Marine Simulators: Technical And Performance Specifications - A Paradoxical Parallelism?

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ABSTRACT

The need for safety of life at sea and the protection of life and the marine environment resulted in the harmonization of training for navigation in the form of the Standards of Training, Certification and Watch keeping for seafarers (STCW 95). The Use of simulator for training is also something that has come to stay, in view of the advantages accruable from this, and Performance Standards for simulator use in training seafarers are contained in A-I/12 (training) of the STCW Code.

This paper briefly examines the interesting development in simulator use where performance standards have since been developed with relative ease, but the expected resulting technical specifications seem to be taking much longer in coming, if they do finally come. The framework in the form of the STCW document was developed by the Maritime Safety Committee (MSC), giving performance standards while the International Marine Simulators Forum (IMSF) was assigned the task of developing the technical specifications.

It is revealed that the reasons for the delay lie as much with the opinions of instructors as with the manufacturers and economic concerns. However, safety of navigation which must remain paramount in the minds of all players demands that the technical specifications be developed, and as a matter of urgency.

The International Maritime Organization, non-regional interests and of course those associations representing the interests of the lecturers and instructors will do well to come together to agree on the technical specifications based on the STCW performance standards in the interest of the objectives of the international maritime community.

The works of several scholars and active persons in simulator training come into good use, and their presentations have been considered.

Key terms: performance standards, simulator training, technical specifications.

1. Introduction

Maritime Education and Training is a vital part of the marine affairs, given that incompetent crew translate to damage to or loss of property and life, and indeed damage to the environment. Furthermore more competent crew will assure or at least contribute to the economic viability of the particular sea trade. For these and more, the Standards of Training, Certification and Watch keeping for seafarers, 1978 as amended in 1995 dealt extensively with the issues of education and training of the merchant navy personnel.

The emphasis on hands on experience cannot be better justified in any vocation than the maritime field, and training on board ship is a natural necessity. Over the years however, with the strides in technology, the development of simulation tools has made it possible to reproduce real life situations at sea, in the school. This means that some sea experience is obtainable on land, and some uncommon experiences are also easily experienced . Several other advantages do exist especially where the simulator-training tool is properly utilized.

The interesting scenario in the use of simulator for training presents itself as an intriguing paradox of parallelisms, where performance standards have since been developed with relative ease, but the expected resulting technical specifications seem to be taking much longer in coming, if they do finally come. The attempt

is to approach the subject(s) the way they have been considered; as pseudo-separate issues. This is more especially as the International Maritime Organization (IMO) for some reason deals with one and leaves the other for the International Marine Simulators Forum (IMSF) which for some reason has been unable to bell the cat.

2. Performance Standards:

The Standards of Training Certification and Watch keeping for Seafarers (STCW) Convention 95 has since resulted in performance specifications being developed for marine simulators

2.1 The STCW Input

The establishment of performance specifications for marine simulators was seen as a necessity, especially in view of Cross and Veenstra (1996) who stated inter-alia In the case of simulators training there are no recognized standards of performance furthermore, little research has been done into showing of ship-handling simulators to be an efficient training tool. While the research remains unavoidable, the onus of this presentation lies with the former. The 1995 amendments to the Standards of Training Certification for seafarers 1978 had of course taken cognizance of this lapse, in the interest of the objectives of the convention. It is to be noted that this alarm was actually raised before the standards were born.

2.2 The Requirements: Basic requirements.

A remarkable difference between training and assessment specifications is in A-I/12.1.5(training) of the STCW Code, which states provide an interface through which a trainee can interact with the equipment, the simulated environment and, as appropriate, the instructor and that in A-I/12.2.4 (assessment) which states the same thing with the exception of the underlined above which is grossly irrelevant in assessment. This is the only difference in the two addresses quoted above, each of which contained five sentences, which were exact in every detail besides the highlighted difference. This only difference draws the line between training and assessment, and is a pointer to two vital facts: the STCW did not intend to leave any stone unturned in giving the specifications that were considered important, and the STCW was not going to give specifications which were not necessary. A basic understanding is therefore evident. The establishment of performance standards was indeed a vital matter.

2.3 Additional performance standards.

This includes standards for Radar Simulation and Automatic Radar Plotting Aid (ARPA) simulation. In addition to this, STCW.7/Circ.10 (ANNEX) offers Interim Guidance on Training and Assessment in the Operational use of the Electronic Chart Display and Information System (ECDIS) simulators

2.4 Their Purpose

Generally speaking, the requirements are basically to ensure that the selected objectives and training tasks are achieved. They are also concerned with the operational capabilities of shipboard equipment and the errors and limitations so obtainable, behavioral realism, provision of a controlled environment, instructor control and monitoring, trainee interface with the simulator, instructor (where applicable) and simulated environment. These performance standards are simply a harmonization of performance and quality standards. Miurhead (1996) stated performance and quality standards of simulators and instructor are many and varied.

