



# UKCS | Data & Digital

## Survey Response

Progressing the challenges of Digital Transformation within a UK Offshore Energy Industry

# Contents

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<b>Foreword</b>	<b>3</b>
<b>1. Executive Summary</b>	<b>5</b>
<b>2. Organisations</b>	<b>8</b>
2.1. Survey & engagements	8
<b>3. Background</b>	<b>9</b>
<b>4. Results</b>	<b>11</b>
<b>4.1 Data</b>	<b>12</b>
4.1.1 Key results	12
4.1.2 Discussion	12
4.1.3 Synopsis – Data is the foundation	13
<b>4.2 People</b>	<b>13</b>
4.2.1 Key results	13
4.2.2 Discussion	13
4.2.3 Synopsis – Capability is being left behind	14
<b>4.3 Innovation</b>	<b>15</b>
4.3.1 Key Results	15
4.3.2 Discussion	15
4.3.3 Synopsis – E2E Innovation is immature, with analogues missing	15
<b>4.4 Technology</b>	<b>16</b>
4.4.1 Key Results	16
4.4.2 Discussion	18
4.4.3 Synopsis – Visualisation dominates	18
<b>5. Recommendations</b>	<b>20</b>
<b>5.1 Offshore energy - Data Strategy</b>	<b>20</b>
<b>5.2 Sector coordination</b>	<b>20</b>
<b>5.3 Oil &amp; Gas – Accelerate digital fluency</b>	<b>20</b>
5.3.1 Data	20
5.3.2 People	20
5.3.3 Innovation	23
5.3.4 Technology – Digital	24
<b>6. Appendix I – Feedback</b>	<b>24</b>
<b>6.1 Data</b>	<b>24</b>
<b>6.2 People</b>	<b>25</b>
<b>6.3 Innovation</b>	<b>26</b>
<b>6.4 Technology</b>	<b>27</b>

# Foreword



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Data & Digital are the next step change in performance for our industry and one that we cannot ignore. When we think about Data & Digital we often think of specific data solutions and analytic tools; an app, a wearable device, a remote visual inspection of an offshore operation. Instead we should be thinking about the entire ecosystem that brings all of these solutions together in pursuit of the real goals: increased value, efficiency, reliability, and of course the reduced emissions and transformational technologies that will enable net zero.

In the Technology Leadership Board (TLB) we are focused on nurturing the ecosystem that will support these outcomes.

Last year, working with partner organisations (OGUK, Net Zero Technology Centre, and ONE) we launched the first [UKCS Data & Digital Survey Report](#). The survey helped us better understand the attitudes, strategies and progress of different companies across the industry with regards to their respective digital journeys:

- **Data** is the most important value driver for digital, a priority for many organisations. 61% of companies surveyed have a Data Management Strategy, with only 49% stating data is well owned. There is need for greater communication and drive in data quality awareness, with recognition that quality data is a business asset and needs to be managed as such.
- **People**. Only about half of the companies engaged have Digital Roles identified within their organisations. Without identified digital roles, it is difficult to quantify both corporate and individual development needs, and only 36% of companies are providing the required digital skills and capability programmes (the majority of those are the larger organisations).
- **Innovation**. Companies that pursue a successful innovation process have established well-defined pathways from idea generation, through development, to user delivery. Only 53% of companies surveyed have an innovation process at present, but many of these processes appear immature, underutilised or a bolt-on, rather than core, with little evidence of *digital disruption by innovation* across the sector.
- **Technology**. Without an adequate digital strategy, culture, and business model, companies cannot properly evaluate their technology stacks against transformation goals and business objectives. Digital technologies are frequently purchased with an “offshore” focus, lacking the integration necessary toward back office systems and digital strategy – hence not delivering the full potential.

We completed a second phase of the Survey in 2021, offering tailored feedback to companies that participated in the original survey through 1-on-1 engagements, and better understanding the sector pain points and innovation opportunities. With our partner organisations, we are happy to publish the final findings and recommendations within this report.

Many activities are already underway. For instance, the OGA's notable efforts on upgrading [the National Data Repository \(NDR\)](#) capabilities, building a state-of-the-art data solution for the industry, and many initiatives by individual companies, working with suppliers, to deploy extensive 'digital worker' capabilities offshore, better linked with onshore management systems.

But while the Digital journey is well under way, we have not yet fully embraced the transformation required. This would require more careful change management and real leadership at executive level. While leaders are not expected to be digital experts they need to communicate their digital vision, clearly articulate the value to their business and role model the expected behaviours.

Another key barrier the industry needs to overcome is more data sharing among companies who are competitors today, requiring leadership to be brave, taking the first steps and creating the environment where the understanding of the shared benefits catalyses action.

Robotics, Artificial Intelligence and Autonomous Systems are revolutionising offshore energy installation, inspection, repair maintenance and decommissioning. They have the potential to improve safety, reduce cost and carbon footprint, while increasing resilience. These technologies will need better data infrastructure and well-defined innovation processes at an industry level, to ensure timely and effective deployment.

Looking to the future and meeting the challenge of de-carbonising, while continuing to supply the UK energy needs, will require greater integration between offshore energy sectors (such as O&G, renewables, CCS and hydrogen). This will require further evolution of the data infrastructure, tools and technologies to allow planning and operational data to be accessed and shared.

A key recommendation from this work is to define a holistic [Offshore Energy Data & Digital Strategy](#) which brings together industry and government efforts, across the multiple energy sectors operating offshore, understanding the implications of the new data and digital capabilities available today and the energy transition journey to net zero.

Completing this Data & Digital journey will create significant economic opportunities, ensuring our industry continue to be a strategic source of energy to the UK and an attractive place to work, developing cross-sectoral skills to tackle the big challenge of net zero.

# 1. Executive Summary

Net Zero is presenting new challenges and opportunities to UK Oil and Gas. At the same time, Oil and Gas is being disrupted by digitalisation, as has already happened in other industrial sectors (e.g. Finance, Transport, and Automotive). Digital disruption is expected to prove just as impactful as Net Zero on how the industry conducts its operations.

To assess the state of digitalisation OGUK commissioned its **2020 UKCS Data and Digital Maturity Survey** report, jointly with the TLB, Net Zero Technology Centre, Opportunity North East, supported by Deloitte. This report was supplemented in early 2021 by **Tailored Results Reporting** and direct operator and supply chain company engagement, all framed through the four digital pillars of Data, People, Innovation and Technology.

This work highlights the need for the oil and gas industry to acquire more “digital fluency”, a step change in culture and behaviours comparable to changes in safety behaviours in the 90’s. Digital fluency is the strategy, language and practices necessary to exploit digital opportunities within a company’s behaviours, workplace processes and performance indicators, to maximise data derived decision-value.

With some exceptions, bottom-up initiatives, rather than top-down leadership have driven progress in the sector to date. Without strong top-down leadership and support, organisations risk being left behind by the digital disruption, and be out-competed by those more able to set organisational priorities for effective application of digital strategies and resources.

To address these issues this response makes the following principle recommendations:

## Recommendation 1: Coordination – Data, Digital & Technology

The sector has clearly demonstrated through the survey and subsequent engagements that value can be maximised through effective coordination at an industry level, consolidating and strengthening delivery to the benefit of all.

Although discrete activities remain the responsibility of individual organisations, coordination should be maintained through a Digital Network under the governance of the North Sea Transition Forum’s (NSTF) Technology Leadership Board (TLB). As a Top-Down Leadership initiative the Digital Network will provide a consolidated view of matters which may benefit from NSTF awareness and escalation.

As a minimum the Network should comprise:

TLB	Technology Leadership Board
OGA	Oil & Gas Authority
NZTC	The Net Zero Technology Centre
OGUK	Oil & Gas UK
ONE	Opportunity North East
ORE	Offshore Renewables Energy Catapult
SE	Scottish Enterprise



In an analogue to the OGA Technology Insights, the Digital Network, will seek to publish Digital Insights (on a two-yearly cycle), incorporating refreshed survey details, strategy highlights and insightful cases studies.

### **Recommendation 2: Data – Offshore Energy Data & Digital Strategy**

Noting that current industry activities are driven through bottom-up processes, an Offshore Energy Data Taskforce should be initiated, inspired by the similar **transformative taskforce** set up by the downstream energy sector, with an objective to deliver a coherent **Offshore Energy Data & Digital Strategy** co-developed by all offshore stakeholders, industries, governments and regulators, setting the foundation for the creation of a modern, digitalised, integrated offshore energy system.

