



NASA SBIR 2016 Phase I Solicitation

H12.01 Task Analysis Visualization and Data Management Tool

Lead Center: JSC

Participating Center(s): ARC

Task analysis (TA) is a method within the Human-Centered Design process that represents tasks as sequences or concurring steps and actions that are necessary to accomplish goals. It is used to understand and document the sequence of tasks, steps, and the relationship among these in order to indicate how the user or uses performing them. Furthermore, most major NASA programs, such as Orion, call for TA in the verification process. The output of the TA is a Master Task List (MTL) that feeds into design, models, and databases. Designers use the MTL to design systems, subsystems, and components to accommodate crew tasks. Operations personnel use the MTL for operations concepts and crew procedures development. This solicitation invites proposals intending to develop methods and technologies to manage and visualize TA information.

Although recognized as a critical function in design, task analysis is often erroneously overlooked until final design phases when hardware, system, and software designs are too costly to change. It is essential that task analysis be conducted as early in the design process as possible. Task analysis should be conducted iteratively and should be frequently evaluated throughout the design and development process to allow for proper verification of crew task and system design. Furthermore, task analysis should be performed to identify the "critical" tasks, i.e., those tasks that are necessary to successfully accomplish operations and mission objectives. Function allocation is also an important part of task analysis: deciding whether a particular function will be accomplished by the human or the system, or by some combination of humans and systems.

Task analyses for long-duration missions will result in a complex structure of tasks and sub-tasks. Master task lists can contain thousands of tasks that have complex temporal and sequential relations among them that need to be visualized. In order to use the results of a complex task analysis efficiently, there is a need for a robust visualization tool that helps with overviewing, sorting, and interpreting the results. Available commercial tools are not able to deal with the complexity of long-duration mission task analysis data due to the following limitations: cannot easily show simultaneous tasks and tasks performed by multiple operators, difficult to track changes, difficult to search for tasks, few/no summary options, and few/no file export options.

The tool should improve task design and system design by relating tasks and sequences of tasks in an efficient way, making the data more usable and ultimately improving overall design.

Phase I Deliverables - Conceptual prototype of a task analysis data management and visualization tool and final report detailing the conceptual prototype and software development plan including feature and display requirements.

Phase II Deliverables - Completed, usability-tested software tool along with the source code, user's guide, and final report on the development and testing of the tool.

