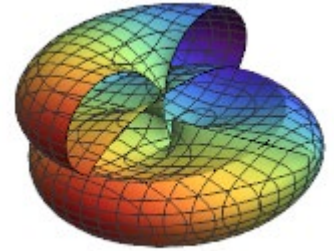


25 Year's of Progress What's Next?

Steve Sawaryn

Speaker Bio



- Introduction
 - Consultant
 - ISCWSA Collision Avoidance Subcommittee Chair
 - 40+ years Major Oil Co / Consultant
 - MA & PhD degrees Cambridge University
 - Aberdeen based
 - Specialized in
 - Drilling Engineering Systems
 - Directional Planning & Surveying

ISCWSA 50th Meeting / 25 Years



A Good Reason
to Celebrate!

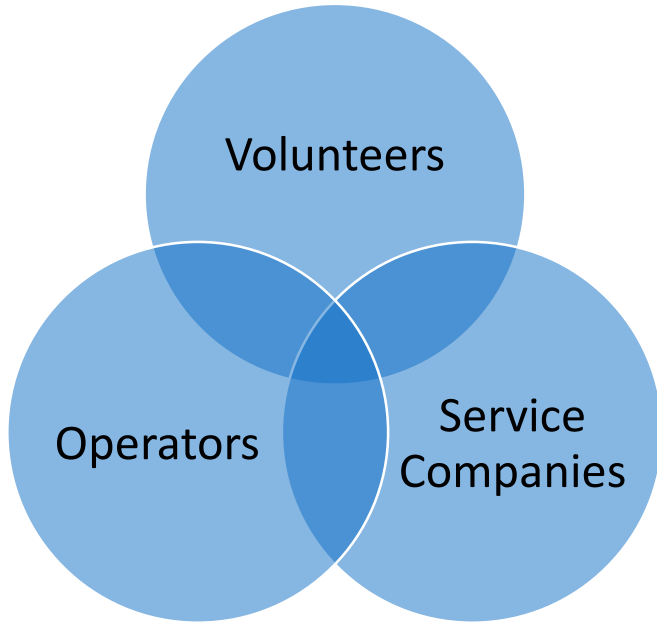
50th General Meeting
October 3rd, 2019
Calgary, Canada



Mission

The primary aim of this group is to produce and maintain **standards** for the industry relating to wellbore survey accuracy; to set **standards** for terminology and accuracy specifications; to establish a **standard** framework for modelling and validation of tool performance; and to raise awareness and understanding of wellbore survey accuracy issues across the industry.

Foundation



Foundation

- Initiated at SPWLA MWD Forum, Kerrville 1995
- First Formal Meeting, December 1995 chaired by Hugh Williamson
- Industry Steering Committee on Wellbore Survey Accuracy (ISCWSA)
- MWD error model (SLB, HAL & BHI Data)
- Affiliated with SPE as WPTS October 2003

Technology Timeline



Key Technologies

- Acid bottle
- Totco (Inclinometer)
- Magnetics
- Gyros
- MWD and Inertial Gyro (1978)
- ERD
- Horizontal Drilling
- GWD (~2000)
- etc.

Sub-Committees

- Error Model (1995)
- Collision Avoidance (2003)
- Education (2011)
- Well Intercept (2011)
- Operator Wellbore Survey Group (2012)
- Survey QA/QC (2019)



