### ABSTRACT
The goal of the Information Presentation Directed Research Project (DRP) is to address design questions related to the presentation of information to the crew. The major areas of work, or subtasks, within this DRP are: 1) Displays, 2) Controls, 3) Electronic Procedures and Fault Management, and 4) Human Performance Modeling. This DRP is a collaborative effort between researchers at Johnson Space Center and Ames Research Center.

### DISPLAYS – Visual displays

#### FY08 Studies

**Label Alignment**
Three studies investigated the effects of label alignment in small and large data groupings: 4, 8, and 16 label/value pairs, as well as high fidelity displays. The task was to find a value that corresponded to a target label.

- For large data groupings, such as the 16-label group, data-alignment is faster than left-alignment.
- In high fidelity displays, there was no difference in search times between left and data-aligned labels.

**Label Orientation**
The purpose of the study was to investigate the effects of label orientation.

- Horizontal labels improve reading time compared to vertical labels.
- Additional label orientation studies are needed and being planned so that a solid design recommendation can be made.

#### Studies Planned for FY09
Follow-up on alignment studies from FY08, further investigating left-aligned versus data-aligned labels for performance differences. The experimental task will be varied, and eye tracking will be used to gather higher precision data.

- Investigate methods of distinguishing between labels and values, such as colors, spaces, and bolding.
- Investigate methods of indicating "clickable" areas on a display.
- Investigate tradeoffs between color-coding on text versus color-coding on an associated symbolic coin.

### VIBRATION STUDIES

- **Orion-Ares exposure will be at levels that may exceed the 0.25 g limit imposed by earlier programs during ascent**
- **There is a serious risk that higher vibration will cause unacceptable degradation of human performance, due in part to decrements in visual function**
- Present study began the process of quantifying this risk by examining how different vibration levels impact ability to make speeded yes/no responses to alphanumeric symbology while in a semi-supine position
  - 5 blocks of 60 self-paced trials, 40 with vibration, 20 without
  - Each block at one vibration level: 0 gx, .15 gx, .30 gx, .5 gx, or .7 gx
  - Response times showed very similar pattern to errors
  - There were more errors for smaller compared to larger font
  - Errors increased with increased vibration
- **Digit processing task (8 participants)**
  - Orient to magenta box
  - Do the three letters in the middle row form a word or a non-word?
  - Press one button for “Yes”, another for “No”
- **Results**
  - Errors increased with increased vibration
  - There were more errors for smaller compared to larger font
  - Vibration effects appeared at smaller vibrations levels for 10 pt font than 14 pt font
  - No significant differences between vibration effects on lexical decision and magnitude comparison tasks
  - No effects of vibration on follow-up trials
  - Response times showed very similar pattern to errors

### EVA OPERATIONS

**Study on HMD use in lunar lighting**
- Collaboration with Orion lighting expert in the lighting lab
- First study to look at HMD in lunar lighting conditions

**Gloved Dexterity and Tactility**
- First study to look at glove dexterity in high pressure environment

**Demonstration of spatially localized beacons**
- Concept prototype for localizing critical mileposts such as lander, habitat, crewmember

### CONTROLS

#### FY08 Studies

**Cursor Movement**
The study examined three cursor movement modes: continuous, discrete, and gravity well, using trackball and a 4-way cast switch, with and without EVA gloves.

- Discrete mode and gravity well provide the most accuracy regardless of device.
- Continuous cursor mode is fastest if the device is a continuous device (e.g., trackball).
- Gravity well mode improved accuracy rates with the trackball and cast switch.

**Dual-task Study**
The study examined single-task and dual task comparisons with a cursor control and a hand controller.

**Follow-up on alignment studies from FY08, further investigating left-aligned versus data-aligned labels for performance differences.**

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#### Studies Planned for FY09
Cursor control device investigations will continue under vibration and in microgravity.