



Decision Making Constructs in a Distributed Environment (DCODE)

Dr. Robert A. Fleming
SPAWAR Systems Center, San Diego

bobfleming@navy.mil
bobfleming@gmail.com *

619.553.3628

Office of Naval Research
Collaboration and Knowledge Management Workshop
January 11-13, 2005

*After Jan 20, 2005

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE JAN 2005		2. REPORT TYPE		3. DATES COVERED 00-00-2005 to 00-00-2005	
4. TITLE AND SUBTITLE Decision Making Constructs in a Distributed Environment (DCODE)				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Space and Naval Warfare Systems Center, 53560 Hull St, San Diego, CA, 92152-5001				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES Collaboration and Knowledge Management (CKM) Workshop, 11-13 Jan 2005, San Diego, CA.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 75	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



Organization:

- **(1) Objectives**
 - DCODE Concepts/Issues
- **(2) Experiments**
 - NPG School
 - Colorado State
- **(3) Expected Final Product**
- **(4) Demos/Validations**
 - Camtasia AVIs
 - Cortex
 - HSI Lab
- **(5) Software Development**
- **(6) Publications**
- **(7) Lessons Learned**

(1) Objectives

- Overall Objective: the development of computer-based methods for obviating the **problems of the exchange, sharing and integration of uniquely held information among decision participants in a distributed, asynchronous collaborative team environment.**
 - The project proposes an integration of EWall technologies with Knowledge Elicitation Tools and develops a simplified subjective assessment template for knowledge elicitation.
- This year: The specific objectives for this year are (1) to complete a **“shrink-wrapped” version of the DCODE** software with (2) the appropriate **audio-visual training tools** for how to use and apply the DCODE technology and (3) **continued experimental validation** of the efficacy of the DCODE approach to individual and group decision making.



DCODE



Decision Making Application Areas

- Information Fusion, Analysis and Situation Assessment
- Option Generation/Selection
- Course of Action (COA) Recommendations
- Consensus Building

Multiple Options, Multiple Information Items About Each Option

Two Problem Areas Addressed



The most important, high impact items



#1 How do we improve the process of getting to here...

#2 How do we form an aggregate opinion from conflicting inputs.

1000's of possible decision relevant information items....





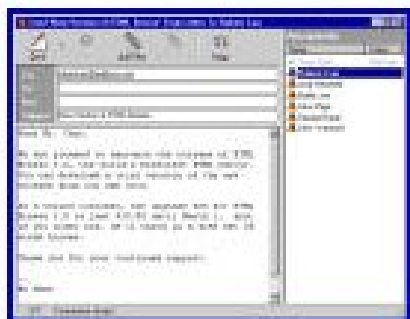
DCODE Approach

- Improve the ability of both individual and group decision makers to:
 - Abstract
 - Encapsulate
 - Assess
 - Share
- ...all decision relevant information items.

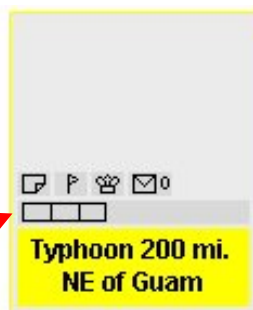
EWall & DCODE

- **EWall:** Architecture for the Abstraction, Encapsulation and Sharing of information.

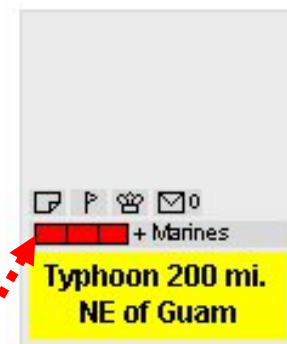
Original Document



EWall Icon

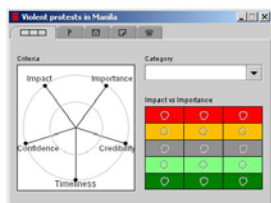


(1.5 x 2.0 in.)



Information Object (IOB)

DCODE: Process for capturing and displaying the cognitive **assessments** of each information item (“what does this mean?”)



