

MARCH 2019

DIGITAL INNOVATION PRIORITIES SURVEY

SUMMARY REPORT FOR
SURVEY PARTICIPANTS



BACKGROUND

In mid-2018, The Offshore Renewable Energy (ORE) Catapult identified data and digitalisation as a key area of opportunity for the offshore wind sector.

At the same time, ORE Catapult recognised that there existed significant challenges around effective management and usage of data, with:

- // data owners (chiefly windfarm owners/operators) struggling with data volume;
- // modern digital technologies not being exploited;
- // many digital service providers lacking offshore wind industry awareness;
- // techniques in areas such as AI and Big Data yet to have an impact in offshore wind.

Mindful that the data and digitalisation domain spans a broad spectrum of processes, data streams, tools and challenges in offshore wind, ORE Catapult realised that the implications of the above challenges for the wider supply chain as well as operational excellence in windfarms were potentially immense.

Offshore Wind Data and Digitalisation

With data streaming in real-time from various sources - including asset machine data (e.g. from SCADA and condition monitoring), grid and trading data (electricity metering, grid frequency, etc), environmental data (including meteorological measurements and weather forecasts), logistics and planning (spares and materials, supply chain management, etc) and HR-related data (e.g. health & safety incidents and payroll), offshore wind projects are generators of massive quantities of data.

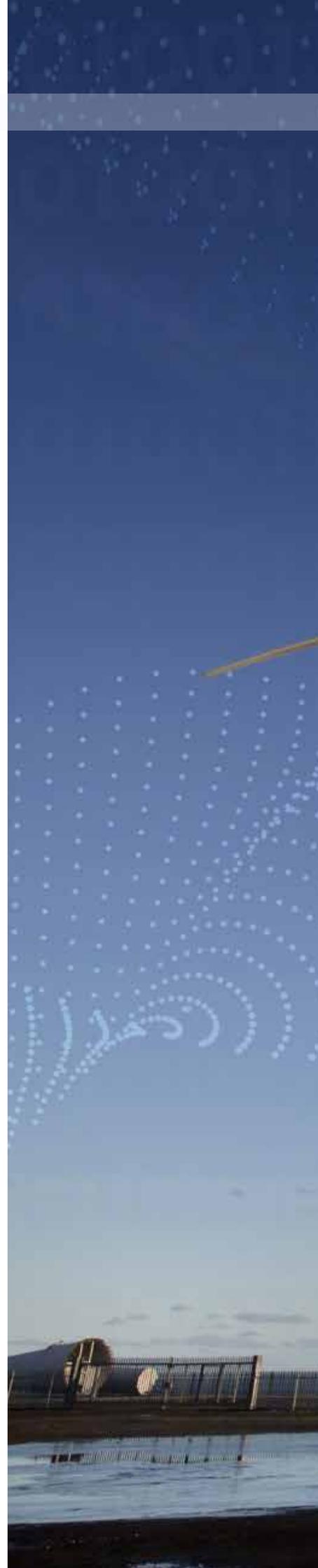
Significant challenges also exist around how to create, store, share and use all this data in such a way that it adds value to the development and operation of renewable assets.

Offshore Renewable Energy Catapult

ORE Catapult is a not-for-profit technology innovation and research centre for offshore renewable energy. As a long-term strategic investment by BEIS (the UK Government's Department for Business, Energy and Industrial Strategy), ORE Catapult's mission plays a key role in delivering the UK's largest clean growth opportunity, accelerating the creation and growth of UK companies in the offshore renewable energy sector. It uses its unique facilities and research, and engineering capabilities to bring together industry and academia, and drive innovation in renewable energy.

With this mission as its reference point, ORE Catapult believes that it is well placed to support the transition of the offshore renewables sector into a data-led industry that can extract the full potential from digital technology, data and information. This belief is based on ORE Catapult's unique positioning in the industry, based on a combination of its:

- // independence;
- // wide industry reach;
- // deep domain knowledge (of offshore wind);
- // expertise in data management and analytics.