The Taskforce team will work with stakeholders to develop proposals for how the Offshore Energy Sector can improve the collection, sharing and use of data. The proposals will be tested with the wider industry across multiple sectors in order to refine and build consensus for the strategy.

### **Recommendation 3: People – Bottom-Up Leadership, (Offshore Energy)**

OGUK Data & Digital forums offer the foundation for significant bottom-up leadership and needs identification. With the recent establishment of a new “Heads of Digital” forum, OGUK provides a means for stakeholders across the full gamut of data and digital to identify and prioritise matters for sector-wide collaboration and resolution.

OGUK’s forums in data and digital comprise:

- Heads of IT
- Heads of Digital
- Information Management Forum
- Supply Chain Cyber Security (SOCS) Forum
- Information & Sample Coordinators Special Interest Group

OGUK should continue to develop these forums, with provision of dedicated digital secretariat ensuring continuity and free-flow of messaging from bottom-up to leadership, and effective integration of activity with other digital stakeholders.

The Digital Energy Platform Advisory Committee, National Data Repository (NDR) User Group offers further foundations in bottom-up leadership. The NDR User Group has been established to better encourage the user community to:

- share user experiences of using the service;
- highlight areas that may require enhancement, and;
- propose future developments for the service.

The Offshore Renewables Energy (ORE) Catapult, acts in a similar capacity for Offshore Renewables forums, where cross working can be driven from, ensuring the business value of digitalisation remains paramount.

### **Recommendation 4: People – Bottom-Up Leadership, (Regional Digital Sector)**

The Digital Sector should be better represented, offering a “Digital Services & Skills voice” where knowledge and perspective can better influence the Offshore Energy Landscape. The Digital Business Growth Programme driven by ONE offers a natural incubation vehicle for such a voice.

Digital and Energy Sectors should work to endorse the anchoring of a Digital Academy in the local region to support the digital upskilling of domain experienced workers.

Skills development is to be promoted (companies and individuals) leveraged by the newly launched regional digital training portal led by ONE (<https://futureskillspartnership.com/>) which offers a single source platform to identify all digital course offerings along with preferred delivery models.

### Recommendation 5: People – Top-Down Leadership

A long term digital vision (a mission statement) is required to communicate and drive delivery pathways (Data, People, Innovation and Technology) incorporated within sector aspirations for [Driving Technology and Innovation](#) as part of industry's [Roadmap 2035](#).

This vision will naturally be informed by [North Sea Transition Deal](#) outcomes adaptable to future outputs from the [Offshore Energy Data & Digital Strategy](#) outlined above.

Outcomes of the [2021 Energy Tech Programme](#), run in partnership by ONE, Barclays Eagle Labs and CodeBase, should be shared with the NSTF by the industry cohort, elevating digital awareness and fluency.

**The EnergyTech programme, led by Barclays Eagle Labs in partnership with ONE and Codebase brings together major players in the industry with innovative start ups to address challenges faced and drive digital transformation and culture shifts in the sector.**

### Recommendation 6: Innovation – Top-Down Leadership

Innovation as a process is not well defined at sector level, leading to lack of access to, or inefficient exploitation of opportunities arising from cross-sector, regional, and national innovation programmes.

The TLB should work with stakeholders to better establish an innovation program, capable of championing multi-year, multi-£M investment and collaboration opportunities, which are consortia led, by a future offshore energy sector.

The OGA under its existing strategy, shall use its unique access to data, together with its digital platform, to promote the use of data and digitalisation. This will help enable industry, academia and the supply chain to develop new products, services and business models based on maximising the use of shared data.

It is vitally important that the OGA continues to use its unique position of influence and access to industry to promote the optimum use of data and digitalisation to deliver innovative and disruptive business models, new data platforms and insight and intelligence. The OGA will continue to develop digital initiatives with ONE, the TLB, NZTC and other organisations to promote the effective use of digitalisation.

### Recommendation 7: Technology – Categorise, Integrate and Deliver

To better track and communicate industry's progress in digitalisation, digital technologies themselves must be classified in a manner recognised at sector level. OGA's Asset Stewardship Expectation 8 – Technology, might be expanded to encapsulate:

- a. Digital Technology Classifications
- b. The use of Digital Technology Classifications, within OGA Technology Plan Submissions
- c. How Digital Technology submissions are mapped to supporting Digital Strategies

The NZTC “Offshore Energy 4.0” theme and [Driving Technology and Innovation](#) section of [Roadmap 2035](#), will harmonise enabling prioritised programmes to be communicated and supported across all Offshore Energy Sectors.

Technology must seek to avoid being a “solution in isolation”. Formal and informal conversations are necessary across multiple stakeholders during the early innovation process (idea & concept) to validate and prioritise specific detail around digital programmes, mediated through NSTF Taskforces and OGUK forums.

# 2. Organisations

## 2.1 Survey & Engagements

The UKCS Data and Digital Maturity Survey and subsequent engagements were developed in collaboration between five organisations, supported by Deloitte with the aim of understanding attitudes, strategies, need and progress toward digital across the four digital pillars of data, people, innovation, and technology.

This response presents insight generated from the 70+ organisations that participated in the 2020/21 survey and subsequent one to one engagements which followed across operator and supply chain companies.



OGUK is the leading representative body for the UK offshore oil and gas industry. We are proud to inform, engage and champion the UK offshore oil and gas industry as part of a diverse energy mix.



The Technology Leadership Board (TLB) works with the industry, government and other stakeholders to define priorities to adopt and develop oil and gas technologies, securing investments, and strengthen UK oil and gas industry competitiveness



Opportunity North East (ONE) is a catalyst driving transformational change in north east Scotland's economy. They develop and deliver projects to accelerate regional economic growth and diversification.



The Net Zero Technology Centre's goal is to unlock the full potential of the UK North Sea, anchor the supply chain in North East Scotland and inspire a culture of innovation and transformation.



**Oil & Gas Authority**

The Oil & Gas Authority (OGA) works with industry and government on the economic recovery of UK oil and gas and support the UK government in its drive to reach net zero greenhouse gas emissions by 2050.







# 3. Background

In 2020, OGUK, NZTC, TLB and ONE with Deloitte delivered the first ever UKCS **Data and Digital Maturity Survey**, giving an insight into the state of UK oil and gas digital maturity (Phase 1).

Key findings identified the oil and gas sector to be relatively immature in its digital transformation journey, based on organisation programmes and process positioning, mapped to Deloitte’s Digital Operations Transformation (DOT) model.

Recommendations were set out against the backdrop of cultural behaviour changes and grouped toward:

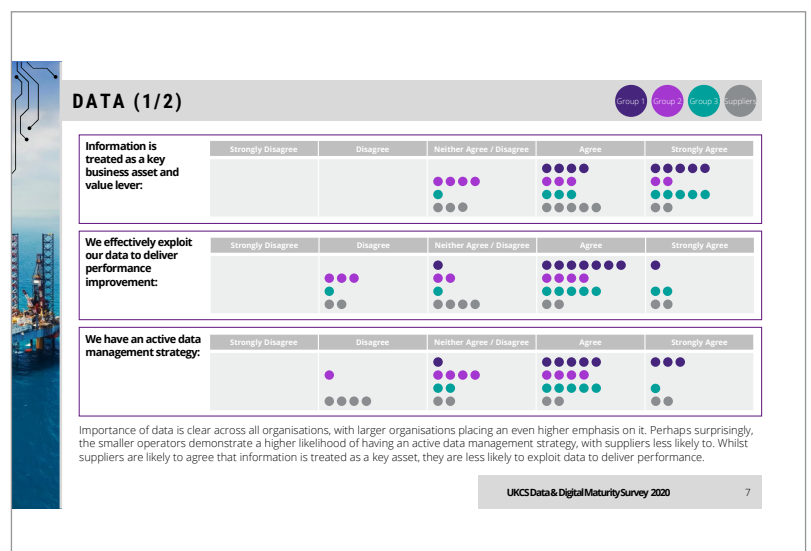
- 
**Data** – the foundation of digital. Governed, accessible offering connected datasets, the basis for digital to add value.
- 
**People** – Without digital capability and a data centric culture, digital will have limited impact.
- 
**Innovation** – process ensures that a pipeline of “ideas” drives transformation, offering with the support mechanism to invest, pilot and scale.
- 
**Technology** – transforms data into tangible value but must be focussed toward solving the right problems and being properly deployed.



