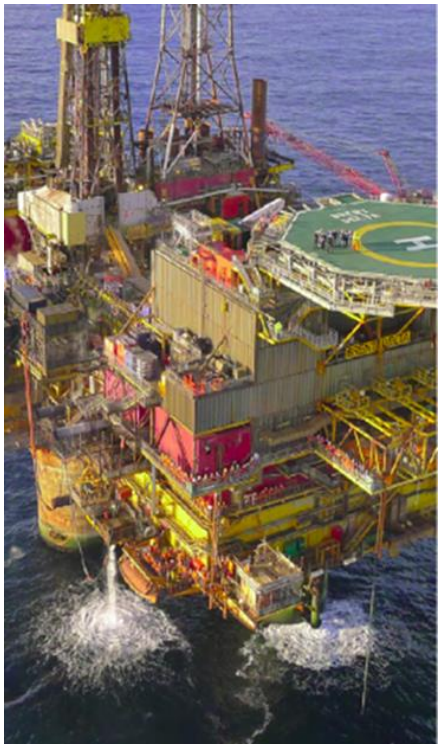
# Comparative Assessments in Oil & Gas Decommissioning



How Decision Analysis principles have been applied in new UK guidelines

Peter Miles

DASIG, 13th July 2016, Manchester



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# Catalyze

- **A specialist management consultancy helping our clients prioritise and make robust sustainable decisions**

- Our Mission
  - To help organisations create and execute decision-making processes which focus on the best possible outcome; engaging people, breaking down barriers, creating understanding of different perspectives and making best use of resources.

- Background
  - Founded in 2001 in association with the London School of Economics
  - Applying techniques originating at Harvard and MIT
  - LSE and now Catalyze leading practitioners

LSE Enterprise

- Operating globally
  - From bases in the UK, USA, New Zealand, Australia



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# Context & Process

- In Oct 2014 Oil & Gas UK (OGUK) contracted Genesis Oil & Gas Consultants along with Catalyze, to develop Guidelines for Comparative Assessments (CA) in decommissioning

- The process:
  - Review of publicly available CAs
  - Industry interviews
  - Circulation of a Technical Note with outline proposals
  - Workshop with OGUK members
  - Development of draft guidelines
  - Review by the relevant working group of OGUK
  - Draft document split into the Guidelines, published by OGUK
    - Guidelines (£40)
  - Worked example completed separately by Genesis and Catalyze, and published by Catalyze
    - Worked Example (£0)
  - Published Oct 2015



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# Review of publicly available CAs (Dec 14)

- Key findings
  - Significant variation in:
    - Information used (data and/or qualitative information)
    - Process
    - Criteria
    - Presentation
    - Transparency
    - Stakeholder engagement
  - Evaluation processes are generally not robust or best practice from a Decision Theory perspective
    - So results presented may be misleading

Against the background of:

- 5 of the 6 derogation case DP's submitted to date had been approved (status of the 6th was unknown)
- Pipelines CAs submitted to date (40) generally align with DECC expectations and have been approved

# 2 Camps

- There were two distinct camps within the operator groups
  - Those who prefer to take a high level and qualitative approach to CA and to adopt a simple system of differentiating performance of options (Red/Amber/Green)
  - Those who see the need for a quantitative approach where possible and when appropriate, supported by a structured form of assessment and scoring system to support decision making
- Both groups views have been accommodated during the development of the guidelines

# The three evaluation methods

A. A simple qualitative assessment
   - Using red-amber-green coding and narrative to describe the difference in performance between the options

B. A mix of qualitative and quantitative assessment
   - Deriving scoring scales to describe the difference in performance between the options against each sub-criterion
   - Enhancing the final narrative with visualisations

C. A mix of qualitative and quantitative assessment
   - Using MCDA techniques to derive and apply scores and weights
   - Resulting in an overall order of preference
   - Supported by narrative and visualisations to describe the difference in performance between the options.

