



DYNAMIC POSITIONING CONFERENCE
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Risk

**Development Guidance and Incident Reporting
for Operations Using Dynamic Positioning**

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(IMCA)***

INTRODUCTION

In 1972 a trade association for professional commercial diving companies, the International Association of Diving Contractors (AODC), was established and in 1990 another association this time for DP vessel owners and operators, Dynamic Positioning Vessel Owners Association (DPVOA), was set up. At this time many of the diving companies were working from the dynamically positioned vessels belonging to DPVOA members. However it should be remembered that the DPVOA membership was intended to cover such areas as drilling and pipelay in addition to dive support.

Trade associations are formed by companies operating within the same area of industry and can promote common interests and improvements in quality, health, safety, environmental and technical issues within that industry. Both the DPVOA and AODC were established as these industrial sectors emerged as driving forces within the marine area in which they operate.

“When should a trade association be established....Where a new industrial sector emerges, particularly one which is subject to regulation. Recent examples include Internet service providers, the provision of some services via the Internet such as health advice, professional rugby clubs, train operating companies, cable television suppliers and self employed IT consultants.” – Trade Association Forum.

Five years after the formation of the DPVOA, and in recognition of common interests and goals in some areas, these two trade associations merged in 1995 to form the International Marine Contractors Association (IMCA), the international trade association representing offshore, marine and underwater engineering companies. IMCA now has a membership in excess of 400, a number, which is growing every month.

INTERNATIONAL MARINE CONTRACTORS ASSOCIATION

IMCA seeks, as stated in its objectives, to:

- Strive for the highest possible standards with a balance of risk and cost in the areas of health and safety, technology, quality and efficiency, environmental awareness and protection
- Achieve and sustain self-regulation in the industry, to ease the free movement of equipment personnel globally
- Achieve equitable contracting regimes
- Provide a framework for training, certification, competence and recruitment to support and sustain the industry globally
- Resolve industry issues
- Promote co-operation across the industry

In an effort to achieve these objectives and those of the various IMCA committees members work with the secretariat to:

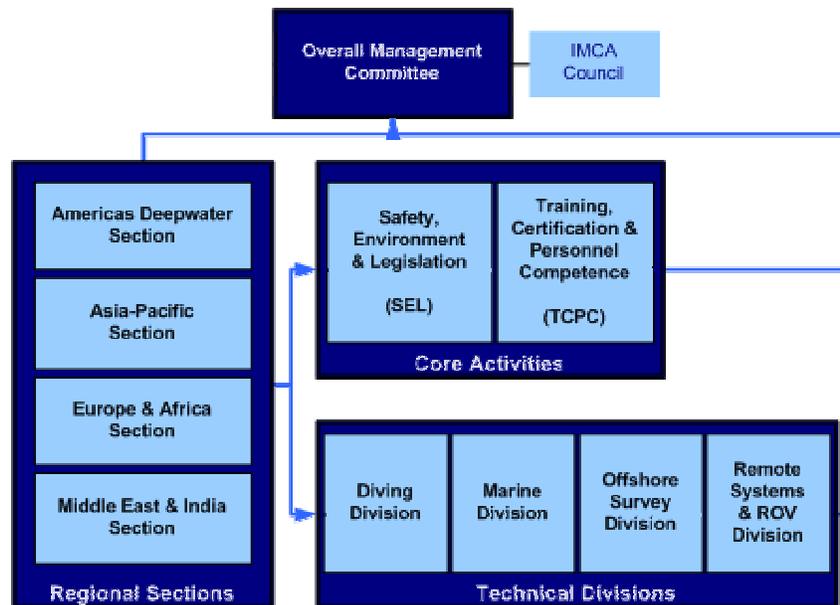
- Ensure endorsement of and continually improve IMCA guidelines
- Ensure endorsement of and continually develop IMCA competence schemes
- Publish global codes of practice, guidance notes, industry briefings, discussion papers and other media
- Promote the use of common and practical industry good practice
- Promote standard contracts to foster the ideals set by the industry and improve relations, increase efficiency and reduce overall cost

- Monitor legislation affecting the industry
- Provide a forum for discussion
- Hold meetings, workshops and seminars at various levels and at various locations
- Ensure the needs of members are adequately and properly addressed
- Encourage research and development of new technology
- Provide a single voice to speak on behalf of members where there is a common interest

THE STRUCTURE OF IMCA

The organogram below shows the structure with its core activities, technical divisions and regional sections. Within this structure the two core committees, Safety, Environment & Legislation and Training, Certification & Personnel Competence, address issues affecting all members and the four technical divisions, Diving, Marine, Offshore Survey and Remote Systems & ROV, cover matters relating to their individual industry sector.

