Marine Warranty Surveying Companies

This note is intended as an overview of Marine Warranty Surveying (MWS) companies.

Part 1: MWS companies, their main lines of business and their origins.
Part 2: The relationship between the MWS company, the Assured and the insurance market.
Part 3: The MWS bidding process, project and document processing and document reviews.
Part 4: The MWS on site.

Part 1: The main MWS companies

Marine Warranty Surveying was largely started by two companies; Noble Denton (now DNV) and Matthews Daniel (now part of BV). Nearly all other MWS companies spawned out of employees from these two companies either directly or indirectly establishing companies as shown in Figure 1.

Very few companies can survive on MWS work alone. In fact the larger they are the more diverse they have to be. All have other, more profitable, business lines. Examples of this diversity, for the largest MWS companies, are as follows:

- **ABL:** ABL Group (formerly Aqualis, Braemar, LOC). Aqualis acquired Braemar and then Aqualis Braemar acquired LOC. LOC was founded by four former employees of Noble Denton. Later Aqualis was set-up by former employees of Noble Denton acquiring first Braemar and then LOC.
  MWS; Marine Consultancy; Engineering; Rig Moving and Well Engineering; Asset Integrity Management and Software Licencing; H&M and P&I Inspections, Expert Witness Work, Salvage and Wreck Removals.

- **DNV**: GL acquired Noble Denton becoming GL-Noble Denton before DNV acquired GL-Noble Denton becoming DNV-GL. Then losing the GL to become DNV.
  MWS; Engineering; Marine Consultancy; Classification; Digital Modelling; Software Licencing.

- **Global Maritime:** Has stayed independent since inception in 1981 when set-up by former Noble Denton directors.
  MWS; Engineering and Software licensing.

- **Matthews Daniel**: Owned by BV but has retained original name of MattDan.
  MWS; Loss Adjusting; Rig Moving.

- **MCE**: Set-up from former employees of Noble Denton
  MWS; Engineering.

- **Sterling Technical:** Set-up by former employees of Braemar/Falconer Bryan.
  MWS; Marine Consultancy; Loss Adjusting and Rig Moving.

- **WavesGroup:** Established as Mwaves (energy) and Cwaves (maritime and shipping) by former employees of LOC. Now known as Waves Group.
  MWS; Engineering; Renewables Consultancy, Expert Witness Work, Salvage and Wreck Removals.

