

## Plenary Discussion Notes – Session 6

### Visualisation and Frame of Reference

#### Summary of Plenary Discussion (M. Taylor)

Clarity as a cue to depth—or of focus. Training effects in seeing unfamiliar kinds of things. Interaction as determining ego-exocentric view. Maintaining context as views changes to help understanding. Provide authenticated markers for movement in augmented reality—this is a good possibility or COP. Egocentric COP on demand. Interactions are not only between one person and one display, but among people looking at different views of the same world.

The point of displays is for the decision maker to “see the picture” better than could without the display. What is often needed is to include in “the picture” the objectives and intentions of others. That is part of the Common Operational Picture.

Reiterate that user preferences don’t model usability! People often like realism versus symbology. Justin says that if you put people in the operational situation they are likely to choose the right thing. Soldiers are often made to do what they don’t want because it makes them perform better. They can be (and should be) told to use what is the best kind of display.

Johansen says strategic level needs symbols, but need to drill down to a more realistic display.

Q. Ambiguity –a true 2D display as compared to 3D-distance estimation

Harvey Smallman: You can systematically model that depression(?)

Bill Wright: Performance might effect.

What if you have an interactive line of sight or a route planning system?

Smallman: In personal action space, we have the most accurate depth perception—just allowing them to choose the angle.

Wright: what is the cost of using those tools timewise etc.

Martin Taylor: We feel we live Euclidean space but not necessarily when we’re dealing with landscape etc.

Experiment with non-interactive viewing suggest that our mental space is hyperbolic.

Capt. Stephen Boyne: Using icons, what level of ID were you talking about?

Smallman: Platform ID.

Capt. Boyne: Were your subjects novice in judging distance?

Smallman: We used 90 subjects. Sometimes we examined people’s abilities to use maps. Training and interaction would improve things.

Vincent Taylor: Depth perception—all displays have uniform clarity—is there any business in effects of clarity?

Smallman: yes, atmospheric perspective.

Capt. Boyne: In the desert it’s hard to tell (distance properly).

Smallman: People have talked about that—driving down the objects.

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V. Taylor: Surgeon using knee scope on my knee: tiny work area and instruments he's navigating in virtual space.

Hollands: That's an example of highly egocentric space—has to think of himself as being in your knee—so he cuts the right thing.

V. Taylor: If it's only a 2D display (he's working with), it must be difficult to know if you're in the right position.

Smallman: There are numerous ways to maintain context.

Wright: Your wayfinding task—did it involve stereo?

Carolyn MacGregor: Yes.

Wright: I'm wondering if virtual wayfinding cues could help—or make it very integrated with environment.

MacGregor: We wanted to try to develop a landmark technique that is generic enough to use in a lot of different applications.

Smallman: Why did you use an egg shape?

MacGregor: We're just using it for broad scope; if you're putting information in it, you want them to be exact. Mousing over something specific is difficult. We've run a number of experiments—coming up with a 3D cursor is challenging. Originally was an Inukshuk. Then ran a number of tests. We're still early in it.

Capt Dan Agar: They could move themselves up to an object and walk through.

Susan Chipman: The best control for navigation I've seen is a robot arm that used on shuttle in Houston (Canadarm).

Capt. Boyne: Have you looked at using the eggs in augmented reality? To compare to where you want to be regardless of where you're pointing?

MacGregor: Don't know if funding was there; If you could this with GPS, someone else could come along and see it. Started in that very concept: augmented reality.

Nada Pavlovic: Do you have to make it a solid shape?

MacGregor: Didn't go with transparency—we were short on time, but we will be doing that.

Greg Trafton: Harvey (Smallman) said that people like 3D displays but they're not really useful. What do other people think?

?: I've been using a 3D text sorting device: I kind of like it. Not a spatial thing. You orient in 3D, then move up to take the 2D view and work from there.

?: If you don't have 3D icons, icons have to face you all the time—digital.

Smallman: Best guess is that 3D symbicons would be the best way to go.

V. Taylor: How do you hook a 3D object in space?

Wright: You can draw a ray through an object.

MacGregor: Every time you change your viewpoint, the scene changes.

V. Taylor: I want to find something that's floating. I can't grab it.

MacGregor: We need to figure out more ways to do that.

Wright: In a synthetic environment you have synthetic...

V. Taylor: It would change depending on the density of the display.

MacGregor: using a stylus or a mouse with one hand.

David Baar: It seems like the natural solution to base it on the user—the set up nodes and light a path between two nodes.

M. Taylor: this same problem arise in 2D displays—we solved this by saying “that town” or “that house”. With 3D it’s not this object what is an object.

Bill Cunningham: So far in the discussion you’ve been talking about human perception vs 2D or 3D—not one word about COP!

Wright. COP. Some are going to be 2D and some 3D—and they will be shared.

Col. Tom Johansen: The point is that a mental picture needs to make the human being better hatn without it. If you’re in a valley as a soldier, the picture should be both 2D and 3D. Let them decide what they need there and then. 3D will not solve everything—put flexibility in a allow user to decide. UAV that was looking down and decide where things are—have a satellite picture as well so you have both 2D and 3D.

Smallman: If you trusted user preference, you’d get people saying yes, that’s what I want but there’s more than that.

Col. Johansen: No scientist is going to override what the operator wants. If a soldier wants to see a ship, he needs to see that ship.

Hollands: If you put the person in the operational context, if you can, give control, and they will choose the right display. Make it easy for the soldier to have the right display.

Capt. Boyne: the military all the time goes against user preference—no soldier likes rucksack marches but it will enhance their performance.

Cunningham: Soldiers certainly are incredibly innovative—they’ll find ways to make it better or worse—if you give them flexibility, they’ll change it to what they want it to be.

