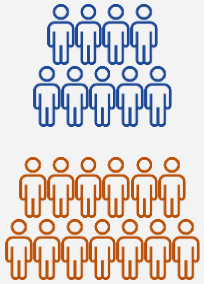
The Oil & Gas Technology Centre
Your Innovation Partner

Non Intrusive Inspection

Rebecca Allison
Asset Integrity Solution Centre

Oct 2018

Intrusive Inspection - Key Risks



Personnel

Between 2003 and 2011 there were 22 fatalities in UK resulting from confined space entries

Loss of Containment

Breaking of flanged joints increases potential for hydrocarbon loss of containment

Environmental

Emissions associated with flaring, cleaning, purging and fugitive emissions

Identified by industry through the Technology Leadership Board

Emerging & existing technology


Corrosion Mapping


Shear Wave


Phased Array


Acoustic Emission

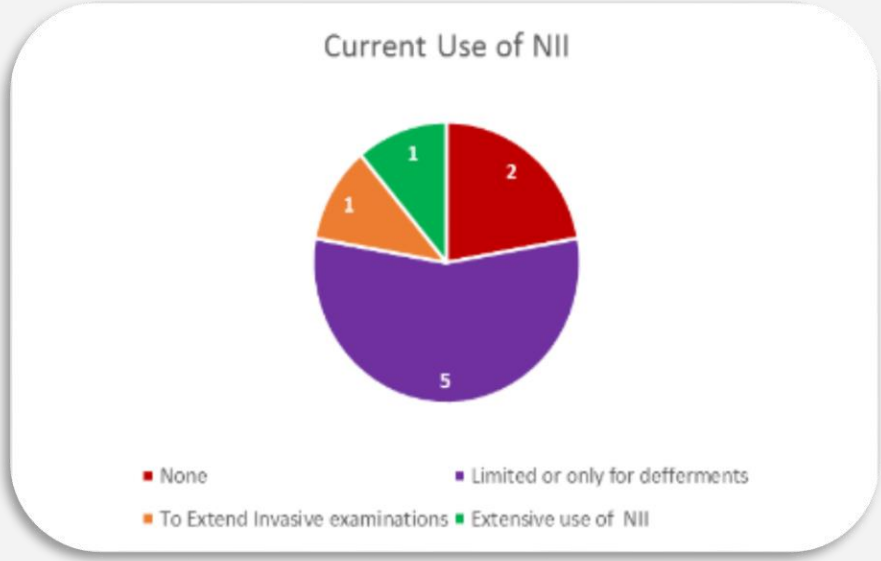

Radiography


Eddy Current


Laser Scanning


Metallography

NII Landscape Study – Phase I

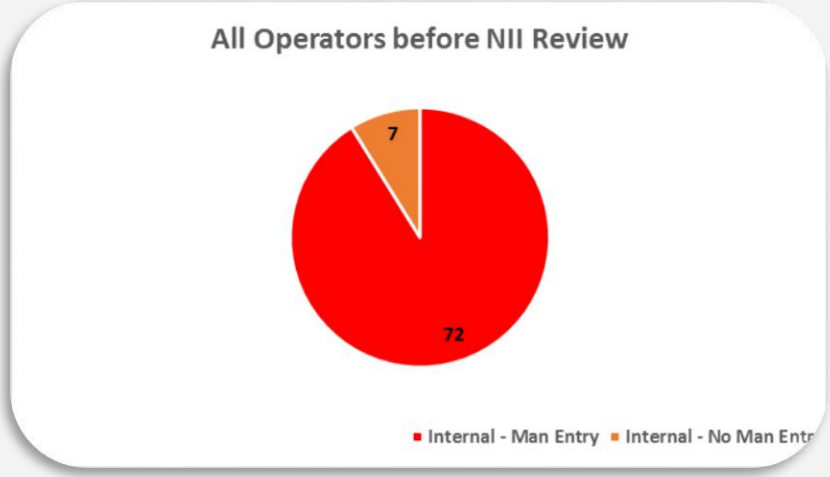


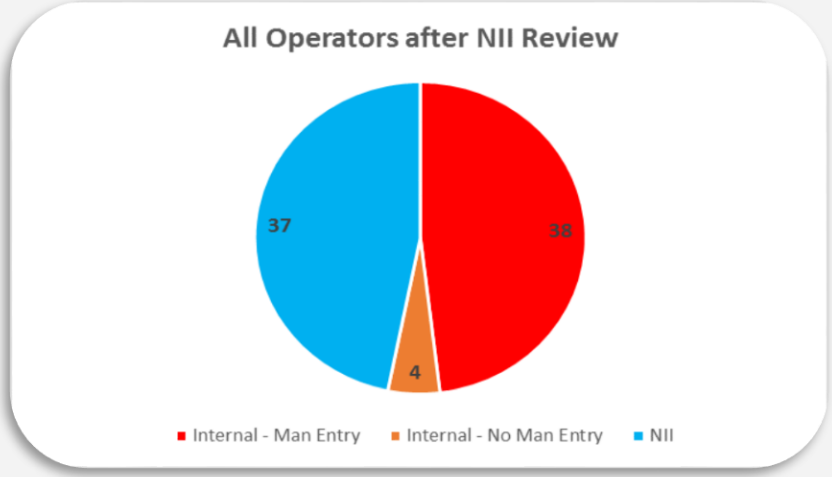
Key Findings

- The current use of NII within the UKCS is limited with some Operators currently making little or no use of NII.
- The survey identified that NII offers the following benefits to the UKCS:
  - Safety – up to 80% fewer confined space entries with a corresponding reduction in the number of line breaks and subsequent leak tests
  - Financial - increased production and lower maintenance costs worth circa £242 million pa to the UKCS

