DSS Build 2 Experiments: DSS-2 Evaluation Study

TADMUS Technical Advisory Board

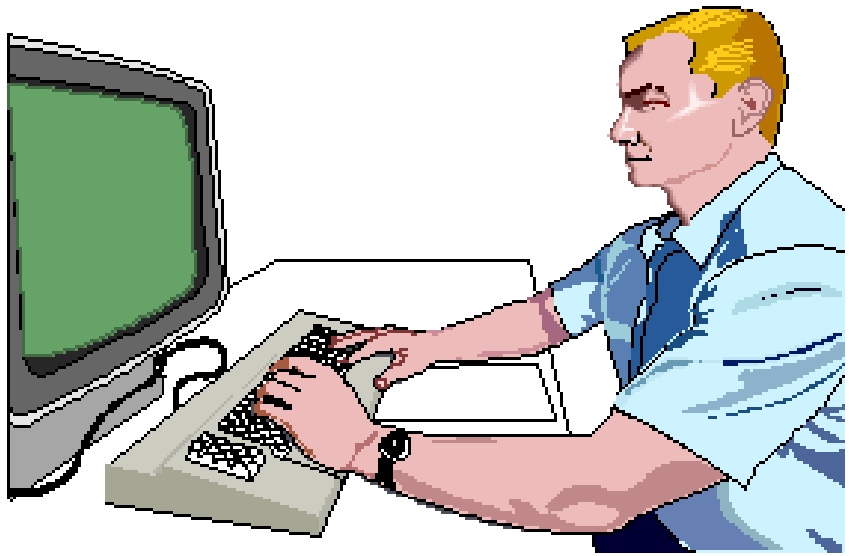
June 24-25, 1997

DSS-2 Experiments

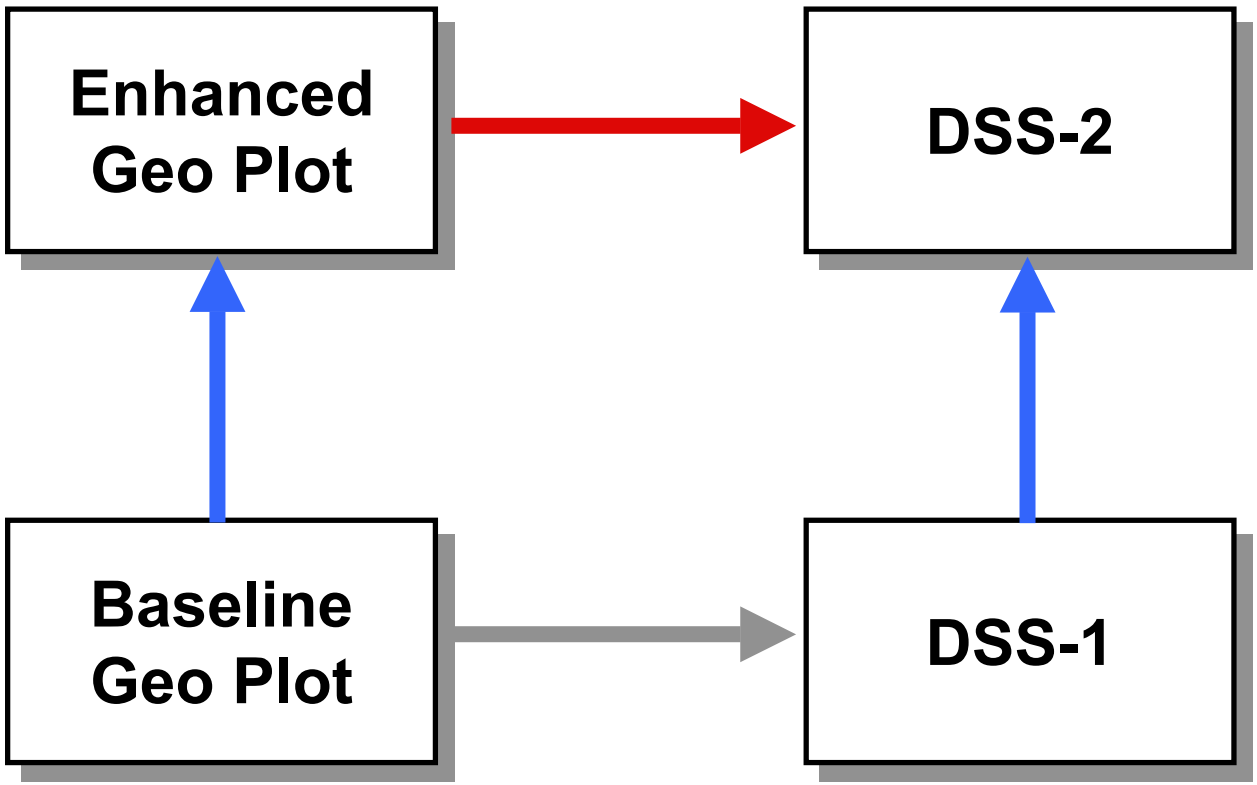
- DSS-2 Evaluation
- Eye Tracking
- Data Reliability
- CIC Team Displays
- Multi-Unit Displays
- Integrated Training for Critical Thinking
- Integrated Training for Track Management
- Tutorial / Advisory Technology
- Integrated Team Dimensional Training
- Support for Multi-Unit Coordination