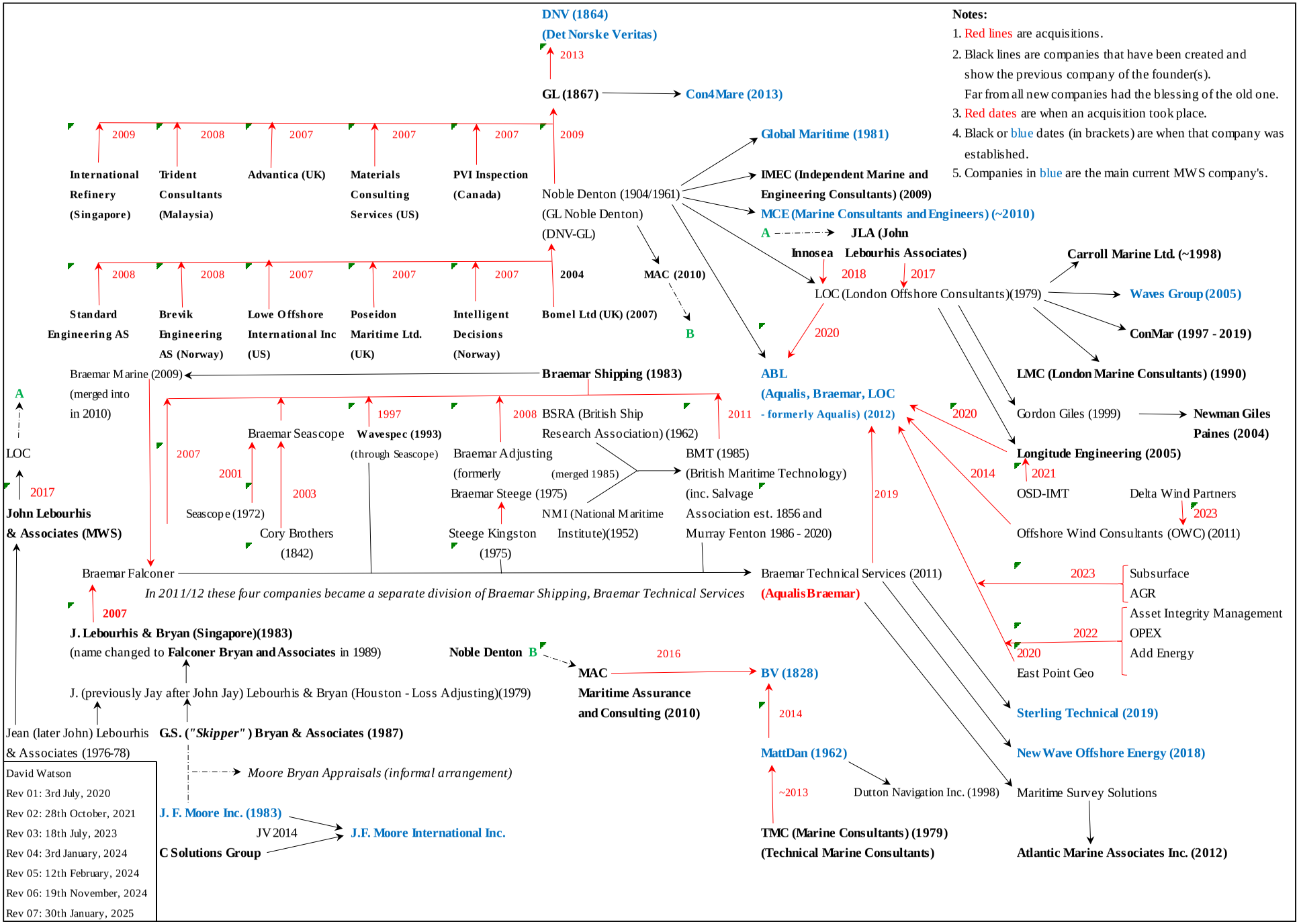


Figure 1: Family tree of most of the best known MWS companies

Part 2: Marine Warranty Surveyor appointment; relationship with the insurance market

This section is intended as a guide for brokers and underwriters on the appointment of the Marine Warranty Surveyor (MWS) and how the role of the MWS fits into the structure of the insurance market.

MWS companies can be of varying sizes, some with hundreds of MWS surveyors in a global network of offices and others with a handful of surveyors in one or two countries. However, a typical MWS project office may have, say, about 12 staff surveyors, with rarely more than 6 in the office at any one time (with many more contractors available if required and also on jobs). Up to a dozen projects could be worked on by this office at different stages of completion. In addition work will also be carried out on all the other aspects of an MWS company's business; engineering, consultancy, rig moves, routine surveys, software licensing and development and expert witness work etc.

The MWS has a seemingly conflicting role in that they are employed by the Assured but act on behalf of the Underwriter's interests, being answerable to the Underwriter. The MWS was originally employed to act on behalf of Underwriters on site from the late 1960's early 1970's onwards, following losses and claims involving novel designs of offshore assets, especially jack-up rigs, including rig moves. MWS services were (and are) funded by a contribution from the premium (2½% is generally used at present but this is subject to review). Typically the client pays the MWS according to the contract and then submits an invoice to the broker who collects an RP (Return of Premium) by way of endorsement to the policy. Additional MWS costs being born by the Assured. There is an exception to the rule; on some offshore cable laying projects the MWS contract is between underwriters and the MWS with underwriters paying the MWS directly.

Assured's have varying degrees of acceptance of an MWS. Many view the MWS as a distressed purchase while a few see the MWS as a project asset with probably the greatest knowledge and understanding, on a project team, of the riskiest parts of a project, the marine operations. These projects incorporate the MWS into the project and its decision making, seeing them as an independent source of expertise and advice while, in the former case, the benefits of having an MWS are largely wasted.

Figure 2 describes this relationship. This diagram is an extension and development of a previous version that can be found at the back of the Scopes of Work produced by the JNRC (Joint Natural Resources Committee, formerly the JRC – Joint Rig Committee).

Efforts are being made to increase direct contact between the MWS and underwriters and brokers. This has, in the past, been very poor but having been recognised as a communications failure is now being addressed. Some kick-off meetings and other regular project meetings are now attended by the assured, underwriter and MWS. Contact also takes place, of course, when something goes wrong, a Certificate of Approval (CoA) is refused or withdrawn, or an accident happens with either the insured assets or associated equipment requiring the underwriter to be informed, usually through the broker.

When this happens either the Assured rectifies a problem by complying with the MWS recommendation(s) or, in the case of an accident, a report is made to Underwriters who may then appoint a Loss Adjuster to investigate the cause, nature and extent of damage and adjust the claim.

During both the MWS appointment and when an incident needs to be reported, the Broker acts as the facilitator between the MWS, Assured and Underwriter(s). The Following Market is then usually advised after the Lead Underwriter(s), unless the incident becomes public beforehand.

