



Standard Practice for Human Systems Integration Program Requirements for Ships and Marine Systems, Equipment, and Facilities¹

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1. Scope

1.1 *Objectives*—This practice establishes and defines the processes and associated requirements for incorporating Human Systems Integration (HSI) into all phases of government and commercial ship, offshore structure, and marine system and equipment (hereafter referred to as marine system) acquisition life cycle. HSI must be integrated fully with the engineering processes applied to the design, acquisition, and operations of marine systems. This application includes the following:

1.1.1 Ships and offshore structures.

1.1.2 Marine systems, machinery, and equipment developed to be deployed on a ship or offshore structure where their design, once integrated into the ship or offshore structure, will potentially impact human performance, safety and health hazards, survivability, morale, quality of life, and fitness for duty.

1.1.3 Integration of marine systems and equipment into ships and offshore structures including arrangements, facility layout, installations, communications, and data links.

1.1.4 Modernization and retrofitting ships and offshore structures.

1.2 *Target Audience*—The intended audience for this document consists of individuals with HSI training and experience representing the procuring activity, contractor or vendor personnel with HSI experience, and engineers and management personnel familiar with HSI methods, processes, and objectives. See 5.2.3 for guidance on qualifications of HSI specialists.

1.3 *Contents*—This document is divided into the following sections and subsections.

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1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Human Systems Integration

2.1 *Definition of Human Systems Integration*—HSI is a systematic life-cycle engineering process that identifies and integrates human considerations into the design, acquisition, and support of marine systems through the application of knowledge of human behavior, capabilities, and limitations. The goal is to optimize human performance, including human capability, proficiency, availability, utilization, accommodation, survivability, health and safety by influencing

design, construction, and operations through the integration of requirements that rely on the expertise found in the following HSI domains:

2.1.1 *Manpower*—Establishing the number and type of personnel needed to operate and maintain the marine system.

2.1.2 *Personnel*—Determining where the people with the required knowledge, skill, and abilities (KSAs) required to fill marine system billets will be drawn.

2.1.3 *Training*—Establishing and providing the training requirements for the personnel selected.

2.1.4 *Human Factors Engineering*—Designing and assessing user interfaces between humans and hardware, software, firmware, webware, courseware, information, procedures, policy and doctrine, documentation, design features, technology, environments, organizations, other humans, and (co) robots.

2.1.5 *Safety and Occupational Health*—Providing a safe and healthy working environment.

2.1.6 *Personnel Survivability*—Providing a platform that maximizes crew survivability.

2.1.7 *Habitability*—Providing the characteristics of systems, facilities, personal services, and living and working conditions that result in high levels of crew morale, quality of life, safety, health, and comfort.

2.1.8 Government-oriented definitions of the HSI domains are provided in **Table 1**.

2.1.9 It is understood that not all HSI domains will be involved in every marine system design project. For example, in the commercial maritime setting, design requirements affecting several HSI domains (for example, manpower, personnel selection, and training requirements) are set by entities other than the procuring organization. This does not diminish the fact that inattention to these HSI domains can lead to the increased likelihood of human error, accidents, and incidents. Therefore, the procuring organization must exert maximum effort to ensure that all HSI domains are considered in the design, construction, and operation of any maritime system.

2.1.10 HSI fundamentally involves engineering processes and program management efforts that provide integrated and comprehensive analyses, design and assessment of requirements, operational and maintenance concepts, and resources for system manpower, personnel, training, human factors engineering (HFE), safety and occupational health (SOH), personnel survivability, and habitability. These seven HSI domains are interrelated and interdependent, and they are primary drivers of effective, affordable, and safe design concepts and deployed systems. HSI relies on a concurrent engineering process to perform co-operative trade-offs among the seven HSI domains to achieve effective system performance levels and affordable life-cycle costs, but does not replace individual domain activities, responsibilities, or reporting channels.

2.1.11 The HSI framework for organizing and integrating of human considerations into marine system design represents a system-level engineering approach. HSI uses the results of its technical domain analyses and tradeoffs to integrate them into the systems engineering and design processes. In the government environment, other HSI domains provide insights, data,