# SPE Webinar

Field automation for data collection and control in O&G beyond SCADA

Webinars

SPE Webinars are Sponsored by:

SPE

SPE Foundation

Webinars

Ryan has worked in technology for over 15 years and has served in various technical roles where he advanced, mentored, and lead consulting, solution, and product development initiatives across a number of technology companies including Matrikon (acquired by Honeywell), Thoughtworks, NavNet, and Clarocity (formerly Zaio).

He holds a BSc in Electrical Engineering with a specialization in Biomedical Engineering from the University of Alberta.

**Ryan Benoit**
CTO, Ambyint

**Slide 1**

**1** +ryan.benoit@ambyint.com

Lauren Cotton, 2/16/2018

## Key production technology pain points inhibit effective engineering and solutions to reduce operating costs

Webinars

Modern wells are more numerous and complex than ever

Dynamic flow conditions make them more difficult to optimize

BUT:

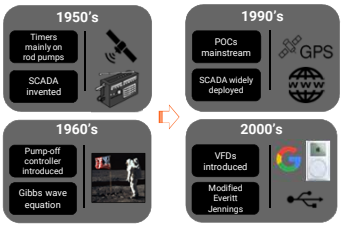
Operators trying to do more with equal or less manpower in the field

Optimization technology stack has remained stagnant and ineffective

| Today's result: | | | = | Tomorrow's concern: | | |
|---|---|---|---|---|---|---|
| Failures ↑ | Uptime ↓ | LOE ↑ | | EUR ↓ | Economic life ↓ | Profits ↓ |

## Artificial Lift Technology Evolution

Webinars




Production has been ignored in the last 15 years of oilfield technology innovations despite the benefits of technology growth in our day-to-day world.

## E&Ps could benefit enormously from technologies that are already showing promise and results in other industries

Webinars

**Artificial Intelligence and Machine Learning**

Artificial Intelligence (AI) has increased safety and quality while increasing revenue and reducing costs in numerous consumer applications

TESLA IBM Watson Google

**Internet of Things**

Internet of Things (IoT) already advancing from simple edge data collection to intelligent automation with distributed automation across numerous segments

Source: IoT Analytics, Q3/2016

## SCADA deployments are costly and complex

**50+ year-old SCADA architecture prevents implementation of modern data science and analytics**

### Architecture

- SCADA poll-based architecture limits real-time analytics and data science
- Low-res polling approach misses insightful events
- SCADA designed (1960s) when storage & compute expensive but bandwidth unlimited (wired)
- Today: storage & compute cheap, while bandwidth is major limitation

### Systems Integration

- Integration of components challenging: hardware + comm's + historian + software
- Complex implementation in field + office means that integration is never seamless
- Single screen solution difficult to achieve

### Cost

- High initial capex
- High maintenance costs
- High replacement costs
- Total cost of ownership limits business case to new/high-value wells

### Security

- Fundamentally unsecured in the field
- Unsecured local ports
- Sniffable Clear Text transmission
- Storage not encrypted
- The air gap myth

## Cybersecurity - Legacy SCADA implementation

| PLC/RTU | Wireless Comm | SCADA Server | LAN / PC |
|---|---|---|---|
| Unsecured local ports | Clear text | Unencrypted storage | Unencrypted LAN |
| Susceptible to DDoS | Sniffable wireless | HDD | No user level security |
| | | Uptime? | Susceptible to malware/ransomware |
| | | Backup? | |
| | | Air gap inhibits data science | |

## Cybersecurity - IIoT Evolution

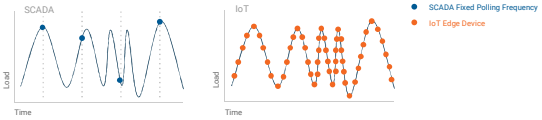
| IoT Device | Advanced Connectivity | Scalable Cloud | Any Device |
|---|---|---|---|
| Secure device | Push capable | Encrypted storage | SSL Encryption |
| No local ports | Encrypted | 99.99% reliable | Browser based |
| DDoS attack immune | Advanced IP security options | Empowers data science | Native apps |
| | | Highly available | User level and app level security |

## Five Key Criteria for Quality Data Science

1. High resolution data
2. Domain expertise to inform feature engineering
3. Data lake (no more silos)
4. Contextual data
5. Continuous feed of new data to continually validate models


## Key Differences between SCADA and IoT

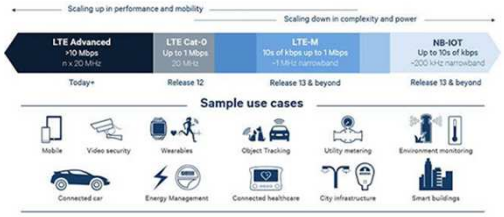
**High resolution + event-based data enables quality data science**




- Regular polling frequency of SCADA misses insightful events
- Uneconomic to ratchet up polling without large Capex spend

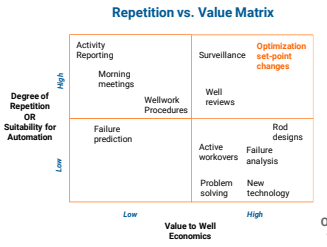
- IoT edge devices capture rich data
- Leverage edge compute to produce edge analytics

## Communication Evolution Focused on IoT



## IoT Enables Machine Learning Opportunities

**Production Engineering/Operations Key Workflows**



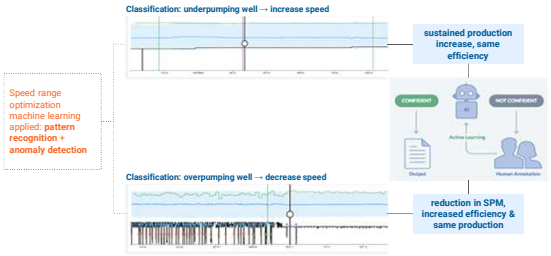

**Problems**

- Optimization of set points is high value but often neglected due to time consuming and repetitive nature
- Successful optimization requires experienced staff and significant man-hours, so is often neglected in favor of other more urgent activities
- Optimization typically follows a consistent methodology and is repetitive, making it highly suitable for automation

**Solution**

**Outsource repetitive tasks to a machine, to focus on higher value tasks better suited for humans**

## POC Speed Range Optimization Opportunity




## SPE Webinar

Field automation for data collection and control in O&G beyond SCADA