Increasingly, especially with renewables, the JNRC Scopes of Work (SoW) and Codes of Practice (CoP) are used as a basis for the MWS appointment. Unfortunately, unlike for the oil and gas

industry, they are being used rigidly and without thought as to their practicality, rather than, as intended, advisory and an *aide memoir*, to ensure the riskiest aspects of the marine operations are covered with 3rd Party oversight by the MWS.

Unlike Class (in which Rules are followed), the MWS, due to the nature of marine operations and the need to be flexible, uses Guidelines. Consequently, the surveyor has to be very experienced because, frequently, situations encountered are novel. Sensible solutions, therefore, have to be agreed and enforced. This requires not just technical knowledge but, as usually the only MWS person present on a site, the MWS individual has to be sure of the technical aspects of a problem, confident in the solution and have the personality to talk to everyone on a project about the problem, independently reviewing routes, presented by the Assured, to a viable solution.

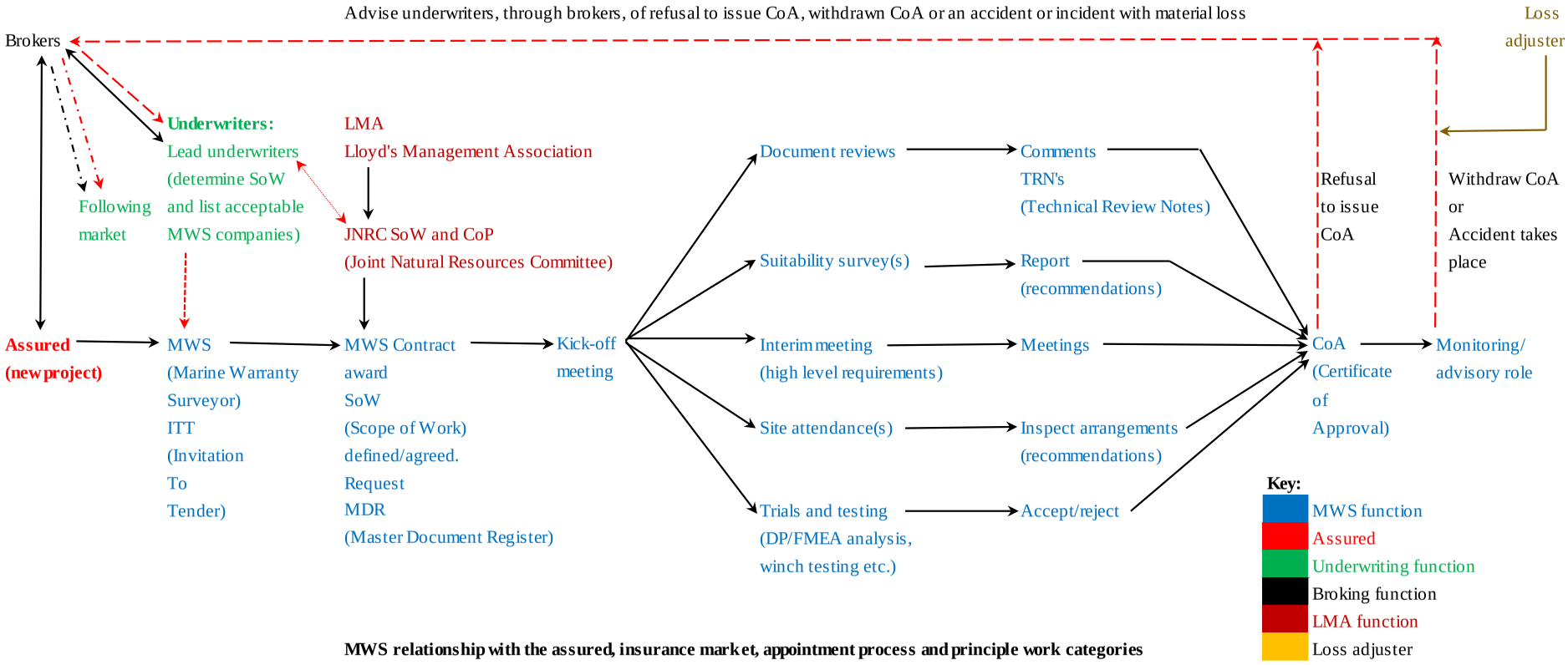
SOMWS (the Society of Offshore Marine Warranty Surveyors: https://www.somws.org/), established in 2017, now addresses the problems of MWS experience and qualifications by ensuring that the surveyors applications for accreditation to SOMWS is reviewed against the requirements of whichever of the four Membership categories, below, the surveyor has applied for. The screening panel of SOMWS make judgements regarding the surveyors breadth and depth of experience and then they make a recommendation, which is presented to the Board for a vote. The four categories of competence are:

- Projects (oil and gas)
- Rig Moves
- Renewables
- Project Cargo

This has led to the insurance market starting to insist that MWS surveyors are SOMWS qualified to be appointed. It also raises the increasing problem for MWS companies, trying to avoid appearing identical to each other in terms of competence and forcing them to provide added value in order to differentiate them from competitors.

