03.05.2016

# CAN'T BE SMART WITH JUNK DATA

## TIME TO TAKE CONTROL

**Доверяй, но проверяй**

# WHY DO WE TRUST DATA?

*"There are lies, damned lies, and statistics."*
—Mark Twain

**… in relation to high frequency drilling data**

- High degree of acceptance without question (human nature)
- General industry approach – *it's good enough*
- Engineers and others lack training on quality and the impact of error
  - *When it is important enough, we'll do something about it*
- Industry lack of error awareness both at system and sensor level

  ⟹ Complicates, obscures, slows improvement and analytics

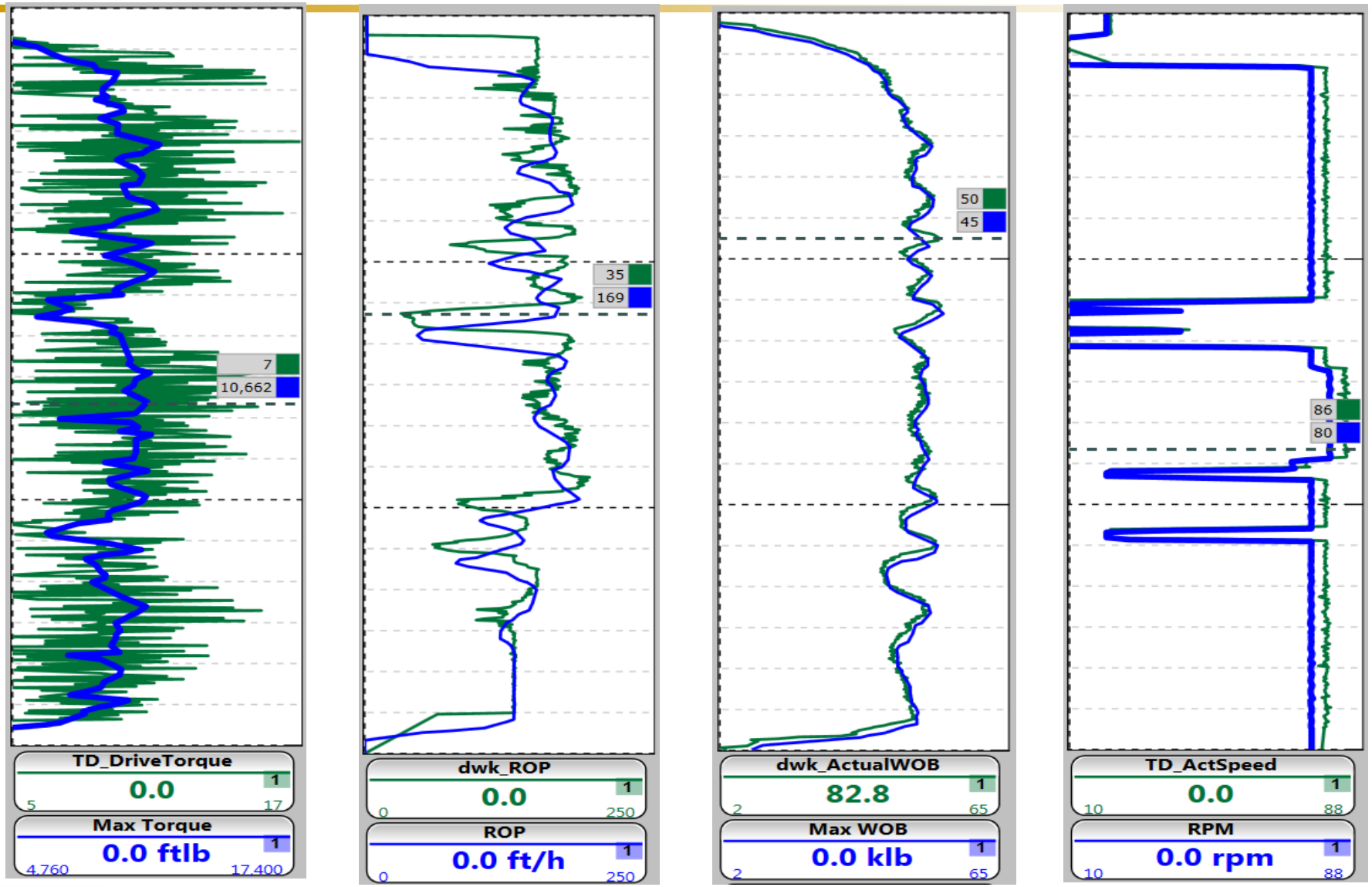
**When we look at real-time data, shouldn't we ask ourselves a few questions?**

- Does the measured data come from reliable sources?
- Margin of error/confidence interval understood—when is a change really a change?
- All data reported that is measured?
- Has data been transformed, if so do you know how?
- Has the data been interpreted correctly?
- How is time measured and do clock differences matter?