SURVEY OBJECTIVES AND METHODOLOGY: IDENTIFYING INNOVATION PRIORITIES AND BRIDGING THE GAP

Against the above background, ORE Catapult has been considering where best to focus efforts and develop new projects for the offshore wind industry, in order to bridge the gap between current operating models in the industry and new ways to extract the full value from data and digital technologies.

In order to inform the strategic decisions necessary to conceive and develop new projects, and to harness and prioritise the required resources, in November 2018 ORE Catapult commissioned the Offshore Wind Data and Digitalisation Innovation Priorities Survey. Based on a programme of in-depth interviews with key stakeholder organisations in the offshore wind industry, the main objectives of the survey were as follows:

- // To explore what the offshore wind industry needs in order to unlock the value from data and digital technology.
- // To identify the most important data and digitalisation related challenges faced by key stakeholders in the industry.
- // To capture recommendations on how bottlenecks can be addressed and on how ORE Catapult can help move the industry forwards.
- // To inform strategic decisions regarding which data and digitalisation projects are needed in the industry.
- // To share conclusions on digital innovation priorities with survey participants.

The survey was ultimately based on 35 interviews (seven face-to-face and 28 by telephone), primarily with a mix of windfarm owner/operators, offshore wind related consultancies, software providers and digital service providers.

Introduction to Report

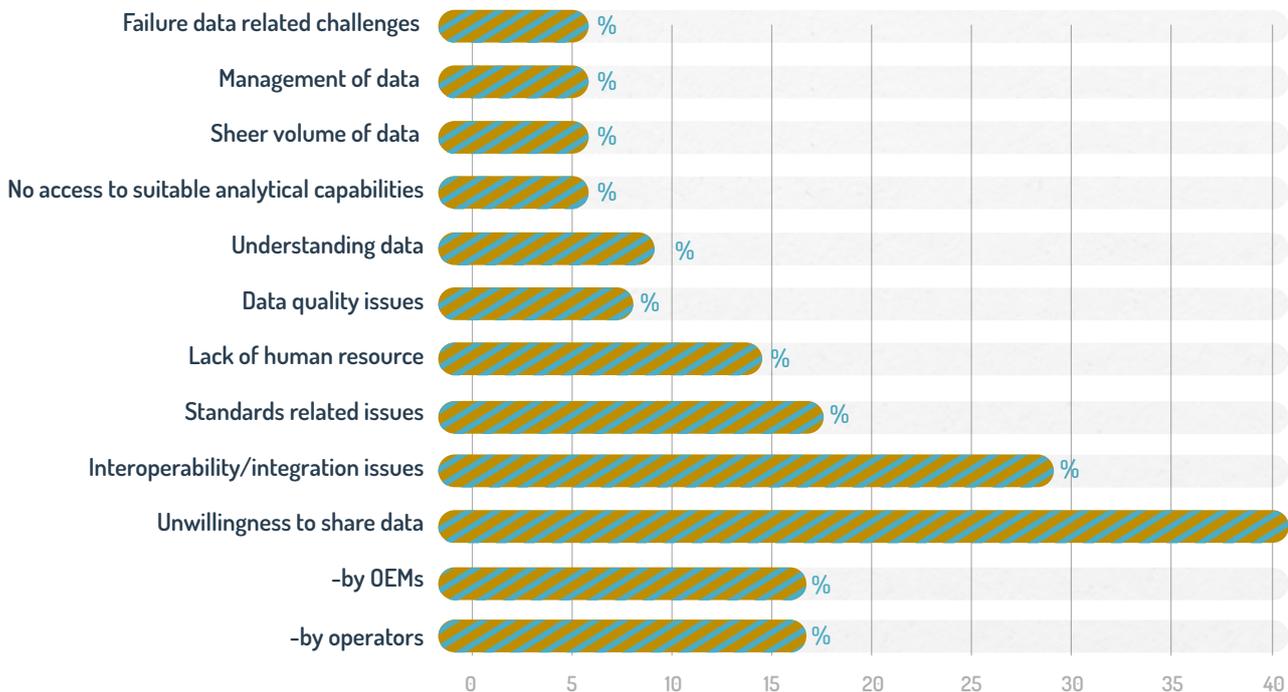
This report has been developed specifically as a vehicle for sharing the results of ORE Catapult's Digital Innovation Priorities Survey with organisations and individuals who participated in the survey. Although touching upon highlights and headlines from the full range of survey results, it focuses particularly upon feedback from four questions which were arguably the most fundamental of the entire survey. These were aimed at establishing:

