WITSML: Data Aggregation and Beyond

IADC ART Committee Meeting
May 9, 2019

Eric Griffith

EVP WITSMLstudio

eric.griffith@pds.group

PDS Group

- Company Overview
  - PDS => Petrotechnical Data Systems
  - Fusion of IT expertise and upstream E&P expertise
  - Offices in Houston, London, Aberdeen, the Hague, and Sofia in Bulgaria
  - 25 year history of consulting and bespoke software for oil and service companies

- PDS Brands
  - Ava focused on streamlining and enhancing geological modeling
  - WITSMLstudio focused on:
    - Integrating with existing systems to deliver existing data as WITSML
    - Bringing drilling data inhouse for analytics via WITSML
    - Providing open source WITSML technology to the community

Agenda

- Brief overview of traditional WITSML data aggregation workflows

- How we have used WITSML in practice beyond these workflows:
  - Open Source WITSML and WITSML 2.0 Adoption
  - Real-Time Calculations and KPIs on WITSML Data
  - Delivering data for analytics
  - Real-time BOP monitoring
  - Frac operation monitoring
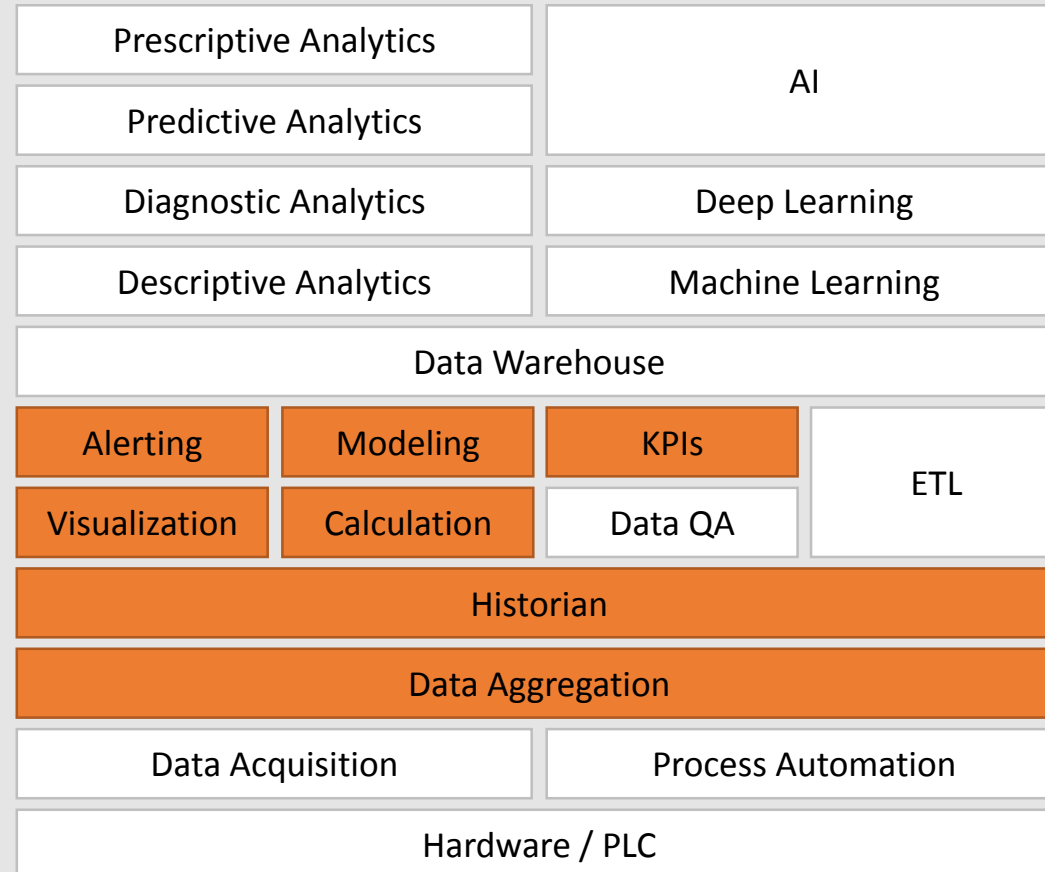 - Supporting real-time automated quality analysis

How Is WITSML Used Now?

Data Models

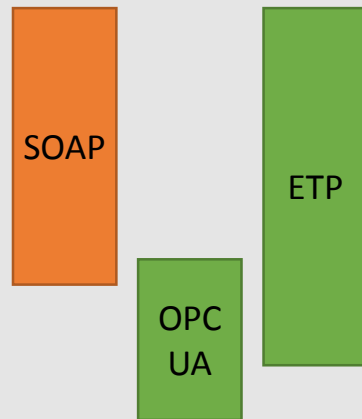| WITSML 1.x |

Data Interfaces

| SOAP |

Applications

Prescriptive Analytics	AI
Predictive Analytics	
Diagnostic Analytics	Deep Learning
Descriptive Analytics	Machine Learning