Phase 1 conclusions were delivered in the September 2020 Leadership Event ([UKCS Data & Digital Maturity Survey 2020 Report Launch1 \(vimeo.com\)](#))

Phase 1 validated the need to have the Offshore Energy landscape work together to better coordinate efforts under the banner of a “Network”, coordinated through the TLB.

Leveraging Phase 1 success, parties elected to progress a second phase, building upon survey insights, with the objective of offering participants **tailored results reporting** and benchmarking metrics.

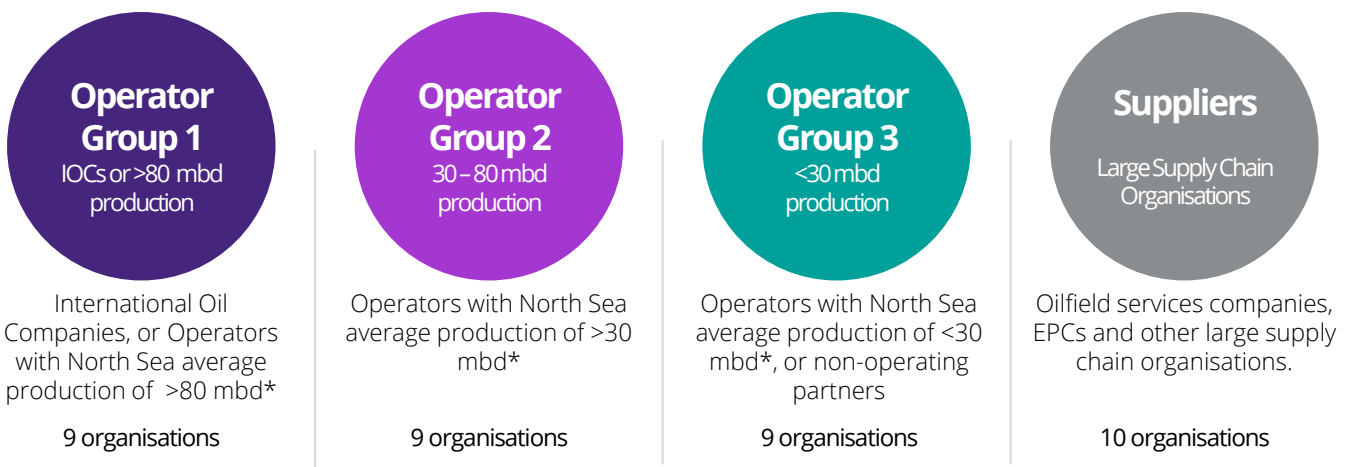


Question Response Clusters by Group

Phase 2 kicked-off in October 2020, and included circa twenty 1:1 feedback sessions, where selected Operator and Supply Chain partners were engaged to better understand pain points from a user perspective, along with the gathering of innovate suggestions.

Phase 2 preliminary conclusions were delivered in the March 2021 Leadership Event [Building Digital Maturity in Oil and Gas \(vimeo.com\)](#).


To better identify insights, as well as offer benchmarking metrics, twenty-seven (27) Operators were split into three groups accompanied by ten (10) large supply chain organisations. These groups are identified through different colours within the playback report, allowing like-for-like peer group comparison.




Note: - On occasion a respondent may have omitted to answer a question, therefore less "dots" appear against a response.

# 4. Results


The survey results are structured around the four digital pillars of data, people, innovation, and technology:




**Data**, the foundation of digital. Governed, accessible and connected datasets provide the basis for digital to add value



Without digital capability and culture in an organisation’s **People**, the impact that digital can make is limited



**Innovation** process ensures that a pipeline of “ideas” drives transformation, offering with the support mechanism to invest, pilot and scale.



**Technology** transforms data into tangible value, but must be focussed on solving the right problems, and properly deployed

The 2020 survey and early 2021 interviews are summarised to provide a reference summary:

	Data	People	Innovation	Technology
Description	<ul style="list-style-type: none"> <li>Standards</li> <li>Architectures</li> <li>Policies</li> </ul>	<ul style="list-style-type: none"> <li>Skills/Training</li> <li>Competencies</li> <li>Bottom-Up Leadership</li> </ul>	<ul style="list-style-type: none"> <li>Top Down Leadership</li> <li>Sector Innovation Strategies &amp; Platforms</li> <li>Sharing Ideas &amp; Value</li> </ul>	<ul style="list-style-type: none"> <li>Machine Learning</li> <li>Offshore Energy 4.0</li> <li>SMART Basin</li> </ul>
Key Figures	<ul style="list-style-type: none"> <li><b>61% CPYs have a Data Mgmt. Strategy</b>, with 49% stating data is well owned driving 44% “Users” satisfaction</li> <li><b>5% NOT willing to share</b></li> </ul>	<ul style="list-style-type: none"> <li><b>54% CPYs have identified Digital Roles</b></li> <li><b>35% CPYs have dedicated Digital Skills Training</b></li> </ul>	<ul style="list-style-type: none"> <li><b>59% CPYs hold a Digital Strategy</b></li> <li><b>53% CPYs operate E2E Innovation Process</b></li> </ul>	<ul style="list-style-type: none"> <li><b>On AVG a CPY has “widely utilised” 7% of the listed Technology</b> (30039) inc. BI &amp; Dashboards</li> </ul>
Observations	<ol style="list-style-type: none"> <li>Quality Data is a key value driver,</li> <li>Data Management is frequently under valued/ invested in,</li> <li>Operators perceived to monopolise data, creating supply chain knock on cultures</li> <li>Recognised need to facilitate greater competition, innovation and markets in Offshore Energy through improving data availability and transparency.</li> </ol>	<ol style="list-style-type: none"> <li>Digital skills is a shared responsibility</li> <li>Digital skills are mostly bottom-up sourced by individuals,</li> <li>Skills mindset focuses predominantly on tools, rather than digital fluency,</li> <li>Digital Strategies appear unbalanced, Data, People, Innovation and Technology may not be treated with the same relevance.</li> </ol>	<ol style="list-style-type: none"> <li>Progressive sector organisations can demonstrate C-Suite commitment and drive,</li> <li>Innovation is a strong indicator of Digital Maturity,</li> <li>Sector led Innovation is needed and missing</li> <li>Many Innovation processes appear immature/underutilised/unconnected.</li> <li>E2E Innovation — prioritise, coordinate and instil accountability for value delivery.</li> </ol>	<ol style="list-style-type: none"> <li>Trend is to focus upon physical (offshore) technologies, rather than connecting data to enable better decision making.</li> <li>Transformation technologies and their associated strategies are often not widely understood, business process implementation is frequently overlooked, resulting in poor uptake/utilisation in the Deployment Phase.</li> </ol>

Overall, digital maturity appears company specific, with leaders dispersed throughout Operators and Supply Chain Partners. Successes to date are potentially correlated to “digitally savvy” management, able to use a combination of carrots and sticks to steer through the steps necessary to capitalise on this disruptive opportunity.

Whilst all companies are clearly making conscious efforts to invest in digital, the drive is frequently from the bottom-up, with top-down engagement often a rate limiting step.

The “muddled landscape” was frequently identified as a factor, in the same way that digitalisation is not a single product, rather a federation of skills and technologies. A more consistent approach is required to ensure improvements in data use and decision making are not hampered by mixed messaging and strategic confusion.

## 4.1 Data

Data is the foundation of digital, where Governance, Quality, Accessibility and Portability, provide the value basis:

### Four levels of data maturity



#### 4.1.1 Key Results

Without a coherent Data Management Strategy, roles, quality, ease of access and overall trust in data are weakened, undermining the ability to improve and realise digital benefit.

Of the 37 sample companies (Phase 2), 61% stated they operated an active Data Management Strategy, dropping to 49% stating their information was well owned, with 44% of “users” satisfied with data access, when needed.

Supply Chain engagement was positively prioritised by 49% of companies however, few active examples could be communicated.