The DCODE assessment “bar”

The DCODE assessment template

Cognitive Assessments

4 Major Categories

(1) Which Option?

e.g. SEALS, Marines, Army

(2) Impact on Option? (Color)

Very Negative Negative Positive Very Positive

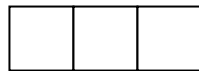
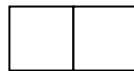


(3) Importance of Information? (Size)

Average

High

Very High

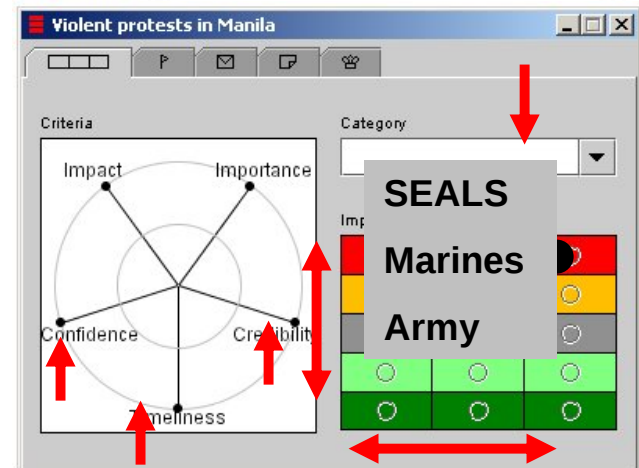
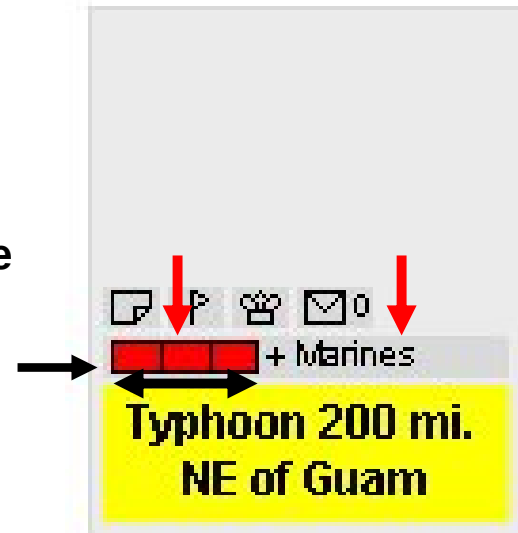


(4) Quality of Information?

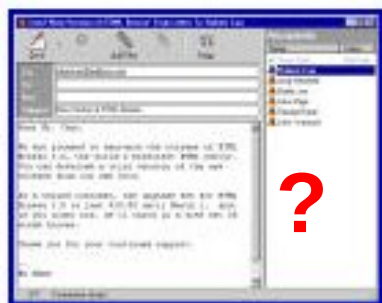
Confidence

Timeliness

Credibility



Information Abstraction, Encapsulation and Assessment



?

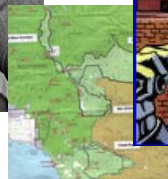
“Typhoon has serious and very negative effect on using the Marines”



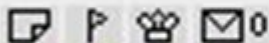
Perform DCODE assmt. on IOBs that are retained for use/sharing in final decision making. **(Assessment)**



Convert candidates from original format into EWall IOBs **(Abstraction, Encapsulation)**

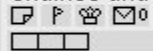


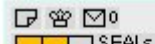
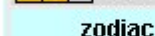
IOB format can be tailored to specific decision tasks

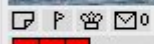

 + Marines
 Sep-29-04 2:22PM PST
 Fleming
 Helos Grounded

**Icon/Text
area**

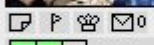
**Admin
DCODE Bar
Date/Time
Author
Heading**

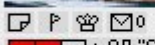
SpaceShipOne safely landed in California's Mojave Desert today, after a brief, wild ride to suborbital space. The craft rolled more than 30 times shortly after the rockets fired, but pilot Mike Melvill shut off the engines and kept going up. Radar showed the flight reached 358,000

 Sep-29-04 11:06AM PST
 Jones
 SpaceShip One's Flight

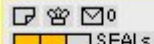

 SEALS
 zodiac
 7 man
 15 mph

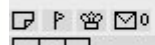


 Aug-17-04 2:23PM PST
 Jones
 SH-60

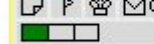
Brown
 Cassidy
 Deward
 Kippton
 Larsen
 Longstreet
 McGuire
 Muldone
 Norris
 Porter
 Psomas
 Sander
 Wolf
 20 May Rpt.