Only one of the eight companies was making any significant use of NII

NII Landscape Study – Phase II



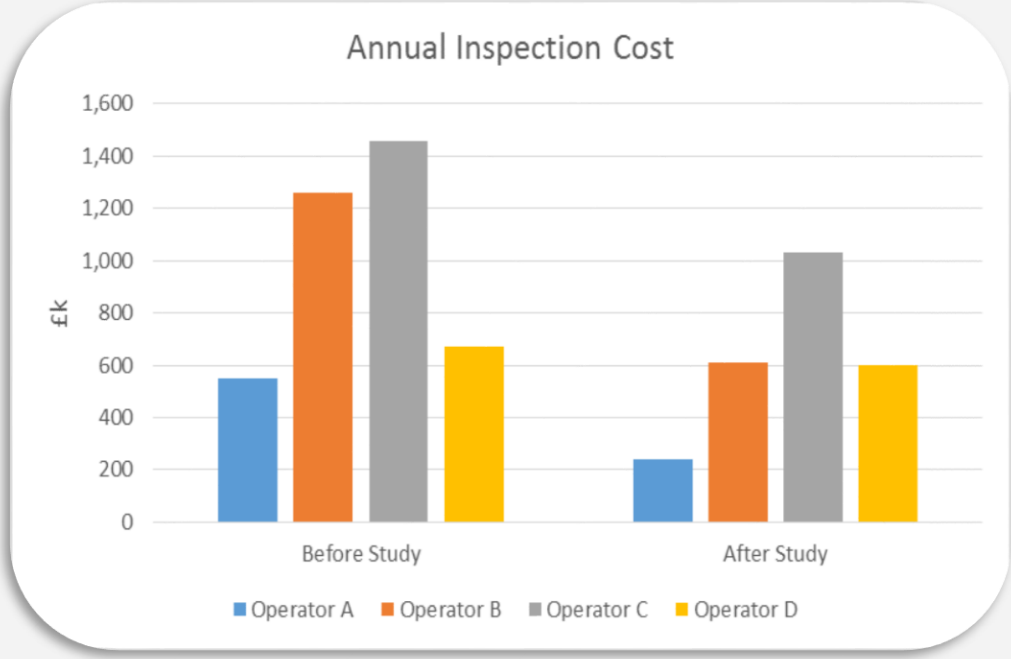


Results

- 47% of the vessels reviewed were found to be suitable for NII
- The results varied considerably from 70% of vessels for one Operator to only 20% of vessels for another

79 Vessels reviewed across 4 Operators

NII Landscape Study – Phase II



Does not include the value of reductions in lost & deferred production

37% reduction in inspection cost

Barriers to adoption

Conservatism/ Perception

Management Engagement

Inspection Cost

Regulatory Compliance

NII – Case Study

Project summary:
The results of three non-intrusive inspection (NII) trials on Elgin Franklin demonstrated that new technology can deliver significant cost, safety and efficiency benefits compared with traditional intrusive methods.

Eddyfi, MISTRAS and Sonomatic conducted trials of their inspection technologies while two vessels were online and operating, and the intrusive inspections were later completed as planned during the shutdown.

The NII scopes did not detect any significant defects that would pose a risk to the integrity of the pressure vessels, and the intrusive inspection confirmed the same.

50% cost saving achieved

TEPUK 2018

4 Non-Intrusive Inspections

Oil & Gas Authority

Potential Applications

- On-line vessel/tank inspection without entry - ultrasonic corrosion mapping, time of flight diffraction
- Heat-exchangers for shell and channel head
- Piping corrosion detection without insulation removal, enhanced/pulse-eddy current, microwave
- As combination of NDT techniques with other assessments to increase efficiency

Prospective Benefits

- 80% of vessels potentially suitable
- 50% inspection costs reduction
- Extension of inspection shutdown frequency from 3 years to 5 years
- >£10M/year OPEX reduction
- Applicable to all O&G process assets

Key findings

- Use of NII in UKCS is limited
- Barriers to adoption exists
- Further discussion with stakeholders needed to broaden understanding of non-suitable vessels
- Internal strategy to be adapted to capture new norms and standards

Recent Actions

Deployment across all assets with suitability assessment (140/560 vessels assessed):

- Stage 1: Initial technical assessment by the operator
- Stage 2: Detailed assessment by the contractor
- Stage 3: Work scope preparation by the contractor
- Stage 4: Execution of NII inspections on site