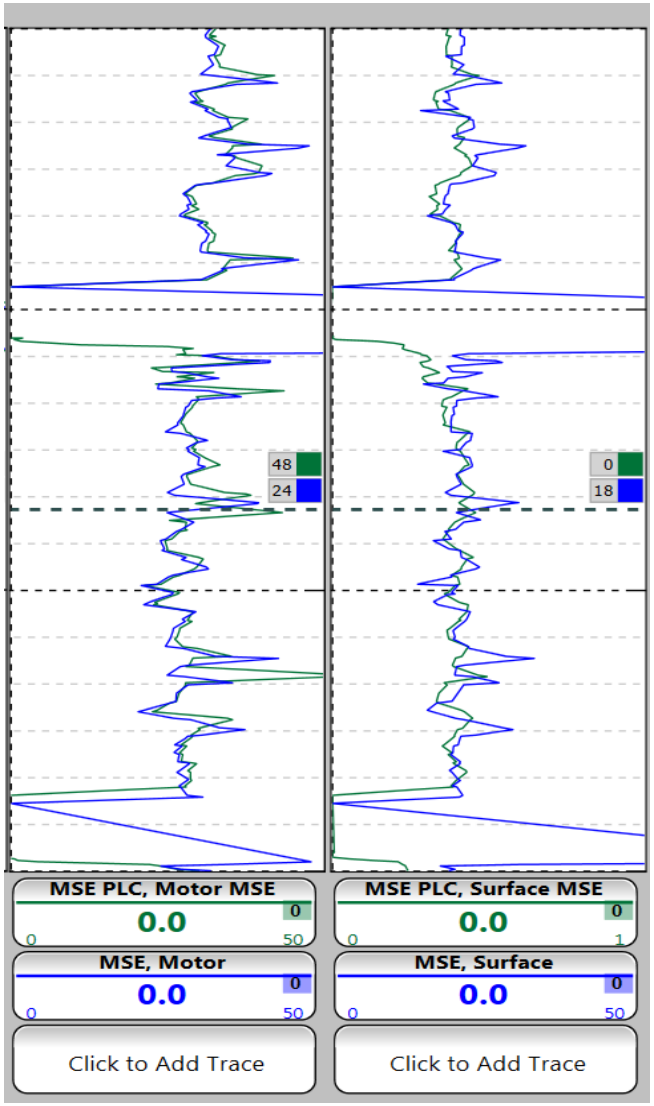
# SOURCES OF BASIC ERRORS AT RIG SITE

- Data Transformation
- Time and mishandling of polled data
- Sensor calibration/verification
- Data protocol, communication issues (Data Bus Wars)