Data Warehouse			
Alerting	Modeling	KPIs	ETL
Visualization	Calculation	Data QA	
Historian			
Data Aggregation			
Data Acquisition		Process Automation	
Hardware / PLC			
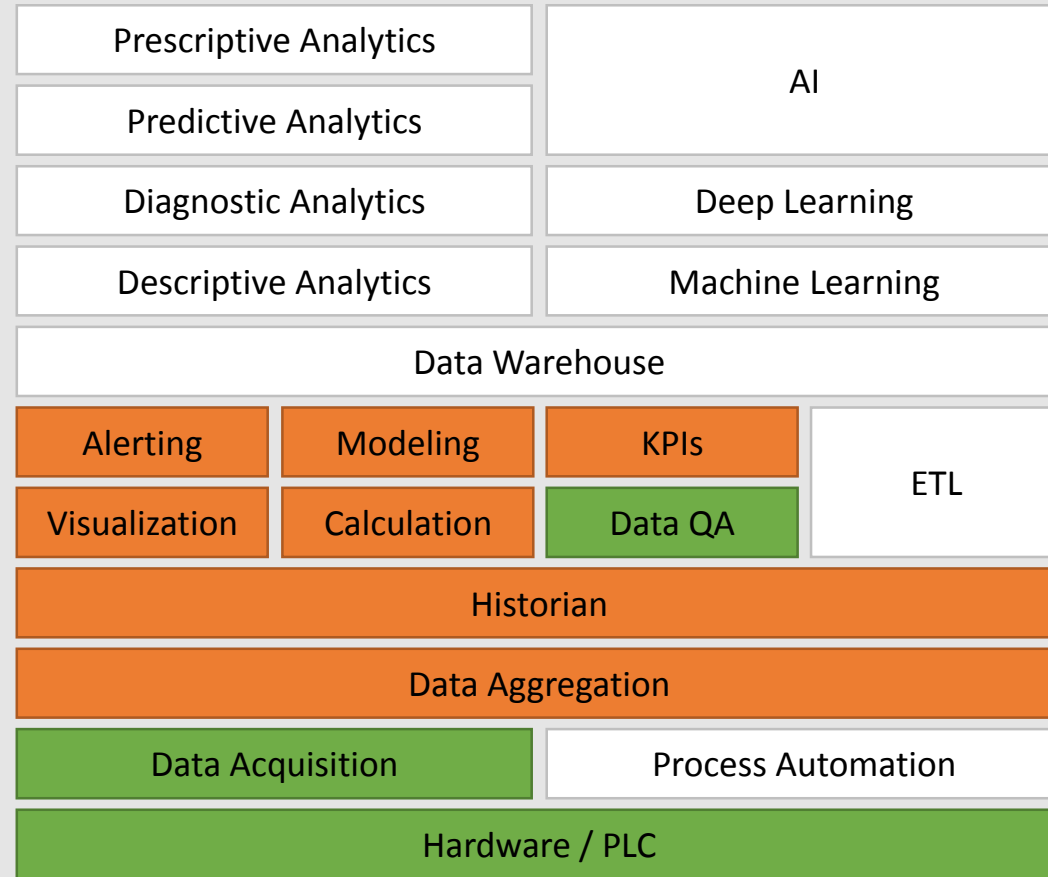
How to Do More with WITSML?

Data Models

- WITSML 1.x
- WITSML 2.x
- WITSML++

Data Interfaces

- SOAP
- OPC UA
- ETP
- IoT

Applications

Prescriptive Analytics	AI
Predictive Analytics	Deep Learning
Diagnostic Analytics	Machine Learning
Descriptive Analytics	

