Oil & Gas Authority

# Technology Delivery Programme


April 2017

# Contents



Cover page image: Subsea 7 i-Tech Services 200HP Work Class Remotely Operated Vehicle (ROV) able to perform maintenance, repair and light construction duties in deepwater from a support vessel

# 1. Foreword

The Oil and Gas Authority (OGA) was established to regulate, influence and promote the UK oil and gas industry, in conjunction with other regulatory authorities, and has a range of powers to deliver this remit.

The development of a series of strategies and associated delivery programmes represents a key step in setting out how the OGA, government and industry should work together to Maximise Economic Recovery (MER) from the United Kingdom Continental Shelf (UKCS) – a core recommendation of the Wood Maximising Recovery review.

The MER UK Strategy underpins the OGA remit and became a legal obligation on licensees in March 2016. It describes how MER should operate in practice, setting out a legally binding obligation on licensees and others to take the steps necessary to secure the maximum value of economically recoverable hydrocarbons.

The MER UK Strategy also sets out a range of supporting obligations and safeguards, as well as the actions and behaviours required to achieve collaboration and cost reduction.

The purpose of these strategies and delivery programmes, developed in collaboration with industry and the MER UK Task Forces, is to promote a new way of working across the oil and gas lifecycle. The strategies set the key direction and the delivery programmes provide further direction and detail on the implementation of each strategy.

# 2. Executive summary

The OGA Technology Strategy, which was published separately and precedes this document, was developed in order to:

- **Achieve MER UK objectives** by revitalising exploration, enabling the development of marginal discoveries and reducing costs of field developments, operations and decommissioning
- **Grow net exports of technology equipment and services** for the UK-based supply chain

The Strategy combines the efforts of the OGA, the Technology Leadership Board (TLB), the Oil and Gas Technology Centre (OGTC), the wider industry and research organisations to achieve a positive impact on industry performance though technology.

This Technology Delivery Programme builds on the Strategy and focuses on the near term (2017-2018), with many actions already in progress. As illustrated in Figure 1, the Delivery Programme defines in more detail how the three core areas of the Strategy will be jointly delivered.

**Figure 1: OGA Technology Strategy and Delivery Programme**

| | Technology Strategy | Delivery Programme (2017-2018) |
|---|---|---|
| **Set Priorities** | • The TLB, working with the OGA, identifies cross-industry technology priorities and plans<br>• Plans cover technology cycle from development through to deployment | • The TLB and OGA develop and maintain a coherent UKCS Technology Strategy and priorities<br>• The OGA actively supports the TLB and ensures effective links with other MER UK Task Forces, industry and delivery organisations |
| **Promote Innovation** | • The OGTC delivers priority technology solutions and creates UK centres of excellence for mature oil and gas basins<br>• The OGTC leverages UK-wide complementary skills and capabilities | • Working with the TLB, the OGA helps steer and support 'technology priority themes':<br>– Well cost reduction<br>– Digital technologies and data<br>– Small pools<br>– Decommissioning<br>– Asset integrity<br>• In addition, the OGA will also focus on other critical technologies for MER UK, e.g. in exploration and EOR |
| **Oversee Industry Efforts** | • The OGA influences and promotes technology by interaction with licence holders on Technology Plans, knowledge sharing, progress monitoring and benchmarking<br>• The OGA regulates the industry to ensure adequate technologies are employed to deliver the MER UK Strategy obligations | The OGA:<br>• Request UKCS licence operators to submit individual technology plans<br>• Proactively engages the industry on enhancing and accelerate delivery of the plans<br>• Monitors and reports progress towards MER UK through use of technologies |

# 3. Delivery Programme structure

The Technology Delivery Programme is structured in three parts, covering the three main elements of the Technology Strategy and outlines six actions.

These actions align with the objectives of the OGA Activity Plan 2017-2018 and are illustrated in Figure 2 below.

**Figure 2: Outline of the Technology Delivery Programme**

| | Strategy | Delivery Programme – Actions | |
|---|---|---|---|
| Element 1 | Set priorities | 1. Technology Strategy | Work with the TLB and industry to develop a UKCS Technology Strategy and Delivery Programme |
| | | 2. TLB and MER UK Forum | Reinforce TLB priorities and theme groups, developing links with other Task Forces under the MER UK Forum |
| Element 2 | Promote innovation | 3. Deliver on technology priorities | **3.1 Well cost reduction.** Reduce cost of drilling and construction by over 50% allowing additional UKCS reserves to be developed |
| | | | **3.2 Small pools.** Unlock development of marginal UKCS discoveries by reducing costs and technology leverage |
| | | | **3.3 Asset integrity.** Achieve efficiencies in integrity inspection and maintenance costs, achieving greater production uptime |
| | | | **3.4 Digital technology.** Deploy advanced methods to acquire, share, analyse and use data for diagnostics and decision-making |
| | | | **3.5 Decommissioning.** Drive efficiencies through technology in wells plugging and abandonment (P&A) and facilities decommissioning |
| Element 3 | Oversee industry efforts | 4. Industry engagement | Engage operators on their UKCS Technology Plans for the development and deployment of optimal technologies |
| | | 5. Technology deployment | Accelerate development, piloting and deployment of key technologies, including through collaboration and campaigns |
| | | 6. Monitoring and benchmarking | Monitor UKCS activities and investments in technology (development to deployment) and sharing of best practices; report progress and benefits |