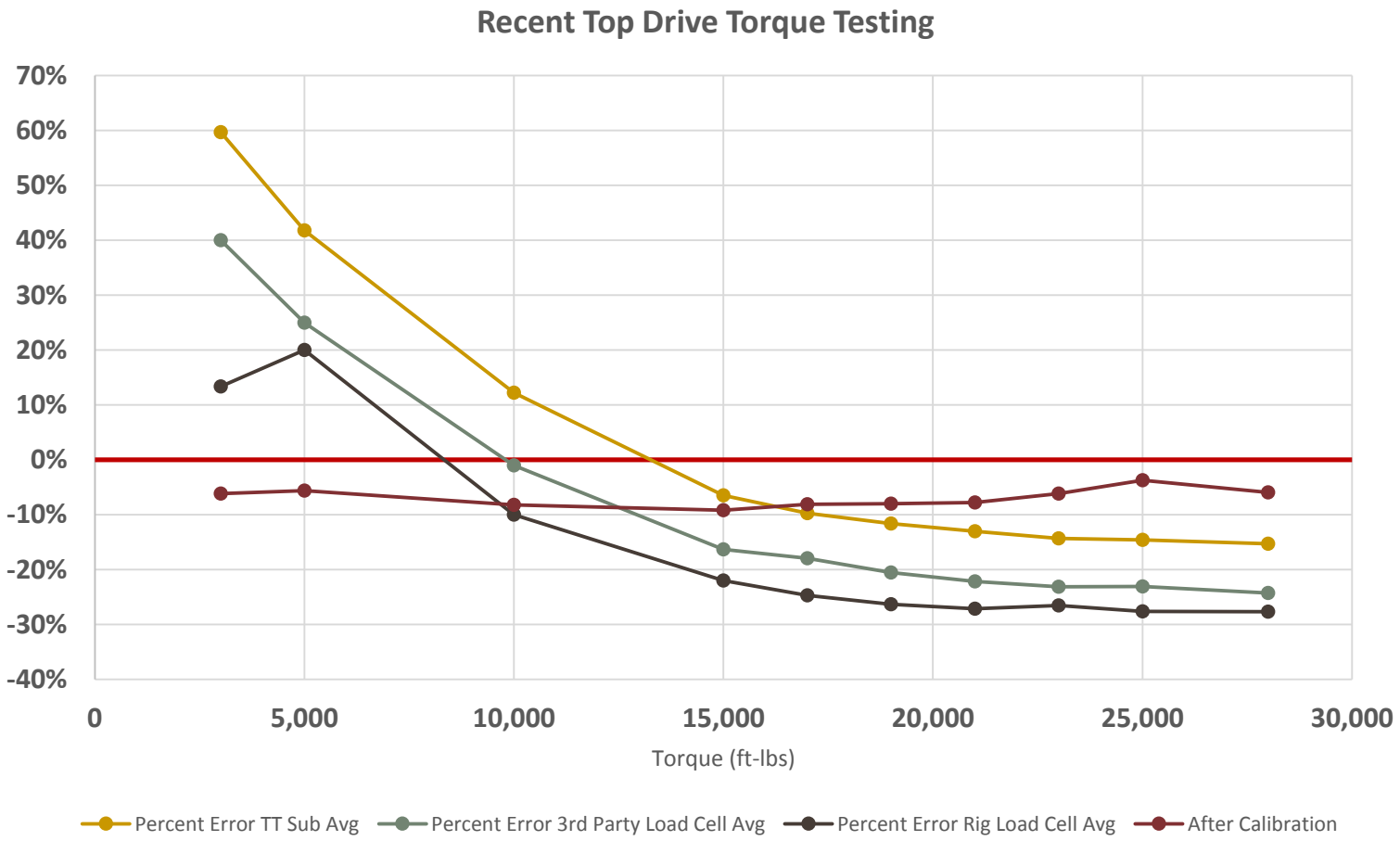
# DATA TRANSFORMATION, TIME, CALIBRATION ISSUES



# IMPACT ON MSE CALCULATION



# DATA QUALITY ISSUES – TD TORQUE




TT Sub Calibrated to 1% of FS, 0 - 40,000 ft-lbs, 3rd Party Load Cell calibrated with-in last 3 months, Rig Load Cell over 18 months since last calibration. Re-calibration achieved through 6 tests in 2,000 ft-lb increments

# ERRORS FOUND THROUGH VERIFICATION ON SITE

- Every rig has had devices significantly out of calibration or lacking verification process
- Most rigs have rig-ups or practices that will lead to device error or drift.
- Errors are common to all rigs and contractors

| | Rig A | Rig B | Rig C | Rig D | Rig E | Rig F |
|---|---|---|---|---|---|---|
| Rotary Torque | 17% | 17% | 22% | 24% | 21% | 18% |
| Makeup Torque | 23% | 11% | 12% | 17% | 60% | 13% |
| Rotary RPM | 1% | 1% | 1% | 1% | 2% | 1% |
| Block Position | 6" | <0.5” | <0.5” | 6ft | <0.5” | <0.5” |
| Hookload | 11% | | 18% | | 12% | |
| Pit Volumes | 15% | 12% | 18% | 16% | 15% | 22% |
| Pump Rate | 1% | 32% | 1% | 1% | 40% | 1% |
| Pump Pressure | 5% | 4% | 4% | 4% | 3% | 5% |

Source: SPE presentation – Chesapeake (The Role of Data in Drilling)

# TAKING CONTROL

- At Apache
  - Rolling out new data aggregation platform capable of taking **all** available data sources via communication protocols (OPC-UA to 4/20 ma signals) and data digital file formats (csv to LAS)
    - Time managed like data
    - Instituted key rig site sensor calibration validation effort
    - Capable of 100 hz data, 1000 tags, 7 day storage onsite
    - Streaming - rig state, modeling, executable algorithms
    - Data quality both comparison at sensor and using Bayesian network model
    - Read/write capability onsite with daily reporting database (important metadata)
    - Has Historian, Database and open executable layer
    - Working on full traceability and transparency on all data from sensor measurement to storage to analytics

- At Industry
  - Participant of new Operators Group for Data Quality (OGDQ)
  - Collaboratively define the process capability requirements of operating companies and share those requirements among operators and with the industry at large
  - Foster a set of productive approaches to quality within and among operating companies and between operating companies, and service companies and OEMs

# THANK YOU

- *"If you can not measure it, you can not improve it.“* and *"To measure is to know.“* William Thomson, 1st Baron Kelvin (Lord Kelvin)
- *“What gets measured gets managed”* – Peter Drucker
- *Not everything that can be counted counts, and not everything that counts can be counted.*
  Albert Einstein, Physicist

Final Word - **Доверяй, но проверяй**,

*Doveryai, no proveryai – Trust, but Verify*