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2019-2020

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PRESENTS

Log Quality Control… Easy as 1-2-3!?

FESM - SPWLA Malaysia Chapter
12-Aug-2020

www.spwla.org

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- Bi-monthly Petrophysics Journal
- Registration Savings on Conferences
- On-line Educational Resources
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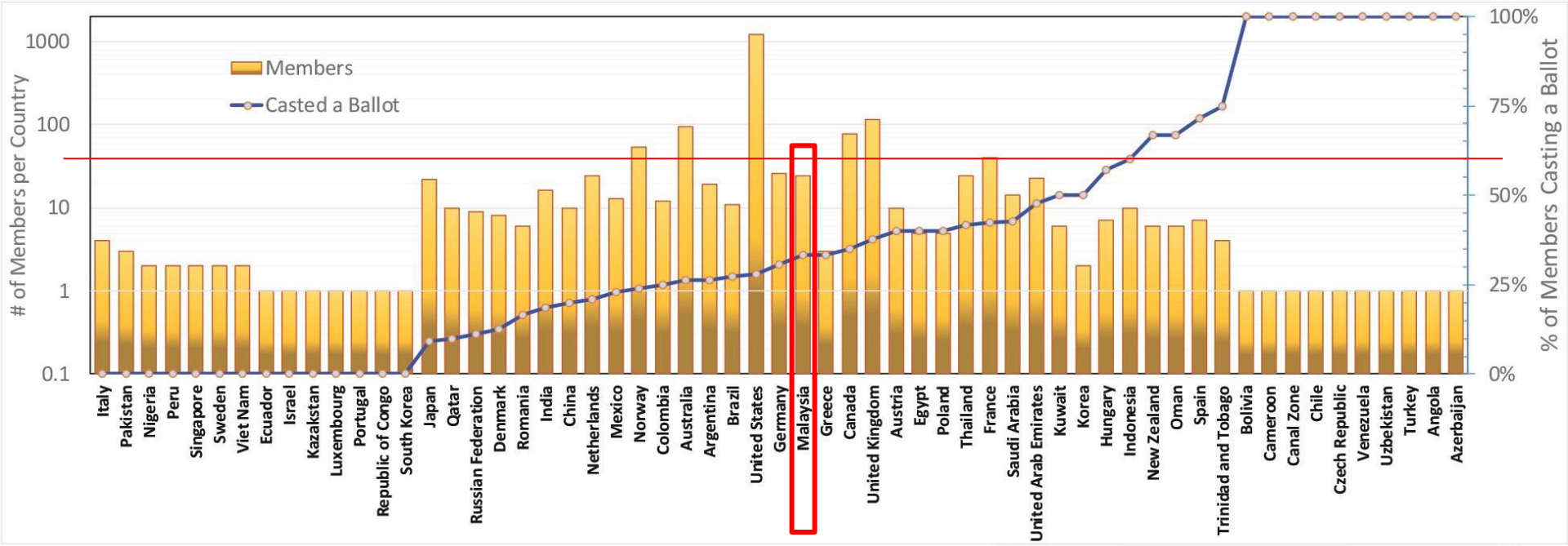

Source: Petrophysics journal Mar-2019

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Objective

To propose a **framework**

to **formalise and simplify log quality control**

in operating companies and data-user organizations

LQC Talk Outline

1. Acknowledging — Log Quality in reality

2. Understanding — Definitions; Root causes

3. Framework — LQC Types; System; Record


SPE-182313-MS

Demystifying Log Quality Control

M.C. Storey, Well Data QA Pty. Ltd.

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Demystifying Log Quality Control