DSS-2 Evaluation

- **Objectives**
  - determine overall effects of DSS
  - examine the use of DSS modules
- **Research Questions**
  - DSS Utility
  - Situation Awareness
  - Communications
  - DSS Usability



Test Conditions



Within-Subject Design

- Counterbalanced order using Latin square.
- Contiguous runs with and without full DSS.
- Comparable procedures to the DSS-1 study.

1	I –	B –	C +	D +
2	B +	I +	D –	C –
3	C +	D +	I –	B –
4	D –	C –	B +	I +
5	I –	D –	C +	B +
6	D +	I +	B –	C –
7	C +	B +	D –	I –
8	B –	C –	I +	D +

CO-TAO Team

Test Scenario

With or Without Full DSS-2

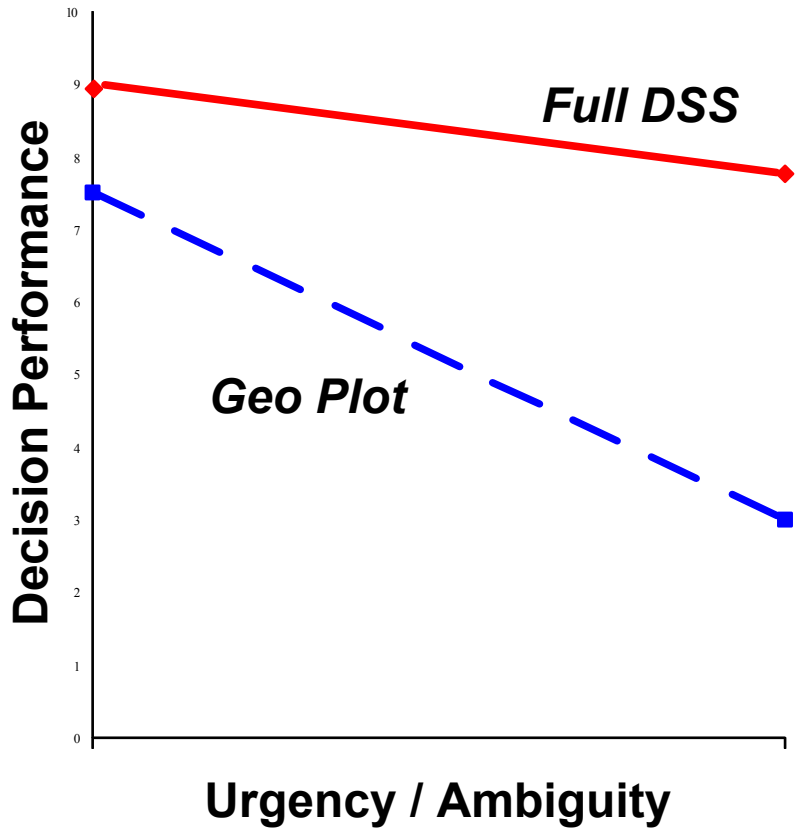
Critical Events

- Scenario events vary in urgency and ambiguity.
- Urgency – time available before action is required.
- Ambiguity – missing, unreliable, conflicting, or non-diagnostic tactical data.