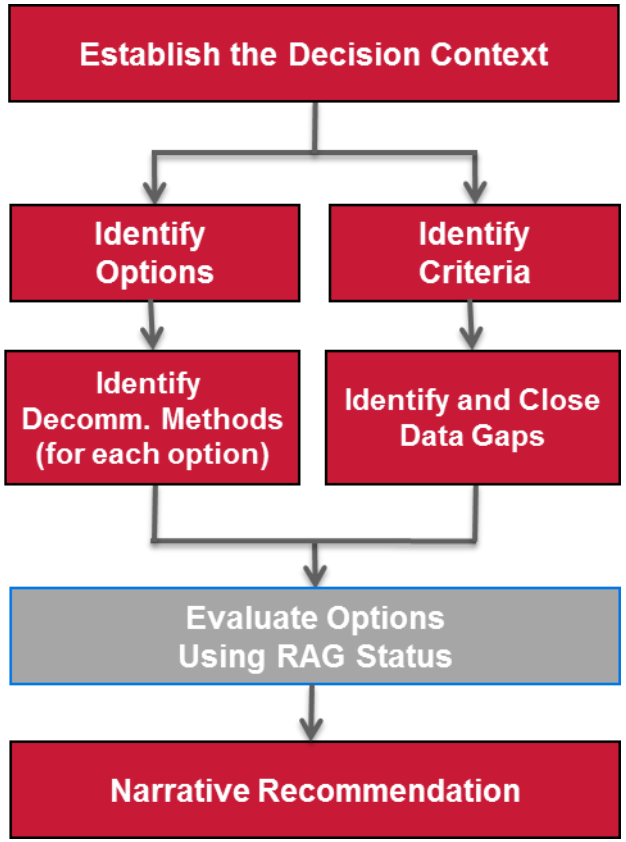
# The 3 Methods

| Evaluation Method | Description | Pros | Cons |
|---|---|---|---|
| **A: Narrative / Red-Amber- Green** | A mainly qualitative assessment, utilising relatively broad brush comparisons across each decommissioning option and concentrating on key and significant differentiators.<br>Assessment carried out generally in terms of comparison activity type, vessel types and numbers, vessel duration on station, weight of recovered materials across the options.<br>Results are described in terms of Red (least preferred) Amber (moderate) and Green (most preferred).<br>Likely to be suitable for most pipelines CAs and initial assessment of simple installations derogation cases.<br>May be sufficient if there is a previous project which sets a precedent. | Least amount of effort and preparation of all evaluation options.<br>Scales and thresholds are described by narrative only and can be understood by non-engineering stakeholders.<br>May be fit for purpose for simple CA where differentiators between options are clear and trade-offs can be articulated by narrative. | May be regarded as too subjective by some stakeholders as all assessments across criteria are based on high level and qualitative assessment.<br>Difficult to compare across different sub-criteria as scales and thresholds adopted will not be directly comparable across different criteria. Does not suit the application of weighting across criteria.<br>Evaluation results (RAG) will need to be justified and explained by narrative. |
| **B: Narrative + Scoring** | A combination of qualitative and quantitative raw data* is used.<br>Still relatively broad brush where a qualitative assessment is concerned.<br>A scoring mechanism or scale is developed to enable the differentiators between the options across the criteria to be rationalised and compared.<br>Scores/ numbers are applied instead of the RAG approach of Method A<br>RAG colour coding may be retrospectively applied to emphasise results tables. | Appropriate supporting evidence can be referenced from existing studies and DPs.<br>Offers a means of rationalising scores across criteria.<br>Scores / Number ranges may provide better incremental definition of differences between the options than RAG.<br>May be used as an incremental and pre-assessment stage before moving to complete the CA using evaluation method C | Adopts a combination of quantitative and qualitative metrics when completing the assessment and may require more supporting studies to be carried out to define metrics.<br>The use of scores/ numbers can imply a false sense of accuracy, for what still remains a subjective assessment.<br>Scoring basis will still require to be justified and explained by narrative as in evaluation method A |
| **C: Narrative + Scoring + Weighting** | Combining qualitative criteria (judgement) and quantitative criteria (data).<br>Scoring as in method B, using scoring guide tables.<br>Introduces a relative weighting of all the criteria, to allow for an overall score to be derived for each option and additional analysis to support the final narrative. | Derivation of a numerical overall weighted score for each option.<br>Explicit trade-offs across all criteria.<br>Ability to perform scenario analysis and sensitivity analysis.<br>Provides transparency, with a clear audit trail. | Additional effort required to produce MCDA model, and to perform weighting.<br>Judgements explicit and hence open to potential challenge.<br>Can portray a false sense of accuracy as still dependent on accuracy of raw data used to inform the process.<br>Weighting basis and scores will still require to be justified and explained by narrative as in evaluation method B |