Introduction

Part 1

1. Acknowledging **Log Quality in reality**

2. Understanding

Definitions

Root causes

3. Framework

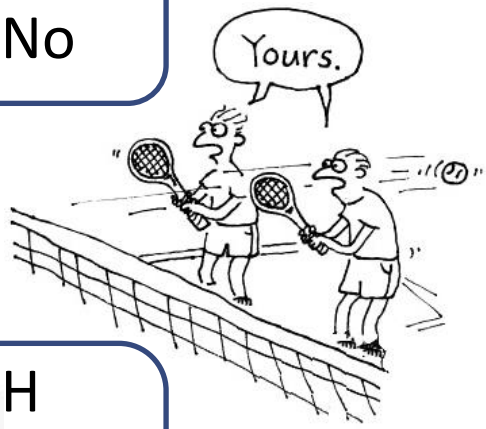
LQC Types

System

Record

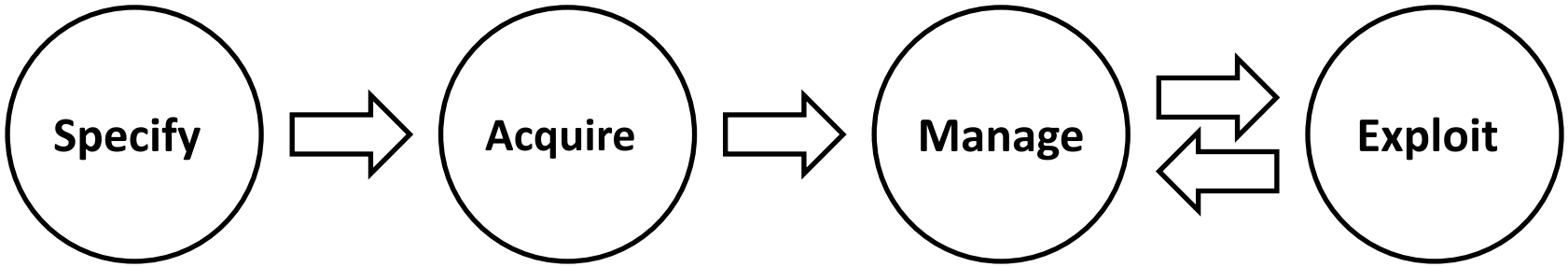
Log Quality in Reality

Log QC'd?
- ☑ Yes
- ☐ No



Log Quality?
- ☐ H
- ☑ M
- ☐ L

Well Log Data Life "Cycle"



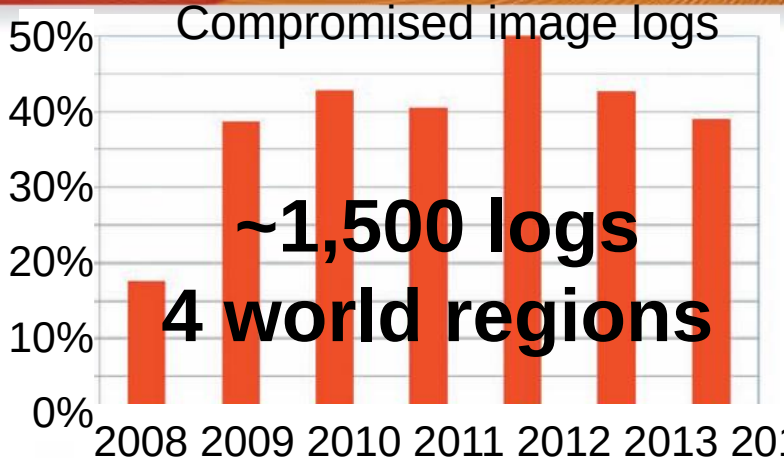
- Bad quality data must not be let into our workflows and decision-making processes
- Mitigation for well logs: **Log Quality Control (LQC)**

Log Quality in Reality

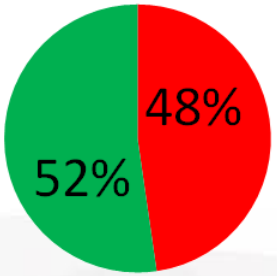
1. **Worrying Borehole Image Data Quality trends over the last decade: a situation about to get worse!**

   By Lawrence Bourke & Jeremy Prosser
   – Task Fronterra Group

   AUGUST – SEPTEMBER 2015
   PESA News



2. Integrity of well depth measurement: 52 / 109 wells had a depth record too incomplete to exploit (H. Santoso, 2016)



3. LQC report by large international company in Australia: 400% *average rejection rate of incoming data* (Aug. 2016)

Part 2

1. Acknowledging — Log Quality in reality

2. Understanding

Definitions

Root causes

3. Framework

LQC Types

System

Record

Definitions

- **Data Quality:**
  - Consistently meeting all knowledge worker and end-customer expectations (IAIDQ 2005)
  - Conformance with specified requirements (Norwegian Standard NS 5801)
- **Quality Assurance:** explicit combination of organization, methodologies and activities that exist for the purpose of reaching and maintaining high levels of quality (IAIDQ = IQ Intl)
- **Quality Control:** an activity of Quality Assurance relating to monitoring, to verify compliance to the specifications

Facets of Log Data Quality

Completeness: whether all of the data required is available.
Incompleteness may be e.g. because the data are incorrectly sampled, or not available over the entire interval, or missing curves, or missing a repeat section

Accuracy: correctness, closeness to true value.
e.g. The well name TITAN-1 could be a correct one.