	Moderate Urgency	High Urgency	Total Urgency
Moderate Ambiguity	9	6	15
High Ambiguity	6	14	20
Total Ambiguity	15	20	35

Analysis of Events

- Permits study of factors affecting workload within scenarios.
- Main effects of Track Urgency and Ambiguity.
- Interaction with DSS (DSS enables decision makers to resolve track ambiguity faster).



Procedures – *Training*

- Pre-briefing and reference materials
- Demographic Questionnaire
- DSS training with criterion test
- 2 practice runs with assistance

Procedures – *Test Runs*

- **Situation / Intelligence briefing**
- **Display set-up and track familiarization**
- **Scenario run**
  - scripted team activity and communications
  - tracks of interest probes (early, middle, and late)
  - automated and manual data collection
- **NASA TLX subjective workload rating**
- **Debriefing on critical events**

Procedures – *Post Session*

- **DSS evaluation questionnaire**
  - usage, utility, and usability ratings of modules
  - overall assessment of DSS utility & usability
- **Structured interview**
  - comments about pros / cons of DSS overall
  - suggestions for changes to the display & info
  - reactions to using DSS for tactical training

Data Sources

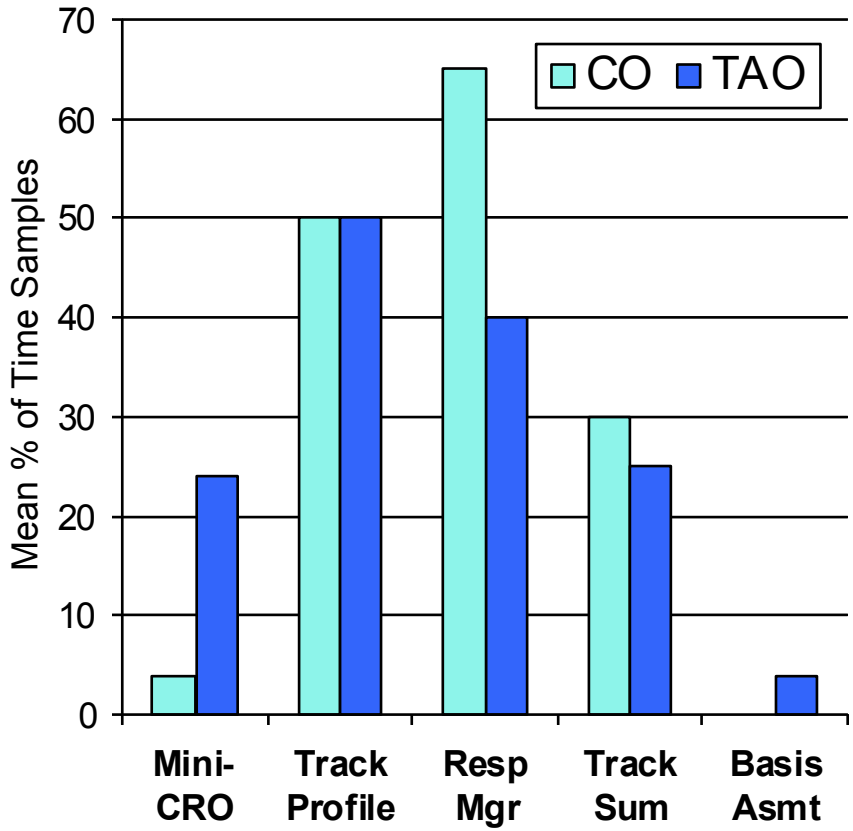
- Voice communications
- Tracks of interest probes
- DSS action log (auto capture of actions)
- Observer log (time-sampling of CO & TAO)
- Post-run debriefing
- TLX subjective workload ratings
- DSS questionnaire
- Structured interview