**The following sections describe objectives and plans of each action in detail.**

# 4. Element 1: Set priorities

In order to ensure critical technologies are developed successfully, tested and deployed, it is essential for industry, government and research organisations to work together on agreed priority areas.

## 4.1 Technology Strategy

The objective is to ensure an overall UKCS Technology Strategy and Delivery Programme are in place to support the achievement of MER UK.

The OGA published the Technology Strategy in Q4 2016, validated by the TLB and a broader group of stakeholders from industry, government and research organisations.

## 4.2 TLB and MER UK Forum

The critical work of the TLB in steering existing and emerging technology priorities towards achieving the MER UK objectives should continue, alongside that of the other MER UK Task Forces.

The OGA continues to support the TLB, co-chairing it with industry, providing the board secretariat and funding selected studies and activities.

TLB member organisations should continue to participate proactively and work with the TLB, including leading or supporting specific workgroups and activities.

# 5. Element 2: Promote innovation

The OGA is continuing to promote critical technology priorities by working together with the OGTC and the broader industry. Technology priorities already identified through work with the TLB are:

1. **Well cost reduction** – Significantly reduce the cost of drilling and construction, allowing additional UKCS reserves to be developed
2. **Small pools/unsanctioned discoveries** – Enable development of marginal discoveries by reducing development and operating costs and increasing recovery through technology
3. **Asset integrity** – Achieve efficiencies in integrity inspection, maintenance costs, greater production uptime; improve the performance and extend the life of existing assets

In addition, the TLB is reviewing additional themes with a view to defining technology demand in these areas:

4. **Digital technology** – Deploy advanced methods to analyse and use data for diagnostics and decision-making in areas including: exploration; reliability and maintenance; asset integrity; and logistics
5. **Decommissioning** – Drive efficiencies through technology in well plugging and abandonment (P&A) and facilities removal

## 5.1 Deliver on technology priorities

### Objective

The objective is to ensure that critical technologies which support MER UK and service exports have robust development plans with:

- Clearly identified industry needs and benefits
- Robust cost estimates, particularly for testing and pilot phases, to secure sufficient funding
- Explicit milestones covering the full cycle of development, testing and commercial deployment
- Commitment by industry to deploy successful solutions

### Activities and Schedule

Deliver business cases and level 1 plans for the TLB priority themes (asset integrity, small pools and well cost reduction – Q4 2016)

Initial landscaping and technology screenings in two additional TLB/priority themes (digital technology and decommissioning – Q1/Q2 2017)

Hand over scope of work to the OGTC and other technology organisations – Q1-Q4 2017)

### Responsibilities

The OGA works with the TLB and its members to define robust business cases and plans for the property themes

The TLB and the OGA work together with research and technology organisations on early workscope and plans for digital and decommissioning

The OGTC and other technology organisations ramp up their resources to accelerate execution of projects aligned with the TLB priority plans

The industry, including operators, service sector and technology developers, fully support and collaborate in the testing and deployment of critical technologies

**The following sub-sections describe progress and summary plans of the TLB priority themes, with elements of the workscope handed over to the OGTC and other technology organisations.**

### 5.1.1 Well cost reduction

Drilling and construction of wells is a significant part of industry exploration and development costs. These costs have escalated significantly in the UKCS in recent years. Current high costs have contributed to a slowdown in drilling activity, impacting on exploration and development.[1]

Analysis by the TLB Wells Theme Group[2] and supporting organisations[3] has indicated that a greater than 50% reduction in well drilling and construction costs is achievable (see Figure 3) and could unlock the drilling of 30 to 60 additional wells each year, above current forecasts.

