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A co-ordinated approach to metocean activities on the UK continental shelf

Prepared by **P A F A Consulting Engineers** for the
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A co-ordinated approach to metocean activities on the UK continental shelf

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The UKOOA Metocean Committee in conjunction with the Health and Safety Executive has carried out this review of the provision of weather forecasts and real-time metocean data for offshore operations. The objective is to prepare a high-level business case for a more collaborative approach by the industry with the aim of delivering the following benefits:

• a reduction in overall metocean costs (together with an equitable cost-sharing arrangement amongst operators with different numbers of assets and various levels of commitment on the UK continental shelf),

• improved accuracy, access and timeliness of metocean data for better decision-making,

• maximising the value of weather data to improve safety, planning and efficiency of operations and thereby to reduce operating costs.

This executive summary distils the main points from the document and provides an overview of the 'Key Findings', the 'Suggested Way Forward' and 'Benefits'.

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INTRODUCTION

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KEY FINDINGS

Weather forecasts

The provision of weather forecasts is characterised by a plethora of ad-hoc contracts, frequent duplication of forecast products in adjacent areas and a lack of cost transparency.

Offshore metocean stations

There are over 200 installations fitted with metocean equipment, but the capability of each and the quality of the data they produce is very variable. Some are old and infrequently maintained, resulting in poor quality data. This potentially valuable resource is wasted and the industry is not realising maximum value from its investment. On the positive side, there are at least 50 stations that provide good-quality, real-time data - but how is a user to distinguish the good from the mediocre or bad?

Metocean costs

It was not possible to get accurate cost figures from UKOOA members, because most do not know how much they are spending on metocean activities. However, from figures provided by metocean contractors, the total annual cost of metocean stations on offshore installations and weather forecasting in the UKCS exceeds £5million/year (and may be as high as £7 million/year).

One of the reasons for the lack of accurate cost figures arises because some services are not invoiced directly to UKOOA members. For example, in the case of weather forecasts, only 30%, at most, is invoiced in this way. The remainder is handled via contractors and sub-contractors who pass on the costs plus a mark-up, as a small part of a vessel day-rate, for example.

Costs of servicing, calibrating, repairing and replacing metocean stations are also frequently 'hidden' within larger budget items, such as topsides maintenance contracts - and, in one case, within a catering contract. In many cases, itemised costs are attributed on an asset by asset basis and no one individual within the operating company is aware of the overall total.

Concerns
Many end users of metocean information expressed concerns about the accuracy and availability of the data and forecasts supplied. This was especially evident from discussions with helicopter pilots, vessel masters and the HSE. Of particular note is the lack of adequate forecasts for pilots setting off for an offshore installation. Similarly, offshore installation managers may be unaware of severe sea states at other locations that can affect the logistics of their supply chain.

The key over-arching concern from this review is the impact on decision-making of inaccurate or no real-time data and the increased risk for an incident to occur.

SUGGESTED WAY FORWARD

There are 3 key recommendations from this review:

1. An optimum number of good quality metocean stations (say 80) should be sufficient for operational decision-making, rather than the 200 of variable quality available at present. There will be a need to ensure correct geographical coverage of the various types of sensors and to use the best existing stations where possible. In the short term, the high quality stations will need to be clearly identified.
2. Networking of the data via web-based displays should be used to provide a spatial overview and facilitate wider availability, particularly where weather-sensitive operations are directly affected.
3. Available real-time data should be used to improve short-term forecasts up to 12 hours ahead.

Already there is strong support from stakeholders, including key players such as the CAA and HSE, for this way forward. Furthermore, it contributes to and does not conflict with the requirements of current regulations (including MAR 1995) and helicopter operations guidance (CAP 437). In particular, it satisfies the concerns of pilots, who recognise that there is a need for more reliable data at and en-route to remote destinations. However, the CAA still need to consider in more detail how data from a high quality network of instruments, many of which would be categorised as automated readings, can best be used for specialised forecasts suitable for offshore helicopter movements.

How would these recommendations be implemented and managed: on a UKOOA-wide basis, by groups of companies, by individual companies or by leaving it to contractors? The report considers the pros and cons of several options. However, this work has also been a catalyst for metocean contractors to review how their services can best be delivered to UKOOA members and the study team has encouraged them to bring forward more collaborative approaches to the industry. One outcome of this encouragement is the new WebMET service being offered by Muir Matheson, which provides a web-based portal for shared access to real-time data originating from 6 UKOOA members. In addition, it has been demonstrated that weather forecast data can also be made available to a wide range of key users by this same means. This technology will allow new services to be provided that integrate forecast and real-time data.

BENEFITS AND COST SAVINGS

Having a network of real-time weather stations can benefit virtually every offshore activity from seismic work and drilling, through to heavy lifts, subsea operations and logistics. The common theme is helping to optimise activities, maximise uptime, reduce waiting on weather and facilitate improved decision-making. Above all, this way forward can reduce guess-work, enable safety improvements and reduce costs. A networked system can include: the provision of a spatial overview, which can show when bad weather is coming; remote monitoring from the beach as well as offshore; backup data sources; archiving of data for subsequent analysis; and improved weather forecasts

It is not always easy to accurately quantify direct cost savings, and there are also hidden costs (see below for one example). Estimates of annual cost savings for marine operations include: rig move operations, £2million per annum; DSV operations, £4.5million per annum, and shuttle loading at FPSOs, £0.25million per annum. Similar orders of savings are likely to be realised in seismic survey, drilling and platform crane operations if the arrival of forecast bad weather can be judged more accurately - although further explicit calculation would be needed in each case to detail the particular range of savings possible. **However estimated total cost savings, including hidden costs are of the order £10million per annum spread over all operators on the UKCS:**

Specific example of cost benefits
A recent and not atypical specific example of savings on one day's operation is shown in the following recent email from a Shell Expro Flight Operations Supervisor who was commenting about the value of METNET (Shell's in house real-time metocean network):

'METNET is a great tool for us when controlling flying operations during adverse weather conditions. A typical example today in the Brent area where the wind speeds had been high overnight resulting in heavy seas during the morning which prohibited flying. We could see and follow the downward trend and timed the departure of the helicopters from Scatsta with confidence which allowed 6 out of 9 scheduled flights to be completed. Without METNET we would not have been able to complete these 2 rotations. This saved us having to find 3+ direct ad-hocs (helicopter flights) @ £18k each = ~£60k savings

Example of hidden costs due to lack of data
Normally, helicopters only take off for an offshore facility when good weather is recorded at the destination as well as the departure point; forecasts are not allowed unless backed up by visual observation by a qualified meteorological observer. Take-offs that are delayed until weather clears at the destination use up air crews' allowable work time and keep passengers waiting unnecessarily, causing considerable frustration and work-related stress. Further, the weather can deteriorate at the destination after take-off; resulting in aborted (diverted) landings. Additional fuel needed for diversions = fewer passengers carried. These additional costs to offshore operations are estimated to be in excess of £2.5million per annum.

Metocean cost savings
If operators collaborated more effectively there would be:

- Reduced maintenance costs of metocean equipment (at fewer stations)
- Standardisation of sensors and a common spares pool
- Standardisation of hardware/software, leading to consistency of data

- Optimal deployment of the more costly sensors
- Potential for streamlined contracts
- Potential for integration of weather forecasts throughout the area

There will be some extra initial costs involved in upgrading instrumentation at some of the key, 80 locations and attaching them to a communications link. These costs will vary from very small, less than £500, where a modern set of sensors already exists to substantial (£30,000 to £70,000) if old, outdated equipment needs to be totally replaced. Where the case is made for expensive sensors (wave, cloud and visibility instruments costing, say, £60,000 or more) at one particular site, this cost could be shared by the collaboration. Based on typical running costs of £15,000 per annum per platform for a measuring station, as indicated in the body of the report, the total costs associated with operating and maintaining the hypothetical 80 stations would be around £1.2million per year by comparison with the current best estimate of £1.8million that is paid directly by UKOOA members.

IN CONCLUSION

Today, there is a considerable infrastructure of fixed and floating production facilities across the UKCS. Measurements made at any one site offer only a limited capability to supplement traditional weather forecasts at that site. In contrast, access to information from a network of surrounding sites will provide an improved view of weather development and enable much better decision making for the large number of weather sensitive operations that are performed every day. Modern sensors and communications technology can make such data available to those taking critical decisions and offer new opportunities for improvements in safety, in operational efficiency and, as a result, in reducing operating costs. There will be a need for initial expenditure to bring some metocean measurement stations up to a modern specification and to ensure that key equipment and essential back-up is available. However, this study strongly suggests that expenditure for running and maintaining an adequate network of sites will be less than is currently made in fulfilling today's imperfect, disjointed requirements while the benefits in improved safety and reduced operating costs will be substantial.

REVIEW TEAM

Ian Leggett	Shell U.K. Exploration and Production	Chair UKOOA Metocean Committee
Sandy Fyfe	PAFA Consulting Engineers	Principal Naval Architect

GLOSSARY

BHAB	British Helicopter Advisory Board
CAA	Civil Aviation Authority
CAP 437	Offshore helicopter landing areas – guidance on standards
DMS/OPNET	Data Management Systems network for communications with offshore platforms
ERRV	Emergency Recovery and Rescue Vessels
HSE	United Kingdom Health and Safety Executive
HSE OSD	United Kingdom Health and Safety Executive Offshore Safety Division
HELIMET	Meteorological data system for helicopters (operated via Muir Matheson)
IMO	International Maritime Organisation
IVLL	Installation Vehicle Landing Limitations
MAWS	Marine automatic weather system (operated by Met Office)
METNET	Metocean measurement system operated by Shell
METOCEAN	Meteorological and oceanographic services utilised on the UKCS in support of oil and gas production activities
NIMROD	System for nowcasting operated by the UK Met Office
NOWCASTING	Detailed short-term weather forecasting, typically hourly up to 6 hours ahead (different systems operated by different companies).
OTR	Offshore Technology Research
SBV	Stand-By Vessel
TAF	Terminal airport forecast
UKCS	United Kingdom Continental Shelf
UKOOA	United Kingdom Offshore Operators Association
WEBMET	Web-based distribution of metocean data operated by Muir Matheson
WOW	Weighting on weather

1. BACKGROUND

1.1 INTRODUCTION

In the early days of North Sea development each new installation was treated as independent in respect of the metocean activities it needed to sustain its operation. Herein metocean activities are taken to comprise:

1. Weather forecasting
2. Measurement of meteorological and oceanographic (metocean) data affecting the transport, supply and operation of an offshore installation
3. Communication of appropriate metocean data to those whose work depends on it
4. Archiving of measured data for operational review or as a basis for future design.

A new offshore oil and gas production platform (or floater) obtained regular weather forecasts for the sector of the North Sea in which it was located and legislation required that it was equipped with its own instrumentation for measuring and reporting the "meteorological and oceanographic (metocean) data" deemed necessary for safe implementation and control of weather-sensitive tasks - such as helicopter movements or lifting operations.

In the present day, with an infrastructure of platforms and support activities across large areas of the UK continental shelf, the 'independent installations' model is questionable. There are many support, transport and supply operations, for example, that could as safely and easily be implemented by accessing forecasts and measurements at existing locations other than at the facility to be visited or by using specific readings from high-cost instrumentation that could not be justified against the operating costs of any single field. However these approaches would imply willingness of asset managers and their associated operating companies to adopt collaborative approaches to their metocean activities.

It is a valid question whether such activities as organised across the UK continental shelf might best be organised independently, on a collaborative basis or in some hybrid fashion.

One can perceive a number of potential benefits to the collaborative approach:

1. Collaboration to maintain a suitably spaced, high-quality network of accurate, real-time measurements throughout the North Sea area and at coastal locations could significantly improve the accuracy and resolution of forecasts in many locations. Forecasts depend on the availability of a wide range of data rather than just the measurements at the site where the forecast is required;
2. At any particular site, weather measurements from surrounding platforms may give important, timely indications of changes that are not totally resolved by standard weather forecasts, thereby improving decision making and allowing operations to be suspended in good order before a weather change hits;
3. Some measuring instruments (such as cloud and visibility sensors, subsea current meters or wave buoys) are expensive and difficult to justify on the basis of each separate platform. Such sensors would be more affordable as a shared resource and could improve control of helicopter, supply boat and shuttle loading operations throughout an area of sea;
4. Satellite views of cloud and fog locations might be affordable to a consortium but not to one operator acting alone.
5. It should not be necessary to maintain full sets of the same standard instrumentation on all platforms especially when several are within close proximity.
6. Calibration, maintenance and repair of metocean sensors could benefit from sharing a common pool of spares;
7. Radio relays on intermediate platforms could transmit weather forecast information for Aberdeen airport into the more remote areas allowing helicopter

pilots to plan their return flights more accurately and hence carry increased payload instead of larger fuel reserves;

8. Sharing data across the UK Continental Shelf would also maximise the accumulation of statistical data that would be needed for design of new facilities;

to name but a few. In general, removal of unnecessary duplication and better organisation of offshore maintenance and repair visits for service, repair or calibration would reduce costs. Also a more controlled use of resources and deployment of appropriate instruments where they were needed could increase the value of the data to a range of operations. Reduced costs and better value could be derived simultaneously.

A previous study (reference 1) for the United Kingdom Health and Safety Executive (HSE) found that current goal setting legislation allows operators some lee-way in respect of how they "*make arrangements for the collection and keeping of ... such meteorological and oceanographic information ... for securing ... the safe operation of the installation and the safety of persons on or near it*." Within this legislative framework, a collaborative approach appears feasible.

Reference 1 also observed that, collectively, UKOOA members are already funding a large exercise to obtain metocean data but neither they nor others using the data are in a position to take full advantage of their efforts. Some offshore installation managers (who are responsible for each 'independent installation') and one or two operators (with more than one platform) have invested in keeping their measuring equipment in calibration and up-to-date. However this effort is disjointed and some existing measurements are suspect. Those who should benefit (helicopter pilots, supply boat captains and shuttle tanker masters, for example) are distrustful of data reported to them from an offshore facility and prefer to measure and interpret their own instruments and eyesight although in many cases a platform provides a better foundation for sensors. Some instrumentation is old, and some has been affected by the re-configuration of platform topsides. Whereas instruments on neighbouring platforms could be examined to check for spurious signals, this option is seldom readily available. Further, where modern equipment could be remotely monitored for calibration deterioration, this is seldom practicable with original (historic) instruments.

Presently metocean data gathering costs operators a substantial amount (see the following) but it is fragmented in such a manner that operators do not derive the full benefit from their investment and the work that is carried out on their behalf.

Against this background, the UKOOA metocean committee has proposed an initiative to consider a collaborative approach. The HSE, following on from the observations of reference 1, were keen to see the work followed up by the offshore industry. As a result, UKOOA implemented this study with funding split 50:50 between UKOOA and the HSE and this report summarises the findings.

1.2 REMIT AND FORMAT OF STUDY

The remit of this initiative, was to prepare and present a high-level business case for a shared/collaborative approach to metocean activities across the United Kingdom Continental Shelf (UKCS). To do so, it was felt necessary to build up an appreciation of the main technical and commercial factors affecting them. Key stakeholders who provide metocean data to the industry or who rely on these activities for the safe and efficient performance of their work have been identified. Through a process of discussion, the study team has sought to identify:

1. the whole spectrum of interests for UKOOA members
2. key features that must survive any re-organisation of the status quo.
3. where significant improvements could be made
4. how improvements might be realised.

It was recognised at the outset that each operator might have different opinions and assign different priorities depending on their size, the numbers and locations of their offshore facilities and the scale of their operation on the UKCS. Operators might wish to provide data directly or by reference to their main subcontractors. In any event, each UKOOA member was asked to nominate a representative to the study who could:

1. act as a focal point for communications and discussion with the project
2. co-ordinate any internal data collection on behalf of the project
3. provide authorisation to subcontractors to talk directly and openly with the study team.

The interaction between the study team and UKOOA members is described in more detail in section 1.3 below.

The UK Health and Safety Executive provided the study with a spreadsheet that contains their latest list of all oil and gas production facilities on the UKCS, their locations and their operators/duty-holders. The spreadsheet also identifies most of the active drilling rigs, jack-ups, semisubmersible support units, diving service vessels and other vessels providing support to the oil and gas exploration and production activities. Some improvements were made by cross-reference to other data (such as that held by the British Helicopter Advisory Board) but it is difficult to keep any such list 100% up-to-date because of changes of ownership, oil company mergers, relocation of mobile units, installation of new facilities and removal of old. However, although perhaps only a snap shot at one point in time, the list is reasonably accurate and representative of the total numbers of facilities and the scale of current activities on the UKCS in the period 2001-2002.

This study has been implemented by the combined efforts of Ian Leggett (Chairman of UKOOA Metocean Committee and Head of Metocean Services within Shell U. K. Ltd.) and A J Fyfe (P A F A Consulting Engineers).

Shell U.K. Ltd have integrated and organised their own metocean activities in a centralised manner such that data collected on their offshore installations is available at shore to assist in decision making and to provide co-ordination (and quality control) of the information across the company. Ian Leggett brought the experience of the transition from independent to co-ordinated operation within Shell to the present study. Sandy Fyfe implemented the study that led to reference 1 and as such brings a wide appreciation of many of the weather sensitive operations that rely on these data.

The study team has held detailed discussions with UKOOA members, their representatives and their subcontractors to gain an overview of technical details and cost information about present-day arrangements. As will become evident, the study revealed that very few, if any individuals have an accurate view of total budgets and expenditure across all of these metocean activities even within one oil company.

1.3 UKOOA AND HSE INVOLVEMENT

All UKOOA members were approached by UKOOA management at the outset of this study to nominate representatives to interact with the study team and to provide authorisation to their subcontractors to discuss both technical and commercial aspects of their metocean activities. Copies of these letters are contained in Appendix A.

After much persuasion by the study team, 15 replies were received signing up to involvement and participation. The 15 participating members and their nominees are identified in Table 1. Comparing this list with a summary of the facilities and operators in the data supplied by the HSE, Table 2, reveals that the 15 participants represent 18 operators/operator groupings out of a total of 30 working on the UKCS at the time. The active participants operate 234 out of the total 275 production facilities identified in the HSE list. Most of the operators who did not participate fully are companies with fewer than three facilities.

The largest 'hole' in the project's coverage of the industry lies in the Liverpool Bay/Irish Sea area. Neither of the two companies that operate 18 or so facilities in this area signed up to the study although discussions were held with both. One of these companies did participate in a related workshop that was held in Aberdeen in February 2002 but otherwise there has been relatively little input related to metocean activities in this geographical area.

On the one hand it is encouraging that the operators involved with the study represent 85% of all facilities on the UKCS. However, despite the endorsement that was received by management and the UKOOA Offshore Technology Committee at the outset, it took considerable time for all 15 operators to sign up and return their authorisation letters. Persuading companies that it was in their interests to participate used up project resources and delayed data gathering from the subcontractors. It is also of concern that 12 operators/operator groups have still not shown any interest.

Throughout the project, various attempts were made to organise meetings, to discuss findings, to demonstrate new forecasting and data display systems and obtain guidance from operators about their own specific requirements and preferences. At no time was it possible to schedule a meeting that was attended by more than three or four representatives. Typically three meetings would have to be arranged to get a message out to the majority of representatives.
Meetings with subcontractors (identified below) were more productive and the major metocean subcontractors have provided valuable input to the study. However, subcontractors were, quite rightly, reticent about discussing their clients' data unless they had been given permission to do so. Further, it transpires that many contacts between offshore operators and the main suppliers and subcontractors are via intermediaries rather than direct and consequently, it is difficult to trace all data relevant to all offshore installations.

HSE inspectors provided good advice based on their experience of inspection and monitoring of developments in safety requirements within the industry. Malcolm Birkinshaw provided information based on his experience with metocean data gathering for monitoring operations and design. William Quinn provided comments on helicopter and small boat operations but also guided the study team to appropriate contacts within the CAA who have responsibility for monitoring air safety, including helicopter flights to all offshore destinations. Graham Morrison, who is based in the Aberdeen office of the HSE, attended several meetings between the study team, offshore operators, helicopter pilots, the CAA and some of the metocean contractors. He gave his interpretation of HSE requirements as they affect many offshore operations especially with regard to application of safety requirements in areas of developing technology.

1.4 CONTRACTORS

Several contractors specialise in the provision of metocean support services and measurement systems – see below – but there are yet more independent manufacturers that sell specific meteorological and oceanographic sensors and associated instruments to a wider market than the offshore industry. In general, costs of metocean services and instrumentation are low in comparison to other topsides operating and processing activities and so responsibility for maintenance and supply may be devolved to a larger contractor through a general topside servicing agreement (or even through a catering contract in one case). Some of the larger contractors (Haliburton, AMEC, communications providers or similar) have the cability to tackle maintenance, repair and replacement of metocean equipment themselves by direct approach to instrument manufacturers. Others will further subcontract this work to one of the recognised specialised contractors or to some smaller support company. Major contracts may be specific to each operating platform or floater and the holder of the subcontract to deal with the metocean activities may not be obvious. Consequently, it can be difficult for an operator's shore base (let alone any outsider) to know how metocean equipment or services are being provided to all of their offshore facilities at any one time.