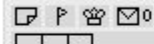


 Aug-17-04 2:24PM PST
 Jones
 Next meeting



 Sep-29-04 11:26AM PST
 Jones
 "JT" sighted
 arriving at LAX
 2300 9/17


 SEALS
 zodiac
 7 man
 15 mph

can only go 15
 mph, hold 7
 people

 Aug-17-04 1:52PM PST
 Jones
 Zodiac



 Aug-17-04 2:25PM PST
 Jones
 Sell now

#1754 Failed equipment: Portable generator Cause: Sand grit \$9,800

 Sep-29-04 11:11AM PST
 Jones
 Possible fraudulent claim?



Sample Use of DCODE (AVI)

Why do we Recommend this IOB Configuration?

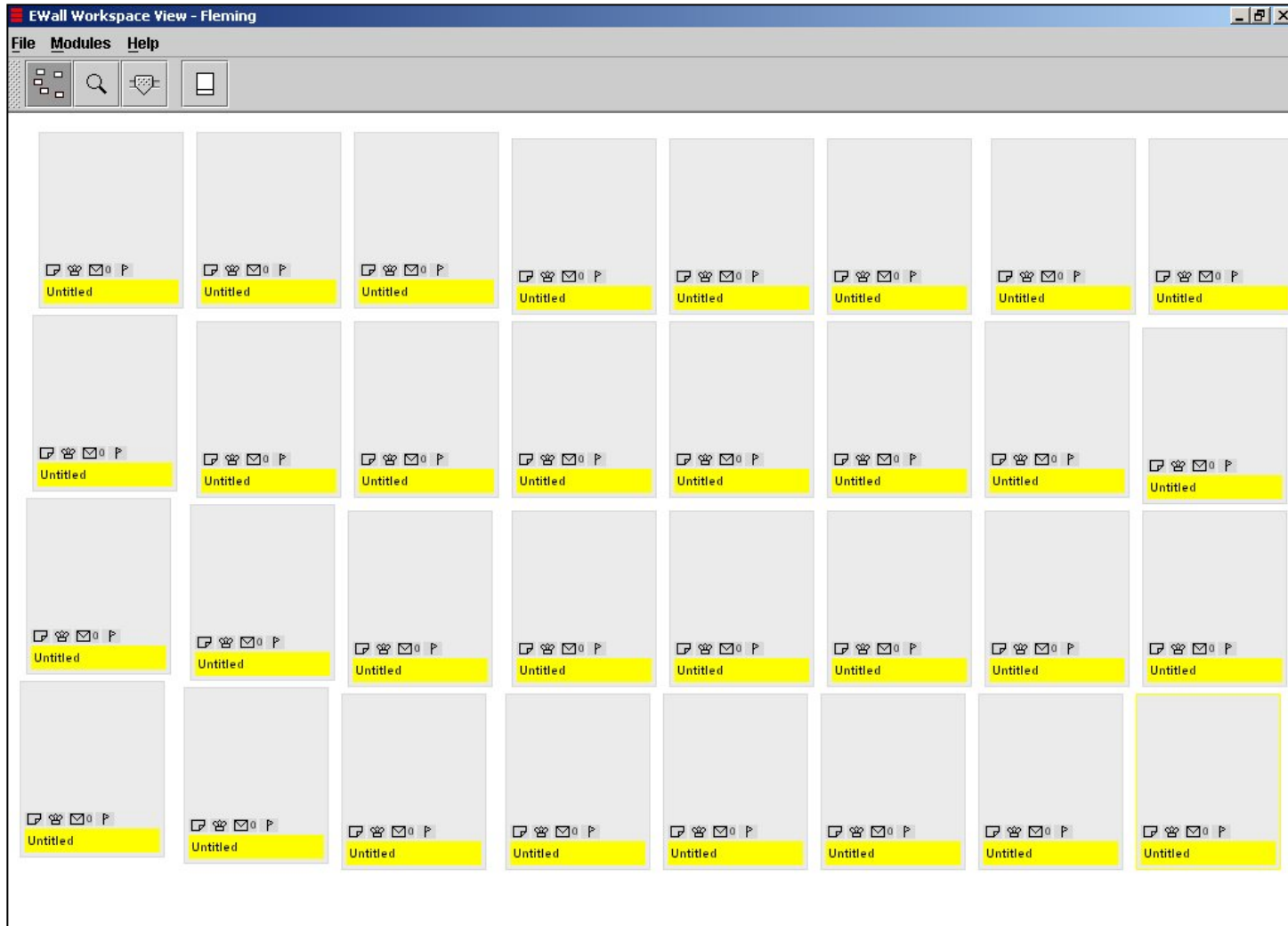


- **Display Real Estate**
- **Use of Pictures**
- **Color Conflict**

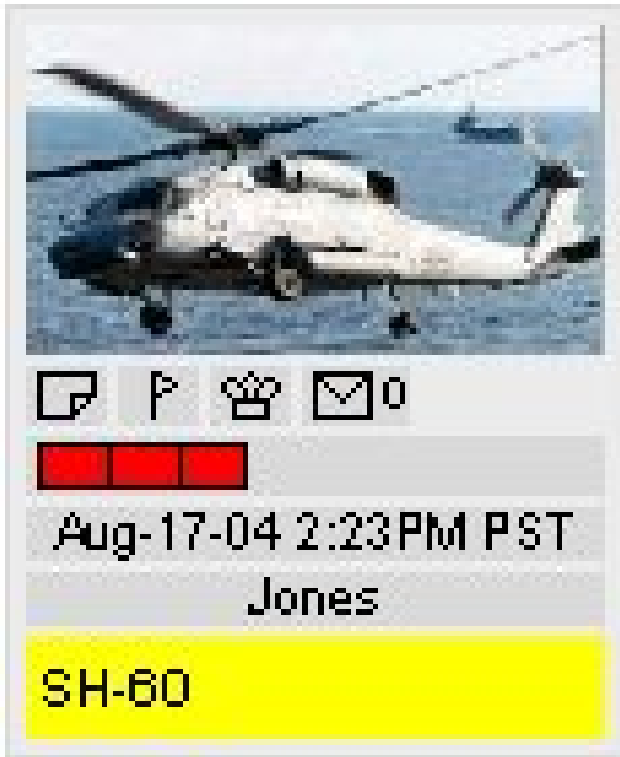
Real Estate

- Example: Three possible decision options, 12 relevant information items for each option. “Big Picture” requires display of **36 IOBs.**

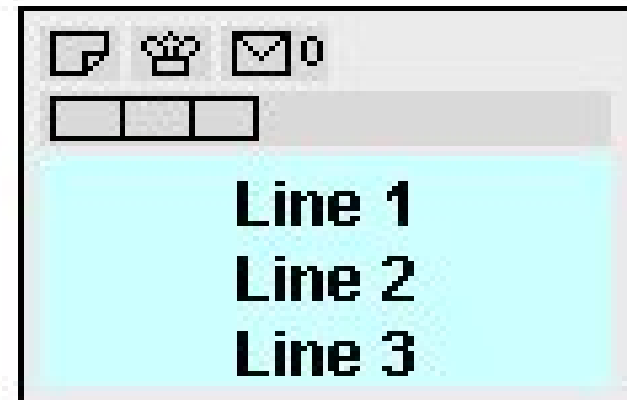
Default Cards, 32 on 1024 x 768 monitor



Reduce size/eliminate picture...