Data Warehouse

| Alerting | Modeling | KPIs | ETL |
| Visualization | Calculation | Data QA | |

Historian

Data Aggregation

| Data Acquisition | Process Automation |

Hardware / PLC

pds group

Open Source Technology

Server / Aggregation Technology

Data Acquisition
OPC DA/UA / Wits0 / MODBUS

Replication / Synchronization
Historian / WITSML / File / SQL

WITSML Server Façade

Shared Access Layer

SOAP Interface
1.3.1 / 1.4.1

UoM
Conversion

ETP Interface
1.3.1 / 1.4.1 / 2.0

Configurable Data Layer

WITSML Server

MongoDB Data Layer

3rd Party
Data Store

MongoDB Data
Store
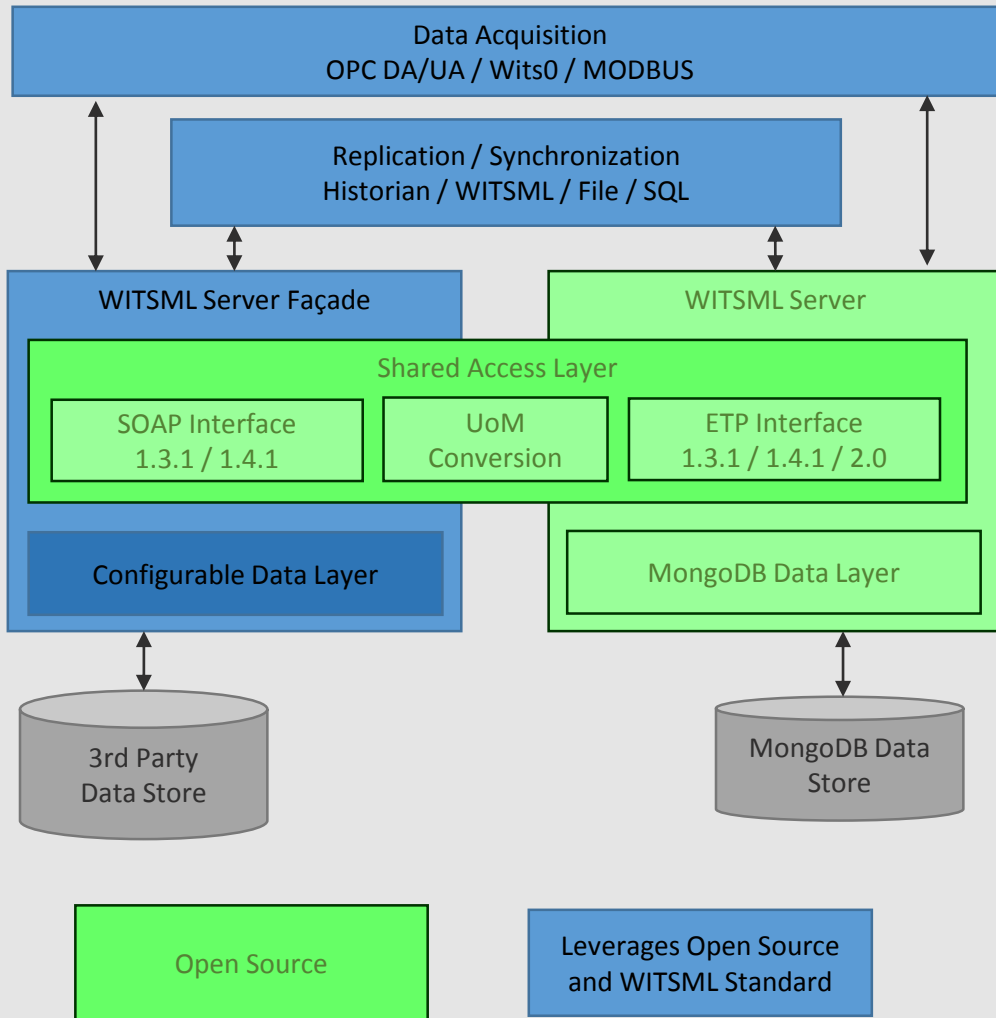
Client Testing / Diagnostic /
Support Technology

Client

Browser / Diagnostic
Plug-Ins

Data Streaming Plug-In

ETP / SOAP DevKits

Open Source

Leverages Open Source
and WITSML Standard
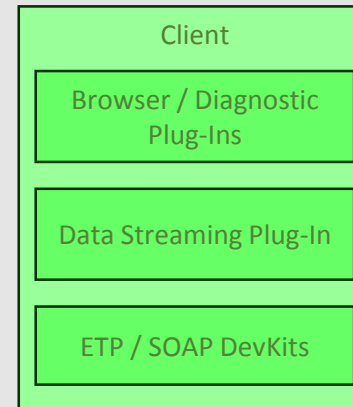
- Portfolio of Open Source WITSML technology
  - Client application is de facto standard testing application

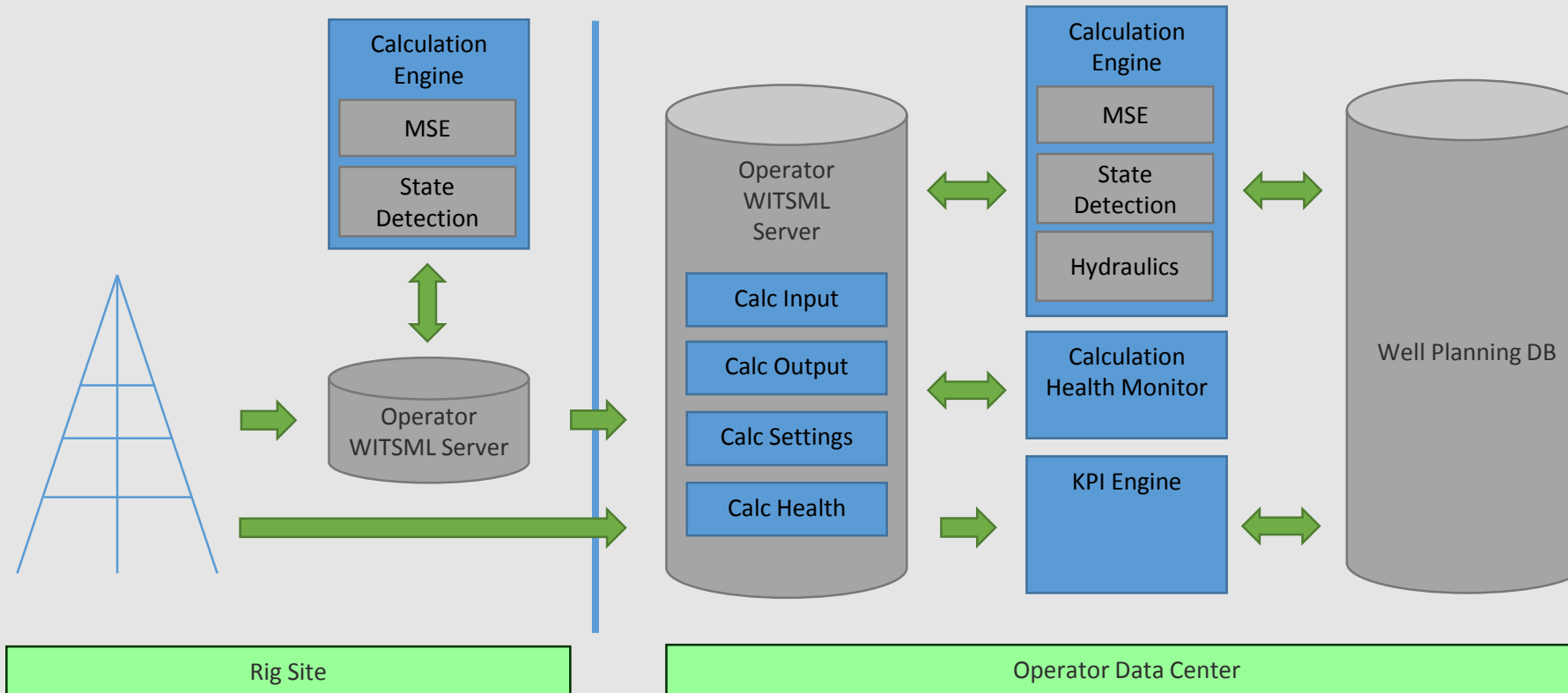- Open Source + Industry Standard = Powerful Solutions

