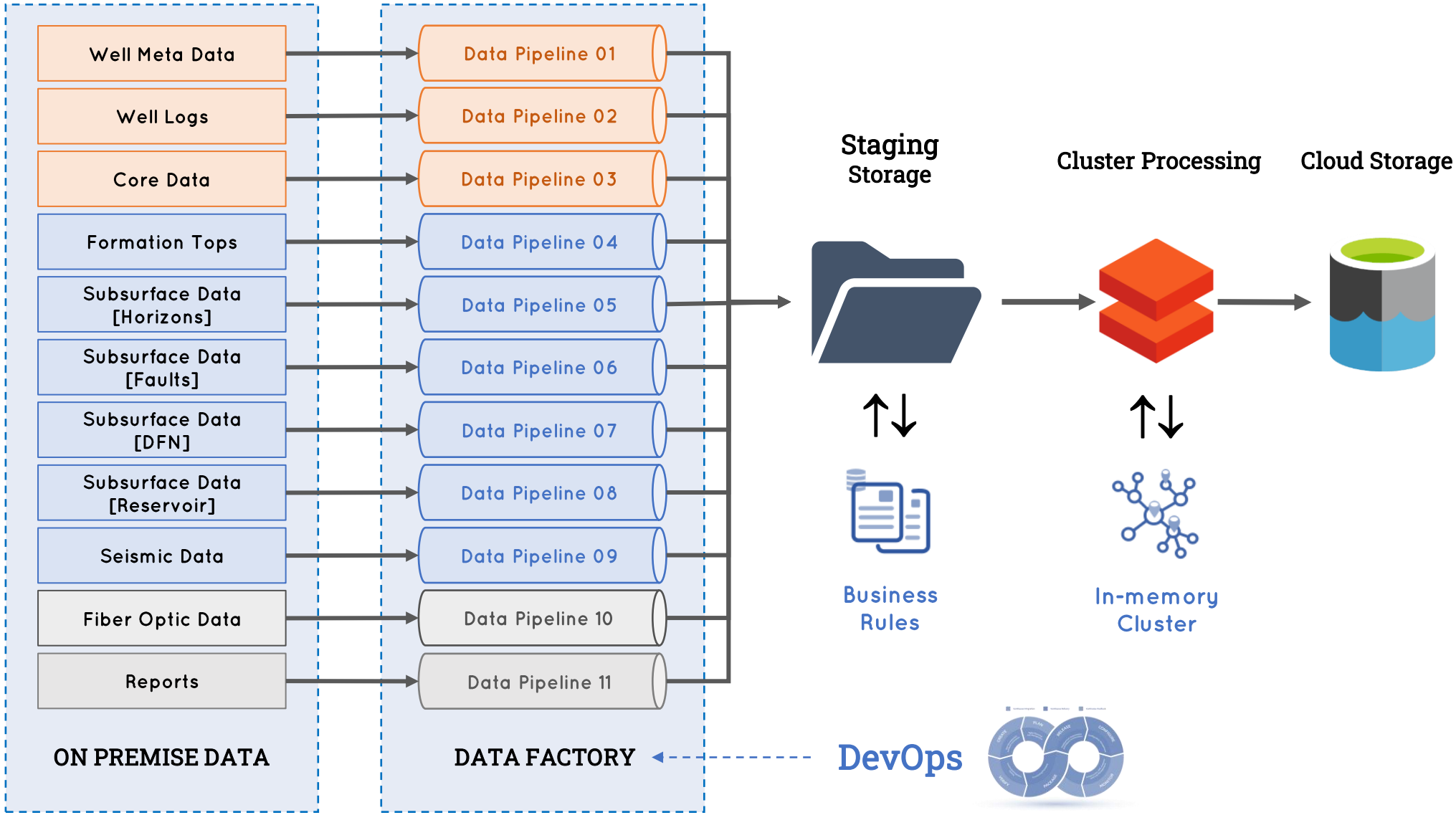
SENSOR DATA


DTS


DAS

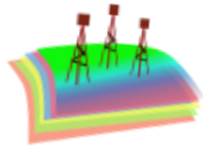

OSI π

Applied Subsurface Data Engineering



Architecture – Real Time + Subsurface Modeling

Real Time Architecture + Subsurface Modeling Integration – Part 1



Subsurface Model

Data Sources

External Cloud Data
S3

On Prem Databases

On Prem File Storages

Public Data Sources
USGS, Rail Road Commission, BOE etc

External Software Exports

Automated ETL

Data Pipelines

In-Memory Clusters

Relational Database

Binary Storage Formats

Cloud Aggregation

Data Lake

BI Tools

Power BI

Quick Visualization

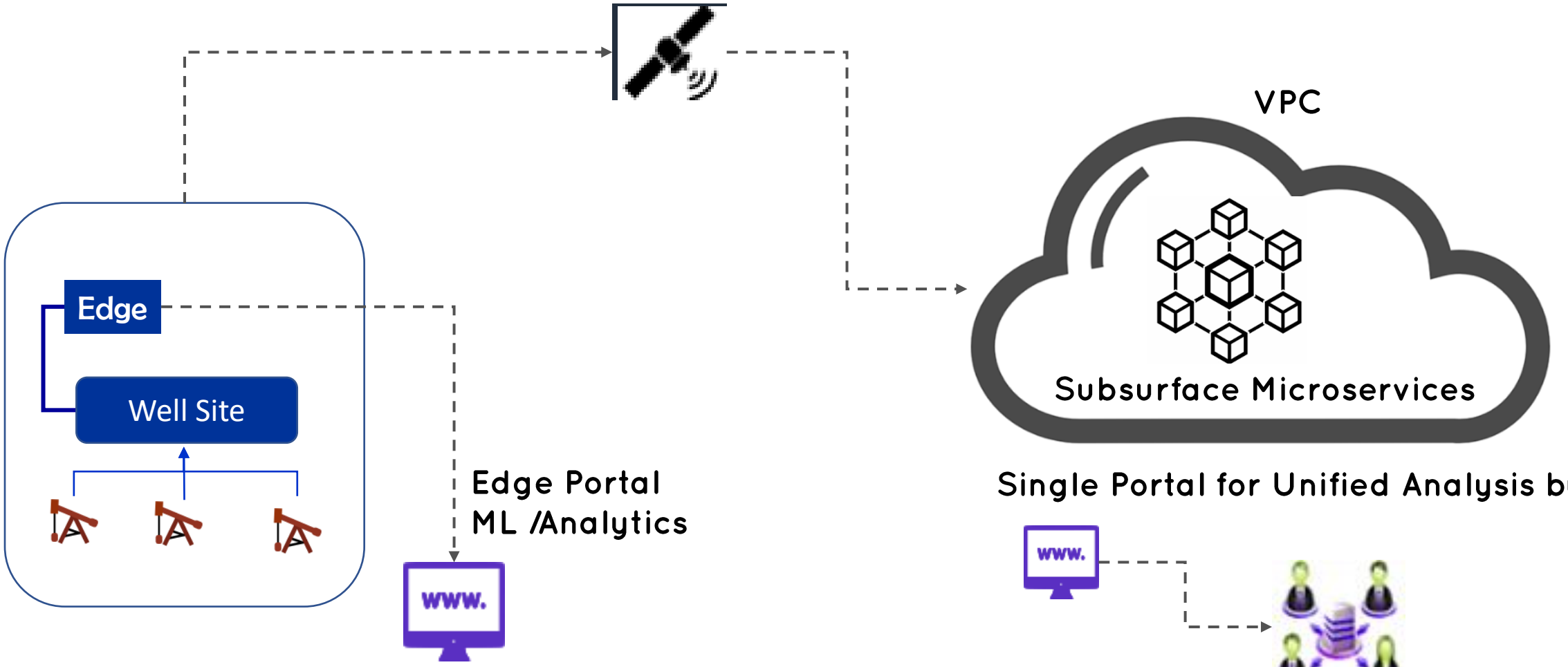
Data Providers - APIs

Advanced Upstream E&P Frameworks

Enterprise Cloud Analytics

Real Time Architecture + Subsurface Modeling Integration – Part 2

Real Time Integration



Real Time Use Cases

- Drilling

- Hydraulic Fracture Monitoring

Demo

- Edge Computing of DAS Data
- Web Portal for Unified Subsurface Interpretation

WHAT WE DO

Petrabytes
Energy Data Insights

Petrabytes provides data driven solutions at scale for the energy industry through a Unified Data Insights Platform.

Our solutions include:

- Data Engineering & Governance
- Advanced Contextual Visualization Dashboards
- Specialized Analytics:
  - Subsurface Modeling
  - Geomechanics
  - Fiber Optic Sensing
  - SCADA Data Analytics

CONTACT

For further information, please contact:

Petrabytes

Energy Data Insights

Sashi Gunturu

Founder & CEO

sashigunturu@petrabytes.com

+1 713.478.9181