Validity: conforming to business rules or expectation.
e.g. The well name TITNA-1 is valid (but it is incorrect).

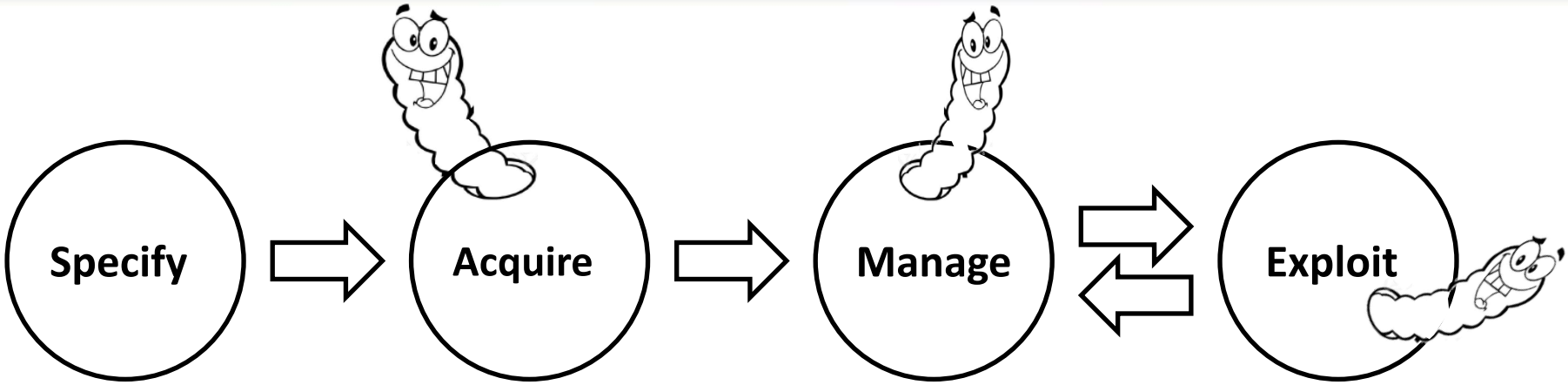
Consistency: absence of contradiction.
e.g. if the log data in a DLIS tape are the same as those seen on a print, that is consistent.

Integrity: the preservation of accuracy and consistency of data throughout their life. ¯P³ŠÅ·'\ÎNRSÜ

Relevance: whether the data address the objectives; timeliness.

mainly based on the IAIDQ (now IQ International) glossary

LQC Opportunities & Risks



Where?	In field / contractor office	in operator's office	Exploiters' office
Risk mitigation: LQC when?	During acquisition	Upon delivery?	Pre-exploitation
LQC Who?	Contractor / Witness	Admin? TA? SME?	SME? TA? Exploiter?

3 types of LQC… Different Objectives

1. During the logging operation:

- Ensure log objectives are met
- Mitigate and manage any problem
- Record/communicate the information

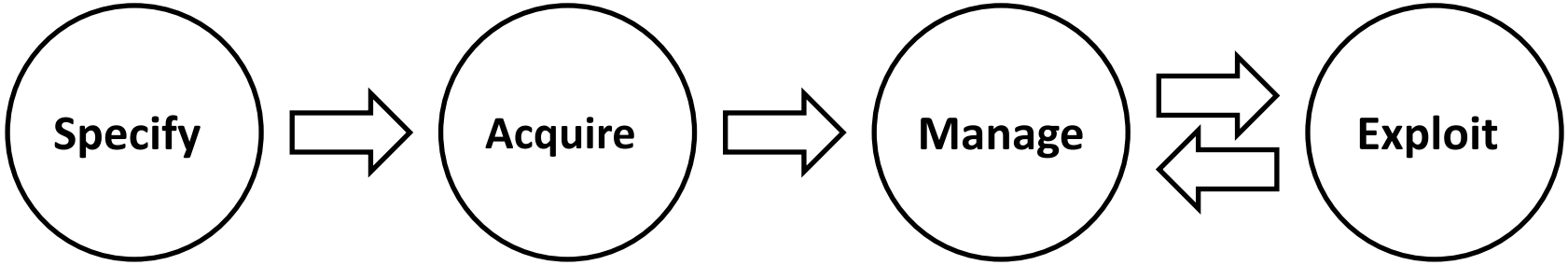
2. On the fresh products (at wellsite & in office):