WITSML 2.0 Adoption
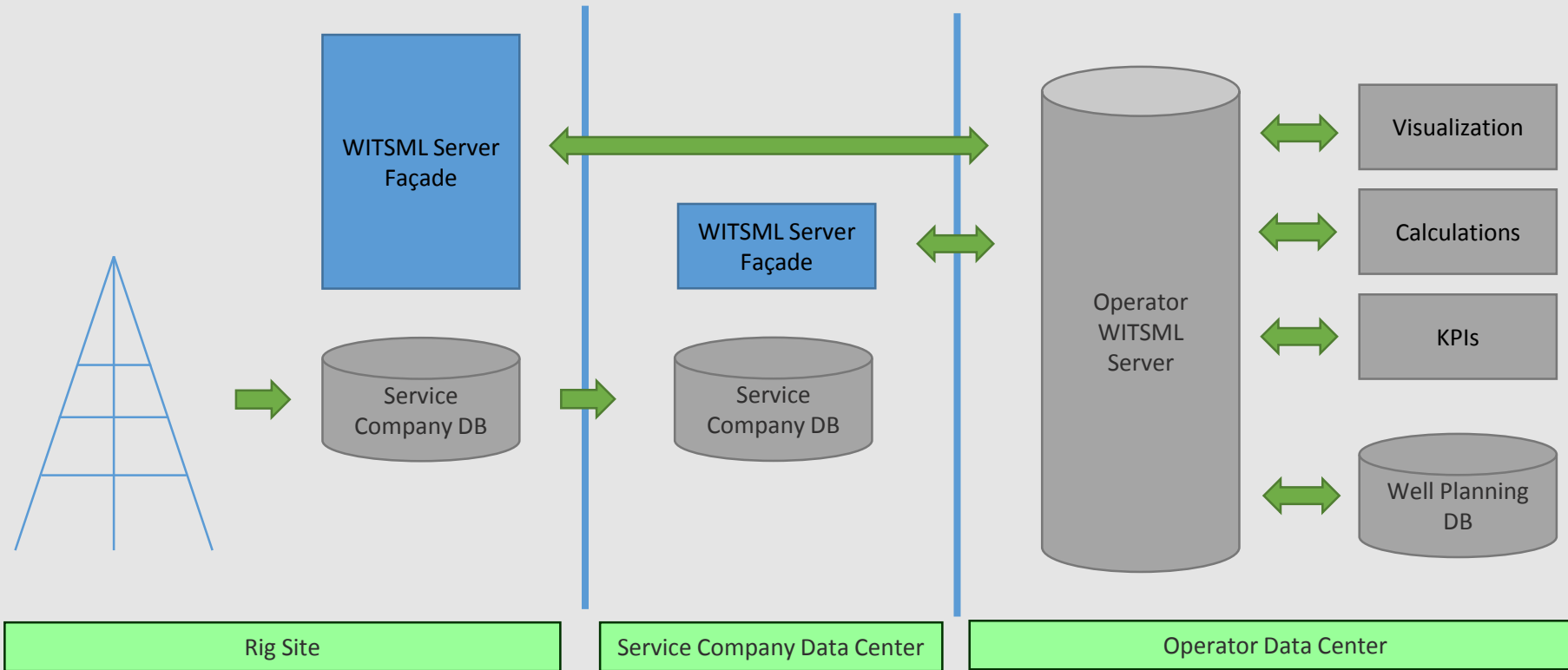
- 4 party collaboration