When the study was initiated, five contractors were identified whose main contribution relates to metocean activities and the UK-based offshore industry. These are:

1. Fugro Geos (through their offices in Southampton and Swindon).
2. The Met Office (through their head quarters in the South of England and the Aberdeen Weather Centre).
3. Muir Matheson (from their base just West of Aberdeen).
4. OceanRoutes (through their Aberdeen office).
5. Installocean (based in Hampshire).

There are several other companies who make substantial contributions to specific operations in other geographical areas. The Meteorological Offices of neighbouring countries such as Denmark and Norway, Noble Denton, Nowcasting International (based in Eire) and Meteoconsult (based in the Netherlands) make specific contributions but play a smaller, less general role in oil and gas activities on the UKCS.

The project team has consulted all five of the large subcontractors and several of the smaller organisations have also given input. However, as this report was being drafted it was being reported that Fugro Geos have taken over Installocean and the marine weather forecasting and marine route-planning arm of Noble Denton thereby reducing the number of medium/large independent subcontractors to four.

1.5 HELICOPTER OPERATORS

All helicopter pilots make extensive use of metocean data to reduce risk and enhance the safety of their operations. Helicopter flights are responsible for the majority of personnel transfers between shore and manned production facilities. Two helicopter companies, Bristows and Scotia provide most offshore flights and both were consulted during this study.

As already mentioned, regulation and safety of helicopter operations are the concerns of the Civil Aviation Authority. In addition, the British Helicopter Advisory Board makes an important contribution to offshore safety by provision of advice/guidance to operators and organising a programme of inspection of offshore helicopter landing facilities. The BHAB maintain a current database of Installation/Vessel Landing Limitations (IVLLs) for each offshore helideck detailing any limitations that might affect helicopter landing at any site. The study team made a point of discussing all proposals affecting helicopter operations with the BHAB and has used the IVLL list as a check of the numbers of facilities that are accessed by helicopter and those that are not. Whereas the HSE list of offshore facilities includes all oil and gas related structures, whether or not they are interconnected and whether or not they have separate helicopter access, the BHAB IVLLs apply to all offshore helicopter facilities (not only oil and gas platforms).

1.6 GENERAL COMMENT

The range of offshore operations that are affected by weather, and hence needing to be considered in this study, is wider than one might at first suppose. Many support operations are weather sensitive or rely on back-up that can only function safely under limited wave, wind, atmospheric or current conditions. Many operations are limited by wave height because, should an employee fall into the sea, there must be some reasonable prospect that he can be recovered. Many operations are limited therefore to sea conditions in which an emergency rescue vessel can operate. Most offshore companies implement adverse weather policies to provide staff with guidance about conditions under which weather-sensitive operations can be performed. Planning and control within adverse weather policies rely on weather forecasts and accurate measurement or assessment of meteorological and oceanographic parameters. Long-term statistical properties of metocean data are also required for design, continued monitoring of adequacy of design assumptions and strategic planning/scheduling of marine operation, maintenance and repair tasks.

Many experiences of the project team led them to conclude that effort in support of metocean activities is fragmented among the operators, their contractors and their subcontractors. Despite the fact that many day-to-day decisions rely on accurate forecasting and measurement of metocean data for safe and efficient offshore operations, it is difficult to pin down anyone with clear, central responsibility. Operational decisions tend to be made offshore and, for most companies, responsibility for this resource is devolved to more-or-less independent offshore operations teams for each separate facility. In general, costs of metocean instrumentation and activities are low in comparison with other topsides operating and processing activities and so responsibility may be further devolved through another contractor. Some companies rely heavily on contractors and their subcontractors to set standards and comply with relevant regulations in this area. Others take more centralised control. Against this background, it is difficult for a central budgeting or management department to have a proper appreciation of the cost of metocean activities or their value to the company's operations.

1.7 GUIDE TO REPORT

Section 2 identifies some of the key stakeholders and their interests. These include UKOOA members; contractors who provide metocean services; helicopter companies, their pilots and the CAA; those engaged in any weather-sensitive operation and the UK Health and Safety Executive. Section 3 identifies various routes of expenditure on metocean services across the UKCS and makes an estimate of the current annual total sums involved. A specific form of collaborative approach is described in section 4 together with some of the issues arising while section 5 provides some top-level estimates of the savings that might be realised. Various ways of introducing a collaborative approach are discussed in section 6 together with a recommended way forward that is based partially on logic but also on the experiences of the authors in implementing this study.

2 DISCUSSIONS WITH KEY STAKEHOLDERS

2.1 UKOOA MEMBERS

It had been planned to hold some large meetings and/or workshops with UKOOA members to acquaint representatives with project progress, to demonstrate emerging advances in metocean data services and presentation techniques and to solicit opinions on key issues as they arose. However, despite strenuous efforts by the project team, this proved impractical for a number of reasons and it became necessary to hold smaller gatherings and a number of one-to-one meetings during the course of the project. Most member's representatives were consulted and took part in relevant discussions but since these meetings were spread over a significant portion of the available schedule no two meetings will have been the same and it is only the project team that are conversant with all the issues that arose.

Shell Exploration and Production (UK) Ltd, have already centralised the control of their forecast and metocean data collection requirements so that it is possible to see both forecast and real-time data from approximately 20 of their offshore facilities from anywhere on their in-house computer system. This is a small-scale example/demonstration of one of the forms that might emerge from a collaborative approach and it was thought appropriate to demonstrate this to other representatives so that they could gain an appreciation of the type of service being discussed.

It became evident from those representatives who did participate that metocean services are organised very differently by different operators. A few organise their forecasting, measurement and archiving centrally but most handle each aspect separately. Responsibility is often devolved further to separate offshore installation managers for each platform and these managers may provide some of the services through their own staff while placing external subcontracts for others. In many cases, servicing of metocean instruments tends to be carried out by platform-based service engineers with occasional contracts being placed with one of the specialist contractors for calibration, review and replacement of instruments.

Timely forecast delivery to those affected by it is an important issue. One operator switched to a web-based delivery service from his forecast provider when he realised that internal distribution of paper and faxes to his offshore sites and throughout his offices was costing him more than the original forecasting service.

Those operators with a central organisation of metocean services had an overall appreciation of their total direct costs, but few had any appreciation of the level of indirect charges incurred through other subcontractors. Unless these services were paid for centrally, it was difficult for head office and the members' nominated representatives to appreciate the overall cost to his company. It seemed particularly difficult to assess total cost when the operator relied heavily on floating and subsea production. In these cases the costs for some or all metocean activities might (or might not) be charged as part of the day rate for the floater or a service vessel and could easily be hidden among other operating costs.

Technically few company representatives had any appreciation of the status of offshore metocean instrumentation across all assets. One of the representatives was unaware that particular measurements and heave/pitch/roll monitoring equipment are needed to operate helicopters to a semisubmersible production facility even though his company did operate one. He assumed that the mariners on the semisubmersible dealt with these issues. In this particular case it was unclear who carried the initial costs of this equipment and how the on-going maintenance and calibration costs were carried (either directly or indirectly) by the operator.

In general, all who participated were in agreement with the objectives of the study and appreciated the opportunity to discuss the issues and see the types of system that might be

available. There was agreement that substantial improvements were possible (by comparison with present-day arrangements) but there was also some hesitation about the extent of re-organisation that might be required to realise these improvements. This was a particular concern for companies with only small numbers of offshore installations. Clearly, participation in any form of collaborative arrangement will need to cater for a range of different companies with many different levels of involvement on the UKCS.
The following is a list of some of the interests and concerns raised by UKOOA members

1 There was concern that committing to one large, collaborative service might be too restrictive and would ultimately reduce the number of metocean subcontractors - and thereby risk creating a monopoly situation. Proposals for a collaborative approach need to be sensitive to "cartel" issues.
2 Several members thought that one way to avoid cartel issues would be for UKOOA (or whichever body was established to introduce the collaborative approach) to set up relevant standards and allow any company to participate provided it met them. However, if UKOOA is to get the best out of negotiations with the metocean subcontractors, this presupposes knowledgeable staff with an appreciation of the requirements. Various standards might be necessary for forecast delivery, instrumentation purchase and logging of data etc., and the standards would need to be reviewed frequently to prevent them becoming a barrier to innovation. However collaboration might be arranged, consideration of standards would be one issue that should be addressed as part of the new set-up.
3 A fair and equitable way of sharing costs will need to be devised that differentiates between large and small companies, between those with a small or large number of facilities in one sector of the UKCS and between those with facilities spread across several sectors of the UKCS.
4 Funding by sector or through a "sector-club" organisation was suggested. Typically, this might imply that one operator in each sector, perhaps the one with the largest representation, might take the lead in organising collaboration within that sector. It might be expected that there would be between 6 and 8 different sectors spanning the UKCS. This might have the benefit of encouraging competition among subcontractors. It would also allow different solutions to be developed depending on the particular technical details of the requirements for each sector. It was also recognised that this might generate difficulties for companies spanning several sectors and prevent the development of appropriate common standards, making this an overall scheme less cost-effective solution.
5 A collaborative approach may allow substantial savings to be made in developing a common spares-pool and in better organisation of offshore calibration and maintenance visits.
6 Collaboration would also significantly increase the purchasing pool and could allow instrument suppliers the possibility of developing instruments to meet specific offshore oil and gas requirements. For example, modern sensors with low servicing requirements could be developed for inherently save use in hazardous areas.
7 One large operator has demonstrated that metocean measurement data from offshore platforms can be brought to shore via existing communications channels and that the modifications needed to do so are minimal and low-cost in many cases.
8 Several representatives felt that it might be difficult for them to put together an internal business case for collaboration especially where internal budgets for these activities were held and/or shared by so many different people. They felt that they lacked the information to assess current costs, the up-keep and maintenance costs and the cost benefits that might accrue from the collaboration.

2.2 KEY METOCEAN CONTRACTORS

All five of the main metocean contractors identified in Section 1.4 co-operated with the study although all were very cautious about discussing their clients' metocean systems and data until they had been given clear instructions to do so. Even then, some were reluctant to provide detailed cost data that might allow a competitor to undercut their service to any particular client. As a result, contractors' cost data presented in this report, see section 3 following, has been generalised to present cost data in an anonymous, 'overview' format rather than one that could be traced to each contractor/client pair.

Although all metocean contractors were supportive of the ideas of a collaborative approach, they were somewhat apprehensive that the letting of large contracts for any particular aspect of metocean activities could be used to drive down prices to unrealistic levels and cause some companies to go out of business. They are also concerned, particularly in the forecasting area, that oil companies may develop unrealistic expectations that they can reduce the costs of their forecasts by placing larger contracts. Presently, similar forecasts are sold several times to a multitude of oil companies and marine contractors at relatively low prices. The costs of producing forecasts and maintaining an infrastructure of experts and advice to support them is such that multiple sales are necessary to cover them at today's prices. Reducing the forecast requirement to one for the entire UKCS or to between 6 and 8, one for each major sector, will have the effect of substantially increasing the unit costs of the forecasts to support the forecasting industry as a whole. Overall there may be little or no reduction in total cost of all the forecasting services.

Offshore measurement stations

Fugro Geos Ltd. is a large company with widespread international interests that has been responsible for developing, procuring, and setting up many metocean measuring systems around the UKCS. It can supply standard weather monitoring systems or design and deploy specific equipment for measurement of wind, wave or current parameters over short or long periods. It has particular expertise in managing and maintaining quality checks on metocean data gathering projects (for Shell's METNET gathering data from 20 platforms throughout the North Sea, for example) and can produce data summary analyses and reports in support of operational statistics or new design projects. They retain a large database of historical data from early measurements around the UK and this database can be supplemented with specific measurements from new sites to prepare design-bases for new projects.

Fugro Geos operate instrument testing and calibration programmes to compare long-term performance of new and old instrumentation systems. They believe that more modern instruments, for wind speed measurement, for example, offer many potential advantages such as remote monitoring of continuing accuracy/functionality and reduced maintenance costs. However, special versions of these instruments need to be developed that are inherently safe in a hazardous environment if they are to be deployed on operational production platforms. Fugro commented that no one company had the necessary supply requirement to allow the instrument manufacturers to undertake the necessary development. A collaborative scheme working over the UKCS might offer the manufacturers a large enough market to undertake the development.

With their involvement in the development of Shell's METNET system and their access to legacy historic data from around the UK, Fugro Geos are aware of the many benefits that could flow from a collaborative approach to metocean data measurement, collection and archiving.

Muir Matheson Ltd., have supplied a number of metocean data gathering systems around the UKCS. They have particular interests in data that is specifically formatted to support helicopter operations both offshore and at various airfields. They also hold extensive, central records of all of the metocean instrumentation systems that they have supplied or have serviced. These records refer to the majority of the existing offshore facilities on the UKCS since Muir Matheson are frequently called upon to provide maintenance and calibration visits. A systematic presentation of these data is made in appendix B. From this list it is possible to see those offshore production facilities that have good-quality sensors that have been calibrated, maintained or updated recently and whether the instrumentation package contains extra measurements above the basic minimum needed to support helicopter operation. Unfortunately, the list cannot show systems that have been supplied or serviced recently by one of their competitors. It is also possible that a larger topsides services contractor could have purchases a system from Muir Matheson and fitted it to a platform without informing Muir Matheson about its ultimate destination.

Muir Matheson maintain a HELIMET system, a collection of real-time offshore data from a few operators (some live and some by dial-up modem link) that is vetted by the UK Met Office and made available directly to helicopter companies and pilots. They have experience of supplying instrumentation and support services to airfields and feel that some of the training and services that they supply for on-shore sites could usefully be adapted to offshore helicopter operations. For example, weather data for approaching helicopters can be broadcast as voice signals, thus presenting data in a more accessible form for the pilot.

In the course of this study, Muir Matheson have responded to the UKOOA collaboration initiative by identifying that part of the market that they feel most capable of developing in a collaborative manner on their own. They have launched a proposal together with Data Marine Services (a communications company that has established a data network – OpNet - embracing many operators on the UKCS) to develop a scheme that would share available high-quality, real-time data amongst participating operators. Companies joining the scheme undertake to contribute data from their own on-board measurement systems, maintained to an agreed standard. Muir Matheson arrange for the measurements to be connected to the DMS communications network and to monitor the quality of the incoming data. They intend to develop web-browser software that will enable all participants to access all the real-time metocean data available to the network. The data would also lead to an expansion of the HELIMET system. Muir Matheson have identified some obvious 'holes' in the coverage of the shared data in the Piper/Claymore and North Alwyn/Dunbar areas of the North Sea and they would like to persuade operators in these areas to install appropriate measurement systems and join in the collaboration.

Installocean Ltd. is the third major supplier of metocean measuring systems on the UKCS. Historically, it has provided weather monitoring systems to a number of fixed platforms and it is still retained by some operators to update and calibrate their instrumentation and data logging systems. Installocean has also provided weather and motion monitoring systems to a number of mobile drilling rigs. As a result it is particularly well placed to provide the additional motion monitoring systems that are required when helicopters operate to floating vessels, such as diving service vessels, semisubmersibles, and ship-shaped production units (floating production, storage and offloading vessels, FPSOs and floating storage units, FSUs). Installocean provides equipment to many owners/operators of floating production systems and also provides advice to the British Helicopters Advisory Board in dealing with the requirements of floating systems. It supplies metocean equipment and support services to some of the larger contractors that are engaged to provide more general topsides maintenance.

Installocean assisted Shell in developing the internal requirement for bringing Shell's weather measurement and monitoring systems to a common standard across the majority of its offshore installations thereby making the current METNET system feasible. As a result Installocean is well aware of the benefits that collaboration among offshore operators might bring.

Weather forecasting

The United Kingdom Meteorological Office is the largest and perhaps most important provider of forecasting services for the whole of the UK and the waters of the UKCS. It has contributed to the development of some of the most sophisticated physical models for world-wide weather and the refinements necessary to use these models for detailed weather prediction in specific areas, particularly for the British Isles and the land and sea areas around North West Europe. In addition to standard forecasting parameters such as temperature, pressure, wind and precipitation, subsidiary models and software have been developed and are used regularly to predict a range of atmospheric and oceanographic parameters - occurrence of lightening and forecast of wave heights, for example.

The Met Office organises and vets the massive, regular collection of data required as input to the computer programs that run the main and subsidiary models of atmosphere and ocean to generate twice-daily predictions that are interpreted as detailed weather information by forecasters. Substantial efforts are made to incorporate incoming and forecast data into appropriate displays to allow forecasters to assimilate all the information and interpret the detail and refinement expected in the forecast of particular weather conditions that can have an effect on the life and work of those receiving the forecasts. The offshore community is only one of the Met Office's many customers.

Display of multiple types of weather/atmospheric data is also an important aspect of forecast delivery services since it can allow clients to interpret several different types of data in terms of the decisions that are important to their particular operations. This is particularly true of data supplied to the offshore community, where the latest satellite image of cloud cover or the predicted wind speeds and wave heights for the next few days may be of particular importance to some weather sensitive operations. The Met Office continues to develop methods of forecast display and delivery for many metocean/atmospheric parameters that can be used more effectively with the new computer display and data communications technologies available to businesses.

As part of its data gathering exercise, the Met Office operate a network of marine automatic weather stations (MAWS) in the waters around the UK consisting of approximately 20 buoys, lightships and automated island data gathering stations. These and a number of offshore installations provide hourly input to the meteorological database where they can also be accessed for weather monitoring and forecasting activities. Table 5 contains a list of the input data sources from offshore and the MAWS network that would normally provide input to the computer runs of the weather models.

Another important activity of the Met Office relates to archiving of measured and forecast data. These archives are used by the Met Office to trial and develop a range of forecasting services. They can be used to assess how availability of particular modelling improvements or items of data might have changed (improved, one assumes) the forecast predictions before decisions are taken whether or not to incorporate new data sources or improved models into future model runs.

The Met Office is organised into both public service and commercial roles. The public service, which is ultimately responsible to the Ministry of Defence supports a large part of the data gathering and development necessary to run the computer models. The various commercial arms sell detailed general or particular interpretations of the output data as forecasts and appropriate displays of forecast and measured data to meet each client's needs.

Although data gathering is an important aspect of the Met Office's activities and it does issue accurate instrumentation to allow offshore staff to provide regular input to the data collection effort, it does not have any significant commercial role in the supply of weather monitoring systems to the offshore community.

The Aberdeen weather centre plays an important role in the delivery of commercial forecasting activity to the offshore community. It has assisted the UKOOA initiative both in providing an understanding of how the forecasting services are provided to offshore operators and in contacts with the operation of the public service that lies behind the forecasts. Peter Buchanan, general manager of the Aberdeen Weather Centre, has participated in several discussion meetings, with the helicopter pilots, for example (see following) where it was felt important to have an accurately knowledge of how current forecasting is used or might be developed.

Table 6 is a list of those offshore operators that use the Aberdeen Weather Centre to provide regular weather forecasts, the types of service provided (routine, in support of towing operations, web-based, brief and telephone) and the nature of the commercial arrangements with them.

The Weather Centre also provides forecasting services to a range of other companies working offshore, such as maintenance contractors, diver support vessel owners, drilling rig owners, seismic companies etc. It is evident from the commercial information summarised in the next section that direct contracts with offshore operators only represent a fraction of the Weather Centre's offshore market. Some offshore companies operate a policy of requesting two different weather forecasts for particularly weather sensitive operations. Often the Met Office will be approached to provide such forecasts by a company that may well receive its regular data from another provider.

The Met Office also provides weather information for control of aircraft movement around the UK. This includes, in particular, forecasting and vetting of data used by the helicopter companies that provide the main source of transport to and from offshore platforms and other facilities.

OceanRoutes is the other major player in the provision of forecasts and similar services on the UKCS. In this case, however, commercial forecasts are based on, computer output from other national weather models (that are freely available) together with access to World Meteorological Organisation data that are freely interchanged between forecasting bodies. Much of the basic data collected by the UK Met Office (for example, the hourly data available from the sources listed in table 5) are also available by this route. Table 7 shows OceanRoutes' main UKOOA client list together with an indication of the different levels of forecast provided to them.

Nowcasting, Nimrod and other forecasting services/developments

Nowcasting is a term used by forecasters to describe short-term weather forecasts, typically hourly for a period of six hours ahead. An accurate, reliable nowcasting service could be immensely valuable for planning and implementation of many offshore activities, particularly supply boat and helicopter movements. At its most basic, many operations depend on an accurate knowledge of whether the weather conditions are liable to improve or deteriorate over the following few hours so that decisions can be taken accordingly.

There are at least two ways of doing this. One method would rely on accurate, general forecast output for the location of interest and based as much as possible on accurate input and trends. The other would be to look at actual weather at surrounding sites, together with an appreciation of how these may develop and affect weather conditions at the point of interest. An experienced mariner given access to appropriate data could attempt either method. The Danish meteorological forecasting model is run on a 6-hourly cycle, twice as frequent as most meteorological models and might allow a reasonable implementation of the first approach. Nowcasting International is a commercial organisation based in Eire that sells a specific type of forecast delivery for specified geographical locations based on the output from the Danish Meteorological predictions. If metocean data from offshore sites were shared and accessible to others in the area, then a mariner might prefer to implement the second approach by keeping a look out for symptoms of change up-wind of his own location.