- // the main challenges faced by an offshore windfarm in gaining maximum business benefit from the various types of data that the windfarm operation holds;
- // whether or not a gap along the lines perceived by ORE Catapult genuinely exists. And if it does exist, what form it takes;
- // what might be done to move the industry forwards;
- // how ORE Catapult's unique blend of characteristics and capabilities (as mentioned earlier) could be best deployed to help the offshore wind industry unlock the full potential from data and digital technologies.

The survey was ultimately based on 35 interviews (seven face-to-face and 28 by telephone), primarily with a mix of windfarm owner/operators, offshore wind related consultancies, software providers and digital service providers.

CHALLENGES IN GAINING BENEFIT FROM DATA

In order to identify and verify fundamental drivers that would suggest a need for action in this domain, interviewees were asked: “What, in your experience, are the main challenges for an offshore windfarm in gaining maximum business benefit from the various types of data that the windfarm operation holds?”.



As can be seen in the bar chart above (which only shows challenges cited by two or more interviewees), the types of challenge highlighted were both diverse and substantive:

The following selected extracts from the two highest response categories illustrate that the diversity of challenge applies within, as well as between, response categories:

Illustrations within “Unwillingness to share data”:

- // This can result in data-related service providers not having enough data to do their job.
- // This is driven by a feeling that service providers might reverse-engineer the data.
- // This applies even in extreme situations where the operators really need the data (e.g. when there are outages due to remedial work).

- // This includes information on future technical developments.
- // Having adequate resolution is more of an issue for some types of data than for others.

Illustrations within “Interoperability/integration issues”:

- // Having disparate data in different places.
- // Combining data from different sources meaningfully.
- // Having separate screens, databases, data streams, etc, for different manufacturers’ turbines.
- // Having scheduling and maintenance management data stored in different systems.
- // Different groups of sensors streaming at different data frequencies.

- // Some people still transfer files in outdated formats – such as CSV files.

“Data is hard to access. The Data Owners charge for access to data, and they format it such that it is difficult to read. Also, some data streams are blocked or restricted. There are huge amounts of data in multiple data streams. But the problem is that the Data Owners simply say: ‘We hold all the data – you don’t get any.’”

IS THERE A GAP?

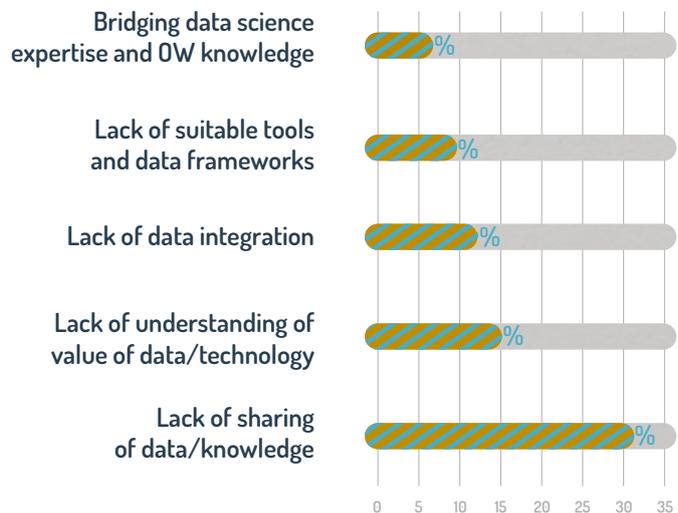
One crucial aim of the survey was to validate (or otherwise) ORE Catapult's thinking – and particularly its reference in the Project Introduction document to “the gap between current operating models in the offshore wind industry today, and new ways to extract the full value from data and digital technologies”.