It was extremely positive to note, that only 5% of companies (2) stated they were not willing to allow other organisations data access however, many companies (54%) stated “Don’t Know”, predominantly because no Data Management Strategy or Governance exists to define what can be accessed and how it should be shared.

#### 4.1.2 Discussion

The sector acknowledges that historic data quality and data management performance has generally been poor. Typically, as a principle, where data quality issues are identified, the organisations responsible for data collection and management should put best practice data management and business processes in place to rectify the issues at source. This principle arguably is still not widely applied, nor has it been applied toward retrospective datasets.

As offshore energy transitions, new infrastructure and business models risk a proliferation of different data approaches, creating a range of incompatible or duplicated structures and interfaces. In order to realise the benefits of a smart, flexible Offshore Energy System there is a need for pragmatic standardisation of data structures along with application interfaces to enable interoperability, improve collaboration and the

effective scale up of innovation. A decision regarding return on data quality improvement investment in historic datasets must also be clear and articulated e.g. [Released Wells Initiative – digital cuttings project](#).

Transition to Offshore Energy will demand adoption of increasingly open or shared datasets, unlocking operational efficiencies, facilitating exchange of emissions metrics and certifications and an ever-closer integration with an already advancing dynamic “downstream” energy sector. Top-down leadership is required to drive this culture, change, unlocking inherent value.

### 4.1.3 Data Summary – Data is the Foundation

Consolidating the survey data, trends and feedback, the following hypotheses acts to reference the sector in 2020/21:

- Data is the most important value driver for digital, a priority for many organisations.
- Data Management is frequently misunderstood as an activity, and under-invested.
- Attitudes towards Data are reasonably consistent, however senior leadership are more likely to have positive experiences regarding the state of data within their organisation than those lower down in their organisation.
- Confidence in data exchanged between organisations is low compared to data received from within.
- Confidence in data exchanged between organisations is low as data is mostly exchanged manually, rather than through automatic interfaces, hence may lack preparation.
- Operators are less affected by data exchange issues, as they influence formats and methods through which they are provided with data.
- Operators are perceived to have a monopoly on data access, stifling competition, innovation and the emergence of new digital markets in the sector.
- The need for an Offshore Data Strategy is well recognised, to facilitate greater competition and innovation through improving data availability and transparency.

## 4.2 People

Without digital capability and culture in an organisation's **People**, the impact that digital can make is limited.

### 4.2.1 Key Results

Digital Roles were identified in 54% of the sample set (20 out of 37). Without identified roles, both corporate and individual development proves difficult, meaning skills and capability programmes cannot be built nor optimised.

Alarming, only 36% of the sample set provide digital skills and capability programmes, the majority of which being larger organisations.

### 4.2.2 Discussion

Many interviewees identified with not having the necessary resource with awareness or skills to maximise investment value from digital technologies. Access to the skillsets necessary to onboard and extract value from data is a significant barrier to digital adoption across all areas, from entry level activities such as analytics and data visualisation, through to advanced subjects including Artificial Intelligence and Machine Learning. Skills are also needed in core IT areas, including network and information security, as well as rapidly changing cloud computing environments, emphasising the need for a culture of partnership across organisational boundaries to progress the digital agenda.

The OPITO's Skills Landscape 2019 – 2025 report, echo's these observation, where

- In just six years, it is estimated the industry needs to attract 25,000 new people and 4,500 of those will be in completely new roles that don't currently exist in areas such as data science, automation and new materials
- 28% of people's time is currently spent on repetitive, transactional activities which are more likely to become automated overtime. Upskilling and reskilling the current workforce will enable people to carry out their role more efficiently and prepare them for different tasks and responsibilities

Attracting new entrants (graduates) to the sector, forms part of this key challenge, where anecdotally the sector appears to be falling short in the advertisement of inspirational long-term digital careers, capable of shaping the energy transition.

### EY – Digital playbook for survival and success

Oil and gas companies are making significant investments in digital technology. But our survey shows many don't have the workforce skills to realize the fullest return on those investments — or a plan to develop the adaptive and technical skills necessary to do so. To navigate the uncertainty and disruption brought by changing market conditions and COVID-19, companies will need to secure competitive advantage through a well-skilled workforce capable of delivering digital transformation.

It is no coincidence that the best leaders are those who manage the greatest transformations in trying times. The critical questions executives can ask now to move toward concrete, systemic solutions are as follows:

1. To what extent is my business strategy reliant on digital technologies to get through the pandemic and make growth gains in the subsequent years?
2. Do we have an accurate assessment of our employees and their current skills and development potential, and therefore a sense of how many workers need to be and can be reskilled or upskilled?
3. What are the current maturity, availability and access levels of critical skills within our organization and local market, and which systems are necessary to begin to consistently and accurately measure those levels?
4. Which tools, partnerships and other resources exist or are available to aid in this transformation, and which still need to be identified, forged or acquired?
5. Do we have a comprehensive view of organizational needs and resources to strategically prioritize our efforts and find the balances necessary to position our organization for success now and in the aftermath of the pandemic?

[https://www.ey.com/en\\_gl/oil-gas-digital-skills-survey](https://www.ey.com/en_gl/oil-gas-digital-skills-survey)

Effective technology adoption and exploitation is required to maximise competitiveness both within and beyond oil & gas. Exploitation encompasses behaviour, mindset and skill shifts. It is not enough for companies to have the technical expertise simply to use a technology. They must also have the skills to apply those technologies as broadly and strategically as possible in pursuit of business value — the critical thinking, creativity, innovation, problem solving, ideation, necessary to find and extract value. This is the heart of the difference between “doing digital” and “being digital”.

#### 4.2.3 People Summary – Capability is being Left Behind

Consolidating the survey data, trends and feedback, the following acts to reference the sector in 2020/21:

- Only one-third of organisations have a digital capability or skills programme in place, even fewer had people attend digital training in the last year.
- Albeit digital leadership must come from the top, it is the front-line of an organisation where many ideas originate. An organisation's Digital Strategy must include “People”.
- Digital progress is a shared endeavour that necessitates crossing multiple organisational reporting lines and boundaries, and multi-discipline teams working for success.
- Soft skills and competencies essential in digital transformation are frequently undervalued or underdeveloped against more traditional oil field skills.
- Capability development has focussed on understanding specific tools and systems, rather than building digital fluency – a digital ‘meta-skill’.

## 4.3 Innovation

A clearly defined and communicated innovation process ensures an organisation always has a pipeline of ideas to work on, driving transformation, but also the support mechanism and controls in place to invest, pilot and scale in a manner that aligns with an organisation's available budget and risk tolerance.

### 4.3.1 Key Results

22 out of the 37 (59%) companies sampled, hold a Digital Strategy, supported through 66% of organisations stating, "leadership visibly drive and prioritise delivery of the digital strategy".

An end-to-end (E2E) Innovation process is a strong maturity indicator, with 53% of the sample, having an end to end innovation process in place.

Successful innovation programmes appear to have more distributed funding models, possibly to ensure cross-organisational buy-in, especially of larger projects, as well as prompting greater top-down management/transparency.

Clear correlations can be drawn between an organisation's size and the likelihood of a digital strategy with a transformation programme in play, with almost all of the supply chain companies interviewed having both. Leadership's drive around a digital strategy although positive, is lower in smaller organisations than larger ones.

Suppliers and larger operators are more likely to place significant emphasis on digital and are more likely to have experienced the benefits associated, describing themselves as "having implemented many [digital] initiatives". Small to mid-size operators (groups two and three) generally indicate a lower maturity level.

### 4.3.2 Discussion

Companies pursuing successful innovation have a well-defined and communicated process which prioritises and sponsors ideas, to put them ahead of others - they formulate pathways designed to take an idea from generation, through development, to user delivery.

The innovation process followed varies, but typically contains four steps:

1. **Idea:** collection of innovation potentials, derivation of ideas, evaluation and release of ideas.
2. **Concept:** Extensive analysis and derivation of concepts for the solution, implementation and user by-in/marketing.
3. **Solution:** Development and testing of the solutions to the finished product.
4. **Market/Deployment:** transition from one-time solution, to a rolled-out product, accepted and owned within the organisation

Each phase has its own characteristics. The early phases are more creative and less structured, with the latter phases of implementation and marketing more focussed and process oriented. Some organisations adopt a waterfall approach to innovation, while others follow a more iterative, 'agile' approach that allows value to be tested earlier on, and appropriate course corrections be taken before significant investment is committed.