One of the problems associated with developing a better nowcasting service is to ensure that adequately-detailed, good-quality meteorological data can be fed into the forecasting process reliably and in good time. If accurate, real-time data were available for a network of locations throughout a region such as the North Sea and surrounding coastal stations, then a more advanced nowcasting system could be established. This is the methodology underlying the nowcasting system run by the UK Met Office, known as Nimrod. Input data to Nimrod include satellite and radar data, synoptic observations and numerical predictions. These are integrated to produce analyses that are the basis of forecasts up to six hours ahead. Nimrod has been operational since 1995 (reference 2) and its range of specific forecasting products is continuing to expand. It is highly likely that it could be made more specific to the requirements of offshore forecasting for a modest outlay if it also had a network of offshore measurements added to its input.

Several other companies provide forecasts to UKOOA members and associated offshore contractors. Meteoconsult is a Dutch company with a close relationship with Muir Matheson that provides forecasts to Exxon/Mobil. Noble Denton provides special forecasts that are normally used in association with particular marine operations such as barge tows. Nowcasting International provides data to ferry operators and is currently trying to expand its client base to offshore operators and owners of offshore support vessels.

2.3 HELICOPTER COMPANIES, THE CAA AND THE BHAB

Two helicopter operators, Bristow Helicopters and Scotia, are responsible for the majority of offshore helicopter traffic around the UKCS. The CAA is the relevant regulator for the industry and The BHAB, or to be more precise, the Offshore Helideck Sub-committee of that body, co-ordinates a process of approving helidecks for offshore operation. The BHAB publishes the Installation/Vessels Limitations List (IVLL) which contains details of all known helidecks together with any operator-agreed limitations applied to specific helidecks in order to compensate for failings or deficiencies so that the safety of flights is not compromised.

After an initial discussion with Adrian Thomas, chief pilot for Bristow and chairman of the BHAB, several discussions were held with representatives of the helicopter pilots, the CAA and the BHAB. Notes of these discussions were circulated for comment and review and are contained in Appendix C, following.

All those who participated in the meetings appreciated that substantial benefits might be gained by collaboration.

The BHAB appreciate that some of the facilities they would wish to see introduced to improve flight safety and efficiency throughout the North Sea area might be possible in a collaborative framework, but not one in which each and every offshore operator guards only his own interests. There is a need for some automatic weather stations in few key locations to allow flights passing over these locations to be organised more effectively. Also, offshore platforms that are only a moderate distance from Aberdeen could assist by relaying weather forecast data issued in Aberdeen to the more remote platforms. This would enable pilots on return flights to Aberdeen to improve their flight planning and thereby carry greater payload and less reserve fuel.

At the moment, all offshore platforms carry a set of metocean sensors as a support for helicopter operations. However, it is clear from some of the feedback received in reference 1 that there is scepticism about the accuracy of the data that is provided by platform staff to approaching helicopters. In a collaborative situation, emphasis would be put on establishing a managed network of high-quality, reliable sites in suitable locations to provide data for all platforms rather than ensuring that a barely adequate system was in place on each and every platform. Experience with the managed network would be expected to define requirements for expansion of the network. In some cases it might become evident that a higher density of sites would be an effective improvement while in others acquisition of a specific instrument such as a cloud and visibility sensor might take precedence over upgrading any set of standard measurements.

One of the key areas identified as in need of improvement (by the pilots) concerns offshore forecasting for helicopter operations. Currently, automated readings are not accepted as adequate for producing Terminal Airport Forecasts (TAFs) for offshore locations. As a result, helicopters flying to offshore locations do not receive forecasts for their destinations (In this respect offshore helicopter operations are different from all other aircraft operations where a forecast for the destination is a requirement prior to take-off). As a result, either helicopters may not take off until favourable conditions are reported from their offshore destinations, or the pilot must ensure he carries extra fuel to compensate for the additional uncertainty in the weather both at the destination and along the route.

If the first approach is adopted, the helicopter may be held on the ground even when a forecast might have allowed flight clearance to a site with 'improving' weather. According to information given by the pilots, at some times of year, in particularly weather conditions, this is the chosen mode of operation adopted for routine flights out of Aberdeen (where a number of full-capacity, routine flights are needed for offshore crew changes). Only after satisfactory weather is reported is the helicopter allowed to take off and then, the pilot must make the judgement concerning whether the weather is liable to close in again before the flight reaches its destination.

The second approach would be to carry extra fuel and accept the resulting payload reductions. When this approach is adopted then a few passengers are left behind to take a later (extra?) flight. Wide spread adoption of this procedure at busy times would lead to increased flight numbers and the associated increased costs.

One of the objectives of introducing a managed network of metocean measuring stations must be to improve the offshore data to an extent that they can be made acceptable for preparing offshore terminal approach forecasts thereby allowing flights to proceed on the basis of a forecast rather than on actual weather.

2.4 OTHERS ENGAGED IN WEATHER SENSITIVE OPERATIONS

Most of the comments regarding more general weather-sensitive marine operations in this study were made by oil company representatives who may have served some time on supply boats or were responsible, in some internal capacity, for movement of drilling rigs. A wider discussion with this section of the industry is reported in reference 1. However, it is evident that marine supply and logistics organisation, shuttle tanker off-loading and movement of drilling rigs are strongly affected by weather and an attempt has been made in later sections to assess how improved metocean services might reduce delay and hence costs.

Most such operations receive weather forecast data in some form or other, sometimes courtesy of a UKOOA member and other times by direct purchase of the appropriate forecast from one of the companies named above. Most marine operations are highly complex and weather information may not be the best guide as to whether an operation may proceed or must be curtailed or postponed. However, it is clear that the forecast data is often a key input to critical decisions. Some owners of diving support vessels are engaged in the evaluation of some of the more advanced "nowcasting" services that are currently available to find out whether they provide any better means of reducing the amount of time that they have to spend waiting-on-weather (WOW).

Most boats and tankers carry their own equipment for measuring wind and wave conditions but these arrangements are seldom the best for taking accurate readings particularly if they are in close proximity to some other structure. The captain must be particularly alert to changes in the direction of the predominant loading in case he is forced into weather-side working. In this situation, the captain may look to a nearby platform for better measurement data. However this may not give ideal input since the measurements will usually have come from an instrument high on the superstructure, not necessarily at an elevation relevant to an attendant boat.

One operator commented that making key decisions about critical rig movement operations was much easier when he had available real-time metocean readings from surrounding platforms to supplement weather forecast information. This type of information is only available when measurements taken on the surrounding platforms are readily accessible. Currently it can only be done in very few locations and when working for, at most, one or two specific operators.

2.5 UK HEALTH AND SAFETY EXECUTIVE

The UK Health and Safety Executive is keen that the offshore industry makes use of new technology wherever it can lead to improved safety. Its interest in this particular area stems from a realisation that better instrumentation, communications and computer technology are now available than were possible when developments in the North Sea began. Better measurement data and communication of that data to those making critical decisions ought to be capable of reducing the risks associated with many weather-sensitive operations and the HSE is keen to see the offshore industry make progress in this area. This is one of the driving reasons why the HSE provided 50% of the funding for this study. The HSE also realise that an offshore infrastructure has developed that may allow problems to be tackled in a different way. Under existing regulations there is a requirement on all those involved in weather sensitive operations to communicate and make risk assessments on the basis of the best available data. Collaboration at all levels may help avoid unnecessary accidents.

2.6 GENERAL CONCLUSION

None of those consulted had any disagreement with the overall objective to adopt a collaborative approach to metocean activities. There was broad acknowledgement that improvements ought to be possible. Nevertheless, there were concerns among the metocean contractors and operators alike that unless an appropriate structure was adopted, some companies might be seriously affected and a reduction in competition might be the outcome.

3.0 CURRENT UKOOA EXPENDITURE ON METOCEAN ACTIVITIES

3.1 INTRODUCTION

Due to the diverse arrangements whereby UKOOA members contract for the provision of their metocean services and the problems associated with getting everyone signed up during the early stages of this project, it proved impossible to assemble member's cost data to any common format. All the main metocean subcontractors provided cost data, eventually, and these data are presented below. Some typical cost figures were also provided by some of the operators. These allow a partial 'reality check' on the data from the subcontractors and an indication about how costs vary when contracts for metocean services are purchased in small numbers or in larger

3.2 EXPENDITURE ON FORECASTING

The UK Met Office provided an estimate of its direct income from UKOOA operators as £375,000 per annum. However, it pointed out that this is only a fraction of its total income from the UKCS forecasting activities, which it estimates to be approximately £1,250,000. The difference between these two figures is the costs of services provided to other contractors, such as mobile rig owners, DSV owners and the like who obtain their own forecasts in support of their own offshore activities. Sometimes these costs may be evident to UKOOA members when they enter into contractual arrangements but in others they are hidden in such general phrases as 'vessel day rate' or 'operational overheads.' However, most of these charges will be passed to operators eventually. The direct charges will be in-line with the figures quoted above. The indirect charges may or may not be subject to a further mark-up before they are included in the bill to the operator.

The UK Met Office also provides forecasting services in support of offshore helicopter operations that are charged at approximately £500,000 per annum. Initially these are paid by the National Air Traffic Service (or its privatised equivalent) and passed on as airport charges to helicopter operators. Offshore operators pay these charges through the cost of each helicopter flight.

Allowing for a modest mark-up in the handling of the above costs, it is apparent that offshore operators pay somewhere in the region of £2,000,000 for forecasting services that originate from the Met Office.

Oceanroutes estimate their direct income from UKOOA members as approximately £300,000 per annum and their total income as approximately £1 million. This income is primarily for forecasting activities but it also derives from some other small tasks such as the provision of experienced meteorological observers in support of specific operations or the training of helicopter landing officers in the interpretation of weather parameters. Once again, it is apparent that the direct costs are only a fraction of the total and that the final bill to UKOOA members may be in the range £1.2 million to £1.5 million pounds.

Given that several other companies provide forecasting services to operators and their subcontractors, it seems that the total forecasting-related bill to UKOOA operators is in the order of £3,500,000 per annum.

Some UKOOA members provided typical cost figures for their regular forecasting bills as follows:

1. For an operator with one platform or an OIM requesting a forecast to cover his specific location, daily forecasting expenditure is about £36 (equivalent to an annual bill of £13000).

2. Another operator with a small group of 4 platforms in one area estimated his regular forecasting expenditure as £30,000 per annum.
3. For an operator with nine production facilities, including at least one floater, extending over a localised area of the North Sea, the typical forecasting expenditure was estimated as £149 per day (£54000 per annum).
4. For an operator with more than 50 platforms widely spread throughout the North Sea area, the forecasting expenditure, inclusive of web based delivery and many advanced data display options, the annual cost is approximately £120000.

There is evidence in these figures of savings due to scale. Taking a weighted average of the above figures indicates an average forecasting bill of around £4,000 per installation which would equate to a total forecasting bill across the entire UKCS of £1,100,000 per annum. Note that these costs only represent the direct costs to operators. According to the analysis of the Met Office data, perhaps twice this amount is paid by other offshore contractors and charged to UKOOA members in some other form (either overtly or hidden).

In addition special forecasts may be taken for particularly weather-sensitive operations such as rig moves, heavy lifting or support for sustained subsea operations. The UKOOA member that gave the information for item 2 above estimated that special forecasts might cost about £80 to £100 per day when required and that these together with additional instrumentation and measurements etc. cost that company about £40,000 per annum.

Internal transmission and delivery of forecasts may also add an appreciable extra to an operator's total forecasting costs, particularly if he has wide-spread offshore facilities of varying ages and no common means of communication. One operator with a modest number of offshore facilities volunteered that an internal review of these costs had revealed that they exceeded his basic forecasting cost. He has subsequently arranged for a web-based forecast delivery system as a means of cutting his internal administrative costs.

The data supplied by the operators and also those supplied by the Met Office and Ocean Routes paint a picture that is consistent with the estimated total annual cost to operators for forecasting services being in the range £3.5M to £4.0M or higher.

3.3 EXPENDITURE ON INSTRUMENTATION AND MET STATIONS

Muir Matheson provided an estimated breakdown of its annual income associated with metocean measurement equipment, both installed by Muir Matheson and others, in the following format:

1.	Offshore metocean measurement systems and spares	£189,000
2.	System upgrades	£155,000
3.	Offshore visits for servicing, maintenance and calibration	£231,000

Installocean provided estimates for the average expenditure associated with the systems it has supplied and continues to maintain. When these figures are presented in the same format as Muir Matheson's data, they equate to the following:

1.	Offshore metocean measurement systems and spares	£260,000-to-£390,000
2.	System upgrades	£65,000
3.	Offshore visits for servicing, maintenance and calibration	£65,000

In addition, Installocean provides a similar service to approximately 20 mobile units. Assuming the unit costs are similar, this would equate to a further income in the region of £800,000.

It is difficult to assign data supplied by Fugro Geos to these same categories because Fugro Geos also carry out a substantial number of special system developments and specific measurement programmes (such as subsea current profiles). Their total annual income from the four areas:

1. Offshore metocean measurement systems and spares
2. System upgrades
3. Offshore visits for servicing, maintenance and calibration
4. Special metocean measurement projects

is estimated as £800,000 from UKOOA members with invoices totalling a further £40,000 being submitted to rig owners.

From these figures, it would appear that the total income to the main metocean subcontractors coming directly from UKOOA members is in the order of £1.8million to £1.9million with possibly a further £840,000 coming indirectly to UKOOA members by way of rig day-rates.

It is clear from the responses of the UKOOA representatives that some OIMs rely on the services of their own offshore staff to maintain instrumentation and only call in the specialist subcontractors for a 'periodic health or calibration check.' It has been impossible to quantify any separate budget associated with these activities since they probably represent only a small part of a much larger topside maintenance budget. One UKOOA member explained how he provided support staff to the metocean subcontractor when a substantial instrumentation upgrade was taking place and estimated the associated internal costs in the range of £10K to £20K. Some OIMs or topside maintenance subcontractors may procure replacement instruments directly from instrument manufacturers. However when an enquiry was made to an instrument supplier, the project team were advised that 95% of his sales went to the subcontractors already identified. However, it has proved all but impossible to gather sufficient data on the costs associated with these activities to assign a reasonable estimate of the total costs to members. Given the number of platforms that organise this work independent of their head offices, it is likely that there will be a substantial associated price tag. An allowance of £500,000 has been made for this figure.

One subcontractor indicated the cost of a typical suit of metocean instruments as £30,000. Clearly this figure must vary considerably depending on the range of sensors provided, whether a computer based logging system is also provided and the extent of installation work needed to tie the instruments into the platform control room. Three UKOOA members indicated total costs between £30,000 and £70,000 for purchase and installation of a complete suite of metocean instruments on their platforms.

Several UKOOA representatives reporting on behalf of specific OIMs indicated that their systems were out of date and that it was becoming difficult to obtain spare parts. One operator obtained a quote of £20,000 to upgrade his system to a modern standard. It is unclear whether this figure includes all installation and software charges.

One operator with 20 high-grade stations estimates their equipment maintenance and offshore visits budget at £200,000 per annum. This figure excludes capital for purchase of new instruments.

Taken together, the above figures indicate a total estimated expenditure by UKOOA members for all of the above activities is liable to be in the region of £3million, at least.

3.4 QUALITY ASSURANCE, DATA MANAGEMENT AND ARCHIVING

Fugro Geos is the main contractor that provides quality assurance and data management services to UKOOA members on a fully commercial basis. Fugro Geos is also custodian of a large quantity of data collected during the earlier years of North Sea development and the associated design basis documents that were prepared from that data.

The UK Met Office operates its own QA and data management procedures and has assembled a vast historical archive of standard meteorological readings that have been used in support and development of its weather forecasting activities. Commercial arrangements can be entered into with the Met Office to produce various summaries of data from their archive.

Such arrangements have been used as a basis for generating design data directly or for input to hindcast data generation software.

Typically, Fugro Geos develops software to display measured data in a convenient format. It monitors recorded data for quality, corrective action being initiated when any problems are spotted with sensors, logging or communications equipment. Data digests are produced on a regular basis so that those interested can monitor operational performance or compare metocean measurements with design basis assumptions. Finally, raw or processed data is cast into an appropriate form, suitable for archiving. To produce a design basis document for a new development, previously archived data from adjacent sites can be retrieved and subject to re-evaluation.

Fugro estimates its annual income from QA/QC, data management and archiving activities on the UKCS as: £300,000 - £400,000

Some of this income comes directly from UKOOA members, but some also comes from the owners of mobile rigs.

Production of design basis documentation (from measurements and archived data) generated substantial income in the early days of North Sea exploration but these activities are much less prolific today. Nevertheless, there is still a small requirement for such services and for documentation of operational statistics. Fugro estimated its annual income to be in the order of £200,000

For one UKOOA member, setting up a data management and archiving	
service for 2 or 3 offshore sites, the typical cost estimate was	£15K/site/annum
and hence the total annual budget to such an operator is between	£30K and £45K

From information received, it would appear that a handful of operators continue to make use of these types of services.

For one member organising this type of support over 20 sites,	
the annual cost is of the order	£200,000 per annum
equivalent to	£10,000/site/annum

Some operators record their own data and archive it using their own computer archiving procedures. Unless an operator follows an established vetting procedure and records data over a number of sites, such data in isolation will be of limited value.

Operators report typical costs for preparation of a design basis document from previously archived data to be in the range £15,000 to £25,000. The lower figure might apply to a simple site with easy access to corresponding archive material while the larger figure would apply to an ‘extended’ site, including flow lines and involving re-analysis of a wider range of archive data.

After more than 30 years of offshore development, relatively few sites around the UKCS require new data measurement programmes to be undertaken prior to the preparation of a design basis document, except perhaps some West of Shetland and those intending to deploy a novel configuration of production facility.

In these areas, the majority of the costs are submitted directly to UKOOA members so the estimated total expenditure to UKOOA will be in the order of £600K.

3.5 TOTAL ANNUAL BUDGET

Summarising the above estimates, the UKOOA members' total expenditure in these areas may be expected to be as follows:

1.	Forecasting expenditure	£4million
2.	Expenditure on instrumentation and met stations	£3million
3.	Quality assurance, data management and archiving	£0.6million

giving an overall annual expenditure on metocean activities in the region of £7million to £8million.

4.0 A COLLABORATIVE APPROACH?

4.1 GENERAL

Collaboration in metocean activities could operate at many different levels and take various forms. At its simplest it might consist of two adjacent platforms agreeing to share weather forecasts or meteorological readings. At another extreme, it might imply a wholesale re-organisation with a subcontractor being appointed to manage and provide an appropriate service to all UKOOA members over the entire UKCS.

The study team's view of the essential elements of a useful UKOOA collaboration has developed during the course of this project but the format that is adopted ultimately will depend on the group of companies that form the core of any collaborative agreement. This chapter records the opinions of the study team and its vision of what might constitute a useful level of collaboration.

Setting out these opinions raises some questions about how collaboration might operate. These issues may only be resolved over a protracted period as one (or possibly more than one) collaborative schemes takes form and is developed to meet the needs of its members. However, some of the obvious questions arising are also recorded below. A later chapter examines what sort of transition arrangements might be necessary to introduce this or some variation of this basic model in the short term and the practical difficulties that may arise.

The study team's first thoughts about the format of collaboration concerned:

- communication and sharing of real-time metocean data measurements.
- rationalisation and improved efficiency in forecasting and forecast delivery.

As will become evident from the discussion below, these two aspects may not be independent of each other.

4.2 REAL-TIME METOCEAN MEASUREMENTS

By communication and sharing of data, the study team envisaged that quality controlled metocean measurements from a network of platforms and long-term-moored floaters should be made accessible to all those engaged in weather-sensitive operations on behalf of the members of the collaboration. Initially this would lead to the emergence of a network of metocean stations where reliable, calibrated, modern instruments would provide a view of the development of meteorological and wave conditions across an area of sea in real-time, i. e. with minimal delay in access to the readings. Those with access to the network would be able to see weather at all stations, not just their own. In particular:

- They could view data from surrounding platforms some miles distant and judge whether weather at their own site might be liable to improve or deteriorate in line with whatever forecast they held.
- They could view weather conditions over that area of sea that boats or other support craft would have to cross to approach their location. Thus they could share a view of remote weather that might have a direct effect on their supply chain and appreciate whether they might experience delays.

Currently there are 200 or more meteorological measurement locations on the UKCS with several more in coastal locations that would have an immediate bearing on an assessment of developing weather. Many of the offshore stations use historical instruments of suspect quality and calibration and as a result it is difficult to place reliance on reported readings. However, in most cases platforms only have access to their own readings and may be unaware of deterioration in the accuracy of their measurements.

The study team envisage a collaboration being established to control and improve measurements at a subset (50 to 80, say), of the 200 offshore locations. To a large extent modern instruments can be interrogated remotely to check whether they remain in calibration. These measurements would be fed into a communication system that would make the readings available to all who should have access and need the data for the safe, efficient performance of their work.

It is also envisaged that, with time, the collaboration would control the further development of the network. Software could be developed to present the data from the network in the most appropriate manner for each recipient – it may even be possible (see below) to overlay forecast versus measured data and provide warning if the weather development was not matching prediction. If a gap in the readings became evident in one area of sea, for instance, then the collaboration might enter into negotiation with an operator in that area to bring instruments up to the necessary standard to supply data to the others. It might also take decisions about where particular sensors should be deployed to enhance the overall performance and relevance of the network. Thus a small number of expensive instruments could be introduced for the benefit of all where any single operator might have found them to costly to justify on the commercial basis for a single platform.

