1.0 INTRODUCTION
The Department of the Navy Space and Naval Warfare Systems Command (SPAWAR) is acquiring Human Systems Integration (HSI) research, services, and support to conduct HSI planning, development, and assessment. The SPAWAR HQ Architecture and Human Systems Group supports acquisition activities for Program Executive Offices (PEO – Space, Enterprise Information Systems, and Command, Control, Communications, Computers, and Intelligence), Joint Program Executive Offices (JPEO – Joint Tactical Radio System), and related acquisition projects.

2.0 BACKGROUND
Human Systems Integration is part of a total systems engineering approach to analysis, design, development, and test of a product or system either existing or new, under development or prototype. It integrates human capabilities and limitations into system definition, design, development, and evaluation to optimize human-system performance under operational conditions. Used appropriately, HSI maximizes total system performance and minimizes lifecycle cost. HSI comprises the following domains:

• Human Factors Engineering (HFE). Human factors are the end-user cognitive, physical, sensory, and team dynamic abilities required to perform system operational, maintenance, and support job tasks.

• Manpower. Manpower factors are those job tasks, operation/maintenance rates, associated workload, and operational conditions (e.g., risk of hostile fire) that are used to determine the number and mix of military, DoD civilian and contract manpower support necessary to operate, maintain, support, and provide training for the system.

• Personnel. Personnel factors are those human aptitudes (i.e., cognitive, physical, and sensory capabilities), knowledge, skills, abilities, and experience levels that are needed to properly perform job tasks.

• Training. Training is the learning process by which personnel individually or collectively acquire or enhance pre-determined job-relevant knowledge, skills, and abilities by developing their cognitive, physical, sensory, and team dynamic abilities.

• Environmental, Safety, and Occupational Health ESOH). ESOH addresses appropriate HSI and ESOH efforts integrated across multiple disciplines into systems engineering to determine system design characteristics that can minimize the risks of acute or chronic illness, and injury or death to operators and maintainers; while at the same time enhance job performance and productivity of the personnel who operate, maintain, or support the system.

• Habitability. Habitability factors relate to the living and working conditions that are necessary to sustain the morale, safety, health, and comfort of the user population.

• Survivability. Survivability factors consist of those system design features that reduce the risk of fratricide, detection, and the probability of being attacked; in addition to the crew’s ability to withstand man-made hostile environments without aborting the mission or suffering acute chronic illness, disability, or death.

The SPAWAR HQ Architecture and Human Systems Group, as part of the systems engineering
(SE) competency, focuses on human performance and provides technical assistance in HSI to PEOs to enhance mission capability by improving total system performance and reducing life cycle costs to programs already in existence, or new systems currently under development. The SPAWAR Chief Engineer (SPAWAR 5.0) is the Navy’s technical authority for the Joint Capability Areas of Battlespace Awareness, Command and Control, Net-Centric Operations, Naval Space Operations, and Naval Information Operations. In this role, SPAWAR 5.0 has the responsibility to set the standards, processes, policies and best practices required for SE in acquisition, warfighter technical support, and the development of overarching engineering processes. HSI is a key component of SE. The overall demand, breadth, and comprehensiveness of the tasks and actions required in the implementation of HSI into the SE process will, from time to time, exceed the available resources of SPAWAR 5.0. The overarching objective of this performance work statement is to facilitate the occasional supplement to SPAWAR 5.0 HSI resources.

3.0 SCOPE
The scope of this effort is to provide the full range of HSI analysis, development, research, assessment, test and evaluation, and support activities to the design and development of Information Dominance (ID) technologies and systems, including modifications, enhancements, and improvements, for SPAWAR, the Joint HSI Steering Committee, the Naval HSI Steering Committee, and Program Managers. This applies to Navy and Marine Corps forces and their support elements, including warriors, combat systems, sensors, platforms, networks, command and control systems (including decision support systems), business, management, and related support systems. In support of the overall SE approach to system development, SPAWAR also requires the integration of HSI into the system architecture for all acquisition milestones. The objective of this work statement is to use HSI principles and methods to research, analyze, design, test, evaluate, manage, improve, enhance, track, and modify in the following areas:

3.1 Systems Engineering Technical Reviews (SETRs). SETRs are an integral part of the systems engineering process and life cycle management, and are consistent with existing and emerging commercial/industrial standards. A SETR occurs at several defined events throughout the acquisition life-cycle and provides for an independent assessment of emerging designs against plans, processes and key knowledge points in the development process. SETRs also apply to post-production, in-service improvements, and maintenance. HSI in SETR focuses on the end-user and assesses requirements traceability and defines product metrics. HSI also addresses system interoperability including integration of new systems into the Global Information Grid (GIG). HSI performed in support of SETR applies to both the SETR event and the activities and tasks leading up to the event to include document reviews, planning document developments, document inputs, system analyses, product assessments, and program guidance.