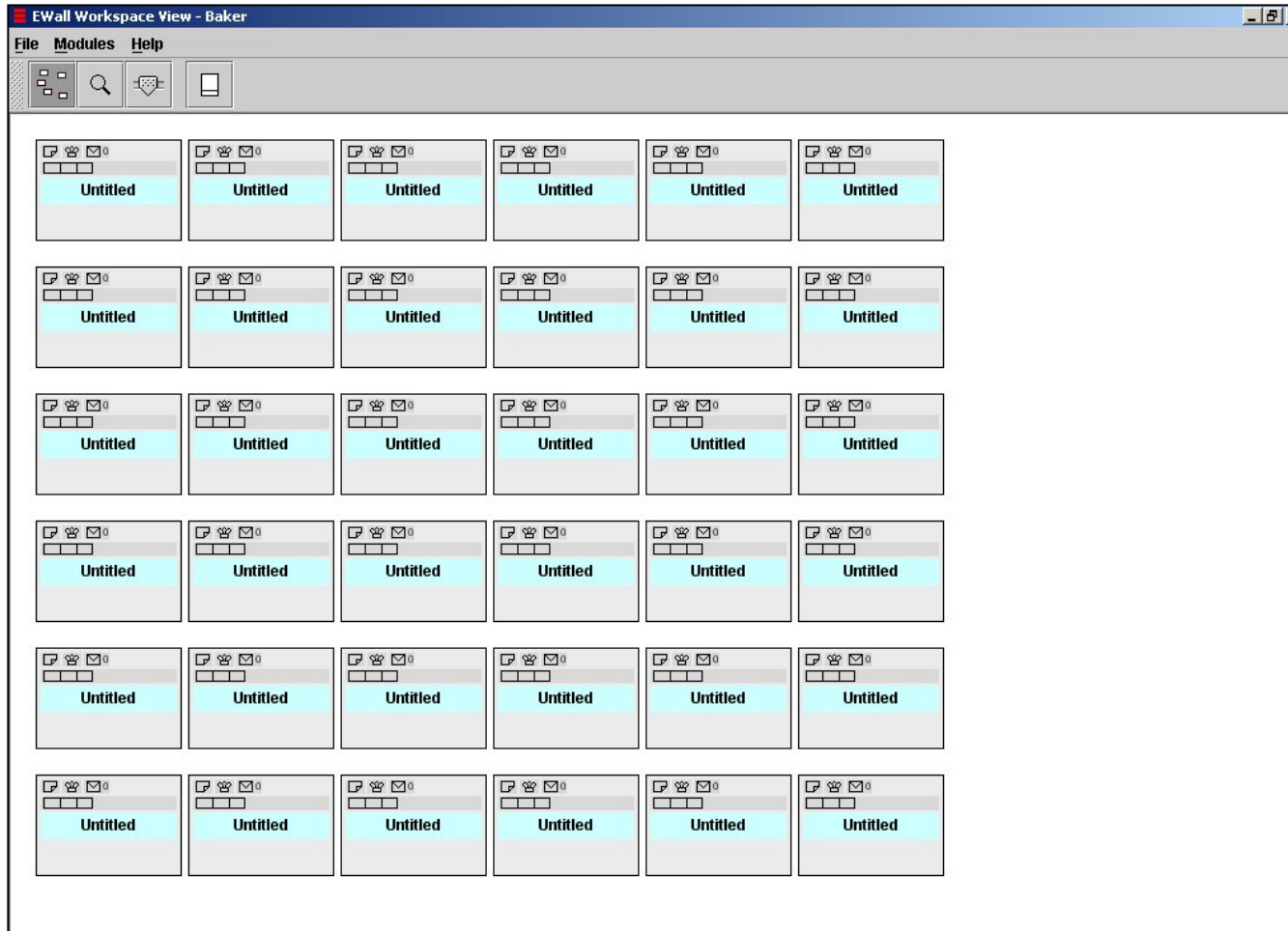
115 x 140 pixels



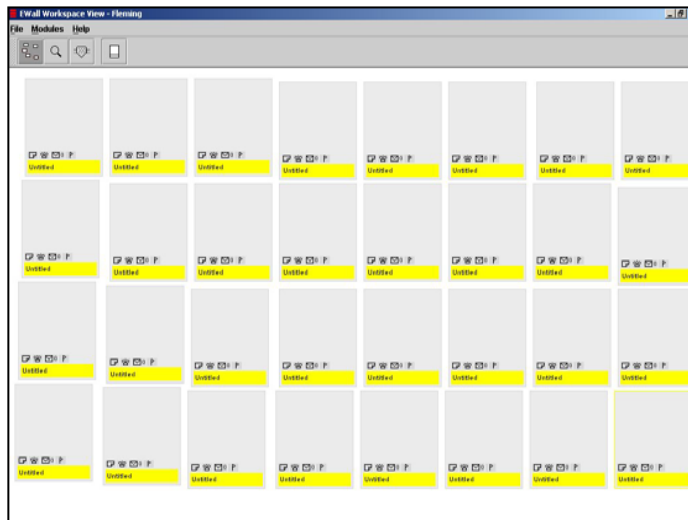
Eliminate Picture area
Go to 115 x 80 pixels