In the short term there would appear to be two essential elements in this vision of collaboration:

1. quality control of measured data
2. a communication system to make the data (and any known limitations) available to those individuals needing the data to plan and control their activities. Recipients of the data might be in an onshore office, at a shore base, on an offshore production facility, on a supply vessel, in a helicopter operations room or perhaps even flying a helicopter.

However, in the medium term two further requirements would seem to be essential:

3. management of the collaboration in its interfaces with subcontractors and regulators
4. controlled implementation of decisions made by or on behalf of the collaboration for instrument purchase, installation and continuing maintenance and callibration.

4.3 FORECASTING

Turning now to forecasting issues, if communications channels already existed to distribute measurement data, then the same channels could also carry forecast data. There are several options, the most obvious being:

- Each company continues to organise provision of its forecasts though normal channels and distribute the information over the communication net in some secure format so that only its own employees would have access. This would allow the status quo in weather forecasting to be retained with each operator receiving data from its normal forecast provider. Forecast distribution might be controlled by some password-protected security arrangements.

- The collaboration acting as an entity might procure a separate forecast for the entire network and broadcast this forecast over the chosen communication channels. The forecast could be a set of standard five day forecasts covering each sea area but with particular reference to what might expect to be observed at the nodal points of the network as weather systems develop and move. This would lend itself to the development of more informed planning of operations. Equally, advanced forecasts similar to the “now casts” described earlier could be developed specifically to meet the needs of the collaboration in particular areas.
- There might still be a need for one-off, specific forecasts relating to specially sensitive marine operations. These could be obtained as at present or issued with the other network measurements.
- Since both readings and forecasts would be available in several locations, forecasting providers might be able to monitor, test and further develop their services to match their experience of network data.

It seems likely that standard 5-day weather forecasts will continue to be the backbone of a basic forecasting service in many areas. In a collaborative setting, however, effort might be focused on standardised delivery mechanisms which would make the forecasts more readily accessible to those making decisions affecting the entire range of weather sensitive operations, including those in onshore bases, on offshore facilities, in helicopters and in boats. A more up-to-date delivery service could free-up resources to allow improvements in other aspects of the service whether to satisfy specific requirements of particular sectors or to meet particular operational needs. Collaboration would open up a debate about whether the £4 million expenditure identified above represents a reasonable overall cost for the entire forecasting service and its associated overheads or whether a more cost effective, higher value solution might be possible within a similar budget.

Access to a network of data from surrounding platforms and coastal weather stations will allow experienced mariners to make a more realistic assessment of the available forecast and improved evaluations of risk associated with their particular operational tasks. They will be able to assess whether the available, standard forecast is accurate, to judge whether weather conditions are developing more or less rapidly than predicted and to make operational judgements accordingly.

In the longer term, improved forecasts, forecast presentation and delivery could appreciably improve the information available to those involved in making judgements about weather-sensitive operations. From the previous discussions, two specific developments have been identified as likely to maximise potential benefits:

Different aspects of a forecast (information about fog or tides and tidal currents, for example) may be more important in different sectors and at various times of the year. These will need to be considered within the collaboration and appropriate arrangements introduced as necessary.

4.4 QUALITY ASSURANCE, DATA MANAGEMENT AND ARCHIVING

Arrangements for these activities would need to be reviewed to ensure the adoption of appropriate standards for dealing with new data obtained through the managed network of measuring stations and any other data from associated measurements or observations. Common standards for presentation, digitisation and storage of particular types of data may need to be agreed or developed so that the recorded and archived data are readily available and accessible to all members of the consortium. Given that suitable communications links will be established for sharing measurement and forecast data, consideration could be given as to how best to make use of these links for recording and archiving purposes.

These arrangements will need to take into account any statutory obligations to maintain records in support of on-going, daily operations. Data may need to be made available for future accident investigations and will need to be referenced in such a manner as to maximise its usefulness for ascertaining causes of incidents and learning appropriate lessons.

Given that the managed network of metocean measuring sites and instruments is expected to generate high-quality, reliable data, it should be relatively straight forward to make provision for the necessary quality and consistency checks prior to archiving them. Consideration should also be given to recording and archiving any measurements that are specific to particular offshore facilities and a reference to a log of operational decisions that could assist with future interpretation and analysis, particularly in the case of floating vessels.

Given the mature status of the oil and gas industry on the UKCS, it seems inappropriate to prepare special data digests and parameter studies for all locations within the envisaged network although a suitable subset may be selected for this treatment on a regular basis.

In the future, consideration could be given as to how data in existing compendia and historic archives associated with earlier developments on the UKCS might be made available to the new consortium.

4.5 ISSUES ARISING

As envisaged above, the collaboration could allow many other opportunities and improvements to be developed.

However, the descriptions also raise some awkward questions that would need to be resolved in establishing the collaboration:

- Does the management and control imply additional staff that might offset any potential savings? Some larger offshore companies already have staff fulfilling such functions. Would these be at the disposal of the collaboration?
- Who purchases and owns any instruments bought on behalf of the collaboration?
- What would the legal status of the collaboration be? What, if anything, does it own and what can it commit to? What are its responsibilities both to the collaborating companies and to the regulatory authorities?
- Whose responsibility is it to provide access to any particular offshore facility for the purpose of installing and maintaining the network? What priority could be maintained for such work?
- What would the forecast providers charge for a forecast that was being made more widely availability across a communications network.
- Who would own and who would be entitled to access and use the archived data from different operators?

For a collaborative approach to work successfully, communication will be necessary at several levels:

- Sharing of real-time measurements among UKOOA member's central offices, production facilities, logistics planners etc., will require the communication of the data over some suitable communications network.
- Helicopter pilots, helicopter landing officers and mariners need direct access to good-quality, reliable data so that they can assess it along with other information relating to the performance of their vehicle or vessel and make their own risk assessments and operational judgements. This may require further developments to the communications network and/or presentation of the data to make the data available in the most suitable format.
- Extensive communication at a personal level will also be needed to ensure that decisions taken are in the best interest of the consortium as a whole. Given some of the detailed studies that will be needed and the complex issues that will need to be considered to ensure that the collaboration continues to work efficiently over an extended period, it seems that a steering committee will need to be established. One or two employees will be needed to prepare papers and presentations to allow the steering committee to make good judgements and to ensure that the interests of all parties are accommodated.
- Ideally, it may be possible to encourage subcontractors to bring forward their own solutions for consideration by the consortium. However, it seems most likely that competitive bids will need to be sought from subcontractors to allow a suitable collaboration to be developed in the early stages.

5 OPERATIONAL COST SAVINGS

5.1 DIRECT SAVINGS ON METOCEAN ACTIVITIES

In the present context, direct costs are considered to be those paid by the operator for any of the standard metocean services whether directly to a contractor, subcontractor or his own staff, for regular weather forecasting, specific forecast services for particular operations; purchase, fitting, maintenance, calibration or repair of instruments and data logging, recording transmitting, validation, verification, summarising or archiving. It is evident from previous discussions that either cost savings or improved value ought to be achievable in many areas by adopting a collaborative approach. In general cost savings should be made where needless repetition is avoided such as the purchase and dissemination of multiple near-identical forecasts or the multiple mobilisations of a subcontractor for instrument servicing on adjacent platforms.

It is not immediately obvious that the total direct cost of forecasts can be reduced substantially but one suspects that economies of scale ought to make some savings possible. If forecast delivery to a large number of operators is organised through one reliable communications channel (that is already available to most operators) then some savings should also be realisable in this area. However, if this was not implemented carefully, it might only move a budget from a low-cost secretarial area to a high-cost "IT and Comms" area.

Reductions in numbers of instruments and the offshore visits needed to service and repair them could also be expected to enable savings to be made. There seems little justification for purchasing multiple sets of the same types of instruments on a group of adjacent platforms so savings may be expected in this area. Standardisation and the possibility of sharing a common spares pool will also reduce maintenance costs. In some instances, cost savings may be used to improve instrumentation at specific sites thereby enhancing the value of the service rather than yielding a direct cost reduction.

In the case of quality assurance and data archiving, added value may be expected to follow from the availability of a reliable uniform coverage across a large area of the UKCS. If the service is organised properly then good records will be available against which any operational effectiveness or incidents, can be assessed.

Precise figures are difficult to quantify since they will depend on how the collaborative approach is implemented but direct savings may be a significant portion of the total budgets described previously. It is interesting to record that Muir Matheson believed they could run a satisfactory network to cover the entire UKCS for between one third and one half of the total instrumentation expenditure identified in section 3.

5.2 GENERAL OPERATIONAL SAVINGS

Overall, uniform coverage of the UKCS with good forecasts, reliable, measured data and with information available to those that need it may also be expected to bring enhanced value. If available data proves to be of sufficiently high quality that mariners and others can rely on it then more informed decision making ought to be possible.

Better, more reliable measurements, better availability of information and improved forecasting should enable savings to be made in the costs of many weather sensitive operations. Estimates of the order of cost savings that may be possible in some specific areas are presented below. Some savings are difficult to quantify simply because there is little data available on measured efficiency of operational performance with current forecasts and data measurements. Nevertheless an honest attempt has been made to put an estimate to the types of savings that might be possible given improved availability of good data to those participating.

It is evident from information gathered during this study that while some operations incur overt costs associated with poor decision making, others incur hidden costs that may not be evident to casual enquiry. The data given below refer to some of the higher profile operations, but improvements should also be expected in decisions affecting many more mundane tasks.

5.3 SAVINGS IN HELICOPTER OPERATIONS

Because of current restrictions that apply to the interpretation of meteorological data from automatic measurements and the non-availability of qualified meteorological observers at offshore locations on the UKCS, pilots are not allowed to use offshore forecasts to initiate a flight to an offshore destination in the same way as they might for an onshore one. Unlike all other aviation services, where a pilot is required to have a forecast for his destination, helicopter pilots on the UKCS are not permitted to use forecasts for offshore locations to initiate their flights. Instead they must await an actual weather report before they can make a routine take-off to an offshore destination. (This is confirmed by air-traffic control in Aberdeen who only relay reports of actual offshore weather to the helicopter operators, not forecast information). Thus, even if the measurements at an offshore destination might indicate that the trend in the weather is improving and conditions would be good when the flight reached its destination, the pilot must either delay his departure until he gets a confirmatory report from offshore that the weather is good or he must follow more restrictive practices that would reduce his load carrying capacity. In the case of normal crew changes for offshore platforms, the effect of the load reduction would normally be to reduce the number of passengers that can be carried on each helicopter and it might even necessitate the introduction of extra flights to ferry the delayed workers to their offshore locations. Consequently, this procedure is seldom adopted for normal crew changes.

This implies that every time that offshore weather is too poor to allow a flight to proceed, an additional delay is imposed before normal operations can be resumed. Whereas a flight between two onshore airfields would be allowed to proceed on the basis of a good weather forecast, one towards an offshore location is delayed. There are several consequences of this restriction. First there is congestion in the helicopter department lounges and staff who might be on their way to their offshore destination must have another coffee or meal before they are allowed to board their flight. Some of this wait is an unavoidable delay due to weather, but a portion is due entirely to the aforementioned restriction. Second, the aircrew who have reported for the flight use up their allowable working hours and in some circumstances they may not have sufficient flying hours to complete their flight.

Table 11 details a calculation based on the number of helicopter flights taking off from Aberdeen and an average portion of the year for which some flight restrictions due to weather might be experienced. The estimated cost to operators based on lost work time, restricted helicopter usage, an ‘average’ flight time of two hours, 17000 flights per annum and flight restrictions for one flight in 16 throughout the year is £1.0 million. This is only the cost of the restriction detailed above and not the total cost due to more general waiting on weather, (which seems inevitable and hence unavoidable).

One operator’s representative volunteered that his company had made savings in the order of tens of thousands of pounds on one day’s operation through his access to data about developing weather at near-by platforms. Since he had information about the developing weather, he had been able to continue to operate a helicopter when otherwise he might have been prevented from doing so.

Another, hidden cost affects helicopters taking off from the remoter areas of the Central North Sea. Because these platforms are out of direct radio range from Aberdeen, the pilot can not access the terminal airfield forecast from Aberdeen before he sets off. This causes uncertainty in the planning of his return flight which forces the pilot to carry additional fuel and hence a smaller payload. Typically this might mean one or two less passengers being carried than would otherwise be possible. To compensate, extra flights are required. Over a year the average cost of these extra flights to the industry (see table 11) would be of the order of £1.2million.

Similarly, any weather uncertainties along the flight path or at the ultimate destination are compensated by a higher fuel provision for the flight. It has been estimated that such uncertainties, imply a further £350 thousand cost arising from helicopter operations out of Aberdeen.

To summarise, the savings in each of these operations is estimated as:

1.	Cost of delayed take-offs from Aberdeen	£1.0million / year
2.	Cost of restricted communication of Aberdeen TAF	£1.2million / year
3.	Cost of poorly known weather en-route	£0.35million / year

5.4 POTENTIAL SAVING IN OTHER MARINE OPERATIONS

Estimates have been made in the average savings that might be realised by the offshore industry in rig moves, in diver support and in shuttle tanker operations. These are detailed in tables 12 through 14.

In the case of rig moves, the calculation has been based on recorded weather down time reported by one large operator over an average year and a calculation based on general weather occurrence statistics of the number of these operations that may be expected to have occurred in marginal conditions for the required operation. It is then assumed that a fraction of these marginal operating conditions could be re-assessed positively had better weather data been available. Finally, the estimate for the one operator is scaled up to be representative of all operators based on an assessment of the proportion of all such operations carried out by this one company.

In the case of diver support vessels, a similar estimate has been made based on data provided by one major DSV owner who operates 5 out of the total 29 such boats operating on the UKCS.

Calculations relating to tanker offloading are based on detailed discussions with an OCIMF tanker captain and his experiences of weather down time during typical offloading cycles in the North Sea.

In summary, the estimated projected savings across all UKOOA operators on the UKCS are as follows:

1.	Potential savings associated with rig movements	£1.7million / year
2.	Potential savings in DSV operations	£4.5million / year
3.	Potential savings in tanker loadings	£0.2million / year

There are many uncertainties in the above calculations but it is believed that, in general, any underlying assumptions have been made on a conservative basis and so the figures provided are probably underestimates of the possible savings.

6 COLLABORATION OPTIONS AND IMPLEMENTATION ISSUES

6.1 INTRODUCTION

Previous sections have claimed several potential benefits for a collaborative approach to metocean activities. This section considers some options for introducing collaboration and discusses some technical and commercial issues that arise as an aid to identifying a preferred way forward.

Discussions with key stake holders have suggested a broad base of support for a collaborative approach based on the following outline:

- a managed network of high-quality metocean measurement stations at a limited number of offshore sites (say, 80);

- introduction of an improved short-term element to traditional 5-day forecasts that provides hourly development of metocean conditions in specified offshore sectors for at least six hours ahead;

- wide dissemination of real-time measurements and forecast data so that they are available to those making operational decisions about weather sensitive activities;

- buy-in by the safety regulators, the HSE and CAA, that this collaborative approach with any necessary safeguards that may prove necessary, represents an improvement on present-day arrangements;

- a managed service that can deploy resources – instruments, services, informed choice, purchasing power etc., etc., – where they are most needed without unnecessary duplication.

In section 6.2, 6.3, 6.4 and Appendix D, various options are presented for introducing collaboration to the weather forecasting service, to the measurement and distribution of real-time metocean data and to the maintenance requirements of such a network respectively. These raise a number of technical and commercial issues that are discussed.

Archiving is not such an important issue at this stage and is not therefore discussed at length - although it is clear that some appropriate archiving strategy will need to be developed that matches the forecasting and measurement options chosen.

Finally, in section 6.5 a brief discussion is offered about the best overall option and a recommended way forward to realise the desired implementation.

While this document was in preparation, Muir Matheson launched a proposal to provide a system for collecting and sharing high-quality metocean data and making this information available as a web-based service, WebMET (See section 6.3 for further information). This system has been shown capable of handling real-time, measurement data and of allowing members to distribute weather forecast data, obtained through separate contracts, to their staff and facilities in their offices and offshore. To some extent many of the detailed points of discussion in this chapter may need to be reconsidered if the Muir Matheson scheme continues to function and develop. For this reason, some of the detailed evaluation tables originally planned for this chapter have been moved to Appendix D. Many of the issues raised herein are still relevant and no doubt will need to be considered further as the Muir Matheson system continues to develop or if it is replaced by some alternative at a future date.

6.2 FORECASTING OPTIONS

First consider the extent of the offshore forecasting activities that might be affected by a UKOOA members' metocean collaboration.

Direct payments from UKOOA to the forecasting contractors only accounts for about one fifth of the forecaster's income (see figures in section 3.2). If this is the only part of the forecasting budget within the control of the UKOOA collaboration, then the level of influence it would have would be minimal and there would be little scope for pressing through improvements or cost savings in the overall service.

On the other hand, since UKOOA members ultimately pay a much larger part of the forecasters' income, perhaps the collaboration should seek to establish a greater influence. To do so, it would need to involve other stake holders.

Given that most marine contractors and helicopter companies may be required to obtain forecast data to ensure safety and efficiency of their own operations and to meet the requirements of their own governing regulators, it would be necessary for such companies to be represented within the collaboration rather than purely as recipients of data (this type of involvement already seems to be reflected within the membership of several of UKOOA's committees). By widening its base, the collaboration might expect to have a stronger influence on the forecasts and the forecasting activities but it would need to represent a wider range of interests, some of which might be competing.

The collaboration would need to ensure appropriate delivery and distribution networks were established that extended to offshore platforms, head offices, logistic planning centres, contractor's ships, helicopter flight-preparation areas and other support vessels (but to a large extent these channels of communication already exist). For sake of argument, it may be assumed that some existing delivery route or web-based alternative could make the service available to all.

In its contractual arrangement with the forecasters, the UKOOA collaboration would need to ensure adequate back-up for those who might need advice on interpretation of available metocean data ahead of particularly sensitive offshore operations. The collaboration (through working groups perhaps?) might also need to become involved where specialised forecast formatting and delivery need to be established. It might expect to take part in budget/cost negotiations where the members of the collaboration ultimately bear a substantial part of the final bill. Participation in such negotiations implies that the collaboration would need at its disposal the services of informed buyers both in the technical and commercial senses. It is more likely that these could be arranged from the collaboration than for any individual member.

Detailed discussion about the scope of forecasting contracts to UKOOA, how these might be administered and distinct cases that would need to be considered by UKOOA is given in Appendix D

6.3 OPTIONS FOR MANAGED NETWORK OF METOCEAN MEASUREMENT STATIONS

Various options, similar to those proposed for a collaborative approach to forecasting, could be considered for the establishment and sharing of data from a managed network of metocean measurement stations. However, during the course of this study, one metocean contractor (Muir Matheson, MM) has taken an initiative with a group of interested UKOOA members to set up a data network so that those joining the MM initiative can see/share each others real-time measurements.

Given this scenario, UKOOA is faced with one major choice irrespective of the more detailed options considered above, namely whether to encourage the development of Muir Matheson's initiative or to attempt to set up an independent system.

The aims of Muir Matheson's initiatives are relatively modest since they are constrained by commercial considerations of what Muir Matheson feel they can reasonably propose and get funded in the short term by their clients. It may have the capacity to develop to meet all of UKOOA's requirements in the longer term but, for the moment, its objectives are less ambitious.

By way of comparison, one can consider the current status of the MM initiative with those that might reasonably fulfil the UKOOA long-term requirement:

1. The MM initiative has, so far, collected modest support among some UKOOA members (including Amerada Hess, BP, Kerr McGee, Shell and TotalFinaElf), but it has also attracted support from the UK HSE, the UK Met Office and Ocean Routes.

2. MM are knowledgeable about the current status of many measurement systems in the North Sea and to the West of Shetland and are seeking to link-up those that are relatively modern and easy to network and are on platforms owned by contributing members. Two groups make up the majority of their linked sites at this stage, those on Shell platforms and those that form part of an existing Helimet data gathering service (and supplied to assist planning of helicopter operations). MM also have strong connections with meteorological measurement stations on coastal airfields and expect to be able to incorporate data from them too. While MM would like to incorporate more systems within their network, particularly measurements in key locations, they are constrained by the limited commitment from UKOOA members.

3. MM are also constrained by the resources they can commit within their existing budget to develop data display systems that will suit all requirements. (It may be worth pointing out that, due to the fragmented approach to metocean measurements within some UKOOA members' organisations, Muir Matheson have been severely restricted in setting budgets that could be approved by those interested in the development.)

4. MM's network only incorporates systems where there is a reasonable opportunity to diagnose faults from shore. They do not require that the instrumentation and computer hardware are supplied by MM, only that they are of a sufficiently high specification that they can easily be connected to the network. MM also requires companies joining their network to make reasonable commitment to the ongoing maintenance of their instrumentation.

