Asia-Pacific Heads of Maritime Safety Agencies Forum

CURRENT STATE OF INTERNATIONAL CONSIDERATION OF HUMAN FACTORS

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EXECUTIVE SUMMARY:
Over the last decade and a half there has been considerable effort by nations, international rulemaking bodies, classification societies, and others to address human factors as a way to reduce the risk of maritime accidents, pollution, and, more recently, security incidents. Given that human factors continue to contribute to the vast majority of maritime casualties, it is imperative that we continue this effort. While the effectiveness of these efforts is thus far difficult to gauge, it is clear that our growing understanding of the complex interrelated human and organizational factors issues will have positive results in the future. It is also clear that as various bodies strive to address the human factor, closer communication and cooperation between individual maritime safety agencies is becoming increasingly important. This paper outlines some active efforts to address human factors in the international forum, from comprehensive efforts directed towards improving the overall safety culture to those focused on specific areas of concern.

1. COMPREHENSIVE EFFORTS
While there are undoubtedly many other comprehensive, strategic efforts going on worldwide to address human factors, we will outline a few of the more renowned programs affecting the international maritime world.

1.1 International Maritime Organization (IMO) Human Element Strategy
As set forth in Resolution A.947(23), the IMO has set for itself a set of Human Element Vision, Principles and Goals. In addition to emphasizing the importance of human factors in contributing to the prevention of casualties, pollution, and security incidents, this instrument provides a framework for consideration of human factors during the development of guidelines and regulations.

To enable meaningful action to this end, IMO’s Maritime Safety Committee (MSC) has been working towards development of a strategy to address human element issues. The joint MSC/MEPC Human Element Working Group is slated to develop this plan at the Fifty-Third convening of the Maritime Environmental Protection Committee (MEPC) this July. In addition to considering previous developments by this working group at MSC 78 (See MSC 78/WP.16) the working group will likely be directed to consider a number of submissions to MSC 79, including a number of specific recommendations by Liberia. (See MSC 79/4, MSC 79/4-1, MSC 79/4-2, and MSC 79/4-3)

1.2 Promoting a Safety Culture
The International Safety Management (ISM) Code is the primary international device for promoting a safety culture and environmental consciousness. The Code establishes safety management objectives and requires a safety management system (SMS) to be established by a ship operator. According to the 2003 Report for Port State Control, in the United States, vessel detentions involving at least one ISM-related deficiency decreased slightly from 55 to a total of 51 detentions. ISM deficiencies represented 16% of the total deficiencies issued on detained vessels. The most common ISM deficiencies were related to lack of documentation and failure to fully implement the Safety Management System, as evident from the lack of
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maintenance of ship and equipment. Effective implementation of ISM is a proven tool that improves compliance with all applicable standards.

1.3 Nautical Institute’s Alert Program
In 2003, the Nautical Institute began a three-year campaign to raise awareness of human element issues as they apply to the commercial maritime industry. Through its quarterly International Maritime Human Element Bulletin, Alert!, and related web site, the Nautical Institute disseminates information about the human element and how it applies to ship operation, design, engineering, regulation and training. Sponsored by Lloyd’s Register, the purpose of this forum is to promote discussion and research related to maritime human element issues while offering a vehicle for distributing and applying the results. More information is available at www.he-alert.org.

In addition to supporting this awareness campaign with funding, Lloyd’s Register has also made a five-year agreement with the Seafarers' International Research Centre at Cardiff University for research projects to increase the general understanding of the human element. Lloyd's Register has carried out a program of research and development for over 15 years focusing on various aspects of the human element in the marine environment, including an active role in the EU-funded ATOMOS project.

1.4 Accident Analysis/Near Miss Reporting
A major element of addressing human and organizational factors is to learn from past incidents. In addition to reacting to major casualties, international bodies, nations, classification societies, and vessel operators must be able to learn and share information on smaller events and near-misses. Internationally, there are several major efforts for collecting, processing, and distributing such information. Among these is the Nautical Institute’s Marine Accident Reporting System. This confidential system allows maritime professionals to share lessons learned after casualties or close calls. More information is available at www.nautinst.org/MARS/index.htm.