6% Issues, rather than a gap

94% Yes - there is a gap

0% No - there is not a gap



In this context, interviewees were asked:

- // whether they agreed that a gap exists;
- // how they, themselves, would describe that gap.

As can be seen in the two charts above, the picture painted by feedback from these questions could hardly have been clearer – revealing:

- // a strong consensus that a gap does indeed exist...
- // ...and with a strong focus on a lack of both sharing and understanding of data.

What is not illustrated in the above bar chart is the diversity of opinion regarding the nature of the gap. (Note that the chart only shows those types of gap that were cited by two or more interviewees). In all, 25 different types

of gap were highlighted by this question. The following is a representative selection:

- // “Shedloads of data piling up”, which takes too much disentangling.
- // A disconnect between disciplines – particularly between offshore wind, IT and data analysis.
- // Incompleteness of data: the interviewee's organisation often gets data “thrown” at it without supporting information (such as data specification detail).
- // Lack of standardisation (with data gathered in proprietary systems and stored in the formats of OEMs).
- // People are not measuring the things that they should be measuring – such as blade erosion.
- // Lack of trust, which means that there is

little space to do things that will make a real difference to the industry.

“At the moment people are using very heterogeneous sets of tools: it is not harmonised at all. The main challenge will be to get all the data into one place.”

It was also commented that

“It is a “knowing/doing” gap: the difficult bit is making it happen”.

MAIN ACTIONS SUGGESTED TO ENABLE PROGRESS

Having validated ORE Catapult's thinking and intentions, and having characterised the key challenges facing the industry in as structured a manner as possible, another central goal of the survey was to generate views and ideas on what might be done to move the industry forwards.

This was reflected in the wording of another of the key questions.

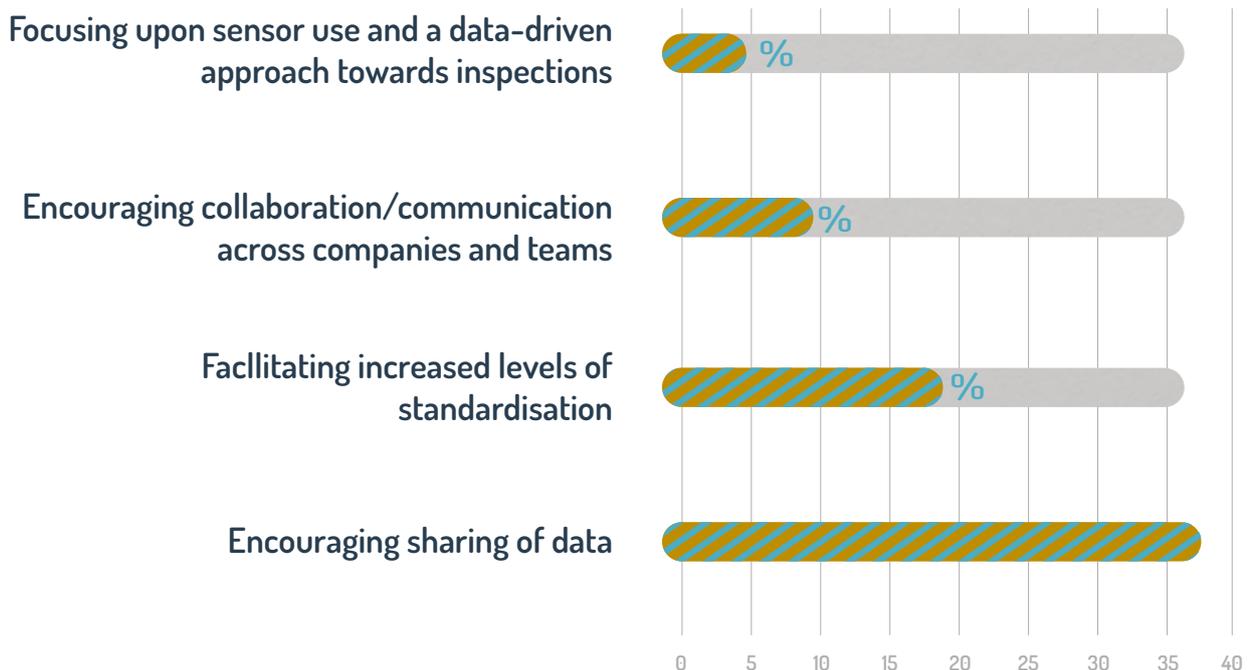
From the bar chart below, it can be seen that – unsurprisingly – key issues and challenges highlighted in earlier questions were strongly echoed in the actions suggested. (Note that the bar chart only shows types of action suggested by two or more participants):