So far, MM's initiative makes no attempt to generate savings by diverting funding from older/poorer-quality instrumentation to the higher quality network. Within its current contractual framework, it may not be feasible to operate the network in a truly collaborative way since it does not resolve the issues identified in section 4.5 above. Their network operates in addition to existing instrumentation. Future studies based on the MM network over a protracted period should make it possible to determine whether or not it would be safe and practical to remove less reliable data at one site and cover it by measurements made at another. However, it is uncertain whether this is a priority area for MM at this time.

At this stage, MM's initiative does not consider how or in what form data might be made available to floating vessels, supply boats, semisubmersibles etc. Given adequate further backing it is propose to introduce a web based delivery mechanism in addition to that issued over their data gathering network and this may make the data more immediately available to the more modern vessels. Through their connections with the helicopter operating companies, MM anticipates making data available to helicopter flight control. It is not clear whether or in which form the data could be made available to pilots approaching offshore locations other than through radio contact with the helicopter landing officer for the platform where the landing is scheduled. For the immediate future, pilots approaching offshore locations will receive a mix of high-quality, well-calibrated, modern instrumentation readings alongside less reliable data. Only the better data will be shared among operators but the presence of less reliable data may have repercussions for user perceptions of the new network.

As noted earlier in this report, the helicopter pilots are willing to consider a lower density of instruments in some areas of the North Sea. At this time their requirement for accepting this would be the availability of forecasts for offshore helideck locations that would enable them to make more reliable flight plans. They also have requirements for the measurement of meteorological data in some key locations (where no quality data are presently available) and for relay of meteorological data from Aberdeen airport into the more remote parts of the central North Sea. While these requirements could be made available through MM's initiative, it would be necessary to provide an injection of funds to achieve it sooner rather than later.

MM have set up a user group to consider how best to deploy available resources for development of their system. The presence of the two major forecasting companies within this group could lead them to consider whether or not the network could be used to deliver forecasts to operators. Their attitude to this facility will be coloured by their perceptions of their own best interests, which may not coincide with those of UKOOA or MM. Both forecasters have their own departments who develop tools for delivering and displaying forecasts and these may or may not function well in the environment being established by MM.

Despite the reservations that have been expressed in the above paragraphs, it is evident that the MM initiative could be developed to become a useful tool for the industry. Even if it were to meet with limited success, it would still be useful for UKOOA members to support the initiative at this stage, appreciate what might practically be achieved and gain an understanding about what aspects are important to their own operation. The MM network is available courtesy of the DMS OPNET communications network that is already used by most operators for inter-platform and platform-to-shore communications. UKOOA members should be encouraged to join the MM initiative and make the strongest case for the system to develop to meet their own needs. Each UKOOA member or group of members, through their own links to OPNET, would be in a strong position to develop further services in parallel to those developed by the MM user group, if they had a particular need that could not be met by the MM collaboration.

The most obvious alternative to supporting the Muir Matheson initiative would be for UKOOA to set up another system that more closely matches the UKOOA requirement. Although one or other of the larger operators could implement such an initiative on behalf of UKOOA, it would still be necessary to employ the services of contractors such as MM or Fugro Geos, to take care of the implementation details. At this stage this would seem counter productive.

A less confrontational approach would be for UKOOA to establish a parallel working-group so that it could meet to discuss progress with the MM initiative. Such a group might be given a budget to initiate separate studies where they felt that another contractor might be capable of making a stronger contribution than could MM working on its own. Communication of data to floaters and better presentations of forecast and real-time data are two typical areas where separate studies might prove beneficial. This working group could also develop a more extensive specification for each element of the final system in consultation with the HSE, CAA, helicopter pilots etc. UKOOA would be seen to be acting in a proactive way to progress the initiative and it would become better prepared to argue the case where savings might be possible and to place appropriate contracts where purchase of one-off instruments would significantly enhance the coverage of the developing network.

6.4 MEETING MAINTENANCE REQUIREMENTS FOR A MANAGED NETWORK

Given the opinions expressed to this and the previous study of weather-sensitive offshore operations, reference 1, there is a need for an urgent review of the location, calibration and maintenance records of all instruments that are currently used for the measurement and reporting of metocean data. Not only should this review examine the instruments in isolation, but also their location in relation to other items of topside structure and process equipment. There will be wind directions and operational conditions for which some instruments are strongly affected by wind turbulence or efflux from a vent. If it is too difficult or expensive to relocate the instruments to alternative locations, then appropriate information should be held on a file that is available to those who might need to use the readings. Software should be developed to alert users when readings might be unreliable. This will be particularly important if users on one platform are accessing data measured on another and are unfamiliar with peculiarities of instrument/topsides layout. UKOOA should negotiate with Muir Matheson to ensure that their network will be capable of displaying warnings if any data it issues is of dubious value for any particular reason.

If the UKOOA initiative is to develop as indicated above, then greater reliance may be put on remote instrumentation readings for the control of some operations and it will become important that:

- all, key, instrumentation is properly maintained and calibrated
- any peculiarities associated with instrument or instrument location are properly recorded
- offshore installation managers come under pressure to maintain their measurement and data communications links in an appropriate manner.
- awkward decisions are made about whether or not to standardise reported data as actual readings, with details of location and height at which the sensors are located or as readings normalised to standard elevations. Different solutions may be more appropriate for different users and interpreters of the data.

The BHAB operate an inspection service that maintains records of the conditions of all helicopter facilities and ensures that they are kept in good condition. Where facilities are in need of attention, weight restrictions on helicopter payloads will be agreed with platform management until repairs are implemented. The BHAB inspection already covers some aspects of platform instrumentation and it would seem appropriate if the next round of inspection were extended to document the current status of all instrumentation systems. Working together with Muir Matheson who maintain their own data bases relating to platform instruments, perhaps, a database of instrumentation status and peculiarities could be established. Depending on the findings of this review, appropriate operating restrictions or some other action might need to be agreed with platform management. Once such a database has been established, the ability to check the functional status of modern instruments from shore and the ability to check readings against those of neighbouring platforms would help in the process of confirming correct operation or issuing warnings where faults are expected.

6.5 DISCUSSION AND RECOMMENDATION FOR WAY FORWARD

There are several good reasons why UKOOA should continue to pursue the objective of organising metocean activities in a collaborative way, namely:

1. The current non-collaborative approach is fragmented and not amenable to centralised assessment or control. There is a suspicion that the measurement of metocean parameters needed for effective control of weather-sensitive operations is suspect in some areas and within the status quo, it is extremely difficult to implement any general improvement in standards. Because data is poor on some offshore facilities, mariners and helicopter pilots who need the information as a guide to their safe-working weather-windows, find it difficult to know whether or not they can rely on any data that is provided to them.

2. UKOOA members are funding a substantial supporting 'industry' both directly and indirectly. With only a few exceptions, UKOOA members are not getting the full benefits of the services they are funding.

3. Even where members operate a strongly competitive regime to control their direct costs, they can exert little influence on their overall expenditure in this area because uncoordinated, indirect routes make up such a high proportion of their outgoings. Few operators have any appreciation of their total expenditure in this area.

4. There are substantial opportunities to develop cost savings, improve performance and realise better value for money in this area.

5. There have been significant technological advances in this field since the model(s) for the present organisation (or lack of it) were introduced and developed in the early days of North Sea development. These advances offer opportunities for improved safety, efficiency and operational control of many weather-sensitive tasks.

6. Offshore infrastructure is very different now than it was in the early days of North Sea development and the old organisational models need improved to match the current scenario.

7. UKOOA members could be held negligent if it is shown that they are not evaluating technological developments seriously to ensure that operational risks remain As Low As Reasonably Practicable (ALARP).

Since many of the benefits of a collaborative effort will be felt across the oil and gas industry (and by spin-off in several other industries) it seems appropriate that the initiative should be progressed by UKOOA on behalf of all operators rather than by a 'private club' of a few. Experience from the early part of the present study suggests that it may take some time before the majority of operators appreciate the potential benefits and begin to offer their whole-hearted support and contribution. For this reason, it may be necessary to begin the next stage of this initiative with a limited number of active participants, but anticipating that others will join as the benefits are clearly demonstrated.

This study has had significant support from the helicopter operators and the BHAB, the HSE and the CAA. It is important that these organisations are kept fully informed as the initiative is progressed. To have maximum effect, it will be necessary to invite the participation of the marine contractors, logistics planners, supply boat owner/operators, diving service vessels and others who might normally procure their own offshore weather forecasts. It is interesting to note that the Muir Matheson initiative has attracted interest from forecasters and, more recently, from a supply boat operator. In fact, it is evident that those contractors in the 'metocean industry' and those whose operations are directly affected by weather show a greater interest than many operators.

Of the five contract scope options considered in the pros and cons analysis, it is suggested that option 3A (centrally organised contracts placed for different geographical sectors of the UKCS) offers the best solution but only in the first instance. This option could be introduced in a progressive manner to one or two sectors in the first instance. The main aims in this first period should be to understand and overcome introductory problems and assess carefully how best the service should be expanded as a pan-UKCS service (as per option 1 or 2) or whether it should be further developed by progressively introducing option 3A across other sectors. Option 3A carries fewer initial threats than any other option and it could be upgraded to one of the more ambitious options (1 or 2) if the new procedures are demonstrated successful and acceptable to the industry as a whole. It also avoids the need to 'burn bridges' before experience has been accumulated of how the new organisation works.

Introduction of shared forecasting services incorporating a short-term weather forecasting element should be pursued simultaneously to develop an appreciation of structure changes, overall cost and an understanding of how it would function when extended to a larger area. To achieve this objective it will be necessary for operators in the initial group to contribute strongly to the implementation of the new procedures. It will also be necessary to establish communications and maintain good working contacts with other organisations that are liable to be affected by the changes – helicopter operators, supply logistics companies and supply boat operators, DSV operators, owners of mobile rigs that work in the chosen sectors and the relevant regulators.

Three administrative options have been identified that seem relevant to this contract scope but more detailed sub-options probably need to be considered. UKOOA may wish to consider which most naturally fits this type of development by comparison with its experience of other (similar?) developments.

With regard to the real-time data measurement and distribution, it would seem most appropriate for UKOOA to encourage participation in the Muir Matheson collaboration. It should also establish a group to monitor progress and pursue parallel, supporting studies or developments that may be incorporated in the MM collaboration, or an alternative (if major re-organisation is felt necessary) at a future date. It will be important that operators participating in the Muir Matheson collaboration should also participate in the UKOOA monitoring group (and vice versa) so that the broadest view is obtained of the affects of the new developments.

From comments received during this and the previous HSE study, there is a need to check that metocean measuring systems are continuing to function adequately to meet statutory obligations for save working associated with weather-sensitive operations. To address this issue it is recommended that UKOOA should seek representation in the on-going survey of helicopter operations facilities that is operated by the BHAB. This survey should be expanded to build up a database of all metocean instrumentation, their specific locations on each platform, their calibration status and known conditions in which they may be expected to produce inaccurate readings. This will also anticipate the needs to service and maintain metocean measurement instruments if reliance is to be placed on a reduced, high-quality network of instruments at some time in the near future.

It may be appropriate to request the involvement of Muir Matheson in this exercise, provided this can not be interpreted as giving them an unfair advantage in the future supply, maintenance and calibration of instruments.

7 LIST OF REFERENCES

1 Weather-sensitive offshore operations and metocean data
OTO no 2001, Issued by the UK Health and Safety Executive, March 2001

2 Nimrod – the Met Office's automated nowcasting system.
NWP Gazette, a quarterly newsletter about numerical weather prediction from the Met Office, 2002, March, pp6-9.

8 LIST OF TABLES

Company	Nominee(s)
AGIP (UK)	Glyn Pritchard
Amerada Hess	James Bunce (initially) Michael Taggert (finally)
BP	Michael Close Michael Pithie Colin Grant
British Gas	Andrew Birkenshaw
Bluewater	Donald Smith
Conoco	David Peters
Enterprise	Charles Keillor
Kerr McGee	Steven Mitchell
Marathon	Kenneth Wood
Mobil	David Rae
Phillips Production Company	Richard Davis
Shell UK Exploration and Production	Ian Leggett
Talisman	Bert van Eyck
Texaco	Richard Macklin
TotalFinaElf	Neil Duncan

Note: The fifteen UKOOA members tabulated above represent 18 of the operator groups identified as being operators or duty holders for all the offshore facilities on the UK Continental Shelf.

They operate 234 out of the total 275 offshore production facilities identified by the UK HSE.

UKOOA nominees to metocean collaboration study Table 1

Operators – Manned Fixed Installations (Numbers)	Operators – Normally Unmanned Installations (Nos.)	Operators – Floating Production and/or Storage (Nos.)	Different operators/duty holders (Totals)
AGIP UK (1)	BG Storage (5)	AGIP UK (1)	AGIP UK (2)
Amerada Hess Ltd (2)	BP Amoco Expl^n Operating Co Ltd (24)	Amerada Hess Ltd (2)	Amerada Hess Ltd (4)
BG Storage (6)	Conoco UK Ltd (16)	BHP Petroleum (1)	BG Storage (11)
BHP Petroleum (7)	Elf Exploration PLC (1)	Bluewater Services UK Limited (3)	BHP Petroleum (8)
BP Amoco Expl^n Oper^g Co Ltd (56)	Hydrocarbon Resources Limited (2)	BP Amoco Expl^n Operating Co Ltd (1)	Bluewater Services UK Limited (3)
Britannia Operator Limited (1)	Mobil (5)	Chevron UK Ltd (1)	BP Amoco Expl^n Oper^g. Co Ltd(81)
Cal Energy Gas UK Limited (1)	Mobil (BP Amoco - Operator) (2)	Golar Nor Offshore AS (2)	Britannia Operator Limited (1)
Chevron UK Ltd (1)	Mobil North Sea Limited (3)	Kerr McGee Oil UK plc (1)	Cal Energy Gas UK Limited (1)
Conoco UK Ltd (15)	Phillips Petroleum Co UK (4)	North Sea Production (1)	Chevron UK Ltd (2)
DNO (1)	Shell Expl^n and Production UK (29)	PGS Atlantic Floating Production (2)	Conoco UK Ltd (31)
Elf Exploration PLC (1)	Talisman Energy UK Ltd (1)	Pierce Production Company (1)	DNO (1)
Enterprise Oil Plc (1)	Texaco North Sea UK Company (1)	Shell Expl^n and Production UK (2)	Elf Exploration PLC (2)
Hydrocarbon Resources Limited (7)	TotalFinaElf Exploration UK (3)	Talisman Energy UK Ltd (1)	Enterprise Oil Plc (1)
Kerr McGee Oil UK plc (6)		Texaco North Sea UK Company (1)	Golar Nor Offshore AS (2)
Marathon Oil UK Ltd (4)		The Maersk Company Ltd (1)	Hydrocarbon Resources Limited (9)
Mobil North Sea Limited (2)			Kerr McGee Oil UK plc (7)
Phillips Petroleum Co UK (6)			Marathon Oil UK Ltd (4)
Shell Expl^n and Production UK (26)			Mobil (5)
Talisman Energy UK Ltd (7)			Mobil (BP Amoco - Operator) (2)
Texaco North Sea UK Company (2)			Mobil North Sea Limited (5)
TotalFinaElf Exploration UK (4)			North Sea Production (1)
Wintershall (UK) Ltd (1)			PGS Atlantic Floating Productn (2)
			Phillips Petroleum Co UK (10)
			Pierce Production Company (1)
			Shell Expl^n and Production UK (57)
			Talisman Energy UK Ltd (9)
			Texaco North Sea UK Company (4)
			The Maersk Company Ltd (1)
			TotalFinaElf Exploration UK (7)
			Wintershall (UK) Ltd (1)
Total 158 MFIs with 22 operators	**Total 96 NUIs with 13 operators**	**Total 21 FPs and/or S with 15 operators**	**Different operators/duty holders 30**
Grand total of all installation types			**275**

Offshore Production Installation Types, Operators/Duty Holders and Numbers Table 2

Data from HSE refer to a total of 275 facilities distributed as follows:

Location	Quadrant(s)	Numbers of facilities	Fixed attended	Fixed NUI	Floaters
NNS (Brent etc)	210 to 211 have	15	14	1	0
CNS (Fulmar - Heather S to N and Beatrice - Bruce W to E)	1 to 41 have	92	58	16	18
SNS (to the Tyne field in N)	42 to 54 have	150	73	77	0
IS/LB (Irish Sea and Liverpool Bay	110 has	16	13	2	1
NWA (Schiehallion and Foinaven)	204 has	2	0	0	2
	Totals	**275**	**158**	**96**	**21**

Notes: Several of the facilities are linked and therefore do not require separate helicopter services.
Several are also too small to accommodate a helideck.

Distribution of Oil and Gas Production/Storage Facilities by Major Subdivision of UKCS Table 3

Type of support vessel	Numbers
Diving Support Vessel (DSV)	29
Heavy Lift Vessel (HLV)	7
Jack Up Accommodation	6
Jack Up Mobile Drilling Unit (MODU)	40
Multipurpose Support Vessel (MSV)	3
Pipe-laying Vessel	3
Semi-submersible Accommodation	11
Semi-submersible Mobile Drilling Unit	108
Vessel Other	5
Totals	**212**

Numbers and types of support vessels Table 4

WMO	Station Name	Field30	Branch	Equipment	Lat	Long	Obs Prog
62001	Gascogne Buoy (France)	(-)	France	Buoy	45 14 N	05 00 W	
62026	K17 Buoy	Basic (R)	(OLA)	Buoy	55 25 N	01 10 E	00-1-24
62029	K1 Buoy	Basic (R)	(OLA)	Buoy	48 42 N	12 25 W	00-1-24
62081	K2 Buoy	Basic (R)	(OLA)	Buoy	51 00 N	13 21 W	00-1-24
62101	Lyme Bay	Sup (-)	(OLA)	Buoy	50 37 N	02 44 W	00-1-24
62103	Channel LV	Basic (-)	(OLA)	LV	49 55 N	02 53 W	00-1-24
62105	K4 Buoy	Basic (R)	(OLA)	Buoy	55 00 N	12 38 W	00-1-24
62106	RARH	Basic (R)	(OLA)	Buoy	57 00 N	09 54 W	00-1-24
62107	Sevenstones LV	Basic (-)	(OLA)	LV	50 04 N	06 04 W	00-1-24
62108	K3 Buoy	Basic (R)	(OLA)	Buoy	53 31 N	19 30 W	00-1-24
62109	K16 Buoy	Basic (R)	(OLA)	Buoy	57 00 N	00 00 E	00-1-24
62112	Brae A	Basic (R)	(OV)M	Platform	58 70 N	01 30 E	00-1-24
62114	Tartan	Sup (-)	(OV)M	Platform	58 30 N	00 06 E	00-6-18
62115	Beatrice 'A'	Sup (-)	(OV)M	Platform	58 06 N	03 00 W	
62116	Maureen 'A'	Sup (-)	(OV)M	Platform	58 06 N	01 80 E	6
62117	Buchan A	Sup (-)	(OV)M	Platform	57 90 N	00 00 E	06-3-15
62120	Fulmar 'A'	Sup (-)	(OV)M	Platform	56 40 N	02 06 E	00-1-24
62123	Janice A	Sup (-)	(OV)M	Platform	56 40 N	02 12 E	00-6-24
62125	Morecambe Bay	Sup (-)	(OV)M	Platform	53 80 N	03 60 W	06-3-18
62126	Morecambe Bay AWS	Sup (-)	(OV)M	Platform	53 80 N	03 60 W	00-1-24
62128	Viking B	Sup (-)	(OV)M	Platform	53 40 N	02 30 E	06-6-18
62130	Hewett Arpet	Sup (-)	(OV)M	Platform	53 00 N	01 70 E	00-6-24
62131	AH001	Sup (-)	(OV)M	Platform	58 06 N	00 06 E	03-6-21
62132	Auk 'A'	Sup (-)	(OV)M	Platform	56 40 N	02 00 E	00-1-24
62133	Gannet	Sup (-)	(OV)M	Platform	57 20 N	01 00 E	00-1-24
62135	Santa Fe 135	Sup (-)	(OV)M	Rig	58 10 N	01 30 E	03-6-21
62136	Santa Fe Magellan	Sup (-)	(OV)M	Rig	56 90 N	01 80 E	03-6-21
62137	Santa Fe Galaxy 1	Sup (-)	(OV)M	Rig	57 00 N	01 48 E	03-6-21
62138	Captain WPP	Sup (-)	(OV)M	Platform	58 30 N	01 70 W	00-6-24
62140	Santa Fe Rig 140	Sup (-)	(OV)M	Rig	57 00 N	00 80 E	03-6-21
62141	Ocean Guardian	Sup (-)	(OV)M	Rig	58 50 N	01 20 E	09-6-15
62142	Leman (Shell)	Basic (-)	(OV)M	Platform	53 00 N	02 06 E	00-1-24
62143	Jack Bates	Sup (-)	(OV)M	Rig	61 18 N	02 42 W	00-6-24
62144	Clipper	Sup (-)	(OV)M	Platform	53 40 N	01 70 E	00-1-24
62145	Sean P	Sup (-)	(OV)M	Platform	53 06 N	02 80 E	00-1-24
62146	Glomar Adriatic XI	Sup (-)	(OV)M	Rig	54 00 N	02 80 E	00-6-24
62147	Sante Fe Galaxy III	Sup (-)	(OV)M	Rig	57 60N	1 70E	00-6-24
62149	Douglas Platform	Sup (-)	(OV)M	Platform	53 50 N	03 50 W	09-3-18
62150	Glomar Arctic 3	Sup (-)	(OV)M	Rig	59 40 N	01 60 E	00-6-24
62152	Maersk Endurer	Sup (-)	(OV)M	Rig	57 00 N	01 90 E	00-6-24
62154	Sedco 712	Sup (-)	(OV)M	Rig	61 30 N	01 50 E	03-6-21
62155	Sedco 706	Sup (-)	(OV)M	Rig	60 60N	01 60E	00-6-24