At IMO, and when directed by the Flag State Implementation (FSI) Sub-Committee, the Casualty Analysis Working and Correspondence Groups consider information received from Member States on investigations into casualties and their related statistics, and conduct an analyses of the relevant casualty reports referred to the groups by the IMO Secretariat. These groups then identify safety issues that need further consideration, and recommend to which IMO bodies a particular issue be forwarded in order to determine what changes in the present regulations might be desirable and the associated remedial action that could be taken. See MSC/Circ.953-MEPC/Circ.372, Reports on Marine Casualties and Incidents, for more details on the type of information that is requested to be submitted by member states.

1.5 United States Coast Guard’s Prevention Through People Program
For over a decade, the PTP program has been the U.S. Coast Guard’s primary means for addressing human and organizational factors. Under this program, there are several active
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industry-government partnerships which have resulted in effective non-regulatory solutions. In addition to the Crew Endurance Management Program mentioned under the fatigue section below, PTP has enabled development of a number of risk-based decision support tools, and campaigns to promote safe work practices. The PTP website also serves as a collection point for human factors-related research and publications, as well as lessons learned. More information is available at http://www.uscg.mil/hq/gm/nmc/ptp/index.htm.

1.6 Classification Society Guidance
Classification Societies like the American Bureau of Shipping (ABS) have developed their own comprehensive approach to addressing human factors. In their Guidance Notes for the Application of Ergonomics to Marine Systems, ABS employs a model that includes the entire system of human and organizational factors: (1) Management and organization, (2) Equipment design and layout, (3) Control of the working environment, and (4) People/personnel readiness. Although not yet a required standard for classification, guides like this provide important references for vessel designers, builders, and operators.

2. SPECIFIC ISSUES
Worldwide there is much being done to address specific human factor issues or areas of issues. Sometimes this work is an offshoot of the comprehensive efforts like those described above, and sometimes it is the result of an independent effort. Together, these individual efforts make up the fabric of the global effort to reduce the contribution of human factors to the risk of marine casualties, pollution, or security incidents. There are undoubtedly many more programs than those described below. However, this brief listing provides a general indication of the types of issues being addressed and the breadth of involvement by the maritime community.

2.1 Ergonomics and Workplace Design
Ergonomics, the design of a workplace so as to maximize productivity and minimize operator fatigue and discomfort, is one of the oldest and most basic tenets of human factors engineering. While there are a number of standards relating to shipboard ergonomics, there are very few areas on board a ship where requirements for workplace-specific design have been codified. One area where an international requirement exists is for the navigation area.

2.2 Navigating Bridge Design
SOLAS Chapter V, Regulation 15 provides principles related to bridge design, design and arrangement of navigational systems, and equipment and bridge procedures. However, this regulation does not provide specific criteria or standards for use by vessel designers. Because of this, various maritime safety agencies and classification societies developed their own guidelines. The European Union’s research project “ATOMOS” was viewed by some as providing the specific ergonomic criteria to meet Regulation V/15. (See MSC 78/18/3.) The International Association of Classification Societies (IACS) developed Unified Interpretation SC 181 on Bridge Design, Equipment Arrangements and Procedures. (See MSC 78/11/3.) Individual Classification Societies developed additional guidance like the American Bureau of Shipping’s Guidance Notes on Ergonomic Design of Navigation.
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Bridges and Guide for Bridge Design and Navigational Equipment/Systems. There is also ISO Standard 14612, Requirements and Guidelines for Centralized and Integrated Bridge Functions. While the effectiveness of this regulation and these standards has yet to be tested by field experience, there is clearly no shortage of available guidance.

2.3 Other Workplace Areas
Beyond the navigating bridge, there are few international regulations which govern the design of the workplace. While there are a few general requirements for engineering control systems on some vessel types, there are no mandatory standards for overall workplace design. However, there are some recommendatory standards available to designers. For example ASTM F1166, Standard Practice for Human Engineering Design for Marine Systems, Equipment and Facilities, provides detailed guidelines for workplace ergonomics. This standard is currently being updated and should support a more comprehensive “Human System Interface” approach. Some classification societies have also developed guides related to ergonomic workplace designs. ABS’s Guidance Notes for the Application of Ergonomics to Marine Systems provides a variety of design criteria for human-system interfaces at the individual task and workstation levels.