Website

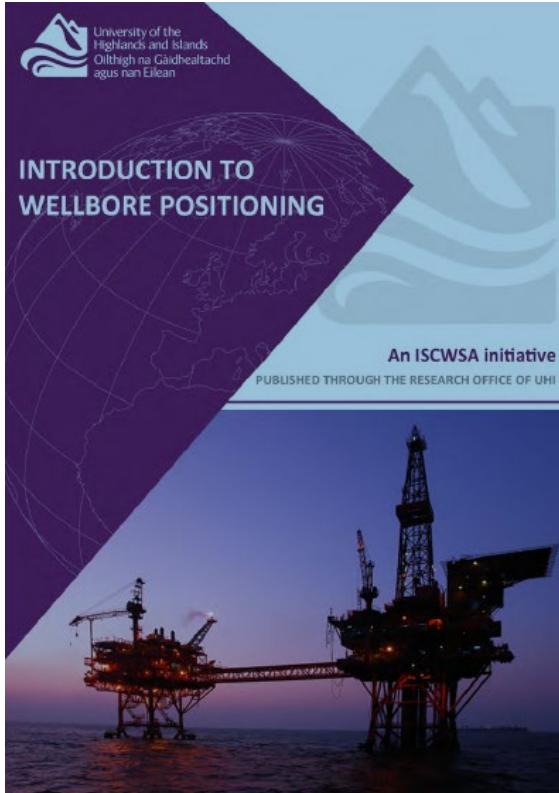


Web Statistics

Communications Mechanism

- Announcements
- Meeting Registration
- Meeting minutes
- Reference documents
- Recommendations / good practice
- Membership
- Measurement of topical interest

e-Books



- Introduction to Wellbore Positioning (2009)
 - ✓ >20,000 Downloads
- Well Intercept (2017)
 - ✓ >9,500 Downloads

**University of the
Highlands and Islands**



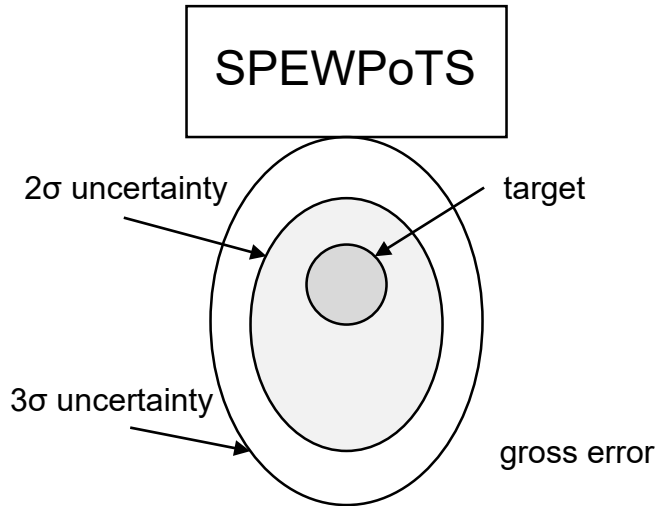
Influence / Training

Journal	Impact Factor
SPE Journal	3.095
SPE Reservoir Evaluation & Engineering	1.807
SPE Production and Operations	1.595
SPE Drilling and Completion	1.327

SPE 29th August 2019

- “*Hits and Misses*” Applied Technical Workshop (ATW)
- Topical luncheons
- SPE Technical Papers
- Networking Events

Highlights



- General co-operation
- Humour
 - Airline Interview
 - Pub quizzes
 - Liquidity
 - Acronym
 - Angus
- Networking Events
- Poetry reading

What's Next?



- Drivers
- Influences
- Adaptations

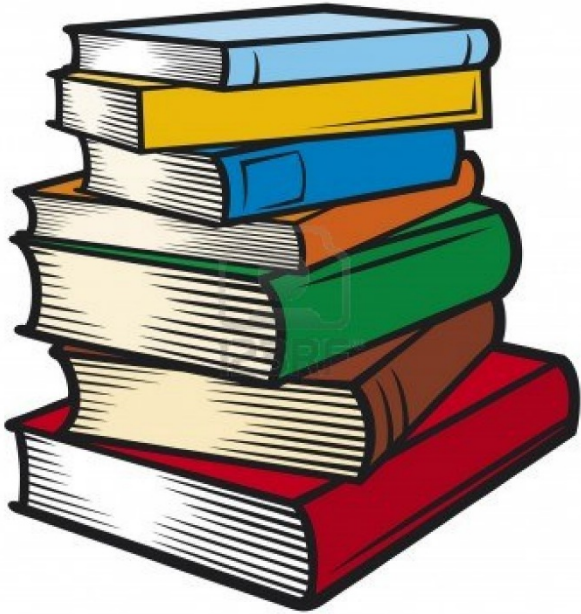
The Future



Drivers

- Cost reduction
- Increased efficiency
- Environmental impact
- Reliability
- Resilience
- Diversification

Characteristics of Our Work



- Highly technical
- Well defined activities
- Limited scope
- Well documented
- Specialist practitioners available