Many described their processes as "skeletal" or words similar, with little tangible deployments, with few able to share productionised examples of innovations implemented through their process, suggesting that the industry has a long way to go to embed innovation at the core of its business model.

### 4.3.3 Synopsis - E2E Innovation is immature, with analogues missing

Consolidating the survey data, trends and feedback, the following acts to reference the sector in 2020/21:

- The sharing of Digital Analogues referencing "what good looks like" are missing within the sector
- Digital Strategies rarely address the digital pillars equally (Data, People, Innovation and Technology)
- Innovation is a strong indicator of digital maturity, offering a mechanism to deliver sustained transformation.

- Many innovation schemes are perceived as underdeveloped and underutilised. The process should sit at the business core, driving priorities, engagement, coordination and instilling a corporate ethos for shared accountability in value enhancement.
- The return on digital investments may often be evaluated by looking at single project or study elements, held to high scrutiny as a cost overhead, rather than through that of a strategic business lens.
- Approaches to innovation are wide ranging however, 'bottom-up' processes appear the most immature. Bottom-up ideas frequently are the best to scale, as they are both wanted and needed.

## 4.4 Technology

Technology transforms data into tangible value but must be focussed on solving the right problems and be properly deployed to meet the longer term needs of the organisation.

### 4.4.1 Key Results

- Many smaller operators deploy lower technology counts (potentially, as they are predominately non-operating partners), where medium-sized operators (group 2) appear to explore the most technology.
- Technology utilisation is diverse across the sample companies, with logistics companies seen as some of the most prolific digital technology users.
- In the survey, responses were requested in relation to thirty nine representative digital technologies, with the aim of assessing industry maturity and through rudimentary classification, offer thematic insight.

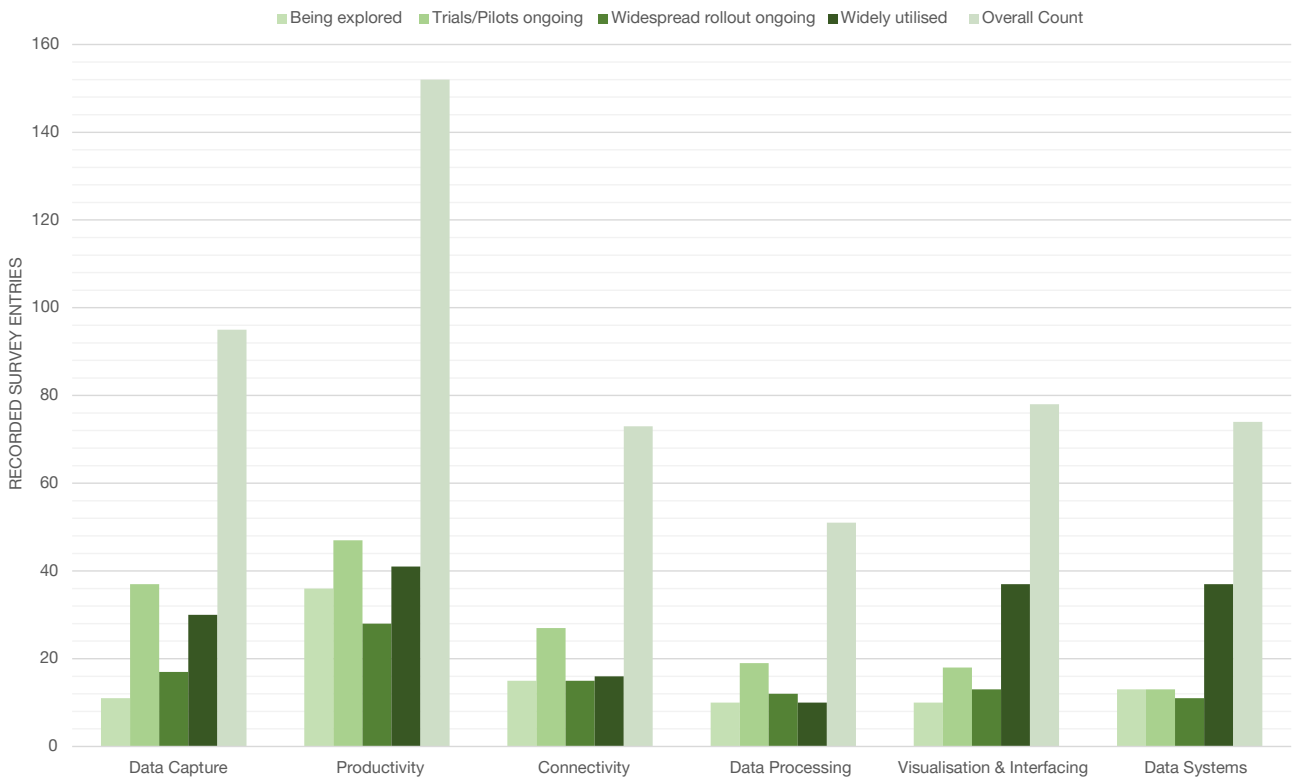
Category	Technology
Data Capture	Autonomous Systems (GRV, AUV, BVLOS)
	Crawlers, Tethered Vehicles
	Wearables and/or Camera Surveys
	Camera Surveys (Drones)
	Mobility Technology (Tablets with Bluetooth)
	Underwater Cloud point/LIDAR/SLAM
	CCTV/Dashcams
Productivity	Drones - Delivery, "Contact" Inspection
	Autonomous Systems (GRV, AUV, ASV, BVLOS)
	Additive Manufacturing/ 3D Printing
	Blockchain/Transactional Ledgering
	Mobility Technology (Apps)
	Robotic Process Automation
	Digital Twin - "Single Source of Truth"
	Track & Trace
	Automated Reporting (BI)
Connectivity	Wearable Technology e.g. Realwear/HoloLens
	Smart Instrumentation/IoT
	Offshore 4G/WiFi/Sigfox
	Satellite Internet Access

Category	Technology
Data Processing	Supercomputing / Processing
	Data Lake Analytics
	AI / Machine Learning, Machine Vision
	Disparate data sources integrators (Data Factory)
	Microservices Architecture
Visualisation & Interfacing	Virtual / Augmented Reality
	Photogrammetry/R2S/Digital Twin
	Natural Language Processing (Alexa)
	Reporting Dashboards
Data Systems	Cloud Native Applications & Processing
	Cloud/ Saas (Software as a Service)
	Cloud/ Iaas (Infrastructure as a Service)
	Cloud/ Paas (Platform as a Service)
	Cloud/ Faas (Functions as a Service)
	Open Source Software/Technologies
	Edge/Fog Computing
	Containers, Docker & Kubernetes
	Serverless Computing
	External Facing APIs