To identify ways to sustainably reduce the cost of UKCS wells, the TLB Wells Theme Group and its supporting organisations have:

- Engaged operators on sharing best practices and lessons learned
- Developed optimised design for typical Central North Sea (CNS) wells, with a 35% reduction in drilling time and costs versus industry norms
- Screened promising new technologies for further development

**Figure 3: Wells cost efficiencies**

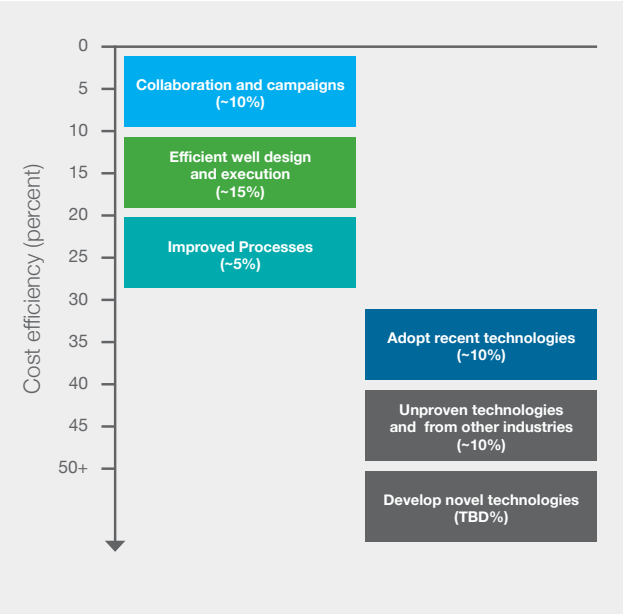



**Figure 4: Examples of recent technologies allowing efficient well design and execution**


Conductor Anchor Node (Neo-drill)

Casing While Drilling (Schlumberger)

[1] TLB Well Cost Reduction Group analysis
[2] Shell, Baker Hughes, Oil & Gas UK, ITF, and the OGA
[3] Oil & Gas UK Wells Forum, and the International Association of Drilling Contractors (IADC)

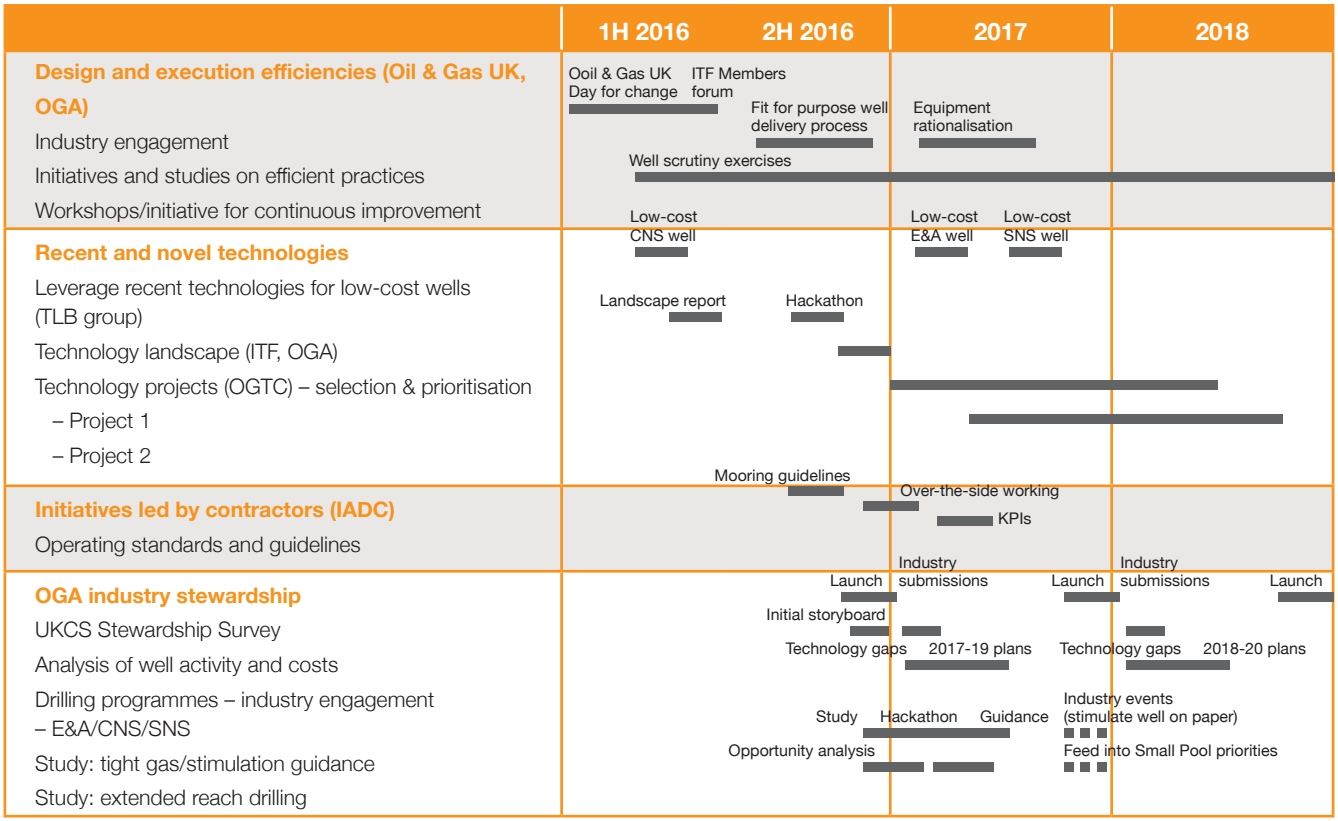
Future well cost reduction efforts should include:

- Continuing efforts to define efficient well design concepts, utilising best-in-class technologies and practices and actively promoting these with industry through, for example, the work of the Oil & Gas UK Wells Forum
- Developing and piloting yet immature and novel technologies, fast-tracked and supported through, for example, the OGTC
- The OGA encouraging operators to adopt efficient well design concepts and technologies, exploiting cross-industry collaboration in drilling plans

Figure 5 provides an outline of the main activities to effectively progress the wells cost reduction agenda, with a (non-exclusive) list of the organisations to lead the key activities.

Technology organisations, including the OGTC, and the wider industry are expected to develop detailed plans, as the selection of specific technology projects and deployment opportunities is clarified over time. The OGA will play a key role in promoting a broad cross-industry focus on well cost reduction, ensuring operators' commitment to the deployment of technologies and best practices in current and future UKCS drilling programmes.

## Figure 5: Well cost reduction theme – summary plan



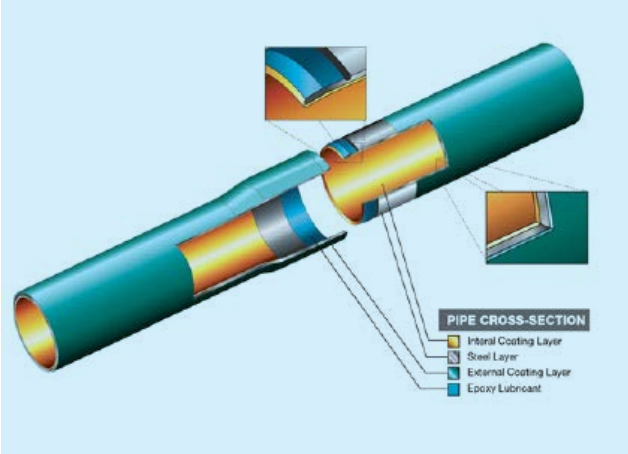
### 5.1.2 Small pools/unsanctioned discoveries

A significant MER UK opportunity is the development of oil and gas discoveries, many of which have been considered economically unattractive by the licence holders. Recent OGA analysis[4] has shown that there are over 350 unsanctioned oil and gas discoveries containing circa 3.4bn boe (P50 technically recoverable resources) and not currently being pursued by licensees. These discoveries are either:

- Close to existing platforms and subsea infrastructure and could be developed as tie-backs
- At greater distances from existing infrastructure and could therefore be better suited to stand-alone technologies
- Smaller fields which are in close proximity with each other, potentially allowing the formation of cluster developments

Industry 'hackathons'[5] conducted by the TLB Small Pool Theme Group[6] identified ways to reduce costs to develop and operate small pools. Existing and novel technologies have a significant role to play in achieving this, from contributing to a reduction in the cost of tie-backs (Figure 6), to innovative low-cost standalone concepts (Figure 7) and the use of low cost and existing platforms for Extended Reach Drilling (ERD) applications.

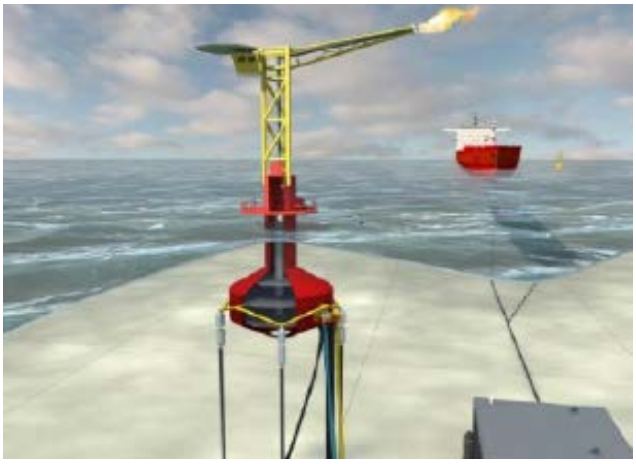
**Figure 6: Examples of technologies which could reduce the costs of tie-back developments**



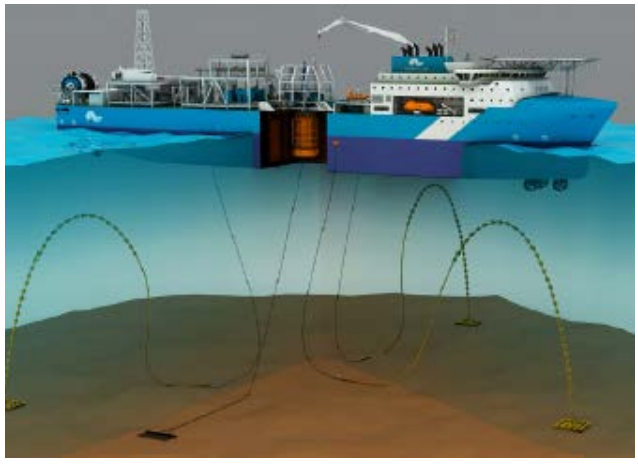

Zap-Lok pipeline system (Cortez-Subsea)