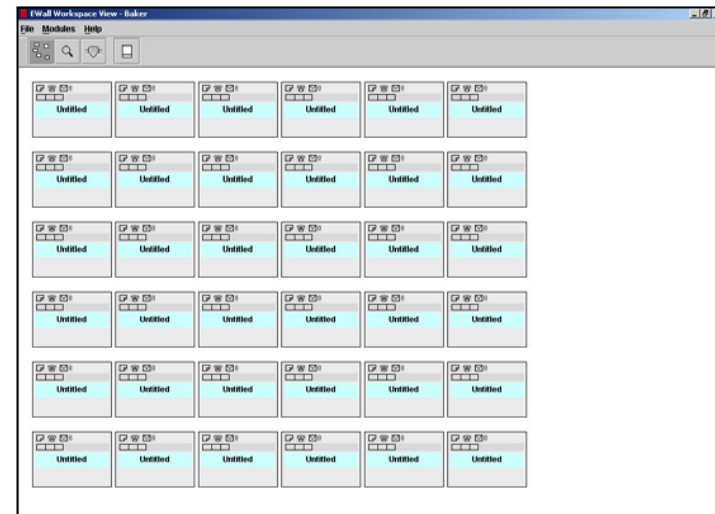
Display of 36 IOBs on 1024 x 768 Monitor



Default Cards vs. Reduced Size



32 Cards



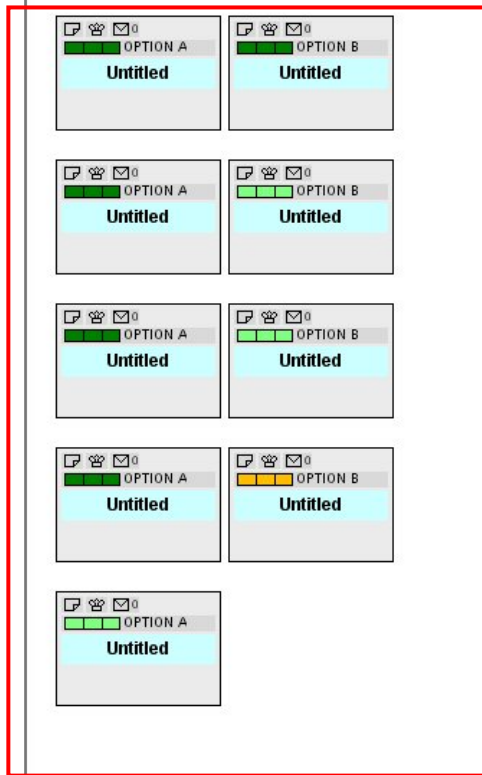
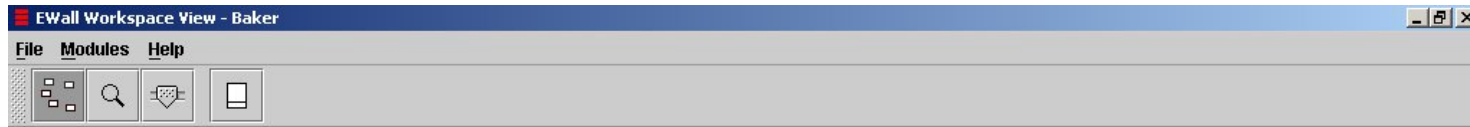
36 Cards