In the first instance, given that simulator use is diversified, and the use of 3D moving graphics means that a great demand for programming and memory space is connoted, each type of simulator will therefore perform a group of tasks. For this reason, there are several simulator types for varying group tasks , all of which add up to marine simulation. This would pose no problem was it not that maritime education and training is globally harmonized (thanks to IMO) and the training standards must then have some degree of parity. It therefore becomes necessary to harmonize the performance standards of the training equipment, major of which is the marine simulator. In order words, this harmonization will aid in ensuring harmonized training.

Again, owing to the capital-intensive nature of simulator production, the tendency is to cut corners with a view to cutting cost, hence producing substandard equipment that may be attractive in certain quarters. The domino effect on the industry will stem from poor training. The fact is that simulators cannot be done away with Navigation education is vocational in nature with prominent attention paid to technical ability the only way out lies in training through simulators whereby the student can obtain corresponding technical ability (Wang 1996). The stipulation of performance specifications will put paid to this.

2.5 Expected Use

The performance of specifications stipulated for simulator training should be so used: compliance to specifications while employing simulators in training. For obvious reasons, the use of simulators in training covers a vital area of ensuring the competence of seafarers, a function which is all-encompassing and hence performance standards must be complied with in all simulator training for marine purposes. There is no justification for exemption, unless such training, assessment and / or certification will not require the recognition of the IMO or its member states.

3 Technical Specifications:

But Efforts to establish internationally recognized technical specifications for marine simulators have failed to date.

According to Muirhead (1996), it is noticeable that not only is there a surprisingly high level of acceptance of simulators in the maritime community, but that the range and type of marine simulators is expanding quickly . Given the prevailing scenario - technological advancement vertically (improvement) and horizontally (broadening of scope), the existence of simulation in practically all physical fields of human endeavor does not come as a surprise, neither does the fact that the community in entirety has been unable to come up with internationally recognized specifications, technically speaking, for the repertoire of simulators, in spite of the fact that performance specifications have existed for quite some time.

3.1 The Underlying factors

While the current quagmire is to be decried, one cannot but appreciate the underlying factors to this precarious yet sturdy situation. Precarious in that the needs and continuous diversifications and generalizations — the simulator industry is moving into new terrains while at the same time simulators are increasingly able to combine more functions than they previously could — portend an imminent collapse or its applicability becoming limited owing to reduced acceptability, dragging the user industry back in time. Sturdy, in that precipitous as the situation may be, the factors (and interests) behind it appear desperate to keep it in such a state.

For one, the ambient view offered by bridge simulators is a major bone of contention. Certain persons feel very strongly that views should be limited to 180° — 240, others cannot agree with anything less than a full 360°. Bole etal (2000) referred to simulators offering less than 360° view as blind simulators. The question arises as to whether or not the bridge of the usual vessel actually offers this. The author attended a lecture in October 2001, delivered by Capt. J. Cross, Director of the Willem Barentsz Maritime Institute, Terschelling, Netherlands He suggested a situation in which the simulator may offer 240°-280° while the remaining of (rear view) is displayed on a monitor (computer screen) on the bridge. This appears to be a convenient meeting point. It is to be seen however if the players on the two sides of this center will agree to be drawn to it.

It is argued by some that simulator based training should be abandoned altogether while certain others are of the opinion that it should totally replace on board training. S. Murata and H Kobayashi (2000) however concluded that a combination of the two approaches would give optimal results. Another center with two poles.

Muirhead (1996) estimated that a total of 810 simulators are in use in maritime training institutions. Different firms in different countries produce these simulators, and the capabilities and functions of the products vary. For economic reasons however, each producing nation argues in favor of its products. In view of this, it is unlikely that there will be internationally accepted technical specifications for some time to come, as such an agreement will be seen by nations as jeopardizing their interests. It is common knowledge that there are numerous firms involved in the manufacture of marine simulators, each with its own different approach to its product, and the use and familiarity procedures as well as training patterns applicable to each machine are varied. There are simply no standards.

The case with assessment by simulator is also worth mentioning. While Endo et al (2000), Hooper et al (2000), Stiles and Jacobs (2000) are strong proponents, Smith (2000) even expresses that instructors should be less involved and let the simulators do more of the work. Conservatives are of the opinion that simulators can simply not replace humans in assessment. The general belief however is that while thought processes cannot be measured by simulators, these simulators remain objective assessors of the indices of these thought processes.