Spoolable pipeline products (Airborne Oil & Gas)

**Figure 7: Examples of novel technologies for standalone development of marginal accumulations**



Unmanned production buoy (ABT Oil and Gas)



Versatile production unit (Amplus Energy)

[4] https://www.ogauthority.co.uk/media/2792/420297-oga-small-pools.pdf
[5] http://www.nsri.co.uk/uploads/NSRI-Hackathon-Output-Report.pdf
[6] Centrica, Enquest, NSRI, O&G UK, ITF and the OGA

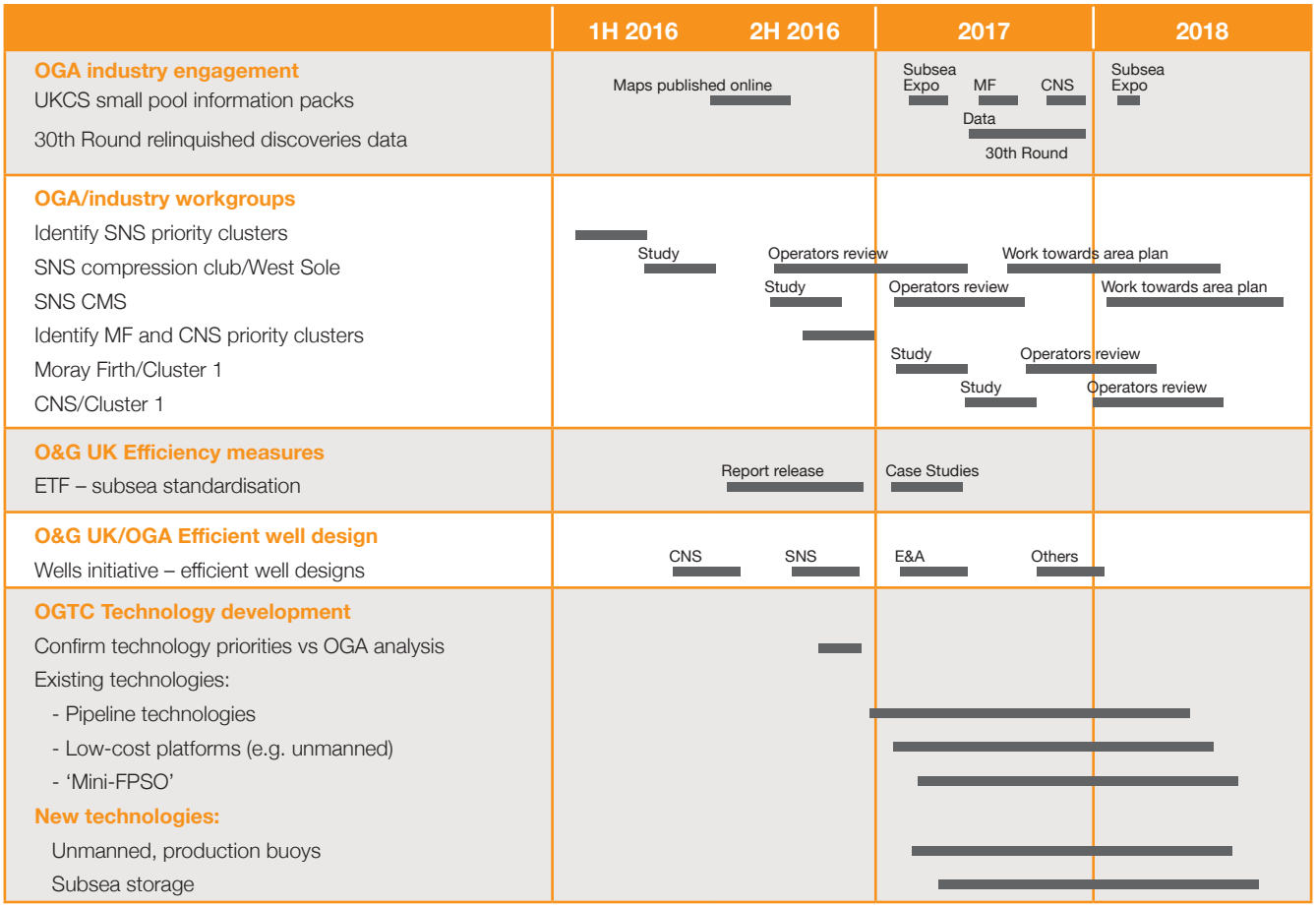
Cost reduction can also be realised through efficiency measures, using fit-for-purpose designs and equipment standardisation. This work is being conducted by member companies of the MER UK Efficiency Task Force (ETF).