- Powerful workflows

- Significant effort

- Significant savings expected

Diagram labels:

- WITSML Server Façade
- WITSML Server Façade
- Service Company DB
- Service Company DB
- Operator WITSML Server
- Visualization
- Calculations
- KPIs
- Well Planning DB
- Rig Site
- Service Company Data Center
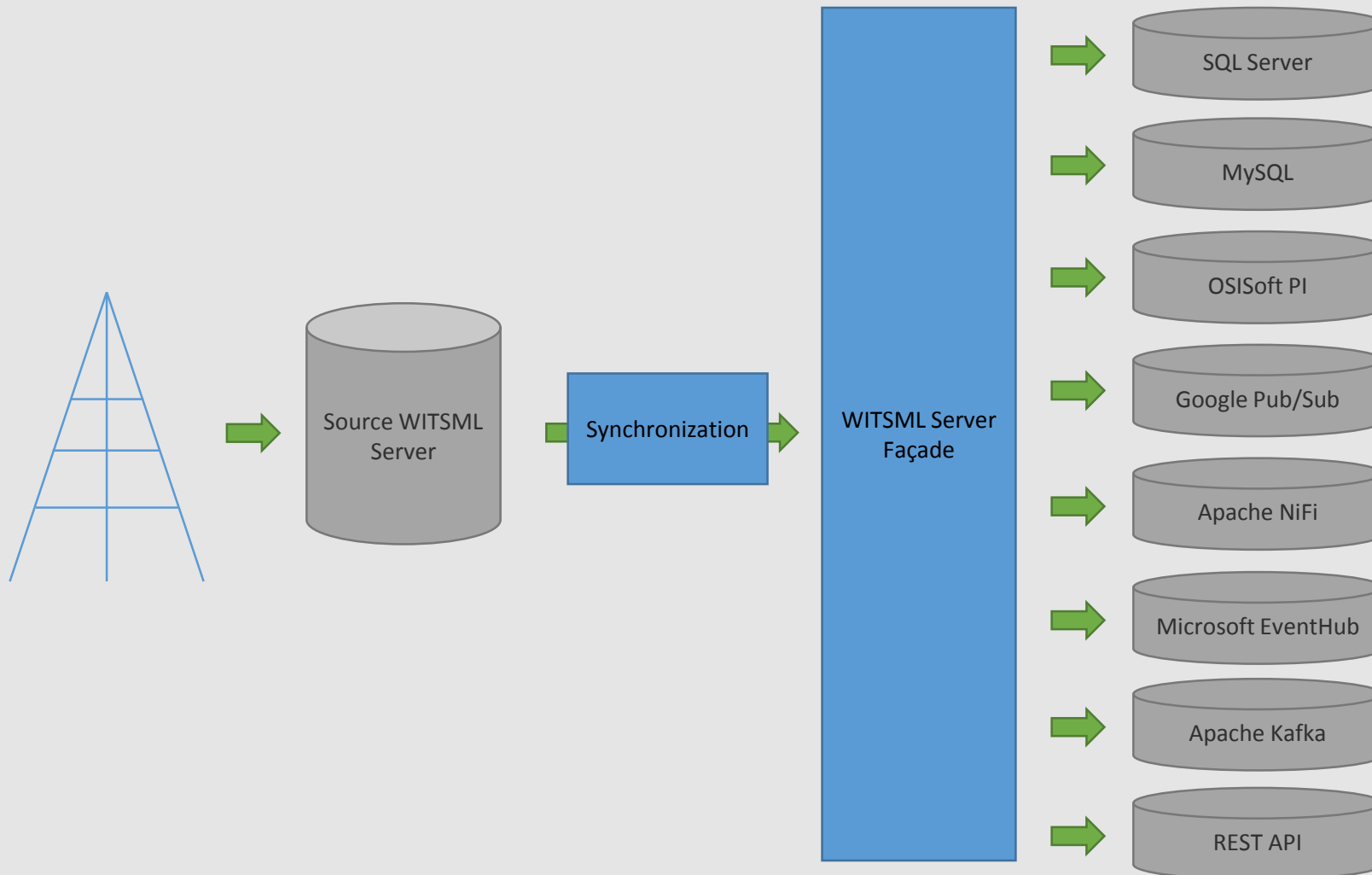- Operator Data Center

# Real-Time Calculations and KPIs

- Rig-site and Data Center Calculations
- Actively monitor calc readiness and health
- Store everything calc-related in WITSML
- Fuse planning, reporting and real-time data

- Powerful and automated
- Complex workflows
- Missing easy experimentation

Delivering Data for Analytics

- WITSML is very flexible
  - Time series
  - Depth series
  - Contextual data

- Any kind of analytics ingestion can be supported:
  - Relational databases
  - Process historians
  - Messaging queues
  - IoT ingestion

