



Human Systems IAC (HSIAC)

HSIAC

Story 1

Story 2

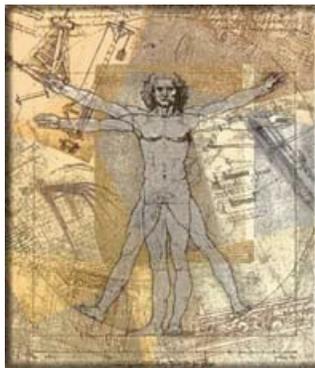
Concepts of Operations for Exoskeletons for Human Performance Augmentation (EHPA)

The Human Systems Information Analysis Center (HSIAC) has developed the concepts of operations (CONOPS) for the Defense Advanced Research Agency's (DARPA's) Exoskeletons for the Human Performance Augmentation (EHPA) program. The primary goal of the EHPA program is to develop human performance augmentation capabilities that increase the speed, strength, and endurance of individual soldiers in combat environments. The program's expected benefits include increased lethality and survivability of ground forces in all combat environments, especially urban terrain.

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C4ISR Systems Benefit From Interactions Between Information Systems (IS) and Human Systems (HS)

Information and information superiority are becoming increasingly important in today's military environment, and the acquisition, processing, distribution, and storage of information is becoming increasingly dependent on advanced, technologically sophisticated information systems. During recent Advanced Concept Technology Demonstrations (ACTDs) briefings concerning the military utility of new information and decision aiding systems to support tactical operations, it became apparent to the Office of the Deputy Undersecretary of Defense (Science and Technology) (OUSD (S&T)) Directors of Bio Systems and Information Systems that developers of Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems could benefit greatly from deliberate and expanded interactions between Information Systems (IS) and Human Systems (HS) professionals. The ACTDs were structured to assess the effectiveness of system hardware and software. However, they were not structured to provide an equally rigorous assessment of the human operator's ability to use the system (e.g., human interface acceptability, cognitive workload, human-in-the-loop workflow, etc.). Decision failures by warfighters can be minimized with effective command and control and decision support systems.



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Concepts of Operations for Exoskeletons for Human Performance Augmentation (EHPA) (continued)

To support DARPA's EHPA program, HSIAC developed a set of CONOPS vignettes. HSIAC began the process by interviewing retired military officers to learn from those who have experienced combat first-hand. The interviewees provided insight into how they would ideally design an exoskeleton device, how they might employ such a device, and how it might change tactics, techniques, and procedures in military operations. From the data collected in these interviews, HSIAC developed a task matrix to characterize the potential environments in which an exoskeleton might be expected to operate, and potential employment variations for exoskeletons.

From the task matrix, HSIAC, in conjunction with the panel of retired military officers, chose two representative operating conditions for further development. These two operating conditions were then developed into CONOPS vignette documents. To further enhance the vignettes, each was developed into a computer-animated movie. These movies graphically depict the actions of the vignette and highlight the military utility of the Exoskeleton devices. The Exoskeleton equipped soldiers are shown with increased firepower, increased load-carrying capability, increase speed and range, and increased survivability through the addition of armor.

The CONOPS scenarios and accompanying videos developed by HSIAC will help ensure effective communication of the EHPA program concepts and utilities to the military user community.

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C4ISR Systems Benefit From Interactions Between Information Systems (IS) and Human Systems (HS) (continued)

In view of this, the OUSD (S&T)/Bio Systems tasked the HSIAC to study and identify ways of facilitating cooperation and collaboration between HS technology and IS technology providers in support of the human factors of future C4ISR systems. In addition to gathering information and insights from the literature and from Subject Matter Experts (SMEs), this effort included conducting a workshop for scientists, engineers, and military operators/analysts.



During the course of the workshop presentations and deliberations, participants identified issues facing members of the HS and IS communities—

- issues common to the two communities,
- issues one community has with the other,
- issues one, or both, communities have with an outside agency.

The workshop was organized around three cycles of presentations and breakout groups that deliberated on specific issues related to HS/IS cooperation and collaboration with which each group had expertise.

The presenters provided case-study examples and personal experiences regarding successful HS and IS cooperation and collaboration. They also provided some insight into system problems and other difficulties that demonstrated how collaboration between the two communities is still, too often, lacking.

The three cycles of deliberations addressed—

- the state of the practice,
- methods and measures needed to foster cooperation, and
- recommendation of solutions.

Factors that restrained collaboration related to language and communication, education, program management, the acquisition process, funding, requirements, available tools and techniques, user involvement, and underlying conceptual issues. Breakout session results were presented to all with open discussion.

There was general agreement of a need to educate the members of the IS community about the "value-added" by HS practitioners. It is generally believed that IS practitioners, if aware of the long-term benefits of HS such as increased system performance and reliability and decreased system error and cost, would welcome HS involvement.

This DoD-sponsored effort succeeded in increasing the awareness of the HS and IS communities of their respective needs and opportunities. As a result, at least one service laboratory has already committed to joint participation in on-going programs.

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