Demographic Summary

- **Junior Officers**
  - 6 LT, 1 LTJG, and 1 CWO2
- **Limited Fleet Experience**
  - Mean years in service: 11.7
  - Mean no. deployments: 4.7
  - Few directly relevant duty assignments.
- **Not TAO Qualified**
  - Training courses
  - Shipboard qualified

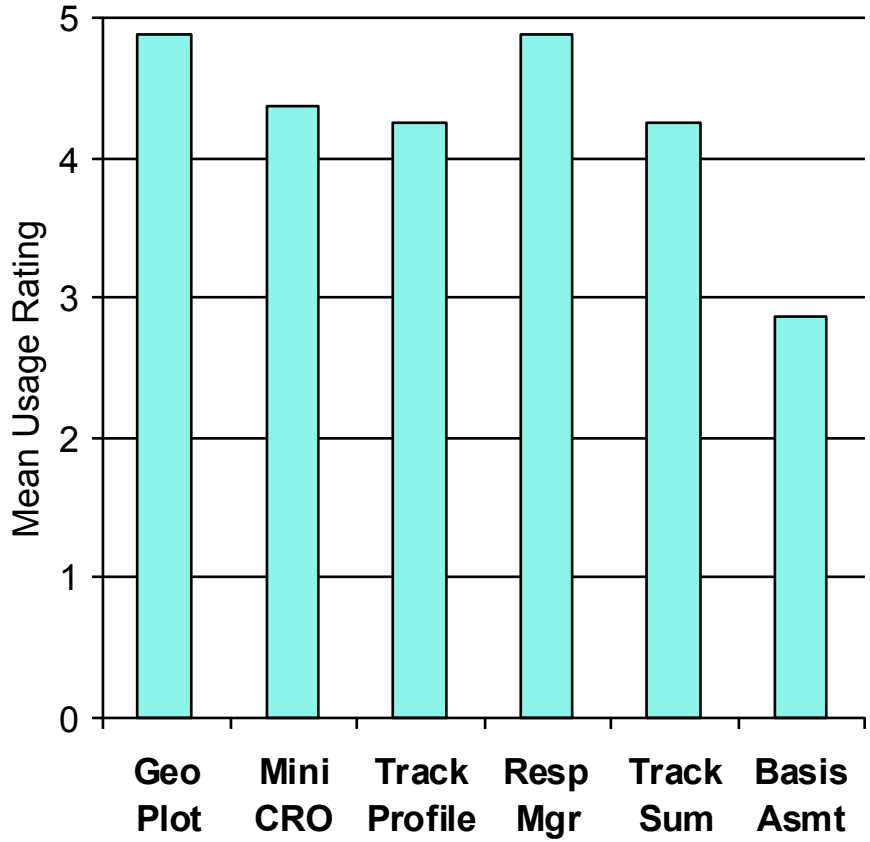
Do the CO and TAO use the DSS? (observed usage)

- **CO and TAO were observed using DSS.**
  - CO – 50% of samples
  - TAO – 80% of samples
- **CO and TAO used the DSS modules in different ways.**
  - CO – response mgmt big picture
  - TAO – track status data summary