Other actions suggested – i.e. those advocated by only one interviewee – included the following:

- // Developing use cases.
- // Making resource and money available to enable relevant trials to be run.

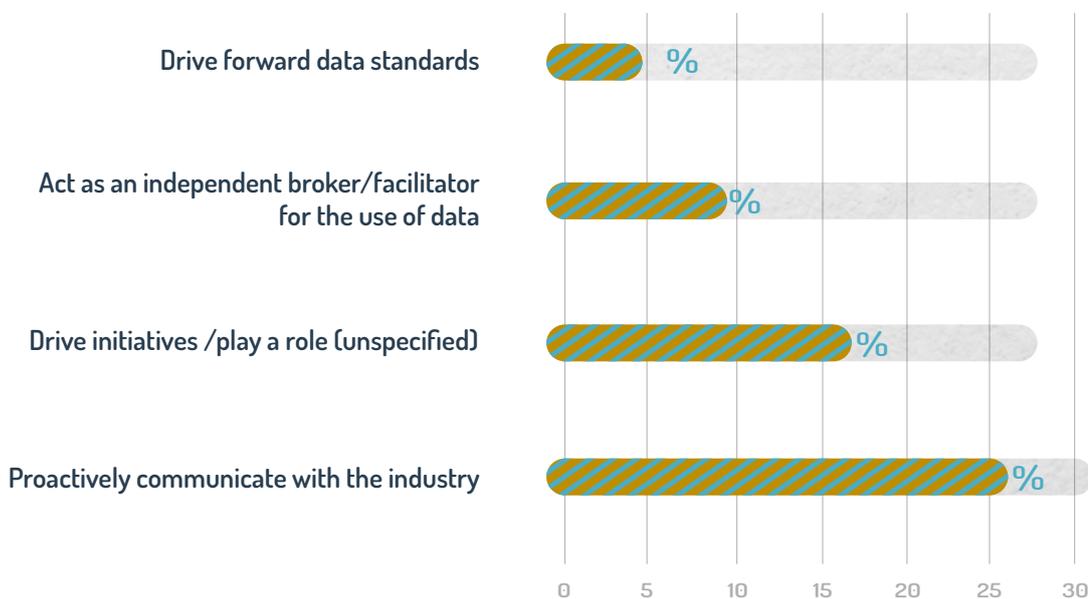
- // A study aimed at understanding current restrictions on access to data – e.g.: “How easy would it be to renegotiate restrictive contracts?”
- // A trial focusing upon security and authentication.
- // An initiative enabling companies to look holistically across all historic data streams and draw conclusions about machinery.
- // An initiative looking at where the biggest savings are likely to be made, and based on combining specific types of data.
- // Bridging the gap between data science and the engineering domain.

“Any big lessons must be shared within the wider offshore wind community. And so lessons learned-type initiatives are needed. Also mechanisms for data sharing across a range of organisations.”



HOW ORE CATAPULT COULD HELP

Given ORE Catapult's belief in its own credentials to run a relevant initiative (which itself earned a consensus endorsement from the interviewees), it was important to go beyond simply asking "What could be done?", and to seek views on how the Catapult itself could deploy its unique blend of capabilities "...to help the offshore wind industry unlock the full potential from data and digital technologies".