The above list is not definitive but, while the company's listed in Part 1 account for nearly all of the MWS market and provide size and depth of coverage, which smaller company's struggle to provide, other companies do get smaller MWS contracts, some even directly from underwriters. Such smaller, specialist, companies also feel they have the expertise to enter the business based on their previous and current experience.

SOMWS addresses the experience and competence of the individual MWS issuing CoA's, but the overall suitability of the company to handle a specific project is typically handled by the Underwriter's use of a MWS panel. Although the MWS company's appearing on the slip are referred to as, *"the panel"* it is largely up to the Lead Underwriter to agree who should be on the list. It is not a panel, as such, in that there is no formal process for admittance but a list of company's who are considered acceptable to represent Underwriter's interests. For them to be considered they have to be known to underwriters either through reputation or informal application to specific underwriters. An alternative approach is to use a pre-qualification process such as that outlined in the JNRC 2019-010 MWS Companies Pre-Qualification and Good Practice Guideline (Sept. 2019).



MWS relationship with the assured, insurance market, appointment process and principle work categories
(process can cover renewables, platform installation, pipelaying, subsea, project cargo)

Notes:

1. All comments, recommendations or higher level requirements must be closed out before the CoA is issued. Hence one CoA is issued for each operation not intermediate stages otherwise it becomes meaningless.
2. TRN: Technical Review Note or similar depending on MWS company terminology. These are a list of comments on the documents being reviewed

Figure 2: The general relationship between the MWS and assocaited interests

Part 3: Servicing a project; Bidding (ITTs - Invitations To Tender), Project Management
This section illustrates the general procedures undertaken by MWS companies when bidding and servicing projects.

Ideally, companies would prefer projects to be won without a bid, with a roll over contract based on previous good performance. Bidding processes are increasingly labour and time intensive, fraught with requests for often irrelevant and unnecessary information unrelated to the work and involve multiple rounds of clarifications, meetings and interviews, often for it to become obvious that they are being used as a price check and there is little chance of success, the lowest price eventually wining. Increasingly companies are required by national regulations and sometimes internal requirements, to go out to bid for a project rather than to appoint a company based on past performance and experience of working with a company. Occasionally bids are straight forward and based only on revised rates being submitted. However, it is soon known, usually by the reputation of the Assured and the nature of the questions, whether or not the bid is down to price alone.

Increasingly, especially in the Far East but also with some European national oil companies, the bid is based purely on the lowest price. Under such circumstances, especially when it is known or assumed a small company with low overheads is bidding, the company has to submit its bid at cost price, occasionally lower (buying a project) if there is the prospect of future work. If pushed, the expenses are also at cost rather than the usual cost plus 10% or similar. When this happens the only way to make money on a project is to rely on VO's (Variation Orders) based on a company's standard rates rather than rates submitted for the bid.

Contracts are increasingly more onerous. They used to contain Hold/Harmless clauses as routine. However, often, such clauses are omitted and the Client requires massive or unlimited liability insurance to be provided or for onerous liability responsibility to be taken by the MWS. Again, this has resulted in some companies, especially those with the capacity to perform the work on large projects, walking away from a bid if the Assured refuses to change the contract. The Assured will hardly ever agree to a contract change unless it contains an obvious mistake. Generic contracts are also frequently inappropriate as they were designed for supply, manufacturing or large construction companies, not a relatively small consultancy.

An MWS company usually agrees to limit liability, for a survey, for instance, to the cost of the survey.

When bidding, documents are usually bid for two reviews of the same document which can average 4 hours for each revision.

Another problem is that, increasingly, the MWS contract is bid by a company way down the line from the actual Assured. In one case the Assured passed the EPIC contract to a shipyard. The shipyard didn't understand the function of the MWS and didn't know what to do so in turn, they passed the MWS contract to the installation contractor, fortunately one of the good heavy lift contractors, who did understand the MWS function. The MWS was, thus, contracted to a company two companies remote from the Assured.

One well known contractor, another heavy lift installation contractor, who was tasked with employing the MWS, on several occasions, by the Assured, always used to phone up, after the bid had been submitted and ask where their 10% discount appeared in the bid. They assumed the bid would always be discounted, even if at cost price. This can be a factor in negotiations.