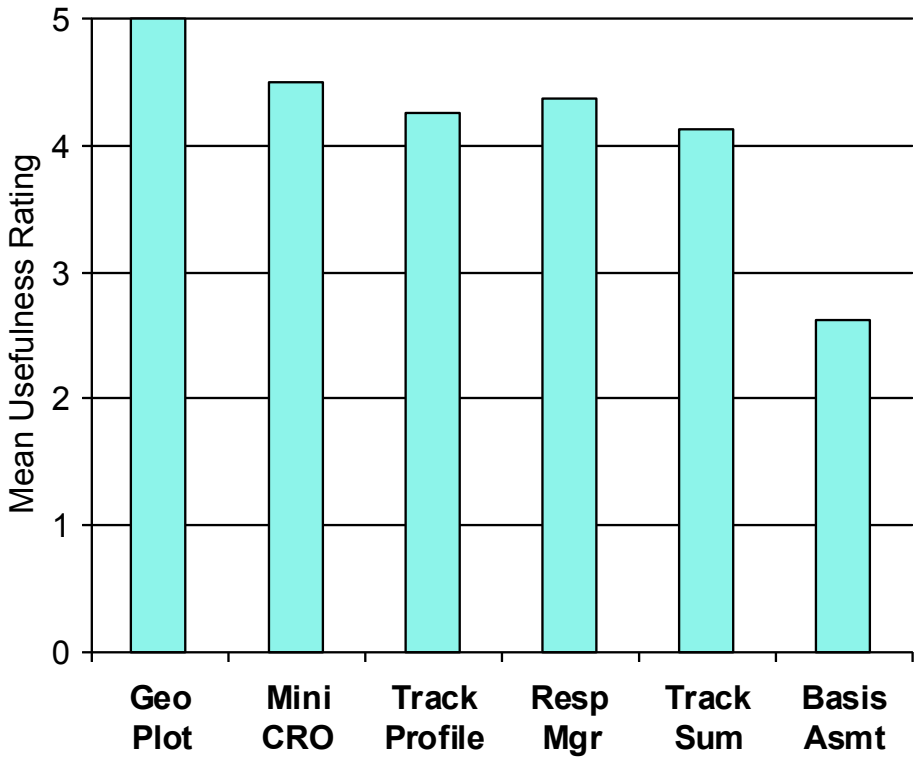
Do the CO and TAO use the DSS? (reported usage)

- **Most modules were reported as used very often.**
- **Note similarity across modules – contrasts with the observed usage.**
- **Basis for Assessment module used less often.**



Is DSS information useful?

- **Modules were considered to be very useful.**
  - supports quick look
  - spatial visualization
- **High utility of DSS for littoral warfare (5.0 of 5-points)**



How does DSS relate to current ship tactical displays?

- **All felt that DSS added considerable value beyond current TDS. (5.0 of 5-points)**

  "Light years ahead of current fleet capabilities ... speed, ease, and necessary info at my fingertips."

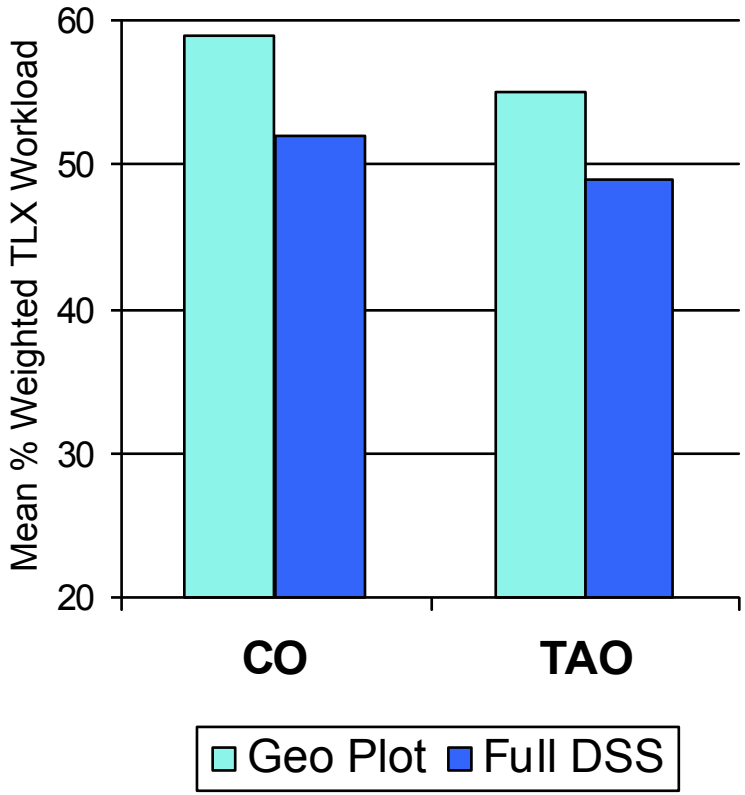
  "It was very easy to correlate track information and keep track of all contacts."