All these committees report to the Overall Management Committee, which is charged among other duties with giving the final authorization for guidance documents to be issued. We will return to the development and production of guidance later in this paper.



SELF-REGULATION

One of the cornerstones in the way in which trade associations work is self-regulation and one of IMCA's objectives is to "achieve and sustain self-regulation in the industry". IMCA, as do other trade associations, provides guidance to members and works to update existing guidance and introduce new guidance where necessary. Members then operate to this guidance and are thus self-regulating.

International and government legislation tends to address basic cross-industry requirements and often takes significant time to introduce and implement. Self-regulation is easier and quicker to implement and modify particularly where new technology requires this.

It can be seen that is guidance is of use to not only IMCA members but also to the wider industry and some of its regulators, examples of which include:

- Being referenced by International Maritime Organization
- Regulatory acceptance of guidance by, for example, the UK Health & Safety Executive
- International recognition of the diving supervisor scheme

DEVELOPMENT OF GUIDANCE

The first port of call for IMCA in developing guidance will be its members. IMCA would ask if any member has its own guidelines, which can be used to form the basis of industry wide guidance.

The guidelines may be developed by a consultancy or in-house. In either case a clear specification of the work will be developed and in the case of external consultancy a tender document will be produced against which various appropriate organizations are invited to tender and, if successful, work.

However the information used to generate this documentation and meeting, in the first place, usually comes from and is developed by the members. This may be in the form of a member's pre-existing guidance, which they are prepared to share with the membership in order that an industry wide guidance can be developed. This final part is done, once again, by the members themselves contributing to working groups, task forces and committees.

At the Division Management Committee the progress of the various documents being produced is both contributed to and monitored. Once in that committee's opinion it is ready for publication it is forwarded to the Overall Management Committee who has the final approval on publication. It is worth noting that should a document be produced in area covered by more than one technical division it will pass through all the appropriate committees to ensure the guidance is coherent across the divisions.

CORE DP GUIDELINES

IMCA M103 Guidelines for the Design & Operation of Dynamically Positioned Vessels

This is one of key documents for the Marine Division and these guidelines represent a practical amalgamation of current regulations, operating procedures and good practice. These guidelines aim provide a standard that is both achievable and an enhancement to safety if followed in principle.

The document commences with an introductory chapter on the basic principles to be applied to all dynamically positioned (DP) vessels in the following areas:

1. Basic philosophy
2. Scope of dynamic positioning
3. Extent of dynamic positioning FMEA proving trials
4. System capability definition
5. Operation, training and documentation
6. DP equipment characteristics
7. Weather precautions
8. International, government and regulatory organization requirements
9. Training

Currently there then follow eight chapters detailing the specific requirements for the following particular DP vessel types:

1. Diving support vessels
2. Drilling vessels
3. Floating production units
4. Accommodation vessels
5. Crane vessels
6. Shuttle tankers
7. Pipelay vessels
8. ROV support vessels

Topics covered in these eight vessel specific chapters include:

- Design philosophy
- Redundancy
- Communications
- DP alert system
- Shallow water
- Operations
- Personnel responsibilities and capabilities
- Training and experience

Finally there is a chapter on two vessel operations, which was originally written primarily for shuttle tanker offtake operations and was published as a separate document, and an annex on the DP incident reporting scheme.

From its first production in 1991 to today, this document has been at various times thoroughly reviewed and updated to reflect the changes which have taken place in the intervening years such as the International Maritime Organization's 'Guidelines for Vessels with Dynamic Positioning Systems', its acceptance of the IMCA document "The Training and Experience for Key DP Personnel", the increasing number of class 3 vessels being constructed and operating and the increasing practice of risk analysis.

The latest revision was carried out by initially commissioning a consultant to review and revise the document. Thereafter this document was further developed by a small workgroup and is now ready for publication.