3.2 Product development. Product development allows for process design, artifact definition, and output evaluation. HSI in product development takes into account the full range of HSI requirements and capabilities and provides services and support activities necessary to satisfy the elements within each of the HSI domains - HFE, Manpower, Personnel, Training, ESOH, Habitability, and Survivability.

4.0 APPLICABLE DIRECTIVES
The contractor shall adhere to the following documents in accordance with paragraph 5.0 Performance Requirements:

<table>
<thead>
<tr>
<th>Document Type</th>
<th>No./Version/Series</th>
<th>Title</th>
<th>Date</th>
<th>Version</th>
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<td>2.0</td>
<td>DoD Architecture Framework</td>
<td>Current</td>
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<tr>
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<td>Global Information Grid (GIG) Architecture</td>
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<td>Interoperability and Supportability of Information Technology and National Security Systems</td>
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<td>Joint Capabilities Integration and Development System</td>
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<td>5000.01</td>
<td>Acquisition System</td>
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<tr>
<td>DODINST</td>
<td>5000.02</td>
<td>Operation of the Defense Acquisition System</td>
<td>Current</td>
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<tr>
<td>SECNAVINST</td>
<td>5000.2</td>
<td>Implementation and Operation of the Defense Acquisition System and JCIDS</td>
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<td>Navy Total Force Manpower Policies Procedures</td>
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<td>OPNAVINST</td>
<td>1500.76</td>
<td>Navy Training System Requirements</td>
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5.0 PERFORMANCE REQUIREMENTS
The contractor shall support the SPAWAR HQ Architecture and Human Systems Group by performing Human-Systems Integration/Systems Engineering development and program support in accordance with the requirements of this work statement. The contractor shall provide timely assistance to meet program emergent requirements as requested by the Program Manager or other properly designated authority.

The contractor shall provide HSI/SE and program support to SPAWAR HQ Architecture and Human Systems Group in the following functional areas:

5.1 SETR Development – Conduct HSI pre-design and design reviews and analyses of upgrading current and new ID systems and related concepts, applications, methods, systems, and technologies to determine human and architecture requirements (RDT&E).

The contractor shall perform front-end analysis and experimental work when developing a new ID system, upgrading an existing system, or evaluating a deployed system for potential upgrades or more intensive HSI review. To accomplish this effort, the contractor shall conduct mission, task, and function analyses of military ID systems at a level of detail suitable for acquisition design decisions. Associated tasks include (a) planning, conducting, and interpreting user needs/requirements analysis using interviews, surveys, performance testing, and lessons learned data; (b) conducting safety and human error analyses using fault trees, event trees, and root-cause analyses; (c) completing job/task analyses, training systems requirements analyses, and training systems designs including embedded training systems; and (d) designing and developing review processes of all HSI domains for each stage of the acquisition process addressing document reviews, planning, acquisition document inputs, system analyses, product assessments, and program guidance.

5.2 SETR Support – Provide HSI support to current and advanced ID concepts, applications, methods, systems, and technologies to satisfy human and mission requirements (O&MN).

The contractor shall support SPAWAR HQ Architecture and Human Systems Group in technical authority operations and conducting SETRs. The contractor will support Technical Warrant Holders (TWHs) in the areas of HSI, HFE, manpower, personnel, training, and ESOH by providing technical reviews of existing documents in support of SETR events, Joint Capabilities Integration and Development System (JCIDS) document reviews, and provide modifications and minor improvements to the appropriate sections of existing other acquisition documents, system
analyses, product assessments, and program guidance. The contractor will attend meetings as required on behalf of the TWH and provide technical feedback on meetings and documents to support SETR and technical authority operations.