2.4 Crew Fatigue and Endurance
An important aspect in preventing maritime casualties is the ability of the crew to remain alert, to make good decisions, and to maintain performance levels within safety limits. To support the crew’s ability to perform safely, an array of rules, guides, and programs have been developed to manage Crew Fatigue and/or Endurance. The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) includes specific limits on hours of work and requirements for periods of rest. These and other hours of service rules form an important element of the safety system. However, these rules do not take into account the length and quality of a mariner’s sleep, nor do they consider the affect of 24-hour-a-day watchkeeping and vessel operations on one’s circadian rhythm. To address this very complex problem, IMO developed MSC Circular 1014, Guidance on Fatigue Mitigation and Management. This guidance has much in common with the United States Coast Guard’s Crew Endurance Management Program, which was presented to this forum’s seventh convening in New Zealand. Other countries such as New Zealand and Australia have active fatigue management programs in progress.

2.5 Crew Habitability
An important segment of shipboard ergonomics that affects the ability of the crew to obtain rest and function safely is habitability. While SOLAS and the International Labor Organization (ILO) Accommodation of Crews Convention set some very basic requirements for living conditions, these do not take into account the effects of noise, vibration, or the interior climate. Classification societies have developed some guidelines that address these aspects of maritime life. ABS has two, Guides for Crew Habitability on Ships and Crew Habitability on Offshore Installations. Lloyd’s Register has Provisional Rules for Passenger and Crew Accommodation Comfort (Noise and Vibration).
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2.6 Human Factors Related to Passenger Vessels
Because they come aboard a vessel with higher variability in knowledge, physical abilities, and form, passengers introduce a number of very special Human Factors issues. In the area of habitability and passenger comfort, some class societies have guidelines, like the Lloyd’s Register provisional rules mentioned above. However, there are few guidelines to take into account the needs of every possible passenger type. A good example of this is the current legal battle over whether or not non-U.S.-flagged cruise ships must meet the United States’ Americans with Disabilities Act. This highly-publicized case has been heard before the U.S. Supreme Court and a decision is expected this summer. Regardless of the outcome, this decision will greatly affect consideration of passengers with special needs throughout the world.

2.7 Passenger Evacuation/Egress
An ever-present concern for the safety of passengers is the safe and orderly egress to a safe area or off the vessel during some shipboard emergency. There are many rules in SOLAS and other IMO instruments to help ensure that a safe and orderly evacuation is possible. Despite the abundance of studies and guidance like MSC/Circ.1033, Interim Guidelines for Evacuation Analyses for New and Existing Passenger Ships, there is still much we do not know about how the “average” passenger will react at the time of an emergency.

One joint Canadian/European-sponsored effort is a good example of the kind of research going on to help us understand passenger reaction during evacuation. This research, performed by BMT Fleet Technology Limited, places a fairly representative group of non-maritime persons in their Advanced Ship Evacuation Simulator (ASES). The ASES, which represents a passageway on a ship, can be darkened, filled with smoke, and even tilted to simulate possible shipboard emergency conditions. Information gathered through these tests will be used as input to improve computer simulation models. Ultimately, efforts such as this will enable improved evacuation and fire safety design.

3. CONCLUSION – THE WAY FORWARD
The efforts outlined here are by no means a complete representation of the entire body of efforts worldwide. However, as these examples demonstrate, the international community has come a long way in the last few decades towards addressing human factors as they relate to safety, security, and environmental protection. They also show that we are just learning about ways to fully address the complex and interrelated issues that affect our human condition. It is clear that the progress thus far has not been driven by any one entity, but rather has occurred through cooperative and individual efforts by governments, classification societies, academic researchers, and vessel operators. As each of us learns more and as our disparate efforts overlap, it is imperative that we learn to improve cooperation and communication.

To this end, the United States invites members of the Asia Pacific Head of Maritime Safety Agency to actively participate in the international dialog and to help IMO complete development of its strategic plan for the consideration of the Human Element.
The United States also invites members to continue and, where possible, expand the practice of sharing lessons learned regarding Human Factor-related issues. This is particularly of value where those lessons learned are unique to operations in the Pacific, yet, given the diversity of this operating environment, it is likely that any human factor issue will be applicable here.