With the ever expanding use of DP in existing and new vessel types, this document will be again revised to address further issues which have arisen with the aim that the excellent existing document, recognized across the industry, is improved and enhanced. A comparison of the list of DP vessel applications below and the list of vessel types covered in these guidelines, detailed above, shows a need to widen their application:

- coring
- drilling
- production drilling
- diver support
- pipelay
- cable lay and repair
- multi-role
- accommodation
- survey

- wreck survey, salvage and removal
- dredging
- rock dumping
- subsea installation
- lifting
- well stimulation
- platform supply
- shuttle tanker offtake
- floating production
- heavy lift cargo transport
- passenger cruises
- mine countermeasures
- oceanographical research
- seabed mining
- rocket launch platform positioning
- repair/maintenance support to military vessels
- ship-to-ship transfer

Many of these applications can be mapped to existing vessel types however there will be differences in actual operation and procedures. This may show a way forward for these guidelines by taking the core requirements to the front of the document and dealing with the specific vessel operations and procedures later in the document.

Another area in this document for which further guidance has been requested by members is the manning of DP vessels and the gathering of information on this has started in preparation for the next revision. The separation of design and operation as subjects has also been discussed.

Whatever is decided upon in the end, IMCA M103 Guidelines for the Design & Operation of Dynamically Positioned Vessels is an internationally recognized document and any major revision of the format of such well recognized document would have to be carefully explained and, if appropriate, undertaken.

M117 The Training and Experience of Key DP personnel

In recognition that various personnel on board are key to the dynamic positioning operations and is not restricted to those who may have hands on operation of the system. It recognizes that a DP system has a number of parts, which have to come together to operate including the DP control system, the power and propulsion and the communications between the various components. Thus this document covers the following positions on board:

Master/OIM
Senior DPO
DPO
Junior DPO
Trainee DPO
Chief Engineer
Engineer watchkeepers
Electrician/Electronics personnel

The document sets out the knowledge and experience of key DP personnel including the need to train and assess new personnel and addresses the need for these personnel to maintain, practice and refresh their knowledge and skills. At this point it is worth mentioning that IMCA C002 Rev. 1 Guidance document

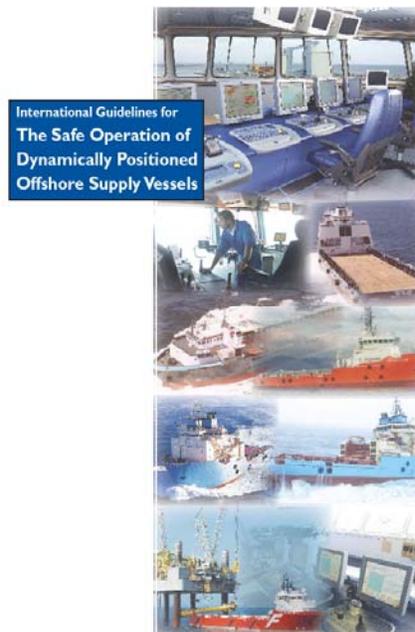
and competence tables: Marine Division is being reviewed and, if necessary, revised. Additionally on the agenda of the thirty-ninth session of the IMO Sub-Committee on Standards of Training and Watchkeeping, to be held in March 2008, is the comprehensive review of the STCW Convention and the STCW Code. One of the principles to be embraced under this agenda item is to address the special character and circumstances of short sea shipping and the offshore industry. Within this there is an objective to provide for training standards for dynamic positioning ships. Furthermore in the general section of STCW there is an objective to set out the knowledge, understanding and competences for electrical personnel e.g. ERO/ETO.

These IMCA documents detailed above form part of the Marine Division core documents which have now been listed and will be reviewed as per a pre-determined schedule to ensure they remain valid and current.

CO-OPERATIVE GUIDELINES

A co-operative guideline for IMCA is where it acts as facilitator for a cross-industry workgroup to enable guidelines to be developed and produced. So far the only example of this approach is the International Guidelines for the Safe Operation of Dynamically Positioned Offshore Supply Vessels. The development of this document was done by a workgroup drawn from across this sector of the industry with a wider circulation list to ensure that this document reflected cross-industry practice.

The reason that IMCA act as the facilitator for publication rather than publish under its own right was at that stage the number of members drawn from the offshore supply vessel sector of the industry was not very significant. However there was a demonstrable need for such guidance.



It has now been over a year since this document was published and the workgroup agreed at that time to review the document and its application, usefulness and effectiveness after one year. As this time has now elapsed, this review will take place in the near future.

With various areas of the industry overlapping it is possible that further co-operative guidelines will be developed in the future.

GUIDELINES CURRENTLY BEING DEVELOPED

New Technology

IMCA already provides a range of guidance and information documents on various position reference systems including Artemis, DGPS, GLONASS, hydro acoustic position references, and marine laser systems. It is intended to add guidance on the new RADius and Radascan position reference systems. To this end both the manufacturers and the members have been contacted for assistance. From the manufacturers IMCA receives the technical and operational information about the system required and from the members it receives their experience of operating these systems.