Geology / Petrophysical Link



Trajectory

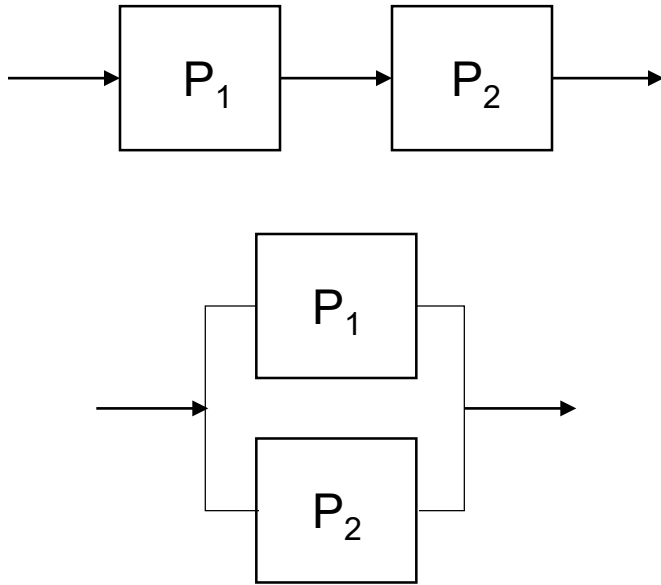
- Geological risks
- Targets
- Formations
- Formation properties
- Down hole processing
- Algorithmic efficiency
- Power management

Office-Based Directional Engineers / Automation



- Computers Disrupt Directional Drilling (JPT August 2017, 24-27)
 - Safety improvements
 - Green credentials
 - Quality control tools
 - Conformance tools
 - Audit tools
 - Automation
- QA/QC
Sub-committee

Reliability / Resilience



- Reliability MTTF / MTTR
- Analysis of combined surveys
- 4 – axis magnetic sensor
- Twin gyro systems
- Mems systems
- Combined gyro / magnetics

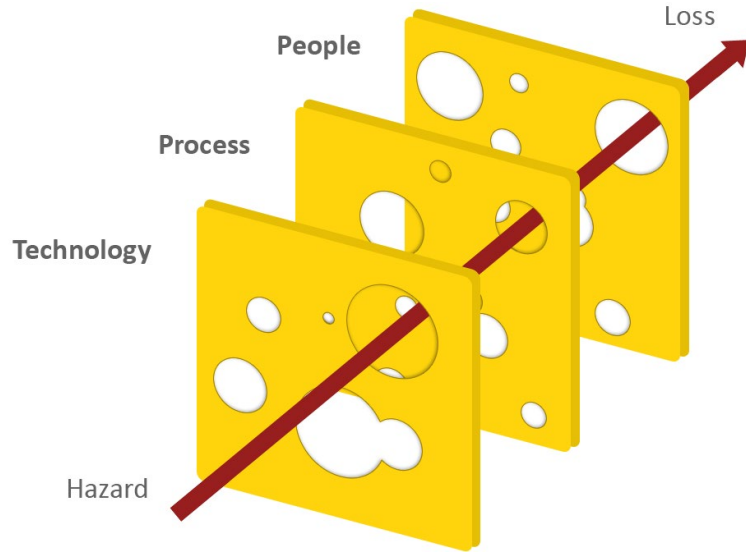
Diversification / Inclusivity



Traditionally inclusive (AIME)

- Water wells
 - Geothermal wells
 - Hydro-electric power
 - Extra-terrestrial drilling
 - Pipeline construction
- } Energy

Gaps / Challenges



- Direct real-time measurement of spatial separation between wells
- Standardisation of wellbore trajectory description suited to tools and quality metrics
- Wellbore position and uncertainty as a function of time
- Omission of surveying from SPE “Advanced Drilling and Well Technology”
- Plethora of new instrument systems
- Standards expected for validation of third-party error models
- Human factors

Summary

We should be proud of our achievements

- Have fulfilled our mission
- Have adapted as needed
- Have kept pace with the industry
- Have had fun whilst achieving these!

Need to

- Continue to adapt
- Refresh our talent / knowledge base
- Encourage volunteerism
- Make vocabulary / mission consistent