UK Met Office Offshore Data Collection **Table 5 (Continued)**

WMO	Station Name	Field30	Branch	Equipment	Lat	Long	Obs Prog
62161	Tiffany	Sup (-)	(OV)M	Platform	58 40 N	01 20 E	6
62162	Kittiwake	Sup (-)	(OV)M	Platform	57 40 N	00 50 E	00-1-24
62163	Brittany Buoy	Basic (R)	(OLA)	Buoy	47 33 N	08 28 W	00-1-24
62164	Anasuria	Basic (-)	(OV)M	FPSO	57 20N	00 80E	00-1-24
62165	Ravenspurn North	Basic (-)	(OV)M	Platform	54 00 N	01 06 E	06-3-15
62166	Santa Fe Monarch	Sup (-)	(OV)M	Rig	57 18 N	01 36 E	03-6-21
62167	Santa Fe Monitor	Sup (-)	(OV)M	Rig	57 18 N	01 54 E	00-6-24
62168	Santa Fe Britannia	Sup (-)	(OV)M	Rig	53 50 N	01 80 E	00-6-24
62169	Northern Producer	Sup (-)	(OV)M	Platform	58 30 N	00 40 E	09 & 15
62301	Aberporth Range Buoy	Sup (-)	F-Def	Buoy	52 17 N	04 30 W	00-1-24
62303	Turbot Bank	Sup (-)	(OLA)	Buoy	51 36 N	05 09 W	00-1-24
62304	Sandettie LV	Basic (-)	(OLA)	LV	51 10 N	01 47 E	00-1-24
62305	Greenwich LV	Basic (-)	(OLA)	LV	50 25 N	00 00 E	00-1-24
63101	Tern A	Sup (-)	(OV)M	Platform	61 17 N	00 55 E	00-1-24
63103	North Cormorant	Sup (-)	(OV)M	Platform	61 06 N	01 06 E	00-1-24
63104	Dunlin 'A'	Sup (-)	(OV)M	Platform	61 20 N	01 60 E	00-1-24
63105	Brent 'B'	Sup (-)	(OV)M	Platform	61 00 N	01 70 E	00-1-24
63108	North Alwyn 'A'	Sup (-)	(OV)M	Platform	60 80 N	01 70 E	00-3-24
63109	Beryl B	Sup (-)	(OV)M	Platform	59 60 N	01 50 E	06-3-15
63110	Beryl A	Basic (-)	(OV)M	Platform	59 50 N	01 50 E	06-3-18
63112	Cormorant 'A'	Sup (-)	(OV)M	Platform	61 06 N	01 00 E	00-1-24
63113	Brent 'A'	Sup (-)	(OV)M	Platform	61 00 N	01 70 E	00-1-24
63116	John Shaw	Sup (-)	(OV)M	Rig	58 00 N	00 80 W	00-6-24
63117	Drillstar	Sup (-)	(OV)M	Rig	58 00 N	00 48 E	03-6-21
63118	Paul B Lloyd Jr	Sup (-)	(OV)M	Rig	60 12 N	01 70 E	03-6-21
64045	K5 Buoy	Basic (R)	(OLA)	Buoy	59 05 N	11 25 W	00-1-24
64046	K7 Buoy	Basic (R)	(OLA)	Buoy	60 40 N	04 30 W	00-1-24
64049	Sedco 711	Sup (-)	(OV)M	Rig	59 60 N	01 30 E	00-6-24
64050	Sovereign Explorer	Sup (-)	(OV)M	Rig	59 36 N	01 42 E	06-6-18

UK Met Office Offshore Data Collection **Table 5 (Concluded)**

Client Name	Location Name	Services	Contracts
Amerada Hess Ltd	Scott JD - 2 platforms	tow, telephone	Ad-hoc (Project based)
BG Storage	Armada	routine, telephone	Short
BHP Petroleum	Douglas - 3 platforms	routine, tow, telephone	Short
Britannia Operator Limited	Britannia (BOL)	routine, telephone	Ad-hoc (Project based)
Chevron UK Ltd	Alba Northern	routine, telephone	Short
Conoco UK Ltd	Viking – 7 platforms	routine, telephone	Short
Elf Exploration PLC	Elgin PUQ	routine, tow, web, brief, telephone	Medium
Enterprise Oil Plc	Nelson	routine, tow, telephone	Medium
Marathon Oil UK Ltd	Brae - 4 platforms	routine, web, telephone	Medium
Shell Exploration and Production UK	Auk A	routine, tow, web, brief, telephone	Long
Shell Exploration and Production UK	Brent - 4 platforms	ditto	ditto
Shell Exploration and Production UK	Clipper - 2 platforms	ditto	ditto
Shell Exploration and Production UK	Cormorant A	ditto	ditto
Shell Exploration and Production UK	Dunlin A	ditto	ditto
Shell Exploration and Production UK	Eider	ditto	ditto
Shell Exploration and Production UK	Fulmar A	ditto	ditto
Shell Exploration and Production UK	Galleon PG	ditto	ditto
Shell Exploration and Production UK	Gannet A	ditto	ditto
Shell Exploration and Production UK	Inde - 2 platforms	ditto	ditto
Shell Exploration and Production UK	Kittiwake - 2 platforms	ditto	ditto
Shell Exploration and Production UK	Leman - 2 platforms	ditto	ditto
Shell Exploration and Production UK	North Cormorant	ditto	ditto
Shell Exploration and Production UK	Sean - 3 platforms	ditto	ditto
Shell Exploration and Production UK	Shearwater - 2 plaforms	ditto	ditto
Shell Exploration and Production UK	Tern A	ditto	ditto
Talisman Energy UK Ltd	14/19 Claymore	routine, tow, web, telephone	Medium
Talisman Energy UK Ltd	Beatrice - 3 platforms	ditto	ditto
Talisman Energy UK Ltd	Clyde	ditto	ditto
Talisman Energy UK Ltd	Piper B	ditto	ditto
Talisman Energy UK Ltd	Saltire A	ditto	ditto
Texaco North Sea UK Company	Captain WPP	routine, telephone	Ad-hoc (Project based)
TotalFinaElf Exploration UK	Alwyn North - 2 platforms	routine, web, brief, telephone	Medium
TotalFinaElf Exploration UK	Dunbar	ditto	ditto

Aberdeen Weather Centre – UKOOA Clients **Table 6 (Continued)**

Client Name	Location Name	Services	Contracts
Conoco UK Ltd	Viking 7 NUIs	routine, telephone	Short
Elf Exploration PLC	Elgin WHP1	routine, tow, web, brief, telephone	Medium
Shell Exploration and Production UK	Barque 2 NUIs	routine, web, brief, telephone	Long
Shell Exploration and Production UK	Brent Flare 1	ditto	ditto
Shell Exploration and Production UK	Clipper 2 NUIs	ditto	ditto
Shell Exploration and Production UK	Corvette A	ditto	ditto
Shell Exploration and Production UK	Fulmar 2 NUIs	ditto	ditto
Shell Exploration and Production UK	Galleon 2 NUIs	ditto	ditto
Shell Exploration and Production UK	Inde 4 NUIs	ditto	ditto
Shell Exploration and Production UK	Ketch A	ditto	ditto
Shell Exploration and Production UK	Leman 12 NUIs	ditto	ditto
Shell Exploration and Production UK	Schooner A	ditto	ditto
Shell Exploration and Production UK	Sean PK 49/25 A	ditto	ditto
Talisman Energy UK Ltd	Beatrice B	routine, tow, web, telephone	Medium
Texaco North Sea UK Company	Erskine	routine, telephone	Ad-hoc (Project based)
TotalFinaElf Exploration UK	MCP 01	routine, web, brief, telephone	Medium
Bluewater Services UK Limited	Bleo Holm	routine, telephone	Ad-hoc (Project based)
Bluewater Services UK Limited	Uisge Gorm	routine, telephone	ditto
BP Amoco Exploration Op. Co. Ltd	Schiehallion	routine, telephone	ditto
Chevron UK Ltd	Alba FSU	routine, telephone	Medium
Shell Exploration and Production UK	Anasuria	routine, web, brief, telephone	Long
Shell Exploration and Production UK	Fulmar FSU	routine, web, brief, telephone	ditto
Talisman Energy UK Ltd	Buchan A	routine, web, telephone	Medium

Aberdeen Weather Centre – UKOOA Clients **Table 6 (Concluded)**

OCEANROUTES CLIENTS	TEXT ONLY	GRAPHS	CHARTS	ADVANCED PRODUCTS	MAN OFFSHORE
AGIP	Y	Y	N	Y	N
AMERADA HESS	Y	Y	Y	N	N
BLUEWATER	Y	N	N	N	N
BP	Y	Y	Y	N	Y
BRITANNIA	Y	N	N	N	N
DNO	Y	Y	N	N	N
GOLAR NOR	Y	N	N	N	N
KERR	Y	Y	Y	Y	N
MAERSK CONTRACTORS	Y	N	N	N	N
PGS	Y	N	N	N	N
PHILLIPS	Y	Y	Y	Y	N
PIERCE	Y	N	N	N	N
TEXACO	Y	Y	Y	Y	N

Advanced Products = products other than standard 3-5 day text, graphs and charts and include items such as 7 day text forecasts, special graphical displays of offshore regions and satellite views.

OceanRoutes – UKOOA clients and services Table 7

Yr	AREA	LOCATION	OPERATOR	FUNCTION	S'ware	Met	Cloud	Vis	Wave	Current	HRP
1995	UK	Armada	British Gas	Platform	X	X			X		
1998	UK	Banff	Conoco	FPSO	X	X					
1997	UK	Bleo Holm	Bluewater(Talisman-Ross)	FPSO	X	X					X
1995	UK	Britannia	Britannia(Chevron/Conoco)	Platform	X	X					
1995	UK	Buchan A	BP	Semi	X				X		
1997	UK	Elgin	Elf Exploration	Platform	X	X			X		
1998	UK	Franklin	Elf Exploration	Platform		X					
1996	UK	Glas Dowr	Bluewater (Amerada Hess)	FPSO	X	X					
1994	UK	Harding	BP	Platform	X				X		
1998	UK	Janice	Kerr-McGee	FPSO	X	X					
1995	UK	Trent	Arco	Platform	X	X					
1995	UK	Tyne	Arco	Platform	X	X					
1998	UK	Waveney	Arco	Platform		X					

Installocean-supplied Metocean Measurement Systems **Table 8**

Operator Name	Vessel Name
CoFlexip Stena Offshore Limited	Alliance
CoFlexip Stena Offshore Limited	Constructor
CoFlexip Stena Offshore Limited	Orelia
CoFlexip Stena Offshore Limited	Seawell
CoFlexip Stena Offshore Limited	Well Servicer
DSND Subsea Ltd	Aquamarine
EMC	Bar Protector
Halliburton Energy Services Ltd	Rockwater 1
Halliburton Energy Services Ltd	Semi II
Ocean Technical services	DSV Sprut
Ocean Technical services	Morecambe Diver
Oceaneering International Services Limited	Norlift
Oceaneering International Services Limited	Smit Orca
Rockwater	Lowland Cavalier
Rockwater	Semi I
Rockwater	Toisa Polaris
Stena Drilling Ltd	Stadive
Stena Drilling Ltd	Stena Seaspread
Stena Drilling Ltd	Uncle John
Stolt Comex Seaway Limited	DSV Discovery
Stolt Comex Seaway Limited	MSV Amethyst
Stolt Comex Seaway Limited	Stephaniturm
Stolt Comex Seaway Limited	Toisa Puma
Stolt Offshore	Seaway Eagle
Stolt Offshore	Seaway Falcon
Stolt Offshore	Seaway Harrier
Stolt Offshore	Seaway Kestrel
Stolt Offshore	Seaway Osprey
SubSea Offshore Limited	Mayo

Diving service vessels and their operators Table 9

1. Location	Quadrant(s)	Comments	Fixed attended	Fixed NUI	Floaters
CNS (Fulmar - Heather S to N and Beatrice - Bruce W to E)	1 to 41	Removed or redeployed	1	1	3
		Recent additions	1	1	1
		Without helicopter access	7	4	0
	Subtotal pre reconciliation	92			
	Subtotal with helicopter access	90			
	Subtotal without helicopter access	79			
SNS (to the Tyne field in N)	42 to 54	Removed or redeployed	1	0	0
		Recent additions	7	3	0
		Without helicopter access	20	16	0
	Subtotal pre reconciliation	150			
	Subtotal with helicopter access	159			
	Subtotal without helicopter access	123			
IS/LB (Irish Sea and Liverpool Bay	110	Removed or redeployed	0	0	0
		Recent additions	1	0	1
		Without helicopter access	2	2	0
	Subtotal pre reconciliation	16			
	Subtotal with helicopter access	18			
	Subtotal without helicopter access	14			

Numbers and types of offshore production facility re-conciled with BHAB database (Ctd. next sheet). Table 10

Location	Quadrant(s)	Comments	Fixed attended	Fixed NUI	Floaters
NWA (Schiehallion and Foinaven)	204	Removed or redeployed	0	0	0
		Recent additions	0	0	0
		Without helicopter access	0	0	0
	Subtotal pre reconciliation	2			
	Subtotal with helicopter access	2			
	Subtotal without helicopter access	2			
NNS (Brent etc)	210 to 211	Removed or redeployed	0	0	0
		Recent additions	0	0	0
		Without helicopter access	0	1	0
	Subtotal pre reconciliation	15			
	Subtotal with helicopter access	15			
	Subtotal without helicopter access	14			
Total numbers of facilities pre reconciliation		**275**	**158**	**96**	**21**
Revised total numbers of facilities		**284**	**165**	**99**	**20**
Revised total numbers with helicopter access		**232**	**136**	**76**	**20**

Notes: Several of the facilities are linked and therefore do not require separate helicopter services.
Several are also too small to accommodate a helideck.
Table below shows adjustments needed
Revisions for SNS include 6 NUIs that are range platforms and unconnected with oil and gas activities.

Numbers and types of offshore production facility re-conciled with BHAB database (Concluded) Table 10

A) Helicopter take-offs from Aberdeen to offshore destinations delayed by waiting on report of actual weather at offshore location:

Extra take-off delay due to wait for good actual weather report
Air crew use up allowable working hours on the ground
Extra passenger hours spent in airport lounge

Approximate annual number of helicopter movements at Aberdeen	36000	
Number of flights from Aberdeen		18000
Less 5% as training flights, leaving total to offshore locations	17100	

Flight delays vary enormously over year, frequent in some weather conditions, very infrequent for others: take average number of helicopter flights affected by weather delays (conservatively) as 1 in 16 although this number will vary from month to month and year to year.

Hence number of offshore flights affected by weather delays 1070/annum

Ideally, when weather is forecast to improve, a flight could take-off as soon as take-off conditions are acceptable and when expected arrival time would coincide with acceptable landing conditions at the offshore site. Since flight will not make a routine take-off until weather at destination is reported clear, the delay can be estimated as somewhere between 50 and 100% of the average flight-time. Base estimate on lower figure.

Take average flight-time to all CNS and NNS locations (conservatively) as 2 hours

Hence in excess of 1070 hours working time and 1070 flights are affected.

Take average hourly rate for offshore personnel as £50/hour
Take average cost of helicopter time and crew allowable working time as £200/hour
Take average helicopter capacity as 15/flight

Hence cost estimate of delay is 1070*15*50+1070*200 £1.0million/annum

B) Helicopters from remote platforms unable to receive TAF from Aberdeen

Helicopter must carry extra spare fuel to cope with uncertainty in weather at Aberdeen. This implies perhaps 2 fewer passengers can be carried.

Assume 1 in 5 flights come from remote platforms, then to enable staff change-overs to be made, approximately (17100/5)*2/15 extra flights will need to be run over one year. Typical overall cost estimated based on £2600/flight

Therefore typical extra operating cost is £1.18 million/annum

C) Excess fuel carried to cope with poorly known weather conditions en-route and at destination

Study of this cost within Shell estimates annual cost as £70000/annum
Likely cost for entire North Sea helicopter operations is estimated as 5* Shell figure.
Hence cost estimate for entire UKCS £350,000/annum

Potential savings in helicopter operations Table 11

Calculation is based on actual weather downtime reported by one large company during rig moves. Possibly, equipment down time is incorrectly reported as WOW but this is difficult (impossible) to confirm.

Number of rig moves in one year	31
Hours per annum for rig movements	3432
Average duration across all rig moves in days	4.6
Actual report of hours WOW	716
Percentage waiting on weather	21%
Portion of WOW decisions that require careful consideration of data and forecasts.	33%
Hence hours per year subject to weather critical decisions	236
Portion of marginal decisions resolved as negative by observation/forecast	50%
Hence percentage of rig move decisions **not** affected by weather	93%
Portion of remaining marginal decisions that might be improved by better data	50%

Better decisions could be taken with more accurate forecasts or access to data from adjacent platforms. Uncertainty will have led to negative decisions for sake of safety so this figure could be higher!

Hence estimated percentage of all moves that might be given go ahead with better data.	1.72%
Possible hours per annum savings with better data across 31 rig moves (This figure is liable to be unevenly spread)	59

Approximate rig-movement costs per operation:

Rig	£100,000 per day		
Average tug	£15,000 per day		
Number of tugs	3		
Daily cost	£145,000 per day	copy	£145,000

Average saving on one company's operations per annum	£356,881

Number of operating sites for this company	57
Total UKCS operating sites	275
Fraction of moves by this company	0.21

Scaled up potential benefit of improved weather data across UKCS. £1.7M

Potential cost savings in rig moves from better weather data Table 12

Calculation is based on one major DSV operator with 5 out of total 29 DSVs operating on UKCS

Number of operating hours per year		25000
Reported average time waiting on weather (WOW)		9%
Hours WOW		2250
WOW conditions clearly in excess of weather restriction		66%
WOW conditions that are marginal decisions		33%
Hours per year that are marginally assessed as WOW		743
Marginal assessments resolved with aid of forecasts		50%
Portion of remainder that could be improved upon		50%
Hours per year that could be reassessed if better access to data and better forecasting was available		186
Daily rate for DSV		£100,000
Savings possible to one company based on above		£773,438
Number of vessels	5	
Total number across UKCS	29	
Savings scaled up across UKCS	**£4.5**	**Millions**

Potential savings for DSV operations from better weather data Table 13

The following are based on discussions with OCIMF tanker captain

Number of FPSOs on UKCS			19
Average loadings per annum (about one per week) per site			50
Percentage close to WOW threshold			10%
Portion subject to marginal WOW decisions			33%
Portion of marginal calls resolved by access to current weather data			50%
Further improvement with better data			50%
Range of delays (in hours) caused by WOW			
Typical minimum delay	6	hrs	
Typical maximum delay	24	hrs	
Average delay	15	hrs	
Average hours that might be recovered with better data			118
Typical daily rate for shuttle ($60K/day)			£42,857
Potential yearly savings across UKCS on shuttle tanker operations		**£0.21**	**Million/annum**

Estimate of potential savings in shuttle operations Table 14

List of Appendices

Appendix A Letters inviting participation in study

From J Wils to Offshore Technology Committee

Requesting nomination of representatives from UKOOA members

From UKOOA Representative -To whom it may concern

Authorising metocean subcontractors to release data concerning metocean activities to the UKOOA study team

From J Wils to Offshore Technology Committee

3rd April 2001

To: OTC Committee

Subject: UKOOA Initiative for a Coordinated Approach to Metocean Activities

The UKOOA OTC has recently approved a study, initiated by the Metocean Committee, to establish a high level business case for a more coordinated approach to meteorological and oceanographic (metocean) activities in the UK sector. In order to proceed with this study, we need your help and assistance in 3 key areas.

Action

Nominate a representative to act as an internal focal point for this study. (We are seeking to establish a business case on both technical and commercial levels so would ask you to nominate a suitable person).
Agree, through your nominee, to make available data and information concerning your metocean activities and contracts.
Authorise, through your nominee, your metocean suppliers, contractors and service providers to co-operate in our gathering details about your metocean activities. (A draft letter is attached to facilitate this). We ask you to customise this letter as necessary and either send it to your suppliers directly or back to the UKOOA study team for their use in approaching your suppliers.

Background

The study will address 3 key technical areas:
The collection of metocean data from offshore installations, and its availability in real-time
Weather forecasts
Metocean data archiving for subsequent analysis to derive operational and extreme statistics

OTC believes that a collaborative approach may offer substantial improvements and benefits to those gathering or using such data with a resultant improvement in safety and reduction in industry costs. We estimate that cost savings and added value from a coordinated approach will exceed £1 million per annum.

A recent study into weather-sensitive operations and metocean data for the HSE, to be made public shortly, supports the concept of a coordinated approach. With this in mind the HSE is jointly funding the UKOOA metocean study.