The OGA is finalising area studies to review accumulation clusters showing the greatest economic potential. In many cases, these clusters also include relinquished discoveries, which could be re-licensed and may also be close to exploration prospects. The OGA is continuing to engage licence holders to promote interest in these areas and the potential of combined development programmes. More detailed information will be published in 2017.

A high level plan of ongoing small pool work is outlined in Figure 8. The plan balances different activities ranging from licence holder engagement on developments, to progressing technical work around equipment standardisation, technology qualification and concepts for efficient development methods.

The OGA seeks to play a key role in unlocking marginal discoveries and is committed to working together with industry, the TLB and the OGTC which has dedicated one of their Solution Centres to unlock the small pools potential.

**Figure 8: Small pools/unsanctioned discoveries theme**



### 5.1.3 Asset integrity

Asset integrity (AI) is critical to safety, improving production efficiency and to extending the life of infrastructure. The TLB has identified two AI areas to be considered; corrosion under insulation (CUI) and process vessel inspection (VI). These are significant contributors to production downtime. VI often requires personnel entry which poses a safety risk, while industry data show that CUI is the cause of 60% of pipe leaks. Technology can provide a major contribution to addressing these problems. For example, if alternative inspection methods can be developed to reduce the need to inert the system and even maintain production during inspection.

In conjunction with significant industry engagement, the TLB AI Theme Group[7] issued a landscaping report[8] to industry earlier this year. This presented a comprehensive review of over 100 technologies to address the challenges of VI and CUI. These spanned the full range of readiness levels and include those that are in use or under development from other industrial sectors.

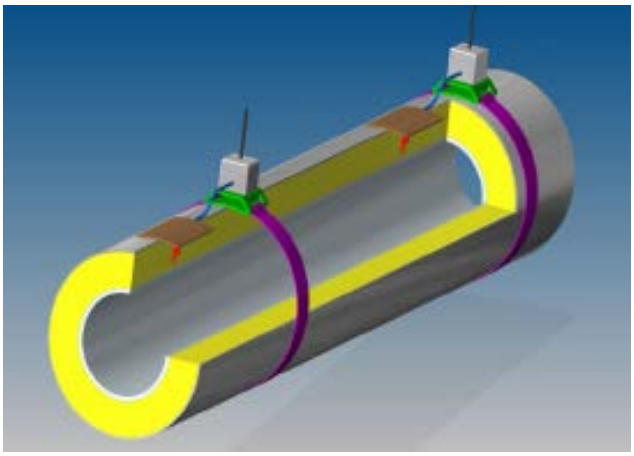
This ongoing work has identified circa 20 technologies which are the most promising for either early deployment or for longer term development. A sample of these technologies is shown in Figures 9 and 10.

**Figure 9: Sample of VI technologies**


Phased-array ultrasonic testing (TWI Ltd)

Vessel inspection robotics (Ross Robotics Ltd)

