Risk Based Assessment of Flow Assurance Challenges

Damien Farrell, OAM
Senior Consultant, Systems Engineering
Frazer-Nash Consultancy
Objectives

Aims:
- To demonstrate how a structured approach can be applied to the risk assessment of Flow Assurance challenges to support investment decisions
- To demonstrate how this approach has been embodied in a software tool
- To introduce the key lessons learned and the next steps

Agenda:
1. Introduction
2. The Challenge
3. Our approach
4. Lessons learned
5. Status
6. Summary
1. Introduction - Purpose

- The Risk Based Flow Assurance Toolkit (RiBFAT) Research Programme will enable Participants to generate assessments of Flow Assurance risks to inform investment decisions.
1. Introduction - Organisation

Risk Based Flow Assurance Research Program

Participants

Researcher

Facilitator
1. Introduction - Participant Benefits

- Make informed investment decisions based on justified and auditable Flow Assurance information
- Make the best use of available data
- Develop future assessments using a standardised, repeatable process
- Increase confidence in assessments through comparison within the industry without comprising confidential data
- Prioritise research and development on the key cost drivers
- Influence the development of an industry agreed approach
2. The Challenge

- New fields - further from existing infrastructure and in deeper water
- Flow Assurance – more challenging
- Increased investment risk and/or cost
- A variety of technical solutions and mitigation strategies

**Flow Assurance is integral to the system design and therefore integral to the investment decision process**

- Support the investment decision making process by:
  - Identifying the most promising design concepts
  - Understanding the Flow Assurance risk profile over time
  - Understand the Flow Assurance risk and cost drivers
2. The Challenge – Hydrates Example

- To enable Participants to identify the lowest risked cost for each Flow Assurance challenge in a development.
3. Our Approach - Philosophy

- Need to focus on end objective – investment decision making
- Align to corporate investment decision making and risk assessment practices
- Make the best use available data, recognising:
  - Limitations and uncertainty
  - Variation over time
  - As data matures risk may decrease (or increase)
- Capture and present data uncertainty
- Where possible use agreed models to predict the risk:
  - Rules of thumb
  - Simple physical models
  - Historical analogues
- Match the model fidelity to the data accuracy

*Finally - As simple as possible, but no simpler* (Albert Einstein)
3. Our Approach - RiBFAT Methodology

Provide a structured process to:
- Capture required development data
- Specify concepts
- Calculate probabilities
- Generate risk scores and associated uncertainty
- Record assessment results
- Compare and analyse concepts
- Generate a standardised output
3. Our Approach – Data Capture

RiBFAT User enters field type, fluid description, system components and Flow Assurance management strategies into RiBFAT to create a variety of ‘Concepts’.
3. Our Approach – Probability Calculation

RiBFAT calculates the probabilities for individual Flow Assurance risks using a combination of User entered data; archive data; and heuristics.
3. Our Approach – Risk Profiles

RiBFAT calculates the single event risks and enables them to be summed to determine the risk profiles for each Flow Assurance challenge, component, year and concept level.
3. Our Approach – Archiving
4. Lessons Learned

- **Lesson #1**
  - Flow Assurance assessment is an important **part** of the investment decision process and therefore must align with other business processes.

- **Lesson #2**
  - Risks evolve during the project lifecycle as new/better information becomes available and hence the process needs to be adaptable.

- **Lesson #3**
  - Risk appetites vary between organisations and projects so any risk based approach needs to allow each organisation to identify its own ‘best’ solution/s at a their required point/s in time.
5. Project Status

- Phase 1 (complete Jun 14)
  - Initial structured approach
  - Concept Demonstrator software
- Phase 2 (mostly complete Dec 14)
  - Refined the structured approach
  - Updates software focused on Hydrates
  - Develop initial draft Guidelines for the structured risk based assessment approach
- RiBFAT Phase 3 (late 15)
  - Finalise the Guidelines
  - Incorporate additional Flow Assurance challenges into the software
  - Develop the central database of archived assessments
  - Include assessment data from Late (New) Participants.
6. Summary

Our presentation has:

- Demonstrated the development of a structured approach for the risk based assessment of Flow Assurance challenges to support investment decisions
- Explained how this approach has been embodied within a software tool
- Noted lessons learned thus far in the research program
- Outlined the current status and next steps for the research project
Questions