- Build your own analytics

- Receiving end is often time-series centric

- Choice overload
  - What data model to choose?
  - What technology to use?
  - What message structure to ingest?
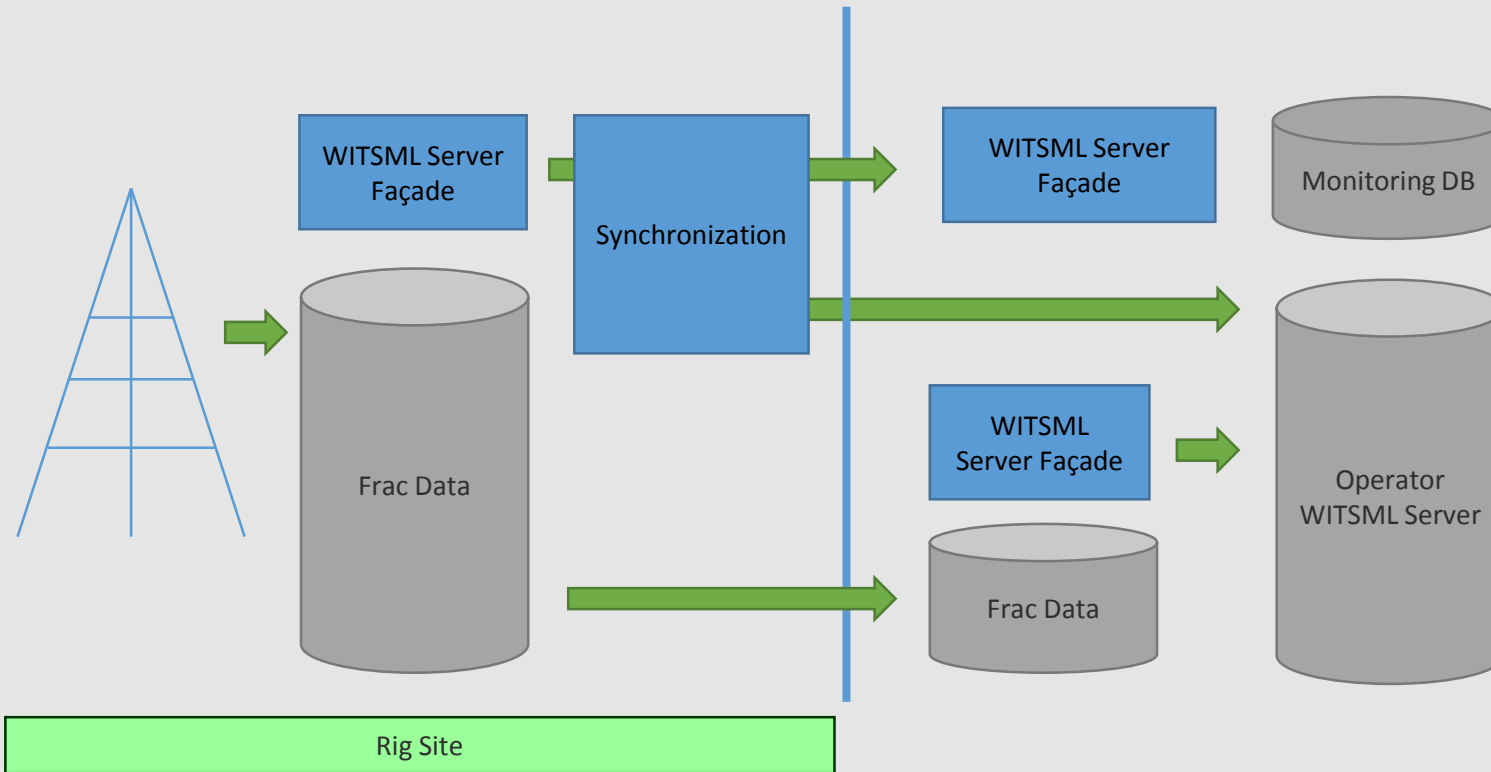
Delivering Data for Analytics
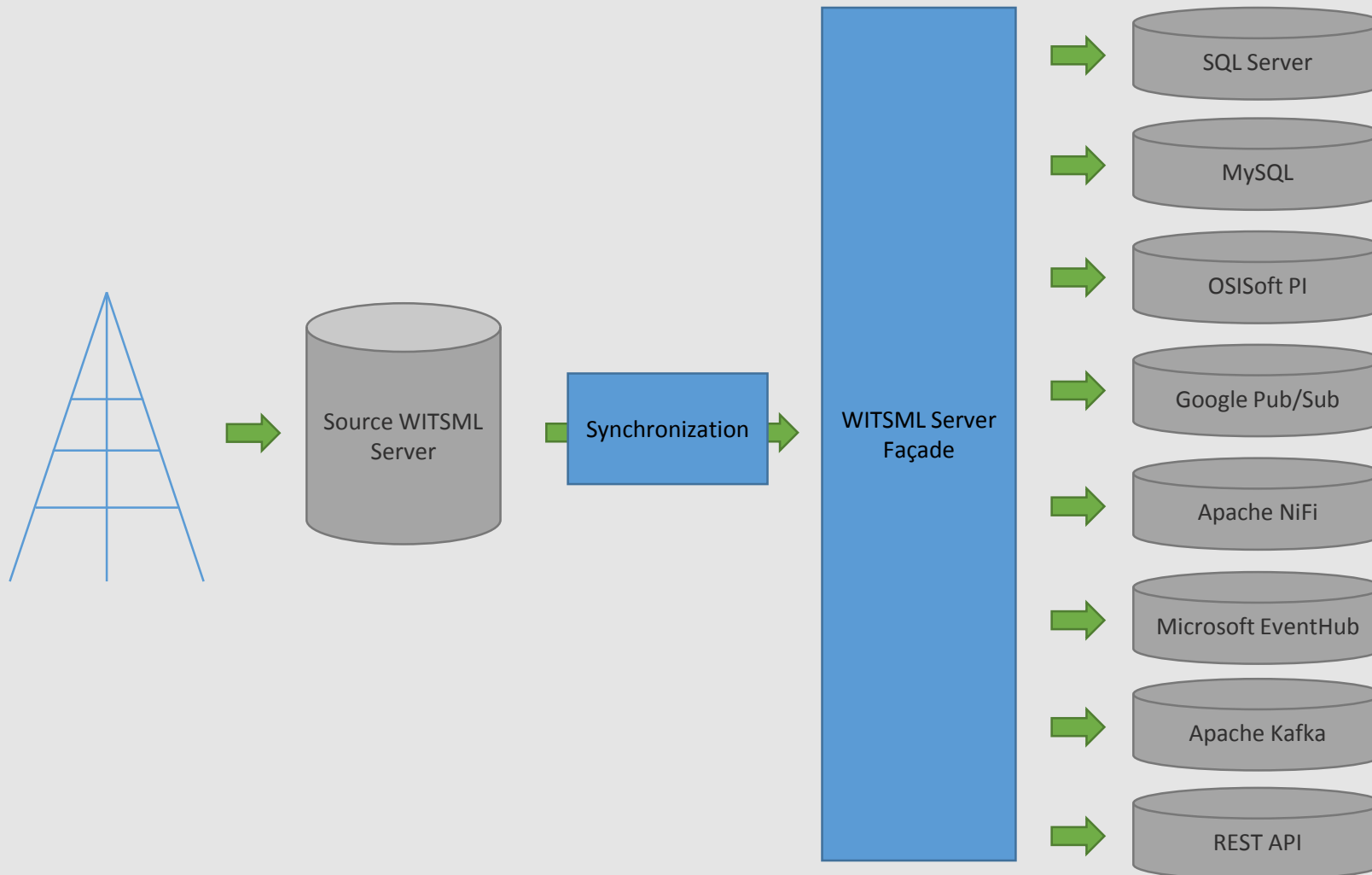
- WITSML is very flexible
  - Time series
  - Depth series
  - Contextual data