The Users in the quagmire

The author has obtained instructor training in simulator use, and has been in some simulator facilities in various locations, including ISSUS in Hamburg, STN Atlas and the GAUSS Institute both in Bremen, all in Germany, the Arab Academy in Egypt, the Willem Barentsz Maritime Institute, Terschelling, Netherlands, and had familiarity programs with others including Poseidon, . The observation is that each software and hardware manufacturer approaches simulation in a different way, and sets principles and priorities as it deems fit. In some cases, certain features that are considered basic in some programs are entirely missing or underdeveloped in others. After all there is no person or agency empowered to enforce standards, more especially in the absence of standards. Worse still, the arguments are always in favor of these inadequacies. The particular is either unimportant or is of minor importance, or scenarios demanding it do not occur. In another argument, the feature is of utmost important because a single occurrence of such scenario can be fatal. There are a lot of other issues, and the instructor and student are at the receiving end. Familiarity of an instructor with a particular simulation equipment does not mean an ease in familiarity with another. Rather, it almost certainly means a need for reorientation, since it is rare if not impossible to find two simulators which perform the same functions having similar operational features. Errors of scenario generation can therefore not be avoided, and more importantly, the same goes for assessment by simulator.

At a briefing on a particular simulator, a student who is used to another one finds that instructor expectation are very different for the same operation, so are those of the training tool and its assessment parameters. Some of these parameters have already been mentioned, and others may include dynamic visual and acoustic realism, system-instructor-student interactivity, amongst others. Of course the final end result of inconsistence in training is clear, and is not desired.

The IMSF Initiative

The International Marine Simulators Forum (IMSF) at the 1993 Marsim decided to develop an international standard for ship operation training simulators. The FIRST stage was the development of a simulator classification, for which a classification working group was established. At the IMSF meeting in Norway in August 1994, a draft recommendation on simulator classification was submitted.

The recommendations for simulator training, assessment and refreshment were to be dealt with by the SECOND stage, but these were overtaken by .the development of the new STCW Code. An opportunity still exists however, for IMSF members to develop practical training and assessment guidelines given their experience, by making contributions to the STCW sub-committee to complete development of Part B of the Code. A scheduled 30 month European Union project (Task 46) entitled Maritime Standardized Simulator Training Exercises Register (MASSTER), coordinated by ISSUS, Hamburg, commenced in 1996 with the participation of IMSF members. The overall objective being the inventory of existing scenarios and the development and documentation of new ones, based on the assessment of gaps and shortcomings in the currently existing scenarios. The resulting final catalogue of scenarios serves as a basis for the harmonisation of maritime education and training for existing simulation facilities, at least in the EU.°

The THIRD stage intended to develop performance standards aimed at the description of technical characteristics and capability of various classifications, including instructor stations given the functional training requirements they are designed to meet. Given that IMSF is best suited for this, especially with the STCW mandate, this has been too long in coming.

The FOURTH stage was to be a development of a classification system in which evaluation of a simulator would lead to class approval. The Quality Standards requirements of Regulation I/8 and the Codes may be seen to obviate this, while indeed they do demand for it. Section B-I/8 (Guidance regarding duality standards) states In applying quality standards under the provisions of regulation I/8 and section A-I/8 to the administration of its certification system, each party should take account of existing national or international models The intention also included the examination of the sea service equivalence of simulator training.

The amendment of the FIRST stage and subsequent approval was done in 1994, but that was where it ended, and even the other stages have not been so lucky.

Conclusion

Generally speaking, for reasons of experience, background, technological advantages and otherwise, local marine industry focus, tradition and many other considerations, there are simply too many opinions, each differing about too many details, for there to be a consensus. This was easily reflected by Muirhead (1996), where he indicated that owing to diversified opinions on specifications for different types of simulation, the International Maritime Organisation (IMO), which incidentally is the parent of the STCW sub-committee concluded that codes do not include detailed technical specifications of simulators. Hence, the line was drawn, and the role of the Maritime Safety Committee (MSC) was therefore to come up with performance standards while the onerous task of developing technical specifications would lie upon the International Marine Simulators Forum (IMSF) which is composed of the users, manufacturers etc. Expectedly, of course the grouse is greater within IMSF than anywhere else. Here lies the imbroglio.

Proposal

Cross (2000) indicated that new initiatives were being made in IMSF to restart the of coming to a new classification, which was scheduled to be ready for the Marsim 2000 and he further stressed that

> It should be noted that in a limited body such as IMSF, it has taken more than 10 years to reach an acceptable draft, due to the great diversification of members, all wanting to be heard and have influence on this classification. No doubt that such a decision for acceptance by a body as diversified as IMO will probably cause even greater discussions and deliberations.

Having therefore concluded as above, it can be argued that the grouse need not be so great, for the technical specifications, if they are to objectively meet the goals of the international maritime community — of promoting safety of life, property and the environment by improving standards of navigation - can not be borne from anything outside the performance standards clearly itemized in Section A-I/12 of the STCW (95) Code.

It therefore behooves the IMSF with the necessary support of the International Maritime Lecturer s Association (IMLA), the International Association of Maritime Universities (IAMU), and other well meaning recognized but non-regional maritime bodies to convoke for the purpose of designing achievable technical specifications from the IMO document. A working group may be assigned the preliminary task before such a general convocation. Again the IMO must be aware of the fact that it can not adopt the position of an observer in this matter, as, delicate as the prospects may seem, it is entirely necessary if the efforts it (IMO) has so far made regarding simulation training are not to be trounced.

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