5.3 HSI Analysis – Perform task analyses and experiments to support SE development process for new or developing systems (RDT&E).

The contractor shall conduct mission, task, and function analyses as part of the SE design, development, and evaluation process for new or developing systems. For these analyses, the contractor will (a) identify and review relevant literature for preparing technical assessments and plans to conduct basic, applied, and advanced research for the development of prototype ID and related technologies for new or developing systems; (b) apply User-Centered Design principles and methods for new or developing systems; (c) design experiments, simulator/wargaming and simulation assessments, usability tests, field tests, and field evaluations of display prototypes and advanced user system interface concepts for new or developing systems. Designs shall accommodate both laboratory research and research conducted aboard U.S. Navy vessels; (d) use modeling and simulation tools and techniques to assess alternative designs, and (e) evaluate printed instructional material and online user documentation in terms of its comprehension, formatting, organization, content, and usability. The contractor will follow appropriate Protection of Human Subjects guidelines and procedures, and complete required forms.

5.4 HSI Support – Monitor and track HSI technologies in SE (O&MN).

The contractor shall provide minor modifications, minor enhancements, and minor improvements to the SE design, development, and evaluation process by addressing appropriate User-Centered Design tools and techniques. The contractor will identify required Protection of Human Subjects guidelines and procedures. The contractor will attend meetings as required and provide technical feedback on meetings and documents for HSI support.

5.5 Test and Evaluation – Conduct assessments, tests, and evaluations to support SE development process (RDT&E).

The contractor shall develop test plans for prototype and developmental systems to collect user performance/usability data in laboratory, simulator, and field environments for new or developing systems. Test plan development includes (a) designing data collection and developing analysis plans to examine the use of agent technologies for improving operator performance during fleet exercises and experiments; (b) developing task network simulation models of military combat operations, command decision processes, user-system interaction, and logistical support; (c) developing data collection plans that identify the observation points, metrics, and data collection methods for use during fleet exercises; (d) collecting human performance and organizational information data at distributed locations during fleet exercises; and (e) analyzing and reporting the results.

5.6 Test and Evaluation Support – Provide monitoring and tracking support for SE assessments, tests, and evaluations (O&MN).

The contractor shall provide minor modifications, minor enhancements, and minor improvements to the experiments, tests, and evaluations of ID display prototypes and advanced user interface concepts in laboratory, simulator, and field environments to existing systems. For completed test and evaluation plans, the contractor will provide minor modifications and enhancements to (a) data collection and analysis instruments; (b) observation points, metrics, and
data collection methods; and (c) human performance and organizational information data assessments. Modifications and enhancements will accommodate both laboratory assessments and assessments conducted aboard U.S. Navy vessels.

The contractor will attend meetings as required and provide technical feedback on meetings and documents for test and evaluation support.

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5.7 Product Development – Develop and assess HSI and architecture technologies, methodologies, processes, procedures, and guidelines which enable the development of ID and related systems for new or developing systems. (RDT&E)

The contractor shall design and develop decision support, planning, crisis intervention, collaborative, and user interface systems for new or developing systems. In the design and development of new or developing systems, the contractor will (a) conduct needs assessments, requirements definitions, job/task analyses, and training systems requirements analyses; (b) create dynamic mockups and representations of the user interface using rapid prototyping techniques; (c) conduct and evaluate usability tests of alternative interface concepts and design configurations in laboratory and field settings; (d) develop models and simulations to compare product alternatives; (e) evaluate user interfaces to hardware and software against military and industrial design standards and specifications; and (f) re-develop interactive prototypes to demonstrate and test technologies for improving the user interface for displays, controls, and databases.

5.8 Product Development Support – Monitor and track HSI and architecture technologies, methodologies, processes, procedures, and guidelines that support the acquisition of ID and related systems to existing systems. (O&MN)

The contractor shall provide minor modifications, minor enhancements, and minor improvements to the design and development of support systems to existing systems. In the areas of HSI, HE, manpower, personnel, training, and ESOH, the contractor will provide technical reviews of documents in support of needs assessments, requirements definitions, job/task analyses, training systems requirements analyses, user interface prototypes, usability tests, and user interfaces. The contractor will attend meetings and provide technical feedback on meetings and documents for product development.