A review of the system is then written which normally addresses some if not all of the following:

- Principle of Operation
- Range and Accuracy
- Operation of More Than One System in the Same Area
- System Description
- Installation
- Servicing and Maintenance
- Training
- System Assessment
- Operational Experience
- Failure Modes
- Technical Specifications

There is also a proposal to produce the guidance in this area in a format, possibly a Position Reference Systems Guidance folder, such that new position reference systems can be easily added and old obsolete removed. This is currently being investigated.

Other DP guidance

On the drawing board at the moment, in addition to the guidelines being prepared for new position reference systems or newer versions of existing ones, are guidelines for simultaneous operations. These are being developed in the first instance by the Americas Marine sub-group. The aim is to produce guidance which can be used by any vessel simultaneous operations and anywhere in the world.

Also reaching the end of the production process is the DP Trials for Drilling Rigs, a document being written to address certain difficulties encountered by DP drilling rig operators when carrying out annual trials. This document recognizes that these trials may have to be carried out differently aboard drilling rigs due to the nature of their work and their availability. However it also recognizes that, if possible, these trials should be carried out in accordance with other published guidance on annual trials.

A review of the document “Fires in Machinery Spaces on DP Vessels” is being undertaken with a view to re-publishing with updated and new information on such as areas as thermal imaging. In many ways a fire in a machinery space on DP vessel is no different from that on other types of vessel. However it is thought that this document is still a worthwhile component of the suite of guidance documents on DP.

Also it is planned to completely review and revise the guidance on DP power systems. This has been prompted by the need to revise the document 126 DPVOA “Reliability of Electrical Systems on DP Vessels”. There is a proposal to produce a wider ranging document, possibly drawing in other power related guidance such as 108 DPVOA Power System Protection for DP Vessels and IMCA M 154 Power Management Study. This work is going to go out to tender and be completed by an external consultant.

GUIDELINES FOR OTHER SIGNIFICANT AREAS

IMCA has produced guidelines for two other significant marine areas, namely security and lifting operations. Both these areas at first look appear to be well catered for with regulation such as the International Ship and Port Security code for example. However, as with other guidance, how to apply the regulation both practically and successfully is left to the vessel owners and operators. In an effort to provide guidance to enable the successful implementation and a coherent application across the sector these guidelines have been produced.

The preparation of this and similar guidance has identified other areas within security which are not addressed by regulation but for which guidance is needed such as personal security, an example of which is the Safety Pocket Card on Personal Security reproduced below.

Personal Security	Personal Security
<p style="text-align: center;">Key Advice</p> <ul style="list-style-type: none"> ◆ Stay alert ◆ Look after your passport - it is your most valuable possession when travelling internationally. Keep it and any air tickets in a safe place and keep a photocopy and spare photographs with you ◆ Avoid drawing attention to yourself ◆ Remember - possessions are replaceable, you are not! <p>Before you travel</p> <p>Ensure you are properly informed about the area you are visiting, including:</p> <ul style="list-style-type: none"> ◆ social and political climate ◆ organised crime and corruption ◆ possibility of terrorism ◆ religious or ethnic extremism or unrest ◆ areas to avoid <p>At the airport</p> <ul style="list-style-type: none"> ◆ Always watch your bags (and computer), especially when going through security screening ◆ Keep anything of value in a carrycase that stays with you ◆ Never carry packages through customs for other people ◆ Never joke about weapons or explosives ◆ Never raise your voice to officials or patronise them or their country ◆ Pack your own luggage and never leave it unattended 	<p>Street and hotel security</p> <ul style="list-style-type: none"> ◆ Respect local customs, courtesies and dress codes ◆ Avoid broadcasting personal information, such as your name, room number, hotel or destination when at reception or when booking a taxi ◆ Maintain a low profile by dressing conservatively and not wearing expensive looking jewellery or watches ◆ Blend in with the local environment and avoid drawing attention to yourself ◆ Watch out for staged mishaps. These can take many forms ◆ Book hotel rooms between the second and seventh floors. This limits easy access to the room from the ground yet is low enough to be reached by fire equipment ◆ Keep hotel doors and windows locked. Use a rubber wedge to secure your door <p>Ensure you get home</p> <ul style="list-style-type: none"> ◆ Do your family and company know where you are and how long you intend to be there? ◆ Trust your instincts. Leave areas where you feel ill at ease ◆ Avoid shortcuts and stay in well-lit areas ◆ Remain in groups ◆ Avoid going out alone and on foot during hours of darkness
 <p>No. 13 in a series of pocket safety cards issued by The International Marine Contractors Association <small>Issue 1 - June 2006</small></p>	<p>For more information on IMCA's safety-related initiatives, please visit our website at www.imca-int.com</p> 