- Ensure data and information have been correctly recorded and delivered
- Find problems and solve, mitigate and/or document them
- Products can still be changed & gaps filled

3. Later, pre-exploitation:

- Determine whether the data is fit for your purpose
- What there is, is likely to be all there is; use with appropriate caution

Root Causes of Unreliable LQC



"**LQC**": one name for

- different **activities**,
- with different **objectives**
- by different **people**
- at different **times**

No common system

Solution:

1. Distinguish 3 types of LQC
2. Systemise

Factors & Trends Exacerbating Risk

- Continuous changes in logging practices
- Continuous changes in product
- Increasing role of LWD

1930s – mid 1980s
vs. mid 80s – early 90s
vs. Early 90s – present

- Increasing variety
- Increasing complexity

Environments
Measurements
Products

- Increasing shortage of skilled personnel ---- Training, field experience
- Increasing pressure to “normalise” ---- Stripping of contextual info
- Increasing deference to software ---- Rule-based
- Unadapted recording systems ---- Impractical capture

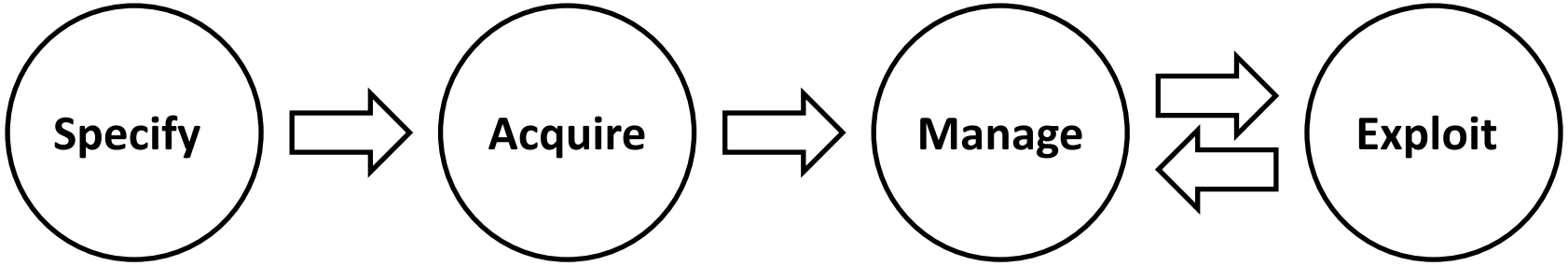
Part 3

1. Acknowledging — Log Quality in reality

2. Understanding — Definitions; Root causes

3. Framework — **LQC Types**; **System**; **Record**

3 Types of LQC, 3 sets of Objectives



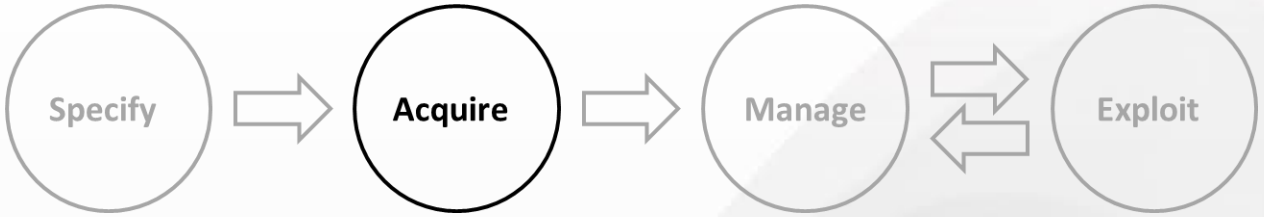
	1. **Acquisition** LQC	2. **Acceptance** LQC	3. **Pre-exploitation** LQC
Objectives:	"first-time done-well" operation & acquisition of **data**, managing any deviation from plan	Verifying, addressing deviations & accepting **products**	Verifying **fitness - for-purpose** of data **in context** for specific exploitation activity

Type 1: Acquisition LQC

Main activities:
- Assure valid data is acquired as per program
- Capture contextual info and any notable event