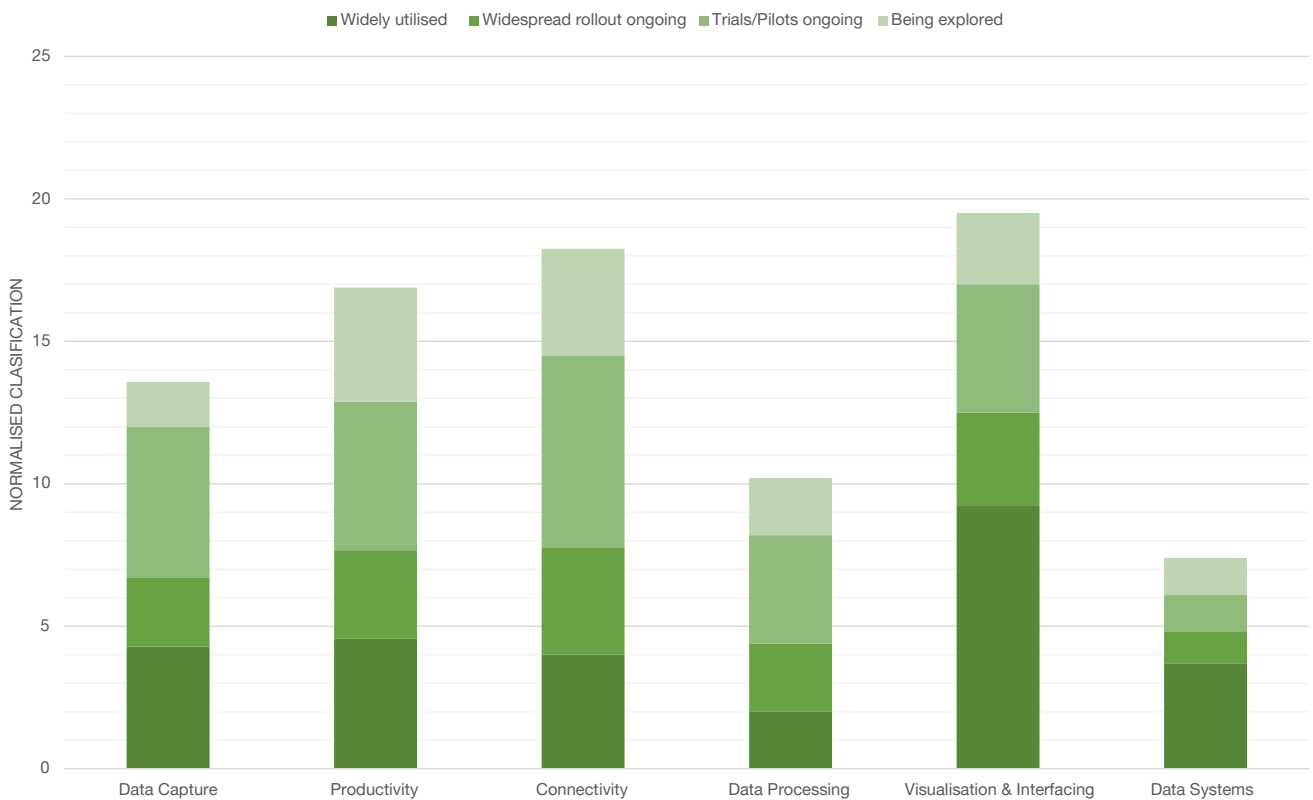
Rudimentary Digital Technology Classification



### Technology Readiness (unnormalised)



### Technology Readiness (normalised)



The unnormalised results indicate that Automated Reporting (BI) and Mobility Apps are the most deployed (Productivity), followed by Software as a Service (Data Systems) and Reporting Dashboards (Visualisation).

Of the 39 technologies listed, 12% (on average, less than five per company) were identified as widely utilised, increasing to 33% if positively identified as within an organisations' technology portfolio. This includes commodity technologies such as Dashboards and Automated Reporting.

Many pilots are underway with Machine Learning, Wearables and Camera derived surveys prominently featuring, with the underlying data showing a strong preference towards technologies that require purchase of tangible items, such as cameras and headsets. Competencies around associated systems (e.g. processing and storage of the data arising from cameras) appear to lag behind.

#### 4.4.2 Discussion

Paradoxically in digital, technology should be the least significant concern. With a strategy, culture, and business model in play, companies can then evaluate technology requirements to ensure fulfilment.

Technology frequently appears to be delivered as a "solution in isolation", where focus is overly placed on "tangible" technology to the exclusion of data, people and innovation processes. Technologies are rarely well integrated and hence potentially fail to maximise process efficiencies, or the overall objective of better decision making.

#### 4.4.3 Synopsis – Visualisation dominates

Consolidating the survey data, trends and feedback, the following acts to reference the sector in 2020/21:

- Focus is often more toward physical/tangible technologies, rather than connecting/data enabling technologies. Data does not capture headlines however, technology which enables governed, accessible and connected datasets are the foundation of value realisation.
- Digital Technology has mostly focussed on visualisation – Dashboards and Automated Reporting.
- Technology investment should avoid being a "solution in isolation". Physical technologies must extend considerations toward all the digital pillars (Data, People, Innovation) as part of any early development/deployment strategy.
- Transformation technology e.g. A Digital Twin often fails to account for implementation complexities, risking the utilisation benefit and ultimately the value case of the investment.

# 5. Recommendations

Recommendations are structured over three sections, spanning wider unification through an [Offshore Energy Data & Digital Strategy](#), Sector Coordination and working toward accelerating short-term Digital Fluency.

## 5.1 Offshore Energy - Data & Digital Strategy

The survey results and follow up interviews highlighted gaps in digital leadership reflected at sector level, as well as within individual companies. While numerous 'bottom up' opportunities for improvements have been identified, there is as yet no 'top-down' framework against which they can be assessed and prioritised to maximise the return on investment at sector-level.

An Offshore Energy Data Taskforce should be initiated, with an objective to provide a set of recommendations for how industry and the public sector can work together through the remainder of the decade to facilitate greater digital collaboration, innovation and market development in offshore energy through improving data availability and transparency.

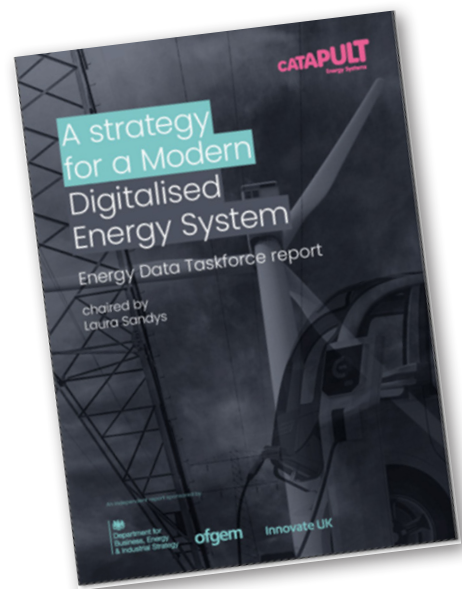
This recommendation mirrors an exercise run in Aug-2018, by the Energy Systems Catapult who were commissioned by BEIS, Ofgem and Innovate UK to lead the Energy Data Taskforce (EDTF), with Laura Sandys CBE as Chair. The Taskforce delivered its findings in June 2019 with [A Strategy for a Modern Digitalised Energy System](#), including five key recommendations to modernise the UK energy system and drive it towards a net zero carbon future through an integrated data and digital strategy throughout the sector.

The Energy Data Taskforce identified and engaged with a wide range of stakeholders to understand the needs and challenges of the onshore energy sector, developed proposals which addressed these needs and fostered support such that the government, regulator and industry were willing to accept the proposed recommendations.

Since the publication of the taskforce report BEIS and Ofgem have formally endorsed the recommendations and industry has responded positively, initiating a significant number of projects to deliver the recommendations. Randolph Brazier (Director of Innovation at Energy Networks Association) recently described the taskforce and its recommendation as "game changing".

The Gas and Electricity network owners and operators have also incorporated the key EDTF elements into their Digitalisation Strategies.

This ultimately was concluded by Government adopting aspects as part of the [Energy White Paper](#).



## 5.2 Sector Coordination

The sector has clearly demonstrated through the survey and subsequent engagements that digital opportunities and value can be maximised through effective coordination, with industry organisations consolidating and strengthening their delivery to the benefit all.

Although discrete activities remain the responsibility of individual industry organisations, coordination should be maintained through a Digital Network under the governance of the North Sea Transition Forum's (NSTF) Technology Leadership Board (TLB). As a Top-Down Leadership initiative the Digital Network will provide a consolidated view of relevant activities and matters which may benefit from NSTF awareness and escalation.

As a minimum the Network should comprise:

TLB	Technology Leadership Board
OGA	Oil & Gas Authority
NZTC	The Net Zero Technology Centre
OGUK	Oil & Gas UK
ONE	Opportunity North East
ORE	Offshore Renewables Energy Catapult
SE	Scottish Enterprise



## 5.3 Oil & Gas - Accelerate Digital Fluency

Immediate, short-term recommendations are set out below, framed within the four pillars:

### 5.3.1 Data

1. As a key influencer in the UKCS digital and data agenda, OGA in partnership with the Digital Energy Platform Advisory Committee should continue to influence the adoption of data standards by exemplifying a robust data access and delivery. The platform will support the preference that data be Findable, Accessible, Interoperable, and Reusable (the FAIR principles) with common interfaces and standards which are secure and resilient.

2. Similarly, OGUK must harmonise with OGA as joint influencers, to accelerate the adoption of business to business (B2B) data standards and promote cross-sector digital initiatives, driving change at a macro level. OGUK forums offer a unique “Oil & Gas user voice” under which to engage and interact with the “Renewable user voice”. Combined they are best placed to champion the management and deliver of future B2B programmes against the Digital Vision of RoadMap 2035.
3. OGUK may also wish to develop its role as the not-for-profit custodian and operator of non-regulatory industry data platforms and shared services, accelerating digital disruption through connectivity and trust.