- Any kind of analytics ingestion can be supported:
  - Relational databases
  - Process historians
  - Messaging queues
  - IoT ingestion

- Build your own analytics

- Receiving end is often time-series centric

- Choice overload
  - What data model to choose?
  - What technology to use?
  - What message structure to ingest?

Real-Time BOP Monitoring
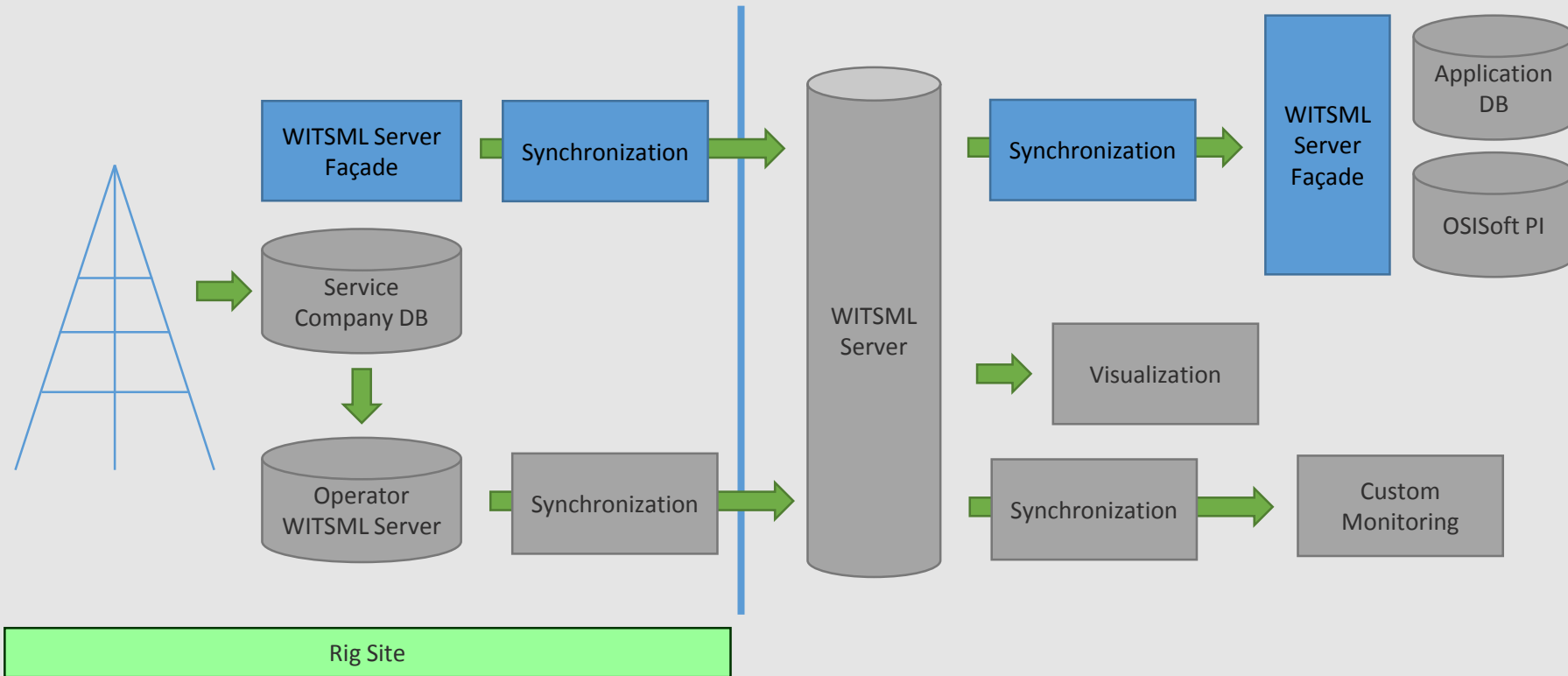
- Enables BSEE Compliance
  - Real-time monitoring
  - Visualization