Main risks:
- Miscommunications reducing value of data
- Undetected operational failure
- Failure to capture essential information

Main opportunities:
- Detect problems when they may still be corrected

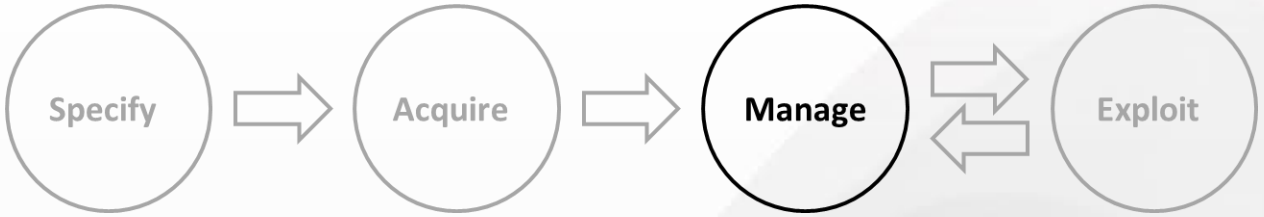


Type 2: Acceptance LQC

Main activities:
- Verify accuracy and completeness of products delivered
- Address promptly any unacceptable deviation

Main risks:
- Inaccurate or incomplete data deliverables
- Inconsistent data deliverables

Main opportunities:
- Communicating with peers with first-hand info on ops
- Securing “best possible” products

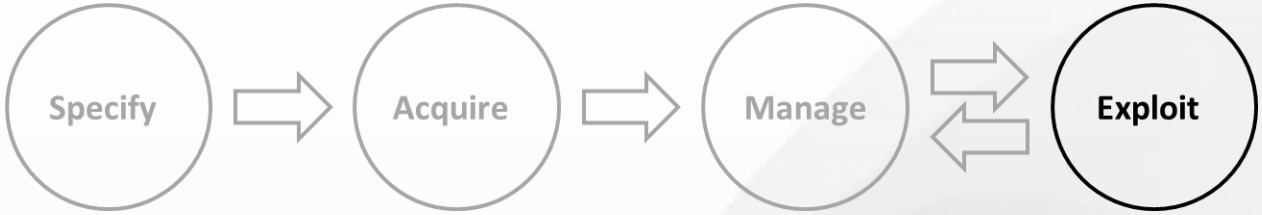


Type 3: Pre-Exploitation LQC

Main activities:
- Basic checks as required by specific objectives
- Data conditioning if required by specific objectives

Main risks:
- Using inadequate data unknowingly
- Using valid data inadequately
- Overlooking essential relevant information

Main opportunities:
- Uncovering problems with information quality
- Becoming familiar with data

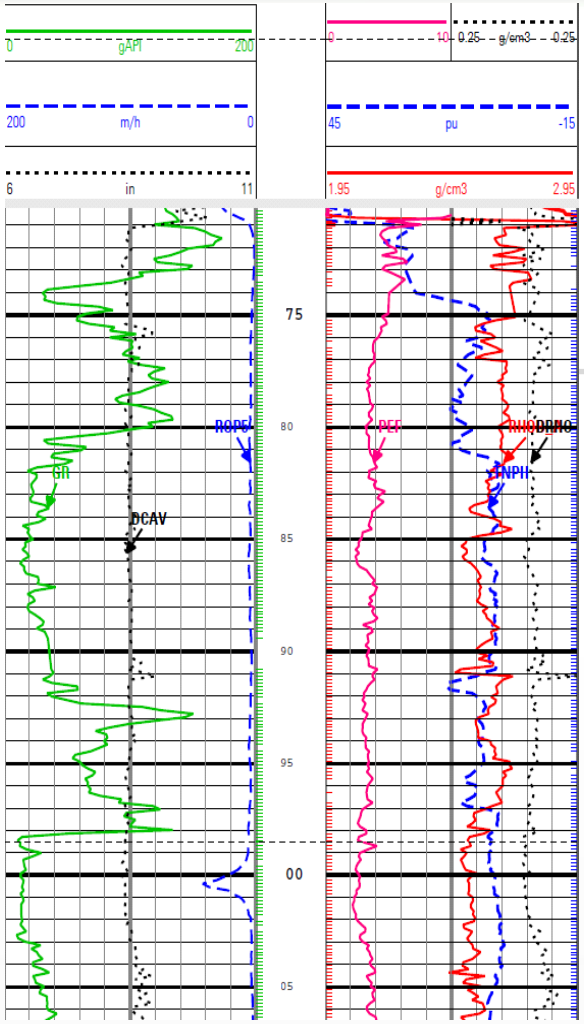


Framework

1. **Distinguish** between : Acquisition LQC (Type 1)
   Acceptance LQC (Type 2)
   Pre-Exploitation LQC (Type 3)
2. Develop / preserve / evolve **checklists** for Types 1 & 2 LQCs
   Use rules
   Focus on the easy stuff
3. Keep shared record of Type 3 LQC **observations**