INFORMATION NOTES & SAFETY FLASHES

As illustrated above another method of disseminating good practice through guidance is the safety pocket cards produced. Additionally safety posters, safety flashes and information notes are produced on various topics as the need arises. Recent marine information notes have addressed a range of issues:

- M 14/07 Consideration of Chart Source Data in Passage Planning and Execution
- M 15/07 Anchor Handling – Guidelines arising from Loss of Bourbon Dolphin
- M 16/07 USA Passport and Personnel Identification Western Hemisphere Travel Initiative (WHTI) - Update
- M 17/07 Rolls Royce Marine Anchor Handling/Towing Winches
- M 18/07 General Thruster Specification and Bid Information Questionnaire – Proposed withdrawal of guidance note IMCA M 137 Rev. 1

These are issued to draw members' attention to information about which they should be aware. In the above list there are two, M 15/07 and M 17/07 resulted from the unfortunate Bourbon Dolphin incident and were based upon information issued by various organizations, in this case the Norwegian Maritime Directorate and Rolls Royce Marine, which warranted wider dissemination.

DP INCIDENT REPORTING

DP incident reporting through IMCA and its predecessor has been around for number of years now. During that time it has been revised a number of times and consideration is now being given to a further revision. The most recent guidance on DP incident reporting is reproduced below and is being incorporated into M103 The Design and Operation of Dynamically Positioned Vessels.

Background

IMCA (and its predecessor DPVOA) has been collecting DP incident reports provided by members and publishing them as annual reports since 1991. During this time, the format of the IMCA report has changed little – using the categorisation of 'Loss of Position 1' (LOP1) for major loss of position, 'Loss of Position 2' (LOP2) for minor loss of position and 'Lost Time Incident' (LTI) for downtime as a result of loss of redundancy but where loss of position has not occurred.

The IMCA Marine Division Management Committee reviewed the system in 2005 and concurred that, since the system at that time could be considered to be somewhat subjective and that there could be some confusion as to when an incident should be reported to IMCA or not, it would be better to replace the reporting categories with those set out below. The aim of the change of format is to help people who are reporting incidents to have a better idea whether to report the incident and in which category it would fall and also to help those reading the annual report as it provides a wider range of incident types.

New Categorizations

The following new categories of DP incidents have been proposed and agreed by the IMCA Marine Division Management Committee. These categories should be used in conjunction with the revised *IMCA Station Keeping Incident Form*. These new categorisations will be used to replace the 'Loss of Position 1' and 'Loss of Position 2' incident categorisation currently used in the IMCA annual DP incident reports.

1 DP Incident

Loss of automatic DP control, loss of position or any other incident, which has resulted in or should have resulted in a 'Red Alert' status.

2 DP Undesired Event

Loss of position keeping stability or other event, which is unexpected/uncontrolled and has resulted in or should have resulted in a 'Yellow Alert' status.

3 DP Downtime

Position keeping problem or loss of redundancy which would not warrant either a 'Red' or 'Yellow' alert, but where loss of confidence in the DP has resulted in a stand-down from operational status for investigation, rectification, trials, etc.

4 DP Near-Miss

Occurrence which has had a detrimental effect on DP performance, reliability or redundancy but has not escalated into 'DP Incident', 'Undesired Event' or 'Downtime', such as:

- ◆ *crane or load interfering with Artemis line of sight;*
- ◆ *scintillation.*

5 DP Hazard Observation

Set of circumstances identified which have had the potential to escalate to 'Near-Miss' status or more serious, such as:

- ◆ *Fanbeam laser target being placed in a position on handrails of a busy walkway where heavy traffic of personnel wearing PPE with retro reflective tape is identified;*
- ◆ *crane lift being swung close to Artemis line of sight.*

This category should also capture relevant occurrences even when not operating in DP mode, such as:

- ◆ *speed and latitude corrections supplied to all gyros from single DGPS by installation engineer;*
- ◆ *unexpected loss of essential DP components which would have had the potential to result in 'DP Incident', 'Undesired Event' or 'Downtime' if vessel had been operating in DP mode.*