The UKOOA team consists of the following personnel:

Ian Leggett (Chairman UKOOA Metocean Committee, c/o Shell UK Exploration and Production, Altens, Aberdeen, 01224 882523,mailto:ian.leggett@expro.shell.co.uk
Sandy Fyfe, Senior Consultant, PAFA, Hofer House, 185 Uxbridge Road, Hampton, Middlesex, TW12 1BN, 0208 979 9544, sfyfe@pafa.freeserve.co.uk)

If you or your nominee would like further background on the aims and objectives of the study they should feel free to contact Sandy Fyfe in the first instance.

OTC is keen to progress with this study urgently to allow an effective interface to be developed between the project objectives and any plans you may have to up-grade your platform instrumentation or weather forecasting arrangements. To allow us to make the necessary contacts ahead of the holiday season we would appreciate your response to this letter by Friday 13th April. Please forward the name of your internal focal point and, if appropriate, the signed contact letter to Ian Leggett.

John Wils
Director, Technical and Operational Affairs

From UKOOA Representative -To whom it may concern

Date:

Name
Company

To whom it may concern,

Subject: UKOOA Initiative for a Coordinated Approach to Metocean Activities

“Oil Company Name Ltd.” is supporting a study, jointly funded by UKOOA and the HSE, to establish a high level business case for a more coordinated approach to metocean activities in the UK Sector.

Through this letter we authorise our metocean contractors, suppliers and service providers to discuss any of the following items with UKOOA’s project team. Further, if requested to do, you may release information concerning:

Metocean data collection from installations
Weather forecasting
Metocean data archiving

The team is led by Ian Leggett, chairman of the UKOOA Metocean Committee, and supported by Sandy Fyfe, a consultant with PAFA Ltd.

I have nominated “Joe Bloggs” (telephone: 01224 ******; e-mail jbloggs@******.co.uk) as our company representative for this UKOOA study. Should you wish to clarify this request, please contact him.

Should you wish to minute any points of your discussion with the UKOOA team, please pass a copy of your minutes to “Jo Bloggs” for his information and attention.

Yours sincerely

“Oil Company Person”
“(Operations Director)”

Appendix B Muir Matheson calibration records

These sheets record Muir Matheson's information on instrument systems on each platform, their status and any brief comments

Notes:	**System level**	**Definition**		**System level**	**Definition**
	Level 0	Less than level 1		Level 2a	Level 2 + transmission
	Level 1	Wind speed + direction, air temp + pressure		Level 3	Level 1 or 2 + cloud and visibility
	Level 1a	Wind speed + direction, air temp + pressure, data transmiss		Level 3a	Level 3 + transmission
	Level 2	Level 1 + waves			

Types of installation	Client Name	Numbers of installations	Location Name	System level	Comment	Transmission capable	Upgrade required?
Fixed Attended (FA) (158 thereof)	AGIP UK (1)	1	Tiffany	2a	with cloud		
FA	Amerada Hess Ltd (2)	2	Scott JD	2			yes
FA			Scott JU				
FA	BG Storage (6)	6	Armada	2			
FA			Rough 47/3 BD	Unknown			
FA			Rough 47/3 BP				
FA			Rough 47/3 CD				
FA			Rough 47/8 AD				
FA			Rough 47/8 AP				
FA	BHP Petroleum (7)	7	Douglas DA	1	networked with Hamilton, Hamilton N and Lennox		
FA			Douglas DP				
FA			Douglas DW				
FA			Hamilton	0	wind only		
FA			Hamilton North	0	wind only		
FA			Johnston Field	Unknown			
FA			Lennox	0	wind only		
FA	BP Amoco Exploration Operating Company Ltd (56)	56	48/6 WA West Sole A	Unknown			
FA			48/6 WAP West Sole				
FA			48/6 WAS West Sole				
FA			Amethyst A1D	Unknown			
FA			Amethyst C1D				
FA			Andrew	1		y?	
FA			Arbroath	0	data from montrose alpha ?		
FA			Bruce D				
FA			Bruce PUQ	2		y	
FA			Cleeton PQ	2		y	
FA			ETAP CPF	0	no pressure!	y	
FA			ETAP Marnock PDR				
FA			ETAP Marnock QU				
FA			Everest NP	2		y	

These sheets record Muir Matheson's information on instrument systems on each platform, their status and any brief comments

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	Level 1a	Wind speed + direction, air temp + pressure, data transmiss	Level 3a	Level 3 + transmission
	Level 2	Level 1 + waves		

Types of installation	Client Name	Numbers of installations	Location Name	System level	Comment	Transmission capable	Upgrade required?
FA			Forties A	2		y	
FA			Forties B	1			
FA			Forties C	1			
FA			Forties D	1			
FA			Forties E	1	plus cloud		
FA			Harding Field	2		?	
FA			Inde 49/18 AD	2		y	
FA			Inde 49/18 AP				
FA			Inde 49/18 BD				
FA			Inde 49/18 BP				
FA			Inde 49/23 AC				
FA			Inde 49/23 AQ				
FA			Inde 49/23 AT				
FA			Inde 49/23 CD				
FA			Inde 49/23 CP				
FA			Leman 49/27 AC	2		y	
FA			Leman 49/27 AD				
FA			Leman 49/27 AP				
FA			Leman 49/27 AQ				
FA			Leman 49/27 AX				
FA			Leman 49/27 BD				
FA			Leman 49/27 BP				
FA			Leman 49/27 BT				
FA			Leman 49/27 CD				
FA			Leman 49/27 CP				
FA			Leman 49/27 DD				
FA			Leman 49/27 DP				
FA			Leman 49/27 ED				
FA			Leman 49/27 EP				
FA			Leman 49/27 FD				
FA			Leman 49/27 FP				
FA			Lomond	2		y	
FA			Magnus 211/12	3?			

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	Level 1a	Wind speed + direction, air temp + pressure, data transmiss			Level 3a	Level 3 + transmission	
	Level 2	Level 1 + waves					
Types of installation	**Client Name**	**Numbers of installations**	**Location Name**	**System level**	**Comment**	**Transmission capable**	**Upgrade required?**
FA			Miller 16/8B	2	plus waves	?	
FA			Montrose	0		y	
FA			N W Hutton	2		y	
FA			Neptune	Unknown			
FA			Ravenspurn North	Unknown			
FA			Thames AP	1			
FA			Thames AR				
FA			Thames AW				
FA			Thistle A	1			
FA	Britannia Operator Limited (1)	1	Britannia (BOL)	1a			
FA	Cal Energy Gas UK Limited (1)	1	Anglia A	Unknown			
FA	Chevron UK Ltd (1)	1	Alba Northern	Unknown			
FA	Conoco UK Ltd (15)	15	Callisto	Unknown			
FA			Conoco/ Britoil Loggs	Unknown			
FA			Loggs PA				
FA			Loggs PC				
FA			Loggs PP				
FA			Loggs PR				
FA			Murdoch 44/22A-MD	Unknown			
FA			South Valiant TD	Unknown			
FA			Viking AC	Unknown			
FA			Viking AD				
FA			Viking AP				
FA			Viking BA				
FA			Viking BC				
FA			Viking BD				
FA			Viking BP				
FA	DNO (1)	1	Heather Alpha	1			yes
FA	Elf Exploration PLC (1)	1	Elgin PUQ	Unknown			
FA	Enterprise Oil Plc (1)	1	Nelson	2			
FA	Hydrocarbon Resources Ltd (7)	7	Morecambe AP1	Unknown			
FA			Morecambe CPC1				
FA			Morecambe DP1				

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	Level 1a	Wind speed + direction, air temp + pressure, data transmiss			Level 3a	Level 3 + transmission	
	Level 2	Level 1 + waves					

Types of installation	Client Name	Numbers of installations	Location Name	System level	Comment	Transmission capable	Upgrade required?
FA			Morecambe DP3				
FA			Morecambe DP4				
FA			Morecambe DP6				
FA			Morecambe DPPA				
FA	Kerr McGee Oil UK plc (6)	6	211/19 Murchison	Unknown			
FA			211/28 Hutton TLP	2	with motion monitoring		yes
FA			Janice	1			
FA			Ninian Central	Unknown			
FA			Ninian Northern	2a			
FA			Ninian Southern	Unknown	with waves		
FA	Marathon Oil UK Ltd (4)	4	Brae A	3a			
FA			Brae B	1			
FA			Central Brae	Unknown			
FA			East Brae	1	with waves		
FA	Mobil North Sea Limited (2)	2	9/13 Beryl A	3a			
FA			9/13 Beryl B	1			
FA	Phillips Petroleum Co UK (6)	6	48/29A Hewett Field	Unknown			
FA			48/29B Hewett Field				
FA			48/29C Hewett Field				
FA			52/5A Hewett Field				
FA			Judy/Joanne	2 + Motion			
FA			Maureen Alpha 16/29a - A	3 - Visibility	inc directional waves and sea temp		
FA	Shell Exp. and Prod. UK (26)	26	Auk A	2a			
FA			Brent A	2a	no waves		
FA			Brent B	3a			
FA			Brent C	1a			
FA			Brent D	1a	covered by Clipper PM		
FA			Clipper PM 48/19A	-			
FA			Clipper PT 48/19A	2a			
FA			Cormorant A	3a	no waves		
FA			Dunlin A	3a			
FA			Eider	1a	no waves		
FA			Fulmar A	3a			

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	Level 1a	Wind speed + direction, air temp + pressure, data transmiss			Level 3a	Level 3 + transmission	
	Level 2	Level 1 + waves					
Types of installation	**Client Name**	**Numbers of installations**	**Location Name**	**System level**	**Comment**	**Transmission capable**	**Upgrade required?**
FA			Galleon PG	Unknown			
FA			Gannet A	2a			
FA			Inde 49/24 JD	Unknown			
FA			Inde 49/24 JP		inc waves		
FA			Kittiwake	3a	not applicable. Loading buoy		
FA			Kittiwake LB				
FA			Leman AD1	2a	as AD1		
FA			Leman AD2		inc directional waves and sea temp		
FA			North Cormorant	2a	as PP		
FA			Sean PD 49/25 A				
FA			Sean PP 49/25 A	2a	as PP		
FA			Sean RD 49/25 A				
FA			Shearwater PUQ	2a	as PUQ		
FA			Shearwater WHP				
FA			Tern A	1a			
FA	Talisman Energy UK Ltd (7)	7	14/19 Claymore	1			
FA			Beatrice AD	Unknown			
FA			Beatrice AP				
FA			Beatrice C				
FA			Clyde	1			
FA			Piper B	1			yes
FA			Saltire A	1			yes
FA	Texaco North Sea UK Co. (2)	2	Captain WPP	1			
FA			Tartan A	1			
FA	TotalFinaElf Exploration UK (4)	4	10/1- Frigg - QP	Unknown			
FA			Alwyn North NAA	2a			
FA			Alwyn North NAB				
FA			Dunbar	2a			
FA	Wintershall (UK) Ltd (1)	1	Windermere	Unknown			
Fixed NUI (96 thereof)	BG Storage (5)	5	43/24 Trent	Unknown			
NUI			44/18 Tyne	Unknown			
NUI			48/11b Pickerill A	1			

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	Level 1	Wind speed + direction, air temp + pressure		Level 3	Level 1 or 2 + cloud and visibility
	Level 1a	Wind speed + direction, air temp + pressure, data transmiss		Level 3a	Level 3 + transmission
	Level 2	Level 1 + waves			

Types of installation	Client Name	Numbers of installations	Location Name	System level	Comment	Transmission capable	Upgrade required?
NUI			48/11b Pickerill B				
NUI			Waveney 48/17C	Unknown			
NUI	BP Amoco Exploration Operating Company Ltd (24)	24	48/6 WB West Sole B	Unknown			
NUI			48/6 WC West Sole C				
NUI			53/4a Welland	Unknown			
NUI			Amethyst A2D	Unknown			
NUI			Amethyst B1D				
NUI			Bessemer (OP)	Unknown			
NUI			Bruce CR	As Previous			
NUI			Cleeton PK	As Previous			
NUI			Cleeton PW				
NUI			Davy (OP)	Unknown			
NUI			ETAP Mungo	As Before			
NUI			Everest NR	As Before			
NUI			Forties Unity	Unknown			
NUI			Hyde 48/6	Unknown			
NUI			Inde 49/23 D	As Before			
NUI			Inde 49/27 G				
NUI			Inde 49/27 H				
NUI			Inde 49/27 J				
NUI			Ravenspurn North ST2	Unknown			
NUI			Ravenspurn North ST3				
NUI			Ravenspurn North WT1				
NUI			Ravenspurn STH A				
NUI			Ravenspurn STH B				
NUI			Ravenspurn STH C				
NUI	Conoco UK Ltd (16)	16	Ganymede	Unknown			
NUI			Murdoch CMS	Unknown			
NUI			Valiant 49/16 PTD	Unknown			
NUI			Vanguard 49/16 PQD	Unknown			
NUI			Victor JD 49/22	Unknown			
NUI			Viking 49/17GD	Unknown			

These sheets record Muir Matheson's information on instrument systems on each platform, their status and any brief comments

Notes:	**System level**	**Definition**			**System level**	**Definition**	
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	Level 1	Wind speed + direction, air temp + pressure			Level 3	Level 1 or 2 + cloud and visibility	
	Level 1a	Wind speed + direction, air temp + pressure, data transmiss			Level 3a	Level 3 + transmission	
	Level 2	Level 1 + waves					

Types of installation	Client Name	Numbers of installations	Location Name	System level	Comment	Transmission capable	Upgrade required?
NUI			Viking 49/17HD				
NUI			Viking AR				
NUI			Viking CD				
NUI			Viking DD				
NUI			Viking ED				
NUI			Viking FD				
NUI			Viking (Phoenix F/Fs) KD				
NUI			Viking (Phoenix Wx/Gn) LD				
NUI			Vulcan 1	Unknown			
NUI			Vulcan 2				
NUI	Elf Exploration PLC (1)	1	Elgin WHP1	Unknown			
NUI	Hydrocarbon Resources Ltd (2)	2	Morecambe CPP1	Unknown			
NUI			Morecambe DP8				
NUI	Mobil (5)	5	Excaliber	Unknown			
NUI			Galahad	Unknown			
NUI			Guinevere	Unknown			
NUI			Lancelot	Unknown			
NUI			Malory	Unknown			
NUI	Mobil North Sea Limited (3)	3	9/13 2nd Beryl SPM	Unknown			
NUI			9/13 3rd Beryl SPM				
NUI			Beryl Riser Tower	Unknown			
NUI	Mobil (BP Amoco Operator) (2)	2	Camelot CA	Unknown			
NUI			Camelot CB				
NUI	Phillips Petroleum Co UK (4)	4	Audrey PWD 49/11a	Unknown			
NUI			Audrey PXW 48/15b				
NUI			Maureen 16/29a ALC	As Before			
NUI			Norpipe	Unknown			
NUI	Shell Exp. and Prod. UK (29)	29	48/13A Barque PB	1a			
NUI			48/14A Barque PL				
NUI			Brent Flare 1	Unknown			
NUI			Clipper PC 48/19A	As Before			
NUI			Clipper PW 48/19A				
NUI			Corvette A	Unknown			

These sheets record Muir Matheson's information on instrument systems on each platform, their status and any brief comments							
Notes:	**System level**	**Definition**			**System level**	**Definition**	
	Level 0	Less than level 1			Level 2a	Level 2 + transmission	
	Level 1	Wind speed + direction, air temp + pressure			Level 3	Level 1 or 2 + cloud and visibility	
	Level 1a	Wind speed + direction, air temp + pressure, data transmiss			Level 3a	Level 3 + transmission	
	Level 2	Level 1 + waves					
Types of installation	**Client Name**	**Numbers of installations**	**Location Name**	**System level**	**Comment**	**Transmission capable**	**Upgrade required?**
NUI			Fulmar AD	As Before			
NUI			Fulmar STL				
NUI			Galleon PM	Unknown			
NUI			Galleon PN 48/20				
NUI			Inde 49/24 K	As Before			
NUI			Inde 49/24 L				
NUI			Inde 49/24 M				
NUI			Inde 49/24 N				
NUI			Ketch A	1a			
NUI			Leman AK	As Before			
NUI			Leman AP				
NUI			Leman BD				
NUI			Leman BH				
NUI			Leman BP				
NUI			Leman BT				
NUI			Leman CD				
NUI			Leman CP				
NUI			Leman D 49/26D				
NUI			Leman E 49/26E				
NUI			Leman F				
NUI			Leman G				
NUI			Schooner A	1a			
NUI			Sean PK 49/25 A	As Before			
NUI	Talisman Energy UK Ltd (1)	1	Beatrice B	Unknown			
NUI	Texaco North Sea UK Co. (1)	1	Erskine	Unknown			
NUI	TotalFinaElf Exploration UK (3)	3	10/1 - Frigg - TPI	Unknown			
NUI			Caister 44/23A-CM	Unknown			
NUI			MCP 01	2			yes
Floating Production System (FPS) (21)	AGIP UK (1)	1	Balmoral	1			
FPS	Amerada Hess Ltd (2)	2	AH001	2			

These sheets record Muir Matheson's information on instrument systems on each platform, their status and any brief comments							
Notes:	**System level**	**Definition**			**System level**	**Definition**	
	Level 0	Less than level 1			Level 2a	Level 2 + transmission	
	Level 1	Wind speed + direction, air temp + pressure			Level 3	Level 1 or 2 + cloud and visibility	
	Level 1a	Wind speed + direction, air temp + pressure, data transmiss			Level 3a	Level 3 + transmission	
	Level 2	Level 1 + waves					
Types of installation	**Client Name**	**Numbers of installations**	**Location Name**	**System level**	**Comment**	**Transmission capable**	**Upgrade required?**
FPS			Triton	Unknown			
FPS	BHP Petroleum (1)	1	OSI	1			yes
FPS	Bluewater Services UK Ltd (3)	3	Bleo Holm	Unknown			
FPS			Glas Dowr	Unknown			
FPS			Uisge Gorm	Unknown	with directional waves and motion		
FPS	BP Amoco Exploration Operating Company Ltd (1)	1	Schiehallion	3a			
FPS	Chevron UK Ltd (1)	1	Alba FSU	Unknown			
FPS	Golar Nor Offshore AS (2)	2	Petrojarl Foinaven	2			
FPS			Petrojarl I				
FPS	Kerr McGee Oil UK plc (1)	1	Gryphon A	Unknown			
FPS	North Sea Production (1)	1	North Sea Producer	Unknown			
FPS	PGS Atlantic FP (2)	2	Northern Producer	Unknown			
FPS			Ramform Banff	Unknown			
FPS	Pierce Production Company (1)	1	Berge Hugin	Unknown	directional waves and motion response		
FPS	Shell Exp. and Prod. UK (2)	2	Anasuria	2a	removed from field		
FPS			Fulmar FSU				
FPS	Talisman Energy UK Ltd (1)	1	Buchan A	As Before			
FPS	Texaco North Sea UK Co. (1)	1	Captain FPSO	See Before	with wamos wave sensor		
FPS	The Maersk Company Ltd (1)	1	Curlew	1			
Total all types (275)	Check sum	18					

Appendix C Notes on meetings regarding helicopter operations

UKOOA Initiative for a Coordinated Approach to Metocean Activities

Meeting to discuss the metocean requirements for offshore helicopter operations

Venue: Offices of Shell U.K. Exploration and Production, Aberdeen
Date: 10/08/01

Present:	D Bailey	Scotia Helicopters
	P Morrish	Civil Aviation Authority
	P Buchanan	Meteorological Office
	I Leggett	Shell
	A Thomas	BHAB and Bristows
	G Morrison	Health and Safety Executive
	A Fyfe	P A F A

Introduction/HSE Study

Sandy Fyfe gave an overview of the study he had undertaken for the HSE into "Weather-sensitive Operations and Metocean Data." The final report is presently under review by the HSE and is expected to be openly available on the HSE web site shortly.

Peter Buchanan pointed out that for activities that require interpretation of weather data, training is an important issue, especially in respect to the marine environment. Many incidents occur as a result of poor interpretation of weather forecasts and poor assessment of weather. Additionally, with modern forecasting techniques, significant quality checking of measured data can be achieved by comparing measurements with forecasts.

David Bailey suggested that Sandy may have only seen occurrence reports that have subsequently been categorised as 'mandatory' (MOR). He offered to make available other 'less serious' occurrence reports that may be of wider interest.

Action: Sandy Fyfe to maintain contact with David Bailey to obtain further data.

Overview of UKOOA Study

Ian Leggett and Sandy Fyfe presented the case that was made to UKOOA that led to the setting up of the 'Initiative for Collaboration of Metocean Activities', and gave an overview of the present state of progress. One of the main purposes of the present meeting was to establish what data was required for offshore helicopter operations and whether this could be achieved from an optimised network of offshore locations, and not necessarily from every platform with a helideck.

Presentation of Shell Expro Metocean Systems

Ian Leggett showed the attendees the types of metocean data collection and forecasting that are presently available within Shell Expro. This included their automatic offshore network of weather stations (METNET system) that provides data in real-time for both offshore and onshore users. It enables staff and contractors working on weather-sensitive operations to observe how the weather conditions are developing around them and to take action accordingly. The complimentary web-based forecasting service (METCAST) is delivered by the Met Office to Shell Expro's intranet.