# Good Practice in Reporting - Principles

- Charts or graphs adopted should be appropriate for the audience
- Any chart or graph axes should be clearly defined
- Any chart or graph axis can be assumed to be linear (unless clearly indicated otherwise)
- The number of charts or graphs and the amount of analysis presented should be appropriate for the audience
- If similar information is repeated throughout a report, a consistent delivery method should be used
- Where RAG (Red Amber Green, or 'traffic light') statuses are used, thresholds should be consistently applied and defined in the supporting narrative
- Each visualisation should have a purpose

# Method A - Narrative/ Red-Amber-Green (RAG)




| Main Criteria | Project Phase | Disposal (including transit) | | | |
|---|---|---|---|---|---|
| SAFETY | Option Description | REMOVAL IN MULTIPLE SECTIONS - Heavy Lift Vessel/Cut and Lift | | SINGLE LIFT - Single Lift Vessel | |
| | Sub-Criteria | Complete Jacket Removal | Partial Jacket Removal (Derogation) | Complete Jacket Removal | Partial Jacket Removal (Derogation) |
| | Project risk to personnel - offshore | Normal occupational risks associated with sea-fastening of structures before transit. More activity than for partial removal but not significant. | Normal occupational risks associated with sea-fastening of structures before transit. | Normal occupational risks associated with sea-fastening of structures before transit. More activity than for partial removal but not significant. | Normal occupational risks associated with sea-fastening of structures before transit. |
| | Project risk to other users of the sea | Most vessel trips required to transport sections to shore of all the options however risk increase is minimal. Project vessel transit activity will me managed to minimise interaction with other users of the sea. | More vessel trips required to transport sections to shore of all the options however risk increase is minimal. Project vessel transit activity will me managed to minimise interaction with other users of the sea. | Minimal vessel transits, albeit larger vessel, transit activity will me managed to minimise interaction with other users of the sea. | Minimal vessel transits, albeit larger vessel, transit activity will me managed to minimise interaction with other users of the sea. |
| | Project risk to personnel - onshore | Normal occupational risks associated with breaking down and disposing of the jacket steel sections. | Normal occupational risks associated with breaking down and disposing of the jacket steel sections. | Significant amounts of scaffolding or working at height for access to dismantle the jacket required; bottles will be >40m high. Controlled collapse may be considered. | Significant amounts of scaffolding may be required or working at height for access to dismantle the jacket, sections of the jacket may be 20m high. |



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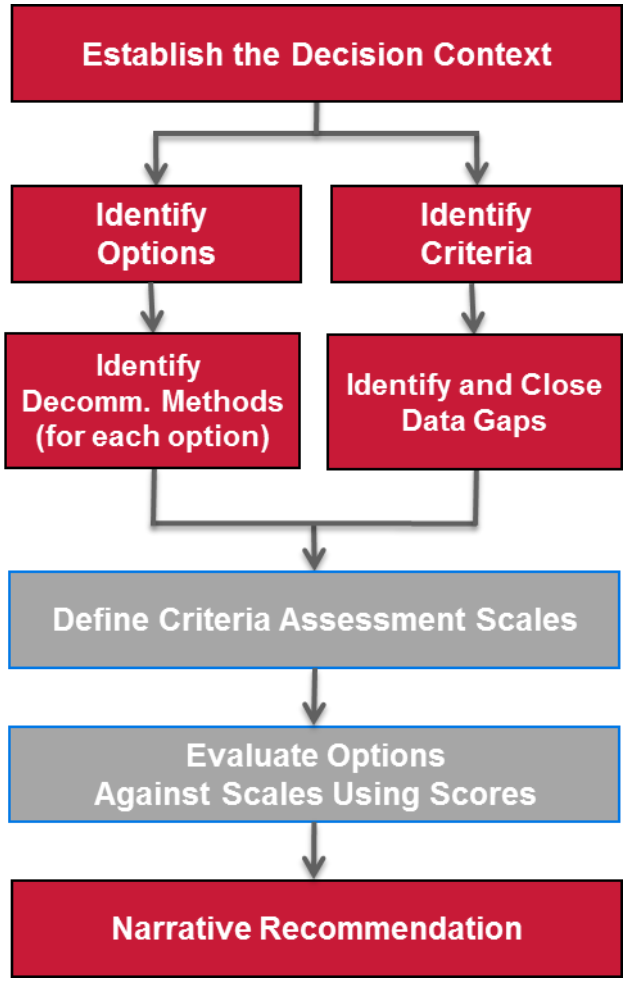
# Method B - Narrative + Scoring