**Figure 10: Sample of CUI technologies**



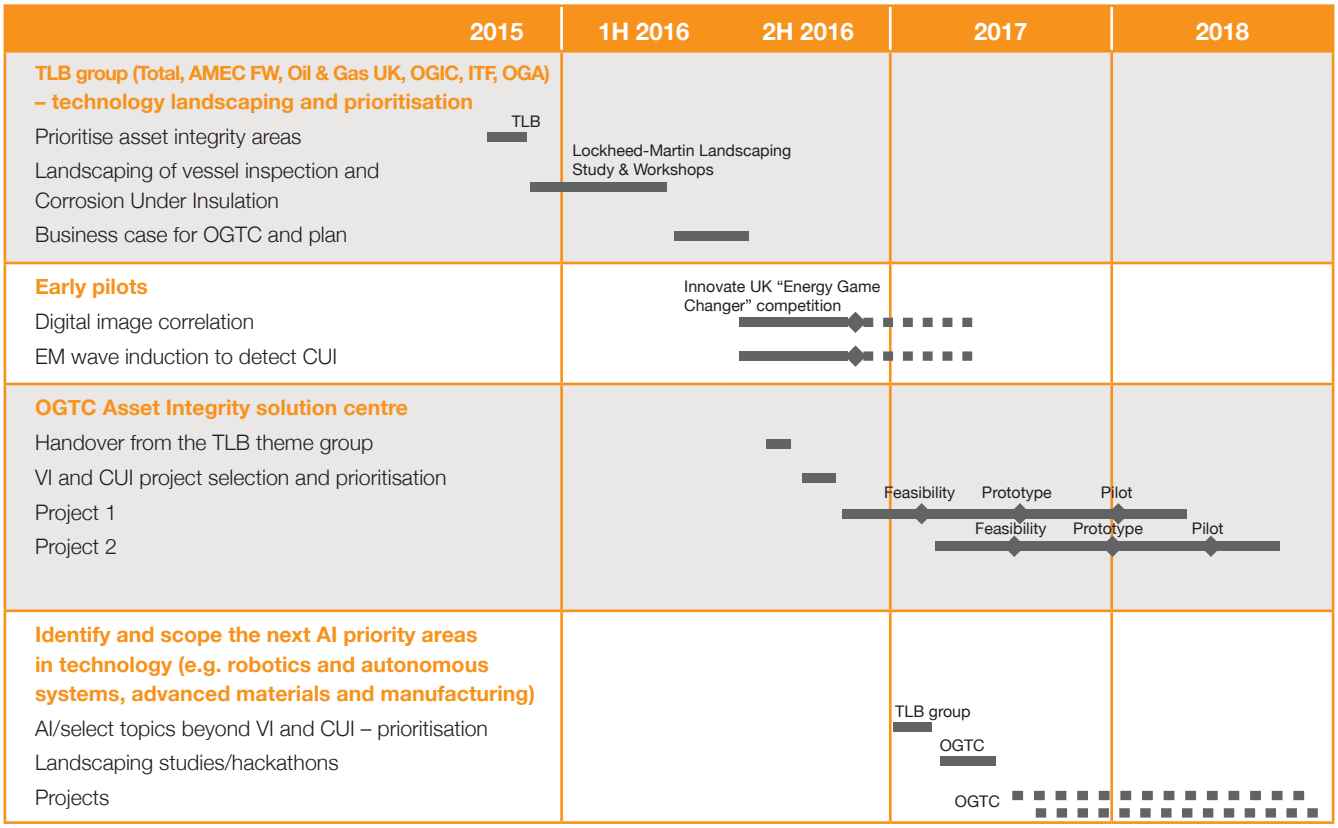
Autonomous in-situ moisture monitoring (3-Sci Ltd)

Inspection by guided wave (Guided Ultrasonics Ltd)

[7] Total, AMEC FW, Oil & Gas UK, OGIC, ITF and the OGA
[8] http://oilandgasuk.co.uk/wp-content/uploads/2016/05/Asset-Integrity.pdf

The plan summarised in Figure 11, covers both activities to date and the handover plan to the OGTC, which will have a key role in successfully developing these technologies through to implementation. The plan includes the extension, over time, of the technology theme to other significant areas in asset integrity and maintenance, beyond VI and CUI.

## Figure 11: Asset integrity theme – summary plan



### 5.1.4 Other technology areas

Additional current or upcoming technology areas include:

**Decommissioning and wells P&A** – Development and deployment of new technology will support the MER UK target of delivering at least a 35% reduction in UKCS decommissioning costs and provide opportunities for the service sector to grow skills and capabilities in this area. The potential from the use of fit-for-purpose technologies and future disruptive innovation is recognised in the OGA Decommissioning Strategy[9]. There is significant scope for technology to help in several areas, from wells P&A, to the inspection, conditioning and removal of facilities and subsequent site monitoring. Work by the MER UK Decommissioning Task Force, the TLB and OGTC will define opportunities, priority initiatives and action plans in 1H 2017.

**Digital technologies and data** – Digital technologies can accelerate progress in areas such as exploration and asset integrity. Joint work with the TLB, the OGTC and other stakeholders is defining industry benefits and potential scope of work, including pilots, in selected areas. Areas include, in a first phase, seismic data analytics and marine logistics optimisation, followed by equipment reliability, robotics and autonomous vehicles. In parallel, the OGA Information Management Strategy[10] is aimed at unlocking access and value from critical data.

**Carbon Capture and Storage (CCS) and offshore renewable energy** – Advances in the areas outlined above may have a significant positive impact on other applications which are also dependent on offshore infrastructure, such as CCS and offshore renewables. For example, technologies to improve reservoir monitoring, reduce well costs and enhance integrity and maintenance of facilities may improve the economics of potential CCS projects. In addition, there is growing interest in potential collaboration between offshore wind power and new oil and gas developments, in terms of potential infrastructure sharing as well as technology transfer between the two sectors.

**Enhanced Oil Recovery (EOR)** – Successful EOR techniques can play a significant role in developing marginal fields and/or extending the life of large legacy fields. The OGA has published an EOR strategy[11] which aims to facilitate the sanctioning, by 2021, of projects designed to deliver up to 250 million barrels of oil equivalent (boe) in reserves. This will involve implementing polymer, low salinity water flood and other EOR techniques. In addition, there could be collaboration between carbon capture and EOR development using carbon dioxide to enhance hydrocarbon recovery.