As with the chart in the previous section, the bar chart above only shows types of action suggested by two or more participants: As this question was intended to equip ORE Catapult with ideas for practical initiatives, it is worth looking more closely at some of the detail underpinning the generic suggestions highlighted above. "Proactively communicate with the industry," for example, includes:

- // Be a facilitator, a thought leader, and an initial catalyst.
- // Engage the rest of the industry in driving decisions.
- // Establish trust in ORE Catapult's expertise in data management & analytics.
- // Facilitate the interconnection of participating companies' thoughts.
- // Get people talking.
- // Help develop trust in the industry.
- // Raise awareness among the right people in the right companies.

Likewise, "Act as an independent broker/facilitator for the use of data" includes:

- // Establish a data integration platform.
- // Provide a mechanism for a study or a trial on the use of data, ideally involving a group of companies.
- // Set up accessibility to data, applying different levels of anonymity to different types of data.

"They can provide harmonised standards on data specifications. (The industry is struggling with naming and protocols in data and data communications)."

"ORE Catapult is government-funded, and so it would be a great idea for Catapult to run any initiatives in this area. I primarily see this as a matchmaking thing – partnership-brokering – based upon which companies have which types of challenge, and who can provide the best solutions and services to help address those challenges."

OTHER HEADLINES AND HIGHLIGHTS

Other key findings from the interview programme, besides those from the four key questions covered in the preceding sections, can be summarised as follows:

- // Asked what types of project, solution or service they could deliver to offshore wind related companies, but that so far had not been commissioned, software and digital service provider interviewees highlighted analytical services, development of digital twins/models, and machine learning applications in particular.
- // Regarding how easy it had been to sell to the offshore wind sector compared with other sectors, almost 1 in 4 of the software and digital service provider interviewees said they had found it harder, while only 1 in 12 claimed that offshore wind had been easier.
- // In interviewees' perceptions of how well the whole picture of data, with its potential for being harnessed to transform operational processes across the business, is understood by windfarms, "high" or "very high" levels of understanding (23%) were outweighed by "low" or "very low" (29%). At the same time, 23% expressed the view (unprompted) that there is room for improvement overall.
- // Assessments of how much operational benefit is typically gained through effective use of data at the various stages of a windfarm's project life cycle suggested that the highest levels of beneficial impact occur at the site assessment & development stage and at the operations & maintenance stage (as opposed to the commissioning, end of warranty and decommissioning stages).
- // The main trends anticipated by interviewees over the next few years were dominated by "applying AI techniques", "applying machine learning" specifically, and "analytics for failure related applications".
- // Asked what they viewed as the Holy Grail in collection, management and use of data in the offshore wind industry, interviewees mainly pointed towards integration (23%), adopting common standards for data (9%), better prediction of failures (9%), and holistic optimisation (4%).
- // Responses regarding which other industry sectors the participants felt offshore wind has most to learn from in this context (i.e. applying digitalisation to unlock the full potential from data) primarily featured oil & gas (31%), aerospace/aviation (26%), automotive (23%) and electrical power (20%).
- // Encouragingly, four questions at the end of the interviews which were aimed at ascertaining levels of interest in various follow-on activities generated very high levels of response indeed, with:
 - // 91% interested in being involved in a trial project;
 - // 94% interested in participating in a focus workshop, enabling some of the survey participants to discuss aspects of the results with ORE Catapult;
 - // 77% interested in being involved in initiative design and specification sessions with ORE Catapult;
 - // 81% saying that they would like ORE Catapult to send them information on its activities and capabilities in the area of data and digitalisation.

The last of the above percentages was all the more remarkable for the fact that the other 19% of participants only declined the offer of information because they felt they already knew the Catapult sufficiently well. In other words: those requesting the information, together with those claiming sufficient prior knowledge, added up to 100%.

Finally, while on the theme of high response levels, it is worth noting that the question "Could I ask you for your overall reaction to the project introduction that I sent you?" also yielded a highly positive response pattern. While 76% of the interviewees provided a response which was positive overall, none (0%) responded negatively. Taken as a whole, the feedback from this question can be regarded as a strong endorsement of the Catapult's thinking.

"This is a laudable aim – especially the aspect of helping small service providers to navigate the industry."

"ORE Catapult's ideas are valuable – particularly with regard to having someone in a position to make competing companies collaborate."

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