	Type 1 LQC	Type 2 LQC	Type 3 LQC
Completeness	✓	✓	(✓)
Accuracy	✓		(✓)
Validity	✓	✓	(✓)
Consistency	(✓)	✓	
Integrity		✓	✓
Relevance	✓	✓	✓

Staying alert for Non-Quality



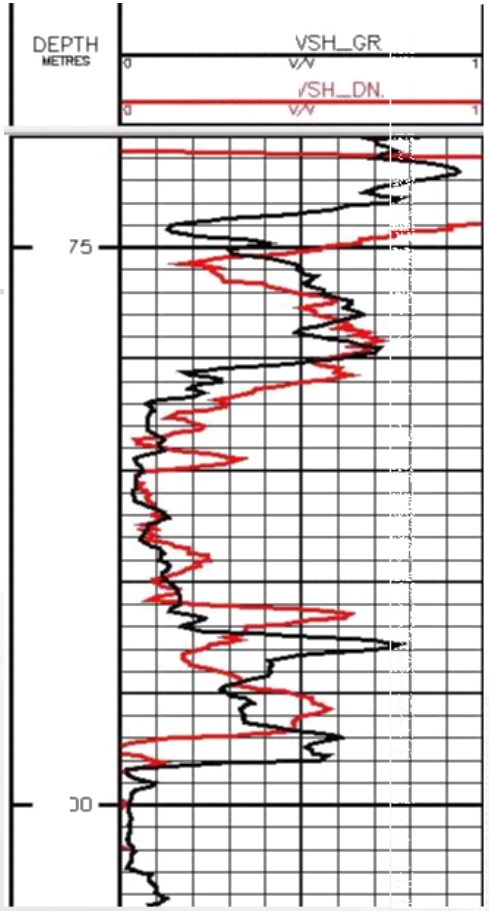
Looking good!

This **LWD GR-Dens-Neut** (acquired in one BHA run) would probably pass Type 1 and Type 2 LQC

However…

During exploitation, a serious depth mismatch (±1.5 m) becomes evident.

It needs to be addressed before the logs can be used.



Latest Observations: Logging 4.0

- Continuous changes in logging practices
- Continuous changes in product
- Increasing role of LWD

Remote operations

1930s – mid 1980s
vs. mid 80s – early 90s
vs. Early 90s – ~now
vs. ~now - future

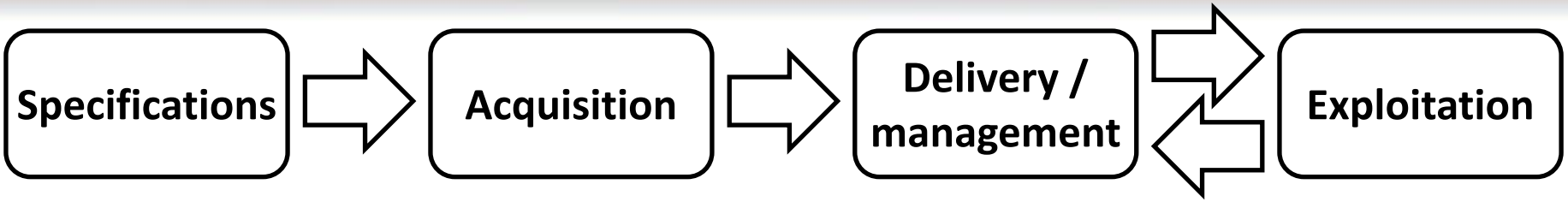
- Increasing variety
- Increasing complexity

Environments
Measurements
Products

- Increasing shortage of skilled personnel ---- Training, field experience
- Increasing pressure to "normalise" ---- Context stripping
- Increasing deference to software ---- Rule-based
- Unadapted recording systems ---- Impractical capture