5.9 Architecture Development – Design and develop architecture products that provide guidance to programs and system developers for new or developing systems. (RDT&E)

The contractor shall develop workflow models in Department of Defense Architecture Framework (DODAF) format. In the development of workflow models for new or developing systems, the contractor will (a) conduct node and link analysis within existing SPAWAR ID models and architectures in order to identify decision nodes and communication links with warfighter functionality; (b) analyze and prepare process descriptions for decision-support architectures that support the network enterprise integrated architecture for new or developing systems; (c) produce warfighter models and warfighter model components that allow the effects of different communications and decision-support architectures to be investigated for new or developing systems; and (d) use DODAF format to represent human functions and tasks identifying the nodes and activities that are the most human intensive.

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5.10 Architecture Support – Minor modifications and minor enhancements to existing products
that support programs and system developers (O&MN).

The contractor shall provide minor modifications, minor enhancements to existing products that support programs and system developers. The contractor shall support the SPAWAR HQ Architecture and Human Systems Group in reviewing existing documents in support of DODAF workflow models. The contractor will support the SPAWAR HQ Architecture and Human Systems Group in reviewing existing DODAF models by providing technical reviews of existing documents in support of node and link analyses of models and architectures, process descriptions for decision-support architectures, warfighter models, and human views that represent human functions and tasks for existing products that support programs and system developers. The contractor will attend meetings as required on behalf of the SPAWAR HQ Architecture and Human Systems Group and provide technical feedback on meetings and documents for architecture support.

5.11 Organizational Design Processes – Design and develop organizational design concepts and processes for new or developing systems (RDT&E).

The contractor shall analyze command organizations by assessing organizational climate, lines of authority, information flow, leadership, and team interdependencies. For organizational design improvement, the contractor will (a) design, develop, and transition innovative technologies that enhance human-system performance and reduce workload for information warfare and intelligence systems on new or previously developed systems; (b) design experiments to determine how differences in information quality and communication flow affect decision-making new or previously developed systems; and (c) develop operational scenarios, assemble laboratory apparatus, and create test protocols to support these experimental studies.

5.12 Organizational Design Support – Minor modifications and minor improvements to existing organizational design concepts and processes (O&MN).

The contractor shall provide minor modifications, minor enhancements, and minor improvements to the assessment and analysis of existing organizational parameters. The contractor will provide technical reviews of existing documents in support of innovative organizational design technologies, information quality and communication flow, and organizational processes. The contractor will provide modifications and improvements to the operational scenarios and test protocols, attend meetings, and provide technical feedback on meetings and documents for architecture support.

5.13 Standards and Guidelines – Develop HSI standards and guidelines for new or developing systems. (RDT&E)

The contractor shall validate, verify, and apply HSI standards, guidelines, principles, and design criteria to the design and development of new or developing systems. (RDT&E)

The contractor shall review of Navy HSI Steering Committee policy and guidelines, and monitor implementation of DoD and Navy HSI guidance in the SE process.


The contractor shall support the HSI lead in refining and updating HSI standards, guidelines, principles, and design criteria. The contractor will support the HSI lead with respect to standards and guidelines by providing technical reviews on documents with the premise of incorporating
new guidelines, concepts, criteria, codes and standards to existing documentation. The contractor will attend meetings as required on behalf of the HSI lead and provide technical feedback on meetings as well as documents for architecture support.

5.15 Competency Model Support – Provide support to competency product teams for existing systems (O&MN).

The contractor will support the SPAWAR HQ Architecture and Human Systems Group by assisting in the continued refinements to the established practices, procedures and policies within the HSI competency. The contractor will support the SPAWAR HQ Architecture and Human Systems Group in the HSI competency model by providing technical reviews of existing documents in support of HSI competency established guidelines, concepts, criteria, and standards. The contractor will attend meetings as required on behalf of the SPAWAR HQ Architecture and Human Systems Group and provide technical feedback on meetings as well as documentation for architecture support.

6.0 DELIVERABLES

The Contractor shall provide deliverables in accordance with the PWS and sample list below. Deliverables shall be prepared in contractor format, except architecture-related products that will be developed in accordance with applicable DoD Directives and configuration managed in the SYSCOM Architecture Development and Integration Environment (SADIE). All work products generated from the included tasks will remain as government property.