Sorting the Workspace

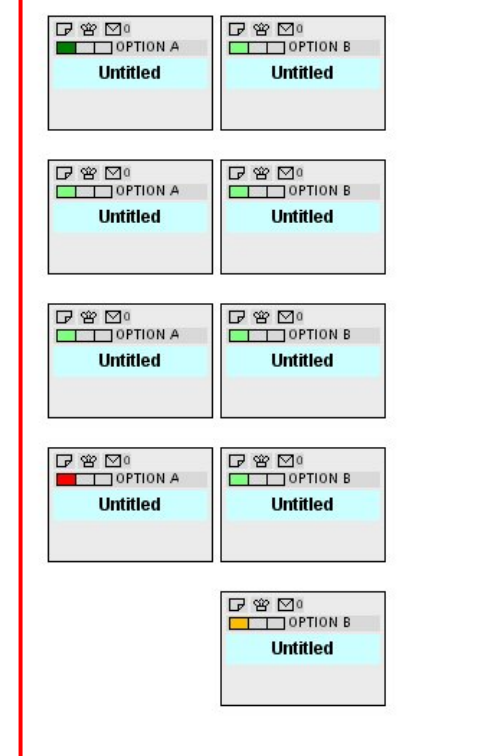
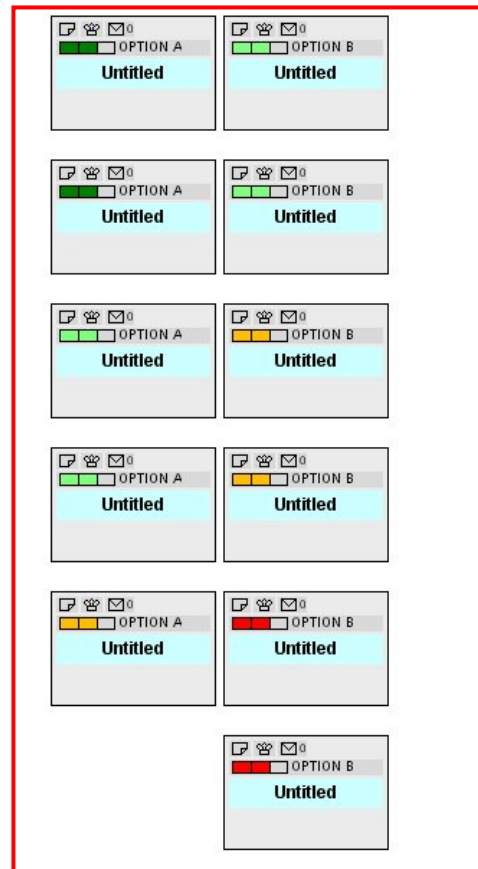
  SEALs zodiac 7 man 15 mph	  SEALs 2 workers are injured	  SEALs Rebels have Stinger missiles. 5 mi range	  SEALs Rebels have land mines
  SEALs West side of Island in friendly hands	  SEALs SEALS Need local translator	  SEALs located on the USS Enterprise.	  SEALs trained as medics.
  SEALs Coral reefs passable only at high tide	  SEALs High tide between 7-9 am or 8-10 pm	  SEALs 45 min from shore to church	  SEALs Night vision capability
  SEALs Enterprise 200 mi east of church	  SEALs DRAPO topography	  SEALs helo can be heard for 5 mi	  SEALs Navy Seahawk all waether night
  SEALs Seahawk 184 mph, range 395 mi, fuel in air	  SEALs rebels have no night vision capab	  SEALs minimize contact with enemy	  SEALs morning of January 15 heavy fog
  SEALs Rain forest terrain	  SEALs Sunrise 6 am sunset 7 pm	  SEALs USS Enterprise has full medical facilities	  SEALs SEALS are very covert

“OK, what is this saying?”