- WITSML enables additional application integration

- Requires highly reliable infrastructure

- Requires multiple parties to collaborate

Diagram labels:
- WITSML Server Façade
- Synchronization
- Service Company DB
- Operator WITSML Server
- Synchronization
- Rig Site
- WITSML Server
- Synchronization
- Visualization
- Synchronization
- Custom Monitoring
- WITSML Server Façade
- Application DB
- OSISoft PI

Frac Operation Monitoring

- Gives Frac Companies insight into their operations

- Gives operators real-time insight into more of the well construction process

- Data sources are less well established and connected

Real-Time Data Quality Monitoring
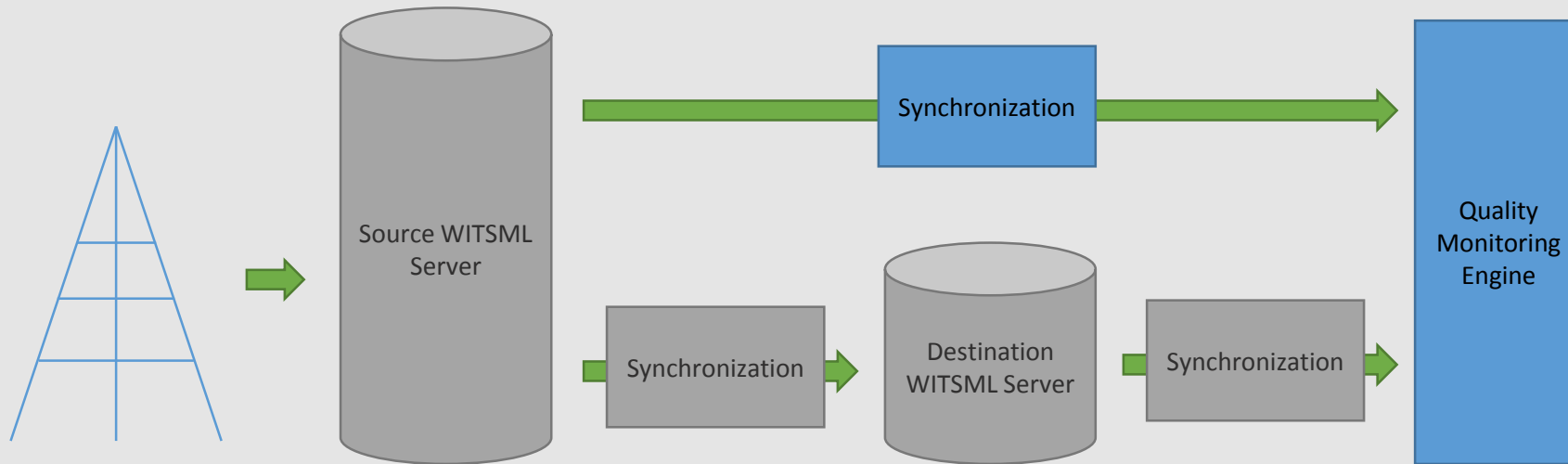
- Track expected and actual data
- Compare source data with destination data
- Track quality of data over time

Source WITSML Server

Synchronization

Destination WITSML Server

Synchronization

Quality Monitoring Engine

Conclusions

- WITSML is a powerful tool for moving wellsite (not just drilling) data
  - Time, depth AND context
  - Designed to handle the realities of drilling: continuously build and tear down entire factories
  - Rich context makes it suitable for integrating with a wide variety of data stores and work flows

- Simplifying this integration is bring value in a variety of situations
  - Analytics and performance optimization
  - Real-time monitoring across the construction (+ intervention + decommissioning) life cycle
  - Assuring the quality of data for high value applications

- Use of an industry standard leaves open future integrations

Thank you