| Assessment Criteria | | | Decommissioning Option 1 | | | | Decommissioning Option 2 | | | | Information Source | Comments/Clarifications |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Main Criteria | Sub-criteria | Quantitative (Qn) or Qualitative (Ql) | Sub Option A | | Sub Option B | | Sub Option A | | Sub Option B | | | |
| | | | Data* | Score | Data* | Score | Data* | Score | Data* | Score | | *Quantitative: Scores derived from data. Data included for reference. Qualitative: Scores from guide tables. |
| Safety | *Context: Annual PLL – Normal Operation* | | *Normal operational PLL ranges likely to be 3.7E-02 to 9E-02* | | | | | | | | Operational Safety Case | If current annual risk figures under normal operations are greater than Project risk figures, then project risk is not an influencing factor in the evaluation. |
| | *Context: Annual IRPA – Normal Operation* | | *Normal operational IRPA ranges likely to be 2E-04 to 5E-04* | | | | | | | | | |
| | **Project risk to personnel - Offshore** | | | | | | | | | | | All factors calculated using accepted practices in Safety Quantified Risk Assessment (QRA). |
| | PLL | Qn | *2.24 E-01* | 22 | *9.81 E-02* | 66 | *2.86 E-01* | 0 | *1.41 E-03* | 100 | QRA Report | |
| | IRPA | Qn | *6.74 E-04* | 48 | *4.71 E-04* | 100 | *8.65 E-04* | 0 | *4.95 E-04* | 94 | | |
| | **Project risk to other users of the sea** | | | | | | | | | | | |
| | PLL | Qn | *6.24 E-04* | 85 | *3.55 E-04* | 100 | *2.14 E-03* | 0 | *8.54 E-04* | 72 | QRA Report | |
| | IRPA | Qn | *3.38 E-06* | 56 | *1.45 E-06* | 100 | *5.82 E-06* | 0 | *3.18 E-06* | 60 | | |
| | **Project risk to personnel - Onshore** | | | | | | | | | | | |
| | PLL | Qn | *3.14 E-03* | 0 | *1.35 E-03* | 100 | *3.14 E-03* | 0 | *1.35 E-03* | 100 | QRA Report | |
| | IRPA | Qn | *4.27 E-05* | 67 | *3.25 E-05* | 100 | *6.38 E-05* | 0 | *3.95 E-05* | 78 | | |
| | **Potential for a high consequence event** | Ql | 25 | | 75 | | 75 | | 100 | | | Scored using guide table. See text in report for rationale. |