Benefits

- So far 40% vessels assessed suitable for NII
- Less scaffolding, insulation removal-replacement
- Better understanding of asset condition optimising inspection intervals and work planning
- Reduction in personnel exposure to risk through removal of confined space entry requirements

Success Stories:

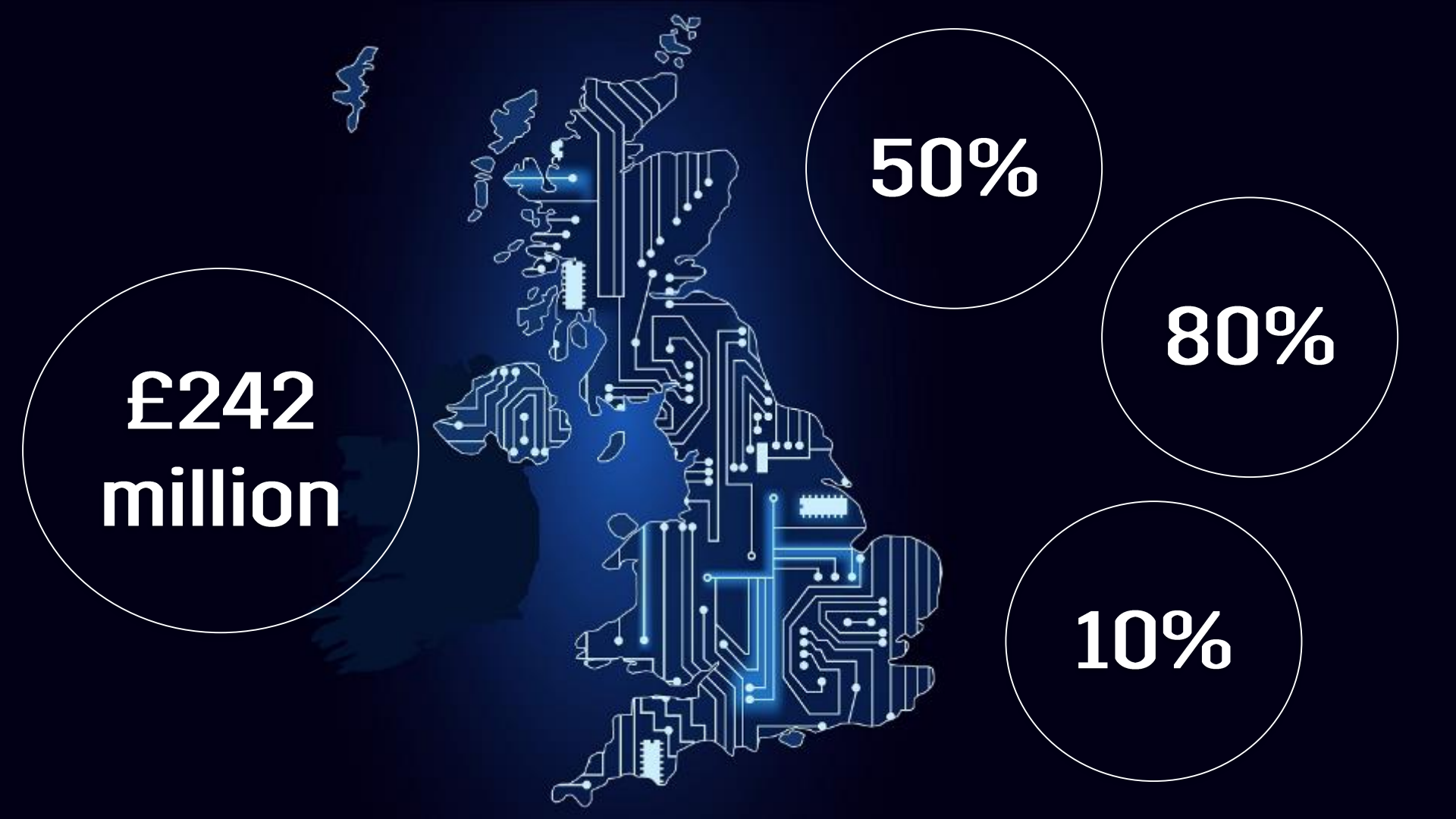
- Flare drums inspection removed from 2018 shutdown on Shetland Gas Plant with NII used instead
- 8 Vessels removed from Alwyn & Dunbar shutdowns by using NII instead of IVI leading to significant cost avoidance (£500k)

Learnings

- Not all vessels are appropriate for NII for various reasons (passive fire protection, high temperature)
- DNV GL RP G103 can be improved for NII assessment; identified whilst implementing NII on an industrial scale
- Continuous communication needed between government bodies, norms agencies and operators to frame industrial scale roll-out

Moving forward

- → NII incorporation into assets plans for 2019
- → Awaiting release of new FAME+ V5 and UNISOL standards to be integrated to inspection strategy
- → Return of experience publication with extensive documentation on lessons learnt
- → User group with stakeholders to discuss limitations and mitigations
- → Evaluation of outcomes after one year of pilot integration
- → Workshop with HSE, UNISOL, MISO and other stakeholders project to discuss NII integration in the industry (tbc)


50%
80%
£242 million
10%


Questions