### 5.3.2 People

Many organisations are working across the globe to reduce data silos, accelerate the deployment of emerging digital solutions and drive energy industry innovation e.g. the Open Group Open Subsurface Data Universe™ (OSDU) Forum (<https://osduforum.org/>)

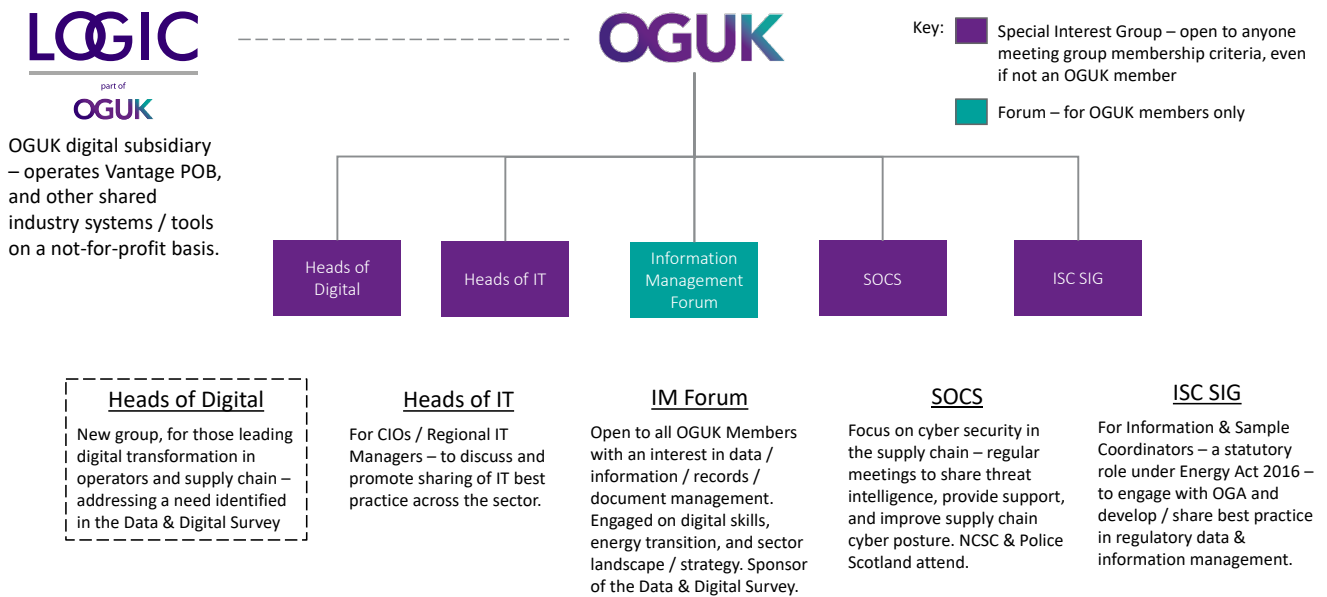
However, few are better placed than OGUK to formulate the needs of UK Offshore oil and gas from a bottom-up people perspective.

#### 5.3.2.1 Bottom-Up Leadership

OGUK Data & Digital forums offer the foundation for bottom-up leadership and needs identification. With the recent establishment of a new “Heads of Digital” forum, OGUK provides a means for stakeholders across the full gamut of data and digital to identify and prioritise matters for sector-wide collaboration and resolution.

OGUK’s forums in data and digital comprise:

- Heads of IT
- Heads of Digital
- Information Management Forum
- Supply Chain Cyber Security (SOCS) Forum
- Information & Sample Coordinators Special Interest Group



OGUK Data and Digital Activity Matrix

Forum	Membership	Function	Responsibility
<b>Heads of Digital</b>	For Chief Digital Officers / Regional IT Managers	Identification and sharing of opportunities to realise business value through the use of digital technologies	Innovation
<b>Heads of IT</b>	For CIOs / Regional IT Managers	Sharing of IT best practices, identifying how to effectively deliver IT solutions needed to underpin digital value.	Technology
<b>Information Management Forum</b>	OGUK Members	Covering all issues arising in data, information, records, and document management. Engaged on digital skills, energy transition, and broader sector strategy.	Data, Skills
<b>SOCS</b>	Service Organisations Cyber Security Forum	Improving cyber security in the supply chain – regular meetings to share threat intelligence, provide support, and improve supply chain cyber posture. NCSC & Police Scotland attend.	Technology – Cyber
<b>ISC SIG</b>	Information & Sample Coordinators (ISC) Special Interest Group	Focussed on regulatory and compliance matters associated with the retention of all types of information and physical samples, their reporting to government, and onward disclosure to the public	Data - Regulatory and Compliance

With overarching secretariat to bridge these (5) discrete forums, consolidating priorities, and activities, joined-up awareness is assured. In this capacity a valid “Oil & Gas user voice” can be offered.

The Offshore Renewables Energy (ORE) Catapult, acts similarly to OGUK as a conduit for Offshore Renewables forums, to ensure where practical cross working emerges for digital and net zero transition.

OGUK should continue to develop these forums and ensure effective linkage with other industry-domain groups (e.g. the Production Efficiency Task Force, and its digital working group) to ensure the business value perspective of digitalisation remains paramount.

### 5.3.2.2 Skills

1. In support of skills development (companies and individuals) the newly launched ONE regional digital training portal (<https://futureskillspartnership.com/>) offers to identify all digital course offerings along with preferred delivery models.
2. Future offering may include:
  - a. A “digital passport/pilots license”, where via Computer Based Training (CBT) existing company derivatives can be hosted/distributed.
  - b. A guide to “preferred” digital learning pathways.
 

Note: Multiple agencies already do this, e.g. The Chartered Institute for IT, formerly known as the British Computer Society (BCS) offers SFIA - Skill Framework for the Information Age.
  - c. Expanding through Sponsors/Programme providers, to offer greater self-taught courses e.g. [Coursera](#) or [The Construct](#).
  - d. The promotion of sector hackathons.
  - e. Showcasing possible Energy Industry digital career paths.

## 5.3.3 Innovation

### 5.3.3.1 Top-Down Leadership

1. A sector long term digital vision (a mission statement) is required to be incorporated into the sector aspirations for Driving Technology and Innovation under industry’s Roadmap 2035. This vision will naturally be informed by outcomes from the North Sea Transition Deal, whilst adaptable to future outputs from the [Offshore Energy Data & Digital Strategy](#) .
2. Underpinning the “Digital Vision” will be detailed delivery pathways relating to Data, People, Innovation and Technology, necessary to meet the overall 2035 objective.
3. The [2021 Energy Tech Programme](#), run in partnership by ONE, Barclays Eagle Labs and CodeBase will be evaluated by the industry cohort and reviewed with respect to leadership endorsement and presentation at the NSTF.

**The EnergyTech programme, led by Barclays Eagle Labs in partnership with ONE and Codebase brings together major players in the industry with innovative start ups to address challenges faced and drive digital transformation and culture shifts in the sector.**

NSTF and TLB members attending the 2021 programme will be asked to provide collective testimonial and insight toward the programme. The Digital Network will seek to ensure the wider dissemination of experiences and learnings, supporting 2022 cohort identification.

### 5.3.3.2 End-to-End Innovation

1. Innovation as a process is not well defined at sector level, leading to lack of access to, or inefficient exploitation of opportunities arising from cross-sector, regional, and national innovation programmes.

The TLB should work along side other stakeholders to better establish an innovation program, capable of championing multi-year, multi-£M investment and collaboration opportunities. Consortia led, by the future Offshore Energy Sector.

Transformative opportunities, driven by digital concepts will be informed by the [Offshore Energy Data & Digital Strategy](#) . Those under evaluation at the present time include:

- a. Data Trust, driven initially from a Well P&A Campaign use case (Wells & Decommissioning)
- b. Shared Analytics Platform, driven initially from a Fabric Maintenance use case (Asset Stewardship)
- c. Offshore Low Touch Energy Robotics and Autonomous Systems (OLTER) – building a best-in-class offshore Industrial RAS (Robots and Autonomous System) centre in Scotland, focused on supporting the energy transition and positioning the country as an international leader in deploying robotic and automation technologies.