Guidance for Completing the IMCA Station Keeping Incident Form

Incident Types:

- 1 DP incident
- 2 DP undesired event
- 3 DP downtime
- 4 DP near-miss
- 5 DP hazard observation

- Incident types 1 & 2 are likely to result in type 3. Identify the option on the *IMCA Station Keeping Incident Form* which represents the greatest potential for harm. All sections of the form should be completed.
- For incident types 1, 2 & 3, please indicate 'Initiating Event', 'Main Cause' and 'Secondary Cause' where appropriate on the *IMCA Station Keeping Incident Form*, e.g.:
 1. *'Initiating Event' – Additional thrust required due to increasing environmental conditions*

2. *'Main Cause' – Stoppage of thrusters*
 3. *'Secondary Cause' – Operator error*
- Incident types 4 & 5 can be reported to IMCA by e-mail and should only require a short description of events.”

However it is now apparent that these categorisations are causing some problems for those completing these reports, for example some events which are clearly DP Incidents have been reported as DP Undesired Event. The suggested way forward for this is to remove the need for the person reporting the incident to determine the category and allow the event to be categorised internally at IMCA. Part of the process is that the reports prepared for the incidents are seen by the vessel owner/operator prior to publication so any misinterpretation or ambiguity, should any occur, could be removed at that time.

Another area where the reporting system may be changed, and hopefully improved, is the acceptance of company incident report forms. It is known and recognised that many companies have their own incident reporting forms and trials have already taken place in accepting these rather than have the information transferred to IMCA DP incident forms. Obviously to maintain continuity and the ability to compare with others similar, if not the same, information should be available on the company form.

An area in which the current DP incident reporting system differs from many other confidential reporting schemes is that they also produce and publish lessons learnt. Currently some reporters will give an insight to the lessons learnt or even state them in the report. However it is hoped to encourage all reporters to submit lessons learnt if available.

ENCOURAGING REPORTING

Some of the justifications put forward for the development and maintenance of an incident reporting system are:

- ◆ Incident reports help to find out why accidents don't happen.
- ◆ Higher frequency of incidents permits quantitative analysis
- ◆ Provide a reminder of the hazards
- ◆ Feedback keeps personnel in the loop
- ◆ Data and lessons learnt can be shared
- ◆ Incident reporting schemes are cheaper than accidents
- ◆ May be required to do so

Some benefits put forward for incident reporting are:

- ◆ A response as soon as the data is released to help close out the incident
- ◆ Analysis highlighting any new areas of concern
- ◆ A dialogue with DP Control system suppliers to check they are aware of a new problem and had a fix in hand

Maybe this can be further illustrated up by the statement made by the Nautical Institute about their own Marine Accident Reporting Scheme:-

“The Marine Accident Reporting Scheme is a confidential reporting system run by The Nautical Institute. The aim of the scheme is to allow full reporting of Accidents (and Near Misses) without fear of litigation. It is hoped that with this free information exchange valuable lessons may be learnt by others and future similar accidents avoided.”

Or that from CHIRP, the Confidential Human factors Incident Reporting Programme:-

CHIRP’s “objects are to carry out research on the causes of incidents and accidents involving aviation and maritime modes of transportation through a confidential reporting system for the collection of Human Factors safety related issues, to analyze data and identify trends, and to advise interested bodies on Human Factors issues relevant to air and maritime transport safety with the aim of the preservation of human life.”

Returning to the MARS reports these not only give lessons learnt but also corrective actions and actions taken to prevent recurrence and maybe these should be considered when revising the DP incident scheme. Indeed in addition to the brief narrative, whereas IMCA DP incident reports talk of triggers and secondary causes, these reports use losses, probable cause, root cause, contributory factors, corrective actions and actions to taken to prevent recurrence. Some these are already within the DP incident reports under other names and some may add more confusion than clarity but they are worth considering.

This subject will be discussed fully within in the IMCA membership with not only the categories and the promulgation of lessons learnt being discussed but also the use to which these reports put being investigated. This applies not only to the owners/operators of vessels but also to training centers.

CONCLUSION

All organizations need to continue to evolve and hopefully improve and in this IMCA is no exception. The introduction of such developments as a document register and the proposed dates for revisiting various documents illustrate this. But not only does IMCA need to take care of its existing guidance but also to develop and issue new guidance. Furthermore it needs to be aware of forthcoming developments, which may require some guidance in the future.

REFERENCES

A Handbook of Incident and Accident Reporting - Chris Johnson - Glasgow University Press
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