Modifying the MWS scope post contract award if the MWS is contracted to the EPIC contractor can be difficult due to the reluctance of the EPIC contractor to raise a Variation Order (VO) with the client company higher up the contractual chain.

Why carry out MWS work?
From the above, it may be reasonable to ask why an MWS company performs this work at all when there is little money in it and when an MWS cannot rely on MWS work alone unless they are a very small company with minimal overheads, in which case they would struggle to have sufficient experience or take on large projects.

The reasons for this are mostly threefold:

1. MWS projects provide good bread and butter work to fill the manpower curve. A company always tries to have a mixture of work; high intensity and low intensity, long term and short term, high skill and low skill and work requiring a lot of experience and little experience. This ensures maximum use can be made of the workforce, reduces dependency on one particular market, allows for some planning and provides a path for qualified and experienced technical staff but new to the MWS industry, to increase their experience, enabling them to work on other projects.

2. MWS work provides a good footprint. Most MWS contracts allow for wide exposure to a large array of people in the industry; energy company personnel, new project teams of mixed age and experience, contractors, shipping companies, engineering companies, freight forwarders, lawyers and many other elements of the industry which are useful contacts for future work.

3. MWS work provides an enormous amount of experience in a very short time period at the sharp and high risk end of a project. It also provides a great deal of responsibility and teaches how to make important decisions on your own (due to costs it is usual for only one surveyor to attend site), often of significant consequence and also how to deal with pressure when making unpopular decisions. On arrival on site there is usually a very steep learning curve, especially for younger surveyors.

The nature of the bid:
When bidding for a contract a spreadsheet is usually set-up to calculate the costs of typical attendances based on air fares, hotel rates, taxi fares and subsistence allowance. These assumptions have to be laid out very clearly to ensure only these trips are included in the contract and no others.

The bid must be as tightly defined as possible. Ambiguities and missing information must be avoided.

The documents for review are also laid out clearly and the assumptions regarding what documents are to be requested and the time taken for each is listed.

For example: A document describing the project weather criteria or design criteria may be allocated 30 minutes, each, to review. A loadout document, lifting procedure, or similarly more involved document, may be allocated 4 hours to review and then another 2-4 hours for a re-review. It is rare a document is allocated more than half a day of review time.

Usually the first review would be at the AFC (Approved For Construction) revision and then another, updated document, would be reviewed.

Project document control:
Good document production, for an offshore project, will nearly always be very formalised with full traceability of documents, full QA of format, procedures, standards and adherence to other processes. This ensures that major engineering decisions are tightly controlled reducing the chance of error.

Similarly, there is also a certain formality in how a project develops.

The stages of a project are usually:

- **Conceptual**: The basic project concept or concepts are evaluated with ideas being suggested and a lot of free thinking. This phase may take a couple of months.

- **FEED (Front End Engineering and Design)**: Details of the chosen concept are firmed up. This phase may take 3-6 months. There may be a little overlap with the start of Detailed Design.

- **Detailed design**: A thorough detailed design developing on from FEED. This is the longest phase which can take up to a couple of years. This is the phase in which the project is designed, procured, fabricated, transported, installed and commissioned. It is also the only phase in which the MWS will participate.

- **Follow on Engineering**: This phase is to provide the support engineering during and immediately post construction. It usually overlaps with the end of Detailed Design and takes as long as the construction takes to finish, say 6 months to a year. At the end of this phase As-Built drawings and documents are created showing all the changes that have taken place between detailed design and completion.

Therefore, the overall design period for even a modest project can take at least two years.

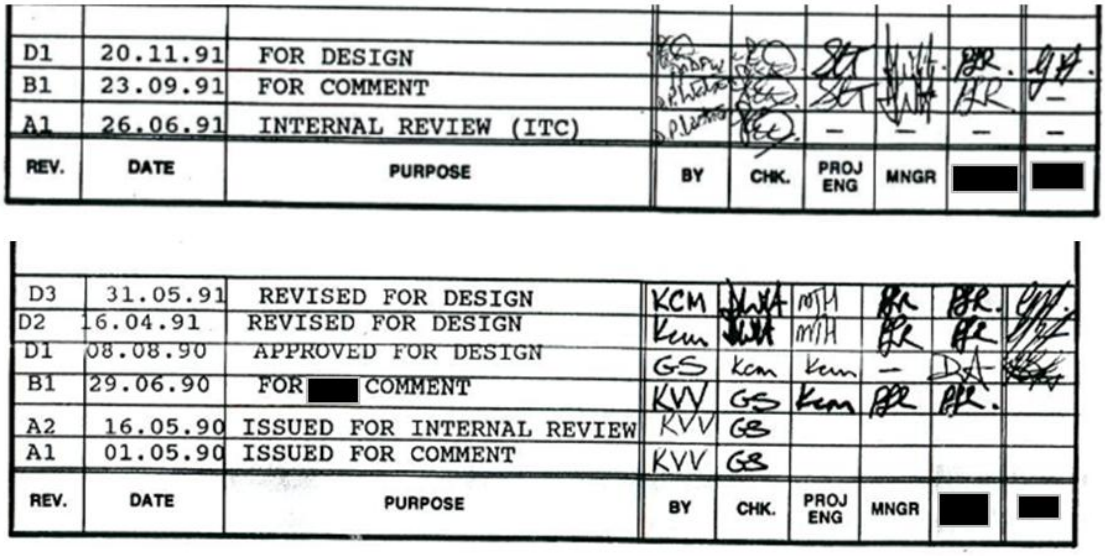
During the Detailed Design phase a document usually goes through many Revisions. As many as 3 to 5 Revisions are common before a document can get to AFC. These may be:

Rev. A1: Issued for Internal Comment (ITC)
Rev. A2: Issued for Internal Review
Rev. B1: Issued for Client Comment
Rev. D1: Approved For Design (AFD) (maybe additional Revised for Design stages)
Rev. E1: Approved For Construction (AFC)

Up to 6 people can check each stage of these documents. For instance:

- Naval Architect/Structural Engineer/Geotechnical Engineer/Pipeline Engineer
- Lead Engineer (department head)
- Chief/Project Engineer
- Project Manager
- Client Engineer
- Client Project Manager

Other features of good document control are to always "mark" the changes as a document is Revved up, always ensure that documents are fully referenced and that other documents referenced are listed clearly, the document number is stated on every page, no pages are missing and the pages are all numbered.



REV.	DATE	PURPOSE	BY	CHK.	PROJ ENG	MNGR	[redacted]	[redacted]
D1	20.11.91	FOR DESIGN						
B1	23.09.91	FOR COMMENT						
A1	26.06.91	INTERNAL REVIEW (ITC)			–	–	–	–

REV.	DATE	PURPOSE	BY	CHK.	PROJ ENG	MNGR		
D3	31.05.91	REVISED FOR DESIGN	KCM					
D2	16.04.91	REVISED FOR DESIGN						
D1	08.08.90	APPROVED FOR DESIGN	GS			–		
B1	29.06.90	FOR [redacted] COMMENT						
A2	16.05.90	ISSUED FOR INTERNAL REVIEW	KVV	GS				
A1	01.05.90	ISSUED FOR COMMENT	KVV	GS				

Figure 3: Two examples of the front pages of two modest North Sea jacket design documents showing the typical stages of checking and revision

Note:

a. The top document is for the 3rd pass of an 89 page jacket upending document. 5 months have elapsed between the 3 submissions. The first submission may have taken up to 6 months to write.
b. The bottom document is a 25 page on-bottom jacket stability analysis. A year has elapsed between the 6 submissions. The first submission may have taken up to 6 months to write.
c. These particular documents would not have been issued at AFC as they were design documents and the results of these documents were used to feed into and design the structure. It is the structural design documents and drawings that would then have been issued at AFC and would be requested by the MWS although, the MWS may request these documents as back-up once the MDR is received.

Another safety feature is that of dimensioning drawings. There may be hundreds of drawings covering all aspects of a platform. However, a dimension should only ever appear once amongst all the project drawings and documents. This is to ensure that, if that dimension changes, it only has to be changed once, thus avoiding missing changing a dimension somewhere which could result in a mistake. Similarly, the differences between two dimensions are never marked on drawings, all dimensions are measured from a single baseline. Again, this is to avoid missing changing a dimension, should another one change.

The above lists the basic principles of good document control showing that there is a large team behind these documents checking and ensuring mistakes are avoided.

Role of the MWS

The MWS, therefore, provides a final overview of the marine operations, often the area where a project team is least expert.

The MWS usually enters the project after the documents have become AFC. By this time there have usually been many iterations, revisions, changes of concept, discussions and a lot of history that could have taken years and documents, at this stage, could be regarded as almost being finalised.

Very soon after the MWS has won the contract for a project the following activities take place:

- Review and confirm the Scope of Work and incorporate any VO's into the contract.
- Sign contract.
- Hold a kick-off meeting so the MWS can meet the project team, confirm the contract has been signed and accepted, understand the standards required, confirm first attendances, introduce the team and establish the mechanism and conditions for submitting invoices.

  Very importantly the MWS will probably request the project's Main Document Register (MDR). Some projects present documents they think the MWS requires. This is rather a tedious job and is often given to someone within the project team from a completely different discipline than required (electrical, QA or process, for instance). Consequently, the documents presented often have a bias towards such disciplines and are often not relevant to marine operations. It is easier if the MDR is presented to the MWS and the MWS selects the documents required.