Autono-mous software

A Few Observations

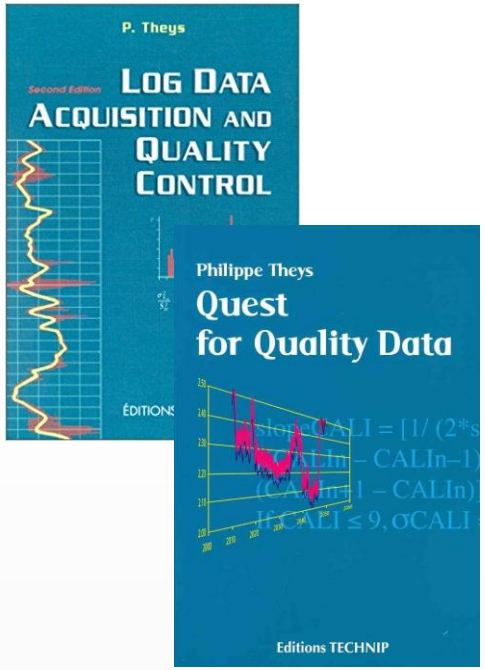


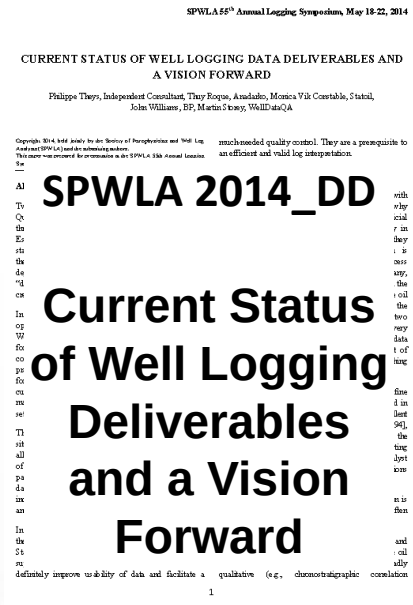
1. The more thorough and complete the Specifications, the easier the Acquisition and Acceptance LQC
2. The more thorough the Acquisition LQC, the lighter the Pre-Exploitation LQC
3. The more thorough the Acceptance LQC, the easier the Pre-Exploitation LQC.
4. Don't forget about legacy data (mainly Pre-Exploitation LQC)

Some References

You are not alone!

- SPWLA.ORG
- PPDM.ORG



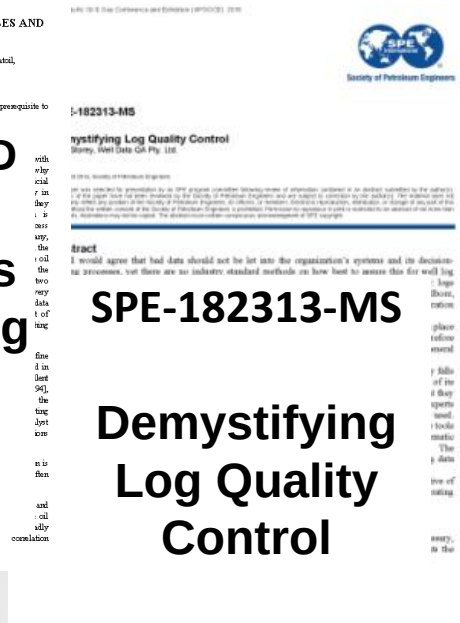

SPWLA 55th Annual Logging Symposium, May 18-22, 2014

CURRENT STATUS OF WELL LOGGING DATA DELIVERABLES AND A VISION FORWARD

Philippe Theys, Independent Consultant, Tiny Roque, Anadarko, Monica Vik Constable, Statoil, John Williams, BP, Martin Storey, WellDataQA

SPWLA 2014_DD

Current Status of Well Logging Deliverables and a Vision Forward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Demystifying Log Quality Control

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Demystifying Log Quality Control

The System

1. **Distinguish** between : Acquisition LQC (Type 1)
   Acceptance LQC (Type 2)
   Pre-Exploitation LQC (Type 3)
2. Develop and keep evolving **checklists** for Types 1 and 2
   Use rules
   Focus on the easy stuff only
   Document findings & actions explicitly
3. Preserve **cumulative trace associated with data**, promote the capture of findings throughout life "cycle" of data
   "Crowd-sourced" LQC

And … remain alert during exploitation!

Q&D?

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