

**Abstract submitted for the  
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**Title:** Application of a Modified Universal Design Survey for evaluation of Ares 1 Ground Crew Worksites

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**Abstract:**

Operability is a driving requirement for NASA's Ares 1 launch vehicle. Launch site ground operations include several operator tasks to prepare the vehicle for launch or to perform maintenance. Ensuring that components requiring operator interaction at the launch site are designed for optimal human use is a high priority for operability.

To support design evaluation, the Ares 1 Upper Stage (US) element Human Factors Engineering (HFE) group developed a survey based on the Universal Design approach. Universal Design is a process to create products that can be used effectively by as many people as possible. Universal Design per se is not a priority for Ares 1 because launch vehicle processing is a specialized skill and not akin to a consumer product that should be used by all people of all abilities. However, applying principles of Universal Design will increase the probability of an error free and efficient design which is a priority for Ares 1.

The Design Quality Evaluation Survey centers on the following seven principles: (1) Equitable use, (2) Flexibility in use, (3) Simple and intuitive use, (4) Perceptible information, (5) Tolerance for error, (6) Low physical effort, (7) Size and space for approach and use. Each principle is associated with multiple evaluation criteria which were rated with the degree to which the statement is true. All statements are phrased in the utmost positive, or the design goal so that the degree to which judgments tend toward "completely agree" directly reflects the degree to which the design is good.

The Design Quality Evaluation Survey was employed for several US analyses. The tool was found to be most useful for comparative judgments as opposed to an assessment of a single design option. It provided a useful piece of additional data when assessing possible operator interfaces or worksites for operability.