### 5.3.4 Technology - Digital

1. To better track and communicate industry activity and progress in digitalisation, digital technologies themselves must be classified (e.g. Capture, Productivity, Connectivity, Processing, Visualisation, Systems, etc) in a manner recognised at sector level. OGA's Asset Stewardship Expectation 8 – Technology, might be expanded to encapsulate:
  - a. Digital Technology Classifications
  - b. The use of Digital Technology Classifications, within OGA Technology Plan Submissions
  - c. Digital Technology submissions that map within supporting Digital Strategies
2. The NZTC “Offshore Energy 4.0” theme will harmonise with the Driving Technology and Innovation section of Roadmap 2035, enabling prioritised programmes to be communicated and supported across all Offshore Energy Sectors.
3. Technology must seek to avoid being a “solution in isolation”. Formal and informal conversations are necessary across multiple stakeholders in an early innovation process (idea & concept) to validate and prioritise detail within respective pathways/roadmaps, encouraged through OGUK's forums and the Digital Network.
4. The wider sharing of informal digital case studies with start-ups is recommended, promoting a cultural shift towards the less formal style exemplified in other sectors through the use of Hackathons, along with similar innovative and creative approaches to problem solving.
5. Digital innovation is significant to the cloud however, better access to a work space for tangible technologies cannot be overlooked. Facility access to cultivate practical start-ups that need space to build, test, fail, collaborate, and build again until achieving success.



# 6. Appendix I – Feedback

## 6.1 Data

Key points raised through the survey and validated by pain point identification, included all aspects relating to data, ranging from Quality, Standards and Sharing to the sign positing of available datasets.

Comments below captured out of the 1:1 engagements are neither exclusive nor exhaustive:

- **Data Quality** – many points were raised toward better data quality - i.e. Data Preparation, the structural foundation. If you don't clean, validate, and consolidate raw data, you won't be able to determine meaningful answers.

Many interviewees identified with data winding up living in silos, where it couldn't fulfil its potential and in spreadsheets, where it is frequently manipulated, by hand and un-auditable.

### Data Preparation Terminology:

- Data Exploration – Discover what surprises the dataset holds.
- Data Cleansing – Eliminate the dupes, errors, and irrelevancies that muddy the waters.
- Data Blending – Join multiple datasets and reveal new truths.
- Data Profiling – Spot poor-quality data before it poisons results.
- ETL (Extract, Transform, Load) – Aggregate data from diverse sources.
- Data Wrangling – Make data digestible for analytical models.

**“Silos and manual preparation processes are like a ten-mile obstacle course lying between you and the insights that should be driving your business”**

- **Data Sharing**

- **Trust**, to ensure trust when sharing data (internally and externally) data must be prepared to an accepted standard

**“To ensure trust when sharing data, take data from a trusted source – the owner, especially if the data is dynamic - prone to modification/update”**

- **Efficiency**, the need to efficiently share vast amounts of data across various departments, companies and industries is an issue faced by many today. Leading entities are working to resolve this problem but, are keen to ensure a standard/common methodology is adopted by all.

**“To drive greater efficiency, we have an OPEN data programme, with our APIs are already available via the web”**

- **Data Access** - to maximise the value of data, core principles require to be explored. Data should be **Discoverable, Searchable, Understandable**, with a sensible approach adopted to **Structures, Interfaces and Standards**.

Captured comments include:

- **Key Pain Point** - the need for greater Standardisation for Data and RAS (Robots and Autonomous Systems)
- **Clients** - need to offer a clearer idea of where they want to go, maybe more toward providing the problem not the solution (each have their own demands – but offer no standard)
- **Our Data Sharing** - in related more to JVs and how to share large datasets, we need to drive toward data quality, built from commonality, adopt a do something, anything approach, do something basic and work on building trust

- Regulators, Operators, Tier-1s, Tier-2s are all looking toward each other as the responsible driver, or excuse for not starting
- Our biggest issue is Data Access
- A Key Ask includes the tackling of specific problems e.g. sharing and data access
- Data Standardisation - Greater use of mandated formats
- Our culture is one that drives to share and ensure ease of access to information and training
- Sharing Data is very difficult - the way to and how to

## 6.2 People

People comments captured out of the engagements are neither exclusive nor exhaustive:

- Digital and those Skills are spread/seeded throughout the company acting like a lighthouse strategy for all participants.
- Our [corporate] culture drives to share and ensure ease of access to information and training - relationships exist between many higher learning institutes
- To encourage competencies a one stop shop, Digital Portal has been developed
- We identified a Maintenance Planner (offshore function moved onshore) who was self-starting in digital skills, with their initiative and mentoring they now perform a user led digital project role
- Without an overarching strategy and identified responsibilities, only short-term objectives are met - How can we better identify and programme Digital Skills development?
- We need Skills and Culture Packaging – to enable individuals, companies and the sector to better coordinate around skills awareness and delivery

- Can a mechanism be provided upon which to initiate and signpost upskilling requirements?
  - Where to go and who to ask?
  - Industry Passport e.g. MIST CBT to identify and reduce some of the gaps
- It is a skills challenge across industry - Culture and Skills awareness maybe best driven by a central coordinating group?
- A key challenge is to have people that understand Digital and Data Science, from Leadership down to the everyday employee.
- We have a need for broader Digital Fluency to better enable workplace practices - this equally applies to Leadership, so that they might better support and fund our activities

## 6.3 Innovation

Innovation comments structured out of the engagements are neither exclusive nor exhaustive:

- A Digital Centre of Excellence was established some +4yr ago, anchored by Management to educate and initiate Digital Leadership
- We recognise that the “best ideas are with the people”
- Digital - “It is clear, there is no other way to proceed”
- Digital is led by the Business Implementation Team – the Value identifiers, they work with an internal customer to map and remove pain points
- Our Delivery Model is 70% Doing, 20% Culture and 10% Education
- We would describe ourselves as more bottom up, digitally driven over top down. We are now seeking wider top down initiatives, to really move the needle
- We’d like our approach to be more sector wide, “at the table”, open to data sharing and engagement
- Digital Programmes are held to high account less faith based, receives more ridicule around added value
- Strategy has been more around connect and explore, rather than internal insight consolidation
- We are seeking to be “uniquely different” – Competitive, Economics and Emission driven

- We desire to be different, driven more by an entrepreneurial spirit
- It is frustrating communicating across the divide,
  - where leadership were either uninspired or unwilling to risk greater digital disruption
  - where the big picture, was being sacrificed to achieve short term goals
  - where central functions were unable to drive initiatives into assets
- We have no clear pipeline or process to engage and bring in start-ups
- We are reflecting around Asset v Central funding and how to get buy-in,
- Digital is “not an IT driven function” thus leaning toward a coordinated Central role, with Asset Users engaged.
- Problem today is lack of coordinated central funding - all Innovation projects are small/individual study driven and not joined up
- To date we are predominantly “Bottom Up” driven, with 96 opportunities identified, although they remain to be prioritised.
- There is no process focus, Commercial model development, no delivery as everyone has started to chase the next offering, before the delivery/role out of the last
- Culture/People are inherently engineers, all about problem solving, we miss the mindset of business model/shaping of value add

## 6.4 Technology

Technology comments structured out of the engagements are neither exclusive nor exhaustive:

- We were too focussed from a technology perspective, with teams responsible for specific solutions forcing them onto the business. We’ve made a big change to focus on where the value is, not to mandate based on the tool or technology.
- Digital Twins & AR/VR is in use via “Return to Scene” - awareness and frustration is generated off the “data” needed behind the vision to get the benefit - especially when having to deal with legacy assets.
- We have “Integrated Planning” working effectively on the 1st asset, proving value. Safety, Planning, Maintenance and other data is shared/linked/ combined to offer better Budgeting, Efficiencies and ensure better resource management
- We have broken our long-range Technology Planning into workstreams
- We are experiencing “green shoots” of Digital innovation within the supply chain, where 4G has been a great enabler for vendors bring their own devices and leveraging their Digital Disruption to differentiate between competitors
- We are exploring the concept of Industry 4.0 in detail
- We are working toward future unmanned solutions
- Technology - is being purchased and driven without an end goal design and the same for business integration