Discussion

Adrian Thomas commented that, currently, helicopter pilots do not get a weather forecast for their offshore destinations, and if the UKOOA initiative were to lead to an improvement in this situation, it was to be welcomed. In all other aviation activities, a forecast for the destination is a requirement. The lack of a forecast means that helicopters may not take off from Aberdeen until the actual weather offshore is reported suitable. This leads to a loss of flying time that can often lead to the cancellation of the flights that were originally scheduled for later in the day. Further, each pilot has to make a judgement about the likelihood of weather conditions changing during the course of a long flight. If the weather changes for the worst, the helicopter may not be allowed to land and will most likely have to return to its alternative landing place, usually, back on shore.

Both Adrian Thomas and David Bailey felt it would be difficult to gather any statistics of 'flights going on to alternate destinations' from the records kept by the helicopter companies. They thought it more likely that this information would be available in the oil companies' records.

Ian Leggett introduced the subject of 'nowcasting' as a means of addressing the pilots concerns about the lack of short term forecast data. A combination of an optimised network of offshore metocean stations plus 'nowcasts' could offer a potential solution. It would not only address the concerns of pilots, but also contribute to improved safety and efficiency and decreased costs.

Peter Buchanan provided further information on 'nowcasting'. Within the Met Office, it referred to a technique for greater integration of real-time data and weather forecasting to enable weather conditions to be predicted for the present time and typically hourly for the following six hours. Peter said that some development would be needed to integrate offshore data into the 'nowcast' system, but this should be capable of giving the types of forecast that helicopter pilots and operators needed. 'Nowcasting' could also make use of extra parameters other than the four basic ones needed for a standard forecast (ie pressure, temperature, wind velocity and humidity) to improve the short term offshore weather predictions.

Peter Buchanan has asked his head office in Bracknell to comment on the potential for improving present forecasting by providing more high quality input to their forecasting model from more high quality measurements from offshore locations and expected to be able to give some advice on this matter shortly.

Action: Peter Buchanan to contact Sandy Fyfe when these data become available.

According to today's procedures, offshore forecasts can be provided if there is a qualified meteorological observer offshore to verify/accept readings from automatic weather stations. Forecasts are often issued by Norwegian platforms such as Ekofisk and these are useful to pilots in helping to interpret the development of weather on the UK side of the North Sea. It was stated that the BP Schiehallion vessel also has qualified meteorological observers but it does not issue the necessary data or data validations to allow a forecast to be made.

'Nowcasting' will also help with the prediction of fog and hence visibility. Peter Buchanan commented that satellite observations, which are available on a half-hourly basis, could be used both to improve 'nowcast' predictions, and also to track moving fog banks. He showed some typical results from such observations. These would assist pilots in making judgements about whether or not fog and poor visibility were liable to hamper their journey in the majority of cases.

Adrian Thomas and David Bailey both commented on the effect of present procedures on congestion prior to take off. This can be a serious problem for the helicopter operators and it also causes significant delays and lost time for their clients.

Adrian Thomas commented that anemometer placement and wind direction can influence the accuracy of the instrument and that it may be necessary to install duplicate instruments in different locations to ensure accurate input under all conditions.

A brief comment was made concerning the operation of Installation Vehicle Landing Limitations (IVLLs). These may be used to reduce vehicle payload to allow landings when the helideck is liable to be affected by turbulence. In extreme cases, a helicopter may need to fly on to its alternative landing site if the IVLL indicates that it is too heavy to land on a particular platform for certain wind speeds and directions.

Peter Morrish commented that any method developed for offshore application should make use of, and be integrated with, existing onshore data sources.

It was pointed out that it would be necessary to build in some redundancy in any system that involved fewer offshore met stations to guard against system failures.

Adrian Thomas asked that he should be involved in the on-going selection of the offshore sites that might form the basis for a high-quality network. Sandy Fyfe said that he is collecting data together about present locations, IVLLs and instruments to allow these judgements to be made and will keep Adrian Thomas and David Bailey informed about any proposals.

Action: Sandy to keep Adrian and David briefed about developments in the selection of nodes for the high-quality network. A follow-up meeting will be arranged to get input from Adrian and David.

Peter Buchanan pointed out that there might be some contractual difficulties to be overcome in establishing an appropriate network of instruments to allow 'nowcasts' to be produced. He felt UKOOA want to preserve more than one source of forecasts. Further, the Met Office have separate contracts with offshore operators and with the CAA which may need to be improved to allow effective 'nowcast' data to be made available to both operators and the offshore helicopter operators.

The meeting was made aware of another meeting being planned for the 3rd September in London which seems to have similar objectives to the UKOOA initiative. Chris Twyman of Shell and several others had received invites. Ian Leggett said he would talk to Chris Twyman and, if desirable arrange for himself or Sandy Fyfe to attend also. It seems that Andy Wells of the CAA is making the arrangements.

Action: Ian Leggett to discuss attendance at meeting on 3rd of September with Chris Twyman.
(Post-Meeting note: from discussion with Chris Twyman the meeting seems to be about weather forecast financial arrangements with NATS).

Conclusion

Ian Leggett concluded the meeting outlining the consensus view that an optimised network of offshore weather stations combined with ‘nowcasts’ offered a way forward for the UKOOA initiative. This was supported by all attendees.

Both HSE and CAA commended UKOOA for this initiative and fully supported its objectives and the proposed way forward.

Circulation: those present, John Wils (UKOOA) and Malcolm Birkenshaw (HSE)

Ian Leggett/A J Fyfe 12/08/01

Appendix D Detailed consideration of options and implementation issues

Consider the scope of the forecasting contract(s) required to service the oil and gas interests on the UKCS. There are a number of options:

1. The UKOOA collaboration (or its administering agent, see administration options described below) might negotiate to purchase a complete forecast for all areas of the UKCS from one forecast provider (chosen as a result of some bid/evaluation process). By this arrangement one particular forecasting company would provide standard 5-day forecasts, the improved short term element and any other special models required for providing a useful interpretation of marine conditions (such as waves, fog, tide, current, lightening etc).

2. Similar to option 1 but, following the bidding process, a small number of different forecasting organisations could be requested to provide different elements of the service.

3. The scope of the forecasting services might be split on the basis of different geographical areas, two or more providers being invited to bid to provide forecasting services for different sectors of the UKCS. This option is further subdivided according to whether:
   3A subcontracts are centrally administered;
   3B subcontracts are not administered centrally (A different operator might administer the contract for each sector, for example).

4. The status quo might prevail in relation to standard forecasting services while the collaboration goes ahead for other activities such as with the development of the short-term and other specialised elements and sharing of real-time data.

In association with these issues there are also issues concerning how UKOOA might best administer the collaboration.

The following is a list of possible administration options:

a) UKOOA does it directly, with one or more of UKOOA's staff being guided by a re-invigorated metocean committee.

b) UKOOA requests one of its established subsidiaries (LOGIC or DEAL, for example) to take over the administration with the metocean committee forming a steering group

c) One operator implements the collaboration on behalf of UKOOA.

d) A group of operators administers the forecasting collaboration, each operator being responsible for one out of five or six major sectors.

e) The major metocean contractors might be invited to bid to organise and run the collaboration on behalf of UKOOA, irrespective of whether the successful bidder or another subcontractor provides all or part of the forecasting service.

f) A group of consultants might be co-opted to assist UKOOA's metocean subcommittee to bring the collaboration to life and develop an acceptable modus operandi prior to inviting bids for one of the other arrangements on a longer term basis.

Two quite distinct cases, A and B say, could be imagined depending on whether:

A) UKOOA is able to proceed with the initiative and represent all of its members

B) UKOOA was only able to proceed with the active support of some of its members and a significant number of UKOOA members did not participate. In this case it might be necessary to proceed with a subgroup of members, administration being handled by a UKOOA subgroup or by some independent group established by those members. In this case, the scope(s) of the contract(s) for forecasting services might be adjusted to match the needs of the participants.

Administration options a through f could apply to both of these cases but with different steering groups and the scopes of work set according to the requirements of those interested. Whether or not case B progresses under the auspices of UKOOA, would depend, presumably, on the numbers of interested members and the agreement of the others.

Options a to f and cases A and B are not evaluated separately, but consideration is given to each in relation to the options for the contract scope.

Forms D.1 through D.5 lay out considerations of the pros (strengths and opportunities) and cons (weaknesses and threats) for each of the scope options 1, 2, 3A, 3B and 4.

Pros and Cons Assessment

Item Assessed: Scope of forecasting contract(s)	
Option: 1 - UKOOA purchases entire UKCS forecast from one provider	
Comments: Considering options 1 - 4 together with administration options a) to f) and g) as described above	
Pros	**Cons**
Strengths • Gives UKOOA maximum influence on more substantial part of their expenditure than they have had previously • Standard and short range forecasts will be made available to all with web access - who will then be in best position to judge anticipated effects of weather on operations. • Since service will be available to all UKOOA members and their subcontractors, there will be no need to incorporate exclusions and the service will be available throughout the industry to all who are employed by UKOOA members.	**Weaknesses** • Difficult negotiations between UKOOA members to arrive at a fair distribution of costs, bearing in mind different numbers and types of facilities, differences in geographical distribution of facilities and different requirements for adverse weather policies, and subcontractor support (such as rig hire, DSV ops., seismic services etc., etc. • Difficult negotiations within UKOOA to establish priorities for different aspects of forecasting service. • Makes it more difficult for a new company with good ideas for improved service to make in-roads • Data will leak into other industries through use of common subcontractors
Opportunities • Enables reduction in wasteful repetition and will allow greater standardisation • Should allow a larger portion of budget to be spent on useful improvements • Should allow UKOOA to make maximum use of all its member's experience to come to informed decisions about setting up technical and commercial aspects of contract. • UKOOA may be able to negotiate contributions from interested third parties • Some specialist metocean staff will be needed to set up and monitor contract on behalf of UKOOA. This would be possible for a collaborating group but certainly not for smaller operators acting independently.	**Threats** • Winner of first contract has strong monopolistic position when contract renewal is approaching. • Unsuccessful bidders may lose interest in offshore work and concentrate resources in other areas. • Difficult to negotiate a back-up service if chosen provider performs unsatisfactorily or is no longer available. • Savings in subcontract services due to UKOOA providing forecasts fail to materialise.

UKOOA purchases entire UKCS forecast from one provider **Form D.1**

Pros and Cons Assessment

Item Assessed: Scope of forecasting contract(s)	
Option: Option 2 - UKOOA places two or more contracts for different elements of forecasts (standard, short-term, specialist predictions, e.g. - tide, waves aviation).	
Comments: Considering options 1 - 4 together with administration options a) to f) and g) as described above	
Pros	**Cons**
Strengths • Gives UKOOA maximum influence on more substantial part of their expenditure than they have had previously. • Standard and short range forecasts will be made available to all with web access - who will then be in best position to judge anticipated effect of weather on operations. • Since service will be available to all UKOOA members and their subcontractors, there will be no need to incorporate exclusions within contract and service will be available throughout the industry who are employed by UKOOA members.	**Weaknesses** • Difficult negotiations between UKOOA members to arrive at a fair distribution of costs, bearing in mind different numbers and types of facilities, differences in geographical distribution of facilities and different requirements for adverse weather policies, and subcontractor support (such as rig hire, DSV ops., seismic services etc., etc. • Difficult negotiations within UKOOA to establish priorities for different aspects of forecasting service. • Makes it more difficult for a new company with good ideas for improved service to make in-roads. • Data will leak into other industries through use of common subcontractors.
Opportunities • Enables reduction in wasteful repetition and will allow greater standardisation. • It may be possible to optimise placing of contracts to take advantage of technical and commercial differences between different forecasting organisations who win contracts. • Should allow a larger portion of budget to be spent on useful improvements to forecasting services. • Should allow UKOOA to make maximum use of all its member's experience to come to informed decisions about setting up technical and commercial aspects of contracts. • UKOOA may be able to negotiate contributions from interested third parties. • Some specialist metocean staff will be needed to set up and monitor contract on behalf of UKOOA. Comment against option 1 also applies here.	**Threats** • Although there are more forecast providers involved, the winners of first contracts will still have strong monopolistic positions when contract renewal is approaching unless both providers are encouraged to maintain a 'standard' forecasting capacity . • Savings in subcontract services due to UKOOA providing forecasts fail to materialise.

UKOOA places separate contracts for different forecast elements Form D.2

Pros and Cons Assessment Form

Item Assessed: Scope of forecasting contract(s)	
Option: Option 3A - Two or more contracts placed for different geographical areas (sectors of UKCS, for example) - contracts organised centrally	
Comments: Considering options 1 - 4 together with administration options a) to f) and g) as described above	
Pros	**Cons**
Strengths • Allows for a range of smaller contracts to be developed to meet specific requirements of each geographic location. • Allows competitive environment amongst service providers to be maintained - although this may be artificial and costly if one provider is superior in all areas. • Central negotiation but with variation according to sector may allow specific needs of each sector to be assessed and funded more effectively - no need for "one forecast fits all" mentality. • Flexible enough to allow common safety standard without imposing rigid requirement in areas where it is not necessary.	**Weaknesses** • Operators with platforms across different sectors may receive different standards and styles of forecast for platforms in different areas making a common approach to adverse weather warning and other operational procedures more difficult. (Although differences should be expected where they are justifiable on the grounds of different technical requirement). • Those operators who have previously exercised effective internal control may find it difficult to revert to a system of control by others. • OIMs who have dealt directly with forecast organisations regarding their own specific requirements may object to dealing through some central administrative organisation. • UKOOA might need to re-organise existing members' staff or take on new technical and administrative staff to handle this option. • Artificial boundaries may appear with platforms on either side of a boundary getting different services.
Opportunities • Market seems more open to new entries with this arrangement. • Better opportunity to arrange forecast requirement and associated cost to fit each sector • Central negotiation will allow special services to be trialed in one or more areas before extending them to others. • To develop cost structure that fairly represents different technical requirements between sectors. • If success in a limited number of sectors, could be developed into an option 1 or 2 for entire UKCS.	**Threats** • Potential for savings in contractor/subcontractor service costs may be substantially reduced by sector subdivision.

Centrally organised contracts covering different sectors of the UKC **Form D.3**

Pros and Cons Assessment

Item Assessed: Scope of forecasting contract(s)	
Option: Option 3B - Two or more contracts placed for different geographical areas (sectors of UKCS, for example) - contracts <u>not</u> organised centrally (e.g. by different UKOOA member, say that with greatest interest in each area)	
Comments: Considering options 1 - 4 together with administration options a) to f) and g) as described above	
Pros	**Cons**
Strengths • Allows for a range of smaller contracts to be developed to meet specific requirements of each geographic 'sector'. • Allows competitive environment amongst service providers to be maintained - although this may be artificial and costly if one provider is clearly superior to others in all areas. • Special services can be trialed in one or more areas.	**Weaknesses** • Less scope and more difficult for UKOOA to reduce repetition and make savings by adopting common standards, especially if the technical requirements and administration are different for each sector. • There seems little scope for developing savings since each operator/provider pair could have different requirements. • Difficult to achieve common standards of safety and administration • Artificial boundaries will appear with platforms on either side of a boundary getting both different technical and different administration of services. • May be difficult to extend services from sector to sector
Opportunities • Market seems more open to new entries with new products. • Different UKOOA members might take on organisation of contracts in each sector, spreading the technical support and administrative burden more equitably. • To develop cost structure that fairly represents different technical requirements between sectors.	**Threats** • Fragmentation of service and deterioration in uniformly high standard • UKOOA companies may be unable to guarantee their service to the others in the face of re-organisation and redistribution of assets among operators. • Disputes about share of funding amongst operators especially where a 'high-overhead' company is providing the technical and administrative support. Costs will vary for this reason • Potential for savings in contractor/subcontractor service costs may be substantially reduced by sector subdivision.

Sector contracts administered by different operators in each sector Form D.4

Pros and Cons Assessment

<table>
<tr><td colspan="2">Item Assessed: Scope of forecasting contract(s)</td></tr>
<tr><td colspan="2">Option: Option 4 - Status quo for standard services, collaboration for new forecasting elements.</td></tr>
<tr><td colspan="2">Comments: Considering options 1 - 4 together with administration options a) to f) and g) as described above</td></tr>
<tr><td>Pros</td><td>Cons</td></tr>
<tr><td>Strengths
Minimal change to change to present arrangements
Allows freedom for groups of UKOOA members interested in better services to make arrangements to suit themselves either with one forecaster or through joint industry research and development project.</td><td>Weaknesses
Fragmentation of supply allows all to hide inefficiencies.
No opportunity to monitor real cost to UKOOA and suspicion remains that UKOOA are overcharged for total service, whether by forecasters or by added service charges.
No opportunity for standardisation of service even for adjacent platforms.
Some operators may get a free ride at expense of others when they share same marine subcontractors and helicopter operators.
Operators with few platforms are unable to take advantage of scale of purchase and therefore pay extra for standard services.
Contractors continue to make own arrangements and pass on mark-ups as hidden costs.</td></tr>
<tr><td>Opportunities
None other than available with present day arrangements.</td><td>Threats
Operators with few platforms are unable to take advantage of scale of purchase and therefore pay extra for standard services.
Difficulty in generating sufficient cost saving to encourage the development of the new services within existing overall budgets.</td></tr>
</table>

Status quo with collaboration for new forecasting elements **Table D.5**

Administration arrangements for each option are considered as follows:

Option 1 (UKOOA purchases entire UKCS forecast from one provider)

This would be a large contract that will make a critical contribution to safety within the industry as a whole. It would require the services of both technically qualified and commercially competent administration to oversee the bidding process and conduct an appropriate bid evaluation. Further, since UKOOA would be providing data to others with statutory obligations to ensure safe working, these other organisations would need to take part in the bidding process and ensure their requirements were fully considered and met.

Much of the responsibility for the proper functioning of the contract would lie with the successful bidder. However, UKOOA (and others affected) would need the services of a technically competent person to assess both the new procedures for distribution of data to those who should have it and the new short-term element of the forecast. The assessment of meteorological success could be incorporated within the contract. The UKOOA metocean committee could become a channel for members to register official concerns. However, given the wider distribution of data and the needs of many others with many differing requirements and points of view, the successful implementation of the contract would require the full-time services of a technically competent administrator for some time.

Since this is a radical change in the way that forecasts are provided, it might be best to approach full implementation of this option progressively. Thus Option3A might be implemented for one or two sectors in the first instance but with the long-term object of establishing a pan UKCS service once teething troubles had been overcome.

UKOOA would need the services of a broadly based and technically competent team to set up the contract initially and the on-going services of a technically competent administrator in the longer term. This could be achieved by:

- UKOOA engaging (or funding) the full-time post and providing appropriate technical back up via its technical committees. Central administrative support would be needed for the bidding process but the longer term administrative support might be provided by several routes, depending on the physical location of the technical administrator

or,

- UKOOA placing a separate contract with a qualified contractor to act on their behalf to consult all interested parties and place the contract. This same contractor might provide follow-through evaluation of contract implementation.

Administration options a), b), c) and f) seem most relevant to the first of these alternatives. They all require the appointment or secondment of one full-time member of staff for a period and incur staff costs and administrative support accordingly.

Administration option e) is most relevant for the second alternative and requires the placing of an appropriate administration contract by competitive tender. Drawing up the request for proposals and evaluating bids for the administration contract might be administered by UKOOA directly with the help of some of its members.

Option 2 UKOOA places two or more contracts for different elements of forecast

The same administration options seem to apply here as they do to option 1. Because two or more contracts could be placed for different technical aspects of the forecast , better co-ordination would be required between the separate contracts but otherwise there would still be the same need to monitor the implementation of the new system technically.

Option 3A Separate 'sector' contracts administered centrally

This option shares many technical requirements with the first two except the nature of the job changes to be more specifically administrative to ensure that appropriate resources are deployed to meet specific requirements of each 'sector.' Once again, the services of a technically competent project administrator would be required to oversee the implementation of the new service. In this case, it might be possible to introduce the new service progressively and take advantage of lessons learned during the process. In fact this option could be used on a trial basis prior to establishing one of the more radical solutions, i.e. an option 1 or option 2 solution in the longer term. If option 3A were to become the model for the final solution, great care would be required to ensure that the final organisation retained a cohesive whole relevant to those UKOOA members with operational interests in more than one sector. Administration options a), b) and f) seem most relevant here.

Option 3B Separate 'sector' contracts: administration distributed among UKOOA members

Administration option d) seems the only one relevant in this case. Each sector would need to be covered by staff working within one member's office. Unless there were strong links between staff in the different offices, this option could very quickly become fragmented and disjointed as each operator imposed different requirements and standards on each forecasting contractor. Operators that did not have control of the contract would also need to establish good links with the responsible employee of the operator that did. Difficulties could also occur in providing long-term continuity that survived internal re-organisations and commitments to other tasks.

Option 4 Status quo for standard forecasting services, collaboration for new services

This option closely resembles a joint industry research project, at least in its early stages, and so could most easily be administered on this basis, each operator assigning its own experts to attend steering group meetings. Assuming that this project were set up by UKOOA, it would be necessary to incorporate the cost of a project manager within the funding and propose a total budget accordingly.

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