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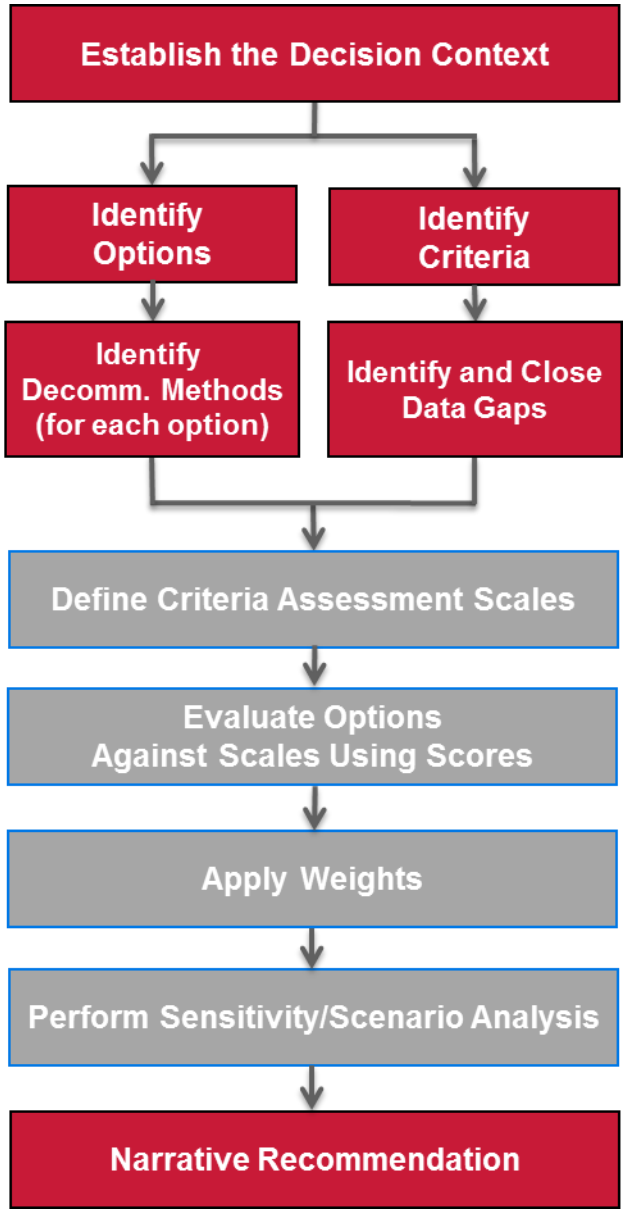
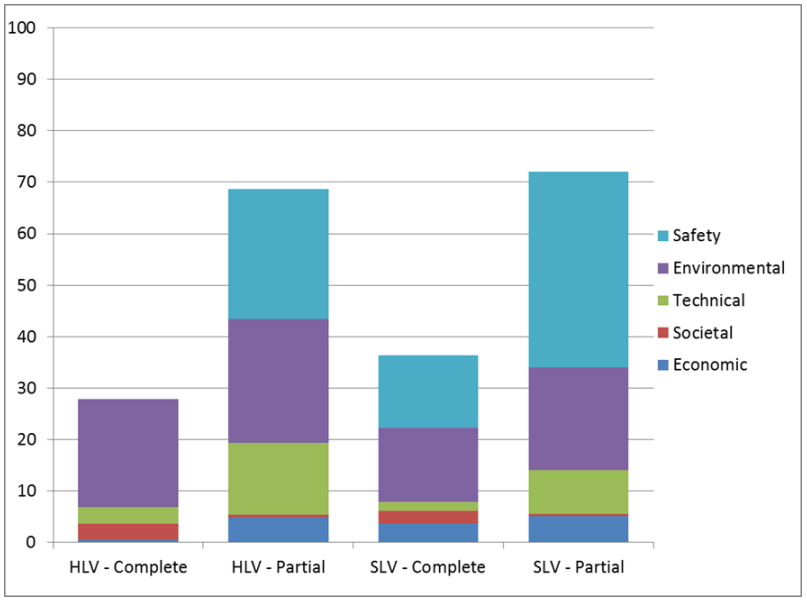
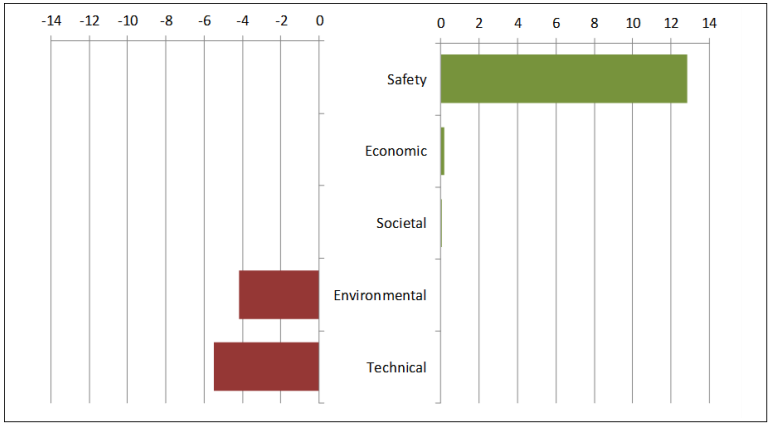
# Method C - Narrative + Scoring + Weighting



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