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Acquisition Logistics Engineering

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Human Factors Engineering (HFE): The comprehensive integration of human characteristics (including limitations or constraints) into system definition, design, development, and evaluation to optimize total system performance (the human-machine system) under operational conditions.

Human Factors

If we cannot effectively operate the systems being designed or it's too labor intensive, we are failing the Acquisition process. This month we focus on Human Factors, one of the key domains within the field of Human Systems Integration (HSI). HSI is the comprehensive management and technical strategy, initiated early in the acquisition process, to ensure human performance, and safety and health aspects are considered throughout the system design and development processes. Human factors engineering requirements are established to develop effective human-machine interfaces, and minimize or eliminate system characteristics that require extensive cognitive, physical, or sensory skills; to require excessive training or workload for intensive tasks; or to result in frequent or critical errors or safety/health hazards.

References you can use:

MIL-STD-1472 Design Criteria: Human Engineering

Defense Acquisition Guidebook (Ch 6)

Human Factors Ergonomics Society

Human Factors and Ergonomics Society

Human Factors and Ergonomics

Human Factors and Ergonomics (HF&E) is a multidisciplinary field incorporating contributions from psychology, engineering, biomechanics, mechanobiology, industrial design, graphic design, statistics, operations research and anthropometry. In essence it is the study of designing equipment and devices that fit the human body and its cognitive abilities. The two terms "human factors" and "ergonomics" are essentially synonymous.

The International Ergonomics Association defines ergonomics or human factors as follows: Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.

HF&E is employed to fulfill the goals of health, safety and productivity. It is relevant in the design of such things as safe furniture and easy-to-use interfaces to machines and equipment. Proper ergonomic design is necessary to prevent repetitive strain injuries and other musculoskeletal disorders, which can develop over time and can lead to long-term disability.

Human Factors and Ergonomics is concerned with the "fit" between the user, equipment and their environments. It takes account of the user's capabilities and limitations in seeking to ensure that tasks, functions, information and the environment suit each user. *Reprinted from the Wikipedia*

U.S. Department of Defense Publishes Major Revision to Human Engineering Standard – Click here to read more…

ALE Employee Spotlight

Tom Kutscher, Systems Analyst & CIO

Tom has been with ALE for ten years in increasing levels of responsibility. He currently functions as senior systems analyst and project manager for some of ALE's biggest projects. He is a graduate of The Ohio State University with a degree in Industrial & Systems Engineering. As ALE's HSI lead, he was responsible for a major U.S. Coast Guard Cutter Program. He analyzed HFE and System Safety across the entire ship system. He is also responsible for ALE's information technology infrastructure serving as the company's CIO. Tom lives in Westerville with his three dogs. He is looking forward to his wedding this August.

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Identifying and Measuring the Value of Human Factors to an Acquisition Project

ABSTRACT – This paper addresses three issues of interest to both human systems integration (HSI) practitioners and to program managers: (1) what is the expected value of human factors engineering (HFE) involvement on an acquisition project? (2) how can that value be measured? and (3) how can that value be optimized? We begin by **examining** several case studies showing the potential range and magnitude of benefits associated with HFE involvement. Next, we present a simple **methodology** for determining the cost effectiveness of HFE intervention within a specific system development context. Finally, we review a sample of HFE **methods** that have been shown to benefit system development efforts. We conclude with a set of recommendations for putting the above information into practice.

INTRODUCTION – In traditional systems acquisition, inadequate consideration of human factors engineering (HFE) issues is a familiar problem. That is, HFE issues are not expressly considered, they are considered but their importance is underestimated, or they are considered too late in the design process. In the latter cases, it is not uncommon for project teams to consider HFE issues at only one or two points, rather than throughout, the system development lifecycle, preferring to focus limited resources on technical issues with a higher perceived payoff. Similarly, if a project experiences a budget or schedule overrun, project activities and/or system components with the lowest perceived value are generally the first to be cut. Such problems could be avoided, in many cases, through better understanding of the value HFE potentially brings to an acquisition project. It is difficult (but not impossible) to estimate the economic impact of usability, but it is extremely important to do so, as the results can be dramatic and significantly impact the course of a project. While most of the examples in this paper come from the literature on human factors and usability engineering techniques, the underlying principles can be extrapolated to other areas of concern to HSI practitioners (e.g., health, safety, survivability).

THE BENEFITS OF HFE – In fact, a positive return on investment (ROI) has been documented in a number of studies (e.g., Nielsen, 1993; Bias and Mayhew, 1994; Pressman, 2000). By contrast, systems with bad usability can have significant negative impact in terms of wasted time, unnecessary expense, incorrectly or incompletely performed tasks, user frustration, and safety issues. Moreover, the early inclusion of HFE techniques in the development of a system has proven to reduce development time and costs. Some examples:

Total Ownership Cost Reduction

Only 20% of software's lifecycle cost is incurred during development. The majority of costs occur after the product is released. Of that work, 80% is due to unmet or unseen user requirements, which could be reduced by following HFE techniques (Karat, 1993).

Similarly, it has been reported by Cunnigham (2001) that typically between 50 and 60% of a military system's total ownership costs is in manning and maintaining the system. Optimizing the crew and considering the maintainer through use of HFE techniques in development will significantly reduce these costs.

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