[9] OGA Decommissioning Strategy https://www.ogauthority.co.uk/media/1020/oga_decomm_strategy.pdf
[10] OGA Information Management Strategy https://www.ogauthority.co.uk/media/2832/infor_management_strategy_master.pdf
[11] OGA EOR strategy https://www.ogauthority.co.uk/media/1143/eor_strategy_final-2016.pdf

# 6. Element 3: Oversee industry efforts

The MER UK Strategy contains obligations in relation to the deployment, to optimum effect, of technologies; including new and emerging technologies. It also introduces the requirement for licence holders to collaborate in any obligation arising for or under the Strategy.

One component of the OGA's Asset Stewardship Strategy is a set of 10 expectations for operators and licensees. These Stewardship Expectations span the oil and gas lifecycle and some relate to technology and innovation including, specifically, the submission by operators of Technology Plans:

- Individual operators are requested to submit Technology Plans, covering the use of new and existing technologies in line with MER UK
- The OGA helps operators to identify best practices and existing technologies which would benefit operators' assets and licenses
- The OGA works with operators to enhance and accelerate their Technology Plans through, for example, industry collaboration in the development of new technologies

## 6.1 Industry engagement

### Objective

The objective is to engage operators on their UKCS Technology Plans for deployment of technologies to support MER UK goals

**Stewardship expectation SE08[12] – Operators' Technology Plans[13]**
The Technology Plan submitted by every licence operator shall present the operator's technology strategy for the UK, demonstrating the company's plan to deploy optimal (both existing and novel) technologies at their operated assets, in support of MER UK objectives. In addition, where applicable, companies should explain the role of their technology investments in developing and retaining advanced technical capabilities in the UK. Operators' Technology Plans should outline the key technology needs at the various operated assets, with a summary of the expected benefits which would be derived from technology deployments. Operators should then describe plans to deploy available techniques and technologies (including industry best practices) and/or develop novel technical solutions. Plans should be accompanied by defined timelines and budgets and an indication whether funding has been committed or not by companies at that stage

### Activities and Schedule

Publication of Technology Stewardship Expectations – Q4 2016

Submission of operators' Technology Plans – Q1 2017 and annually thereafter

Review of Technology Plans – Q2 2017 and annually thereafter

### Responsibilities

The OGA is responsible for publishing the Stewardship Expectations

Operators are responsible for submitting their Technology Plans to the OGA

Operators and the OGA work together to accelerate development and deployment of critical technologies for MER UK, also through collaboration among industry participants

[12] https://www.ogauthority.co.uk/media/2849/asset_stewardship_expectations.pdf
[13] https://www.ogauthority.co.uk/media/3198/technology-plan-implementation-guide.pdf

## 6.2 Technology deployment

### Objective

The objective is to accelerate development, piloting and deployment of critical technologies for MER UK, including through industry collaboration and campaigns

The OGA is working with the TLB and the industry to help address potential technology gaps and to encourage the enhancement and acceleration of individual operators' Technology Plans. In particular, the OGA highlights opportunities to employ practices and lessons learned across the industry, shares resources for technology development, piloting and qualification

Working with the OGTC and other technology organisations, the OGA supports the supply chain in bringing critical technologies to the market and maximise technology-based export opportunities

### Activities and Schedule

Follow-up discussions with operators on individual Technology Plans – Q3/Q4 2017

Identify and address barriers to innovation and technology deployment – Q3/Q4 2017

Promote development and deployment of critical technologies through collaborations and campaigns – ongoing

### Responsibilities

The OGA and operators work together to enhance and accelerate individual Technology Plans

The OGA to works with the TLB to address innovation barriers at an industry level

The OGA works with the OGTC and other technology organisations to ensure funding of critical technology programmes and industry uptake

## 6.3 Monitoring and benchmarking

### Objective

The objective is to monitor investments and programmes in technology, from development to deployment; to understand and communicate industry progress with a view to increase the pace of adoption of critical technologies and unlock MER UK

**Key metrics**
To monitor technology R&D and adoption, the OGA uses metrics covering the full technology cycle:

1. Level of investment in technology R&D by companies
2. Relative focus on priority technologies for MER UK
3. Progress of technology programmes through different stages
4. Speed and success of technology piloting and qualification
5. Commercialisation and deployment to scale (including export)
6. MER UK benefits captured through technologies

### Activities and Schedule

Gather information relative to technology needs and activities through the OGA Stewardship Survey – Q1 2017

Create and maintain a landscape of technology at different stages of maturity – Q3 2017

Identify and communicate key technology gaps to support MER UK – Q3 2017

### Responsibilities

UKCS operators to submit information on technology investment and plans

The OGA works with the OGTC and other technology organisations, to create and maintain a live landscape of technology solutions, both existing and under development

The OGA works with the TLB to identify and communicate UKCS technology gaps and update future TLB priorities accordingly

Oil & Gas Authority



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