  Although the MWS kick-off meeting is primarily for the MWS to meet the Assured's project team and to establish operating parameters the Underwriter and broker should also be present to establish a connection and understand the project. Perversely an MWS kick-off meeting was recently started with everyone present except the MWS, who hadn't been invited. This oversight was corrected by the Underwriter by postponing the meeting until the MWS was at the meeting.

- Once these activities have been carried out the project's document directory's and titled documents (CoA's, TRN's, e-mail address lists etc.) can be set-up and document reviews started.

The MWS bid is then based on understanding each such document within about 4 hours, on average.

Of course, not every detail has to be fully understood but, after a while, an MWS must find the way round such documents quickly picking up, initially, basic information such as:

- Concept and design parameters.
- Basic design and environmental criteria.
- Software and techniques used in the design.
- Identifying and understanding oddities which require particular care and attention (grounded loadouts, for instance at Dragados, particular routes for towage, transhipments, length of project phases etc.)

It can be appreciated that there are occasions when details may be missed.

The MWS will issue a TRN (Technical Review Note) for each document either Accepting the document or writing any comments or questions relevant to that document. Comments are usually written in, generally, one of four categories (company's and their systems vary) for each document. Typical categories may be as follows:

A. Critical showstopper type question.

B. Less critical question as A. but still important. Sometimes clarification required.
C. A problem identified but which can be addressed when the surveyor attends site (examining a winch or piece of equipment, for instance).
D. A matter for information only.

All A and B questions have to be answered before attending site and A, B and C items have to be addressed completely before issuing a CoA.

Standards:
Standards used by MWS companies can be flexible but must be based on good industrial practice. The design codes used for projects, for instance should be, for instance, based on API, ASMI, BS standards or other recognised codes. However, once the MWS has established that the design code is appropriate the guidelines used by the MWS are also based on years of experience. For instance the best known guidelines are those that originated at Noble Denton and have been absorbed as DNV guidelines. These also formed the basis of LOC's guidelines, now absorbed into ABL's guidelines. The Noble Denton guidelines also formed the basis for the ISO MWS standards.

Part 4: Servicing a project; Site attendance
Once the document review process is underway attendances need to be arranged as follows:

- Suitability surveys of vessels to be used for the operations; tugs, barges, construction vessels, heavy lift ships and other cargo ships used for transporting project cargo.
- Testing and trials to be carried out (for instance; DP FMEA trials, equipment testing).
- Attendances for the marine operations; loadouts, sailaways, installations, road, rail and air transportations.
- Additional meetings as required. These may include site meetings, visits to manufacturer's sites, technical meetings the client wishes the MWS to attend (meetings with port authorities, freight forwarders, shipyards, fabrication yards) to state requirements for forthcoming operations.

Suitability surveys:
Suitability surveys are very specific to a project. This is not just a condition survey but a condition survey plus. A vessel may be in excellent condition but maybe unsuitable for an operation. For instance, a tug in excellent condition may have a single propeller which may prevent it from entering a 500m zone around a platform (twin propellers are usually required). A vessel may have dimensional restrictions (draught, for instance or width in the case of barges entering the lock at Burntisland Fabricators), operational restrictions (a harbour tug or Rhine barge may have to cross the North Sea in winter) or other problem that may prevent its use. It may also have defects regarding basic seaworthiness, certification, capacity or faulty equipment. Crew knowledge of certain operations may be required, this needs to be examined, galley hygiene could be an issue on long voyages and housekeeping onboard indicates how well a vessel is run. Nothing is off limits regarding ensuring a vessel is suitable for a particular operation.

An ideal suitability survey would be undertaken about 2 months before an operation; long enough to rectify defects or find another suitable vessel but not too long to allow other defects to occur.

A report is written, recommendations made and follow up surveys made.

Testing and trials:
Some operations require trials to take place. For instance Dynamic Position systems have to be tested before an operation or winches and other equipment may need to be witnessed working under load. Sometimes this is done on site before the actual operation but, with the risk of delaying a project if the tests fail, it is usually wise, if possible, to test it with enough time to rectify defects before use.

Marine operations:
Marine Warranty Surveyors usually attend site on their own with only occasional dual attendances if a junior surveyor needs experience or if 24 hour coverage is required and day and night shifts have to be worked.

Soon after arrival on site for a specific operation, be it loadout, sailaway or installation, a meeting should be held with everyone involved during which the operation is described, weather forecasts provided, go/no-go gates defined, security barriers arranged and the equipment and vessel status advised. Attendees should be senior project staff, including the project manager, supervisors from contractors (SPMT operators, winch providers etc.), marine crews including the Masters of vessel's being used, site staff, including security and site project managers and, of course, the MWS.