Products
1. Task Analysis
2. Job Task Analysis
3. HSI Plan
4. Function Needs Analysis
5. Fault Tree Analysis
6. Error Analysis
7. Root Cause Analysis
8. Lessons Learned Report
9. Training Systems Requirements Analysis
10. User Survey
11. Questionnaire
12. Structured Interview Instrument
13. Human Engineering Program Plan
14. Navy Training Systems Plan
15. Manpower Estimate
16. Programmatic Environmental Safety and Health Evaluation
17. Job Performance Aids
18. Function Allocation Analysis
19. HSI Tradeoff Analysis
20. Interface Design Specification
21. Experimental Design
22. Literature Review Summary
23. Test Plan
24. Data Collection Form
25. Observer Instructions
26. Data Collection Methodology
27. Questionnaire
28. Survey
29. Interview Form
30. Military Utility Assessment
31. Usability Test Plan
32. User Needs Assessment
33. Requirements Analysis
34. Mockup
35. Prototype
36. Usability Test
37. User Interface Specification
38. Protection of Human Subjects Plan
39. Node and Link Analysis
40. Process Description
41. Integrated Architecture Product
42. Organizational Design
43. Workload Analysis
44. Experiment Design
45. Information Flow Analysis
46. Evaluation Protocol
47. Standards
48. Specifications
49. Guidelines
50. Request for Action
51. HSI input to:
   • Systems Engineering Plan
   • Test and Evaluation Master Plan
   • Initial Capabilities Document
   • Capability Development Document
   • Capability Production Document

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• Software Requirement Specification
• System/Subsystem Design Description
• System/Subsystem Specification
• Operational Views
• Systems Views
• Technical Views

In addition, the contractor shall provide:
• Monthly Status Reports – identifies all work accomplished, planned, issues/resolutions options and financial status for each 5.0 performance requirement sub task at the 5.x level. The report shall include: planned amount, funded amount, expended amount to date and planned burn rate to task completion and any cost savings per sub paragraph 5.x and summarized by Appropriation and by Program/Project. Provide an Employee Master Report which identifies all prime and sub
contractor employees’ charging to the PWS, labor category, PWS sub paragraph (5.x) supported and percentage of time charged, and CAC status. Due the 15th of each month.
• Weekly status reports on all tasks. Due weekly, no later than COB each Friday.
7.0 GOVERNMENT FURNISHED PROPERTY (N/A)
8.0 SECURITY REQUIREMENTS
The nature of this PWS requires access up to SECRET information. The work performed by the contractor will include access to unclassified and up to SECRET data, information, and spaces. The contractor will be required to attend meetings classified up to the SECRET level.
Note: If foreign travel is required, the contractor must obtain the country specific briefing, required within 90 days of departure, by calling 619-553-2046, Topside, or 619-525-3385, Old Town. A staff briefer will assist you in obtaining the country briefing.
9.0 NAVY MARINE CORPS INTRANET (NMCI)
The nature of this task does not require Contractors to procure NMCI seats for personnel working at the Contractor site.
10.0 BEST PRACTICES
Work performed by the Contractor shall provide support to SPAWAR HQ Architecture and Human Systems Group and SPAWAR command-level “Best Practices” principles incorporated in the SPAWAR Program Manager’s Toolkit Acquisition Support Office Guides (1) Acquisition Program Structure Guide; (2) Contract Management Process Guide; (3) Program Manager’s Handbook; (4) Scheduling Guide; (5) Systems Engineering Guide; (6) Technology Alignment Guide and support the command wide implementation process.
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11.0 TECHNICAL POINT OF CONTACT
Technical Point of Contact/Task Manager:
Mr. Douglas Magedman SPAWARSYSCOM (HQ Architecture and Human Systems Group)
email: douglas.magedman@navy.mil phone (858) 537-0624
Financial Point of Contact:
Ms. Dee Ambrose email: delores.ambrose@navy.mil phone (619) 524-7219
12.0 WORKLOAD ESTIMATE
The following workload data is provided for informational purposes only to assist in estimating the price of this PWS.
Estimated annual labor level of effort: 15,000 man-hours.
13.0 LOCATION OF PERFORMANCE
The majority of services provided to the Architecture and Human Systems Group will be at the contractor site with occasional work and meetings at SPAWAR Headquarters located in San Diego, CA.