  "I had much more information with less effort and more time to make decisions."

  "This is a great tool to reduce the mental fatigue during high operational tempo situations."

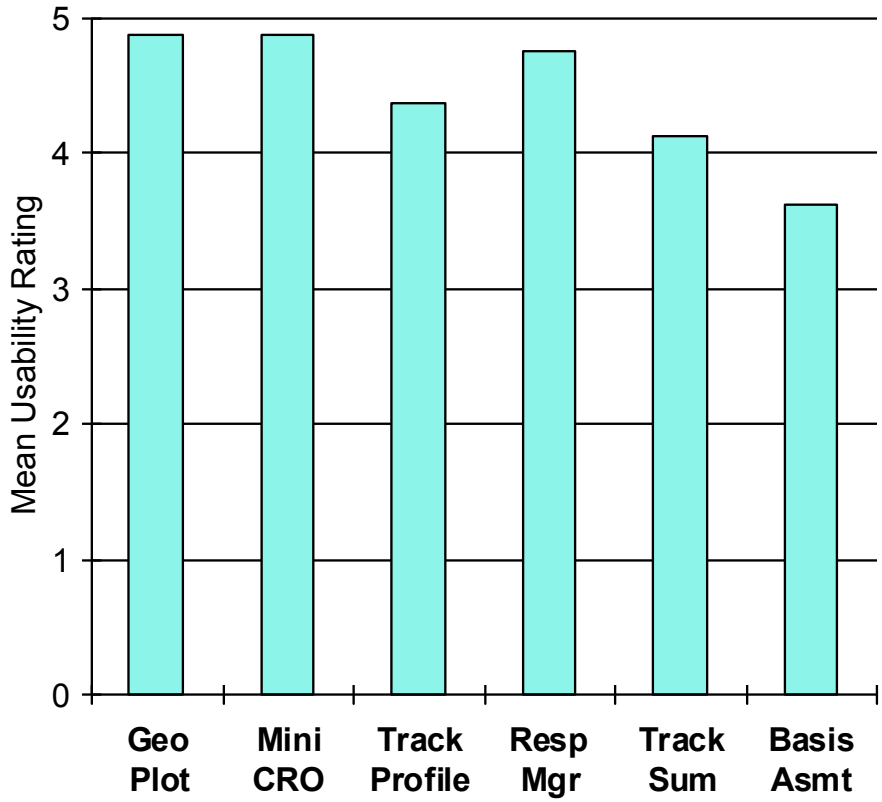
Does DSS reduce workload?

- **Reduction in subjective workload when using the DSS.**
- **Integrated displays minimize user interaction / load.**
- **Large differences between teams.**



Is the DSS easy to learn, understand, and use?

- **Overall rating of DSS usability was very high. (4.85 of 5-points)**
- **Most modules were considered easy to use.**
- **Understood use of DSS modules after 2 hours.**
- **Ready for operational use with minimal additional practice.**



Is DSS useful for training tactical decision making?

- **All felt that DSS offers substantial training value. (5.0 of 5-points)**

  "Absolutely positively could not have conducted this experiment without it. If I can use it, anyone can."

  "Wow, I am impressed. One of the best training programs that I've ever run."

  "It forces you think tactically about ROE, EOB, and pre-planned responses. A great workout for your brain."

  "Don't need to go to sea or even go on a ship. Recommend for all TAOs before reporting onboard and before deploying overseas."

Expected Findings

- DSS is considered useful and adds value.
- More of the critical contacts recognized earlier.
- More likely to take defensive measures and appropriate tactical actions.
- Better performance under high workload.
- Fewer communications overall and fewer clarifications with DSS.
- DSS is easy to understand, learn, and use.
- More rapid acquisition of critical tactical skills.