This meeting is generally followed by a tool box talk held at the site, usually involving the safety officer. This ensures all safety measures are in place, everyone is totally onboard with site safety and

security procedures and to ensure the operation will be as smooth as possible. The hierarchy of the project is reiterated, radios are allocated to those who need them and anyone not involved with the project is banished behind the taped off area of the site.

Although the MWS should be experienced in all aspects of the attendance a checklist is often used, not only as a reminder of items to be checked but also as a QA record. It acts as a basis for ensuring everything is ready and any recommendations made before arrival have been enacted and signed off. For instance, at this stage all documents should have been accepted and approved, all suitability survey recommendations closed out, tests completed satisfactorily leaving site checks to complete. The checklist used should be specific for a particular project and modified as required with items added or removed as appropriate. To accept a checklist without adapting it for a specific job defeats the object and may lead to an important item being omitted. Generic checklists should never be seen as being correct or covering all eventualities. Checklists are Guidelines, not a rigid format to be followed regardless.

Discussions will take place with the vessel crew, weather forecasters and superintendents and water depths and tide gauges checked as well as equipment tests completed.

Referring to Figure 2. Once the five strands of the work of an MWS is complete:

- Document reviews signed off with all responses to MWS questions acceptable.
- Suitability surveys complete with no recommendations outstanding.
- Testing of equipment is complete with satisfactory results.
- Meetings and recommendations from the meetings have been completed.
- All items from the current site attendance are in place and completed to the surveyors satisfaction.

then the CoA can be signed and dated with the time of signing also added. Copies are given to the project manager, who represents the Assured or representative person. The Assured is then free to proceed with the operation, if they wish, with the assurance that they will be covered by their insurance policy.

From then on the MWS is there to monitor and advise. No matter how simple or how many times very similar projects have been carried out something invariably happens requiring decisions to be made. These may involve equipment breakdowns, sudden changes in weather, SPMT wheels getting stuck and holding up a loadout, incorrect barge ballasting, poor mooring management causing a barge or ship to move or any other related problem.

There are stages for each operation when an MWS knows they can leave the site: vessel or tug/barge sailaway and departure from the quay, barge turned and moored safely alongside after a loadout, grouting cube test completed on an offshore jacket installation. Every operation has a defined point when the MWS has completed an attendance.

Conclusions:
The reason the above procedures have been explained in some detail is to illustrate the process of how the MWS generally bids for a project, how documents are generated and examined and how they are reviewed. Hopefully it gives an idea as to the pressures and constraints of time and detail that limit the MWS involvement and ability to pick-up every important aspect within a document.

The MWS provides an overarching view of a project. Every detail of a component to be installed is not always totally understood but enough is known to ensure that the basic principles of marine operations are being adhered to. Sometimes documents are sent internally for a second opinion by a specialist engineer if there is doubt.

Although every job is slightly different there are projects which have totally unique features and these must be identified early. These will contain unknowns and elements of an experimental project which contain higher than normal risks. Such an instance was the installation of hybrid risers for the **"Girassol"** FPSO, which were totally unique in both their installation and operation.

There comes a time when sufficient work has been done to get a comfortable feeling about a project. However, accidents always start in the detail and are nearly always the accumulation of more than one unforeseen event.

This paper is far from exhaustive but is intended to give a flavour of the MWS process, the constraints and it also highlights that the MWS is usually the only independent link in the chain trying to pick up what can go wrong. The MWS is also frequently the presence on site with the greatest overall experience of such critical operations.

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Abbreviations:

ABL	Aqualis Braemar LOC
AFC	Approved for Construction
AFD	Approved for Design
BV	Bureau Veritas
CoA	Certificate of Assurance
CoP	Code of Practice
DNV	Det Norske Veritas
DP	Dynamic Positioning
EPIC	Engineering Procurement Installation and Construction
FEED	Front End Engineering and Design
FMEA	Failure Mode and Effect Analysis
ISO	International Standards Organisation
ITC	Issued for Internal Comment
ITT	Invitation to Tender
JNRC	Joint Natural Resources Committee
JRC	Joint Rig Committee
LOC	London Offshore Consultants
LMA	Lloyd's Management Association
MDR	Main Document Register
MWS	Marine Warranty Surveyor
QA	Quality Assurance
RP	Return of Premium
SOMWS	Society of Offshore Marine Warranty Surveyors
SPNT	Self Propelled Modular Transporter
SoW	Scope of Work
TRN	Technical Review Note
VO	Variation Order