Reduced Size Helps Between-Option Comparisons

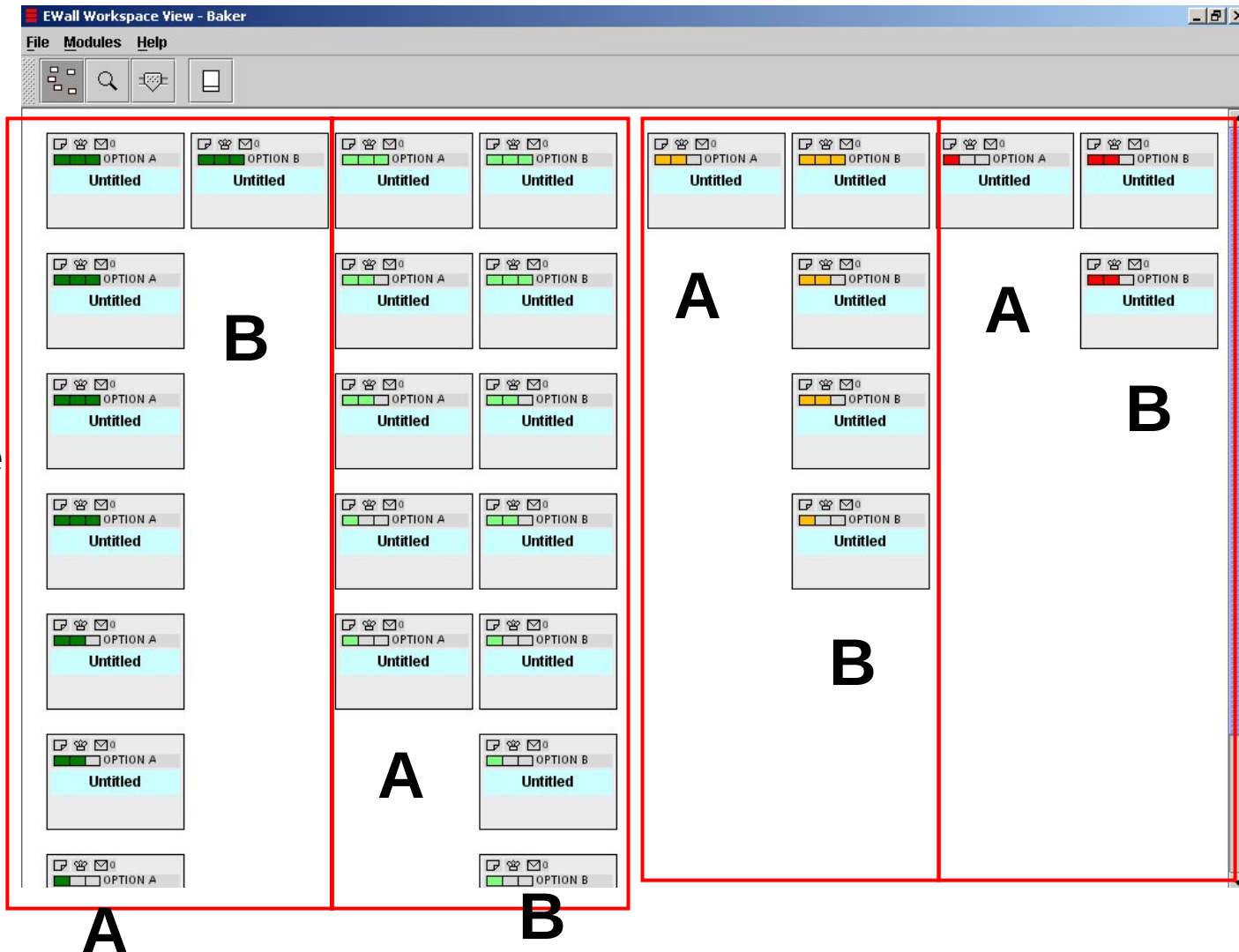


A vs. B
Most Impt.
Items



A vs. B
Average Impt.
Items

Another Approach



Eliminate IOB Pictures?

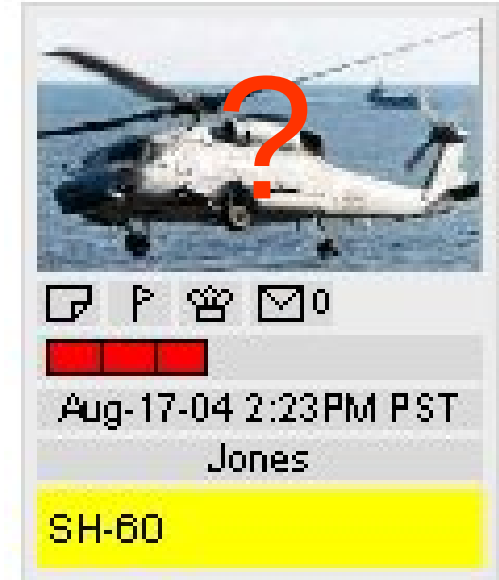
It will take 2 days to repair the Stennis catapult.

The reef is only passable at high tide.

China has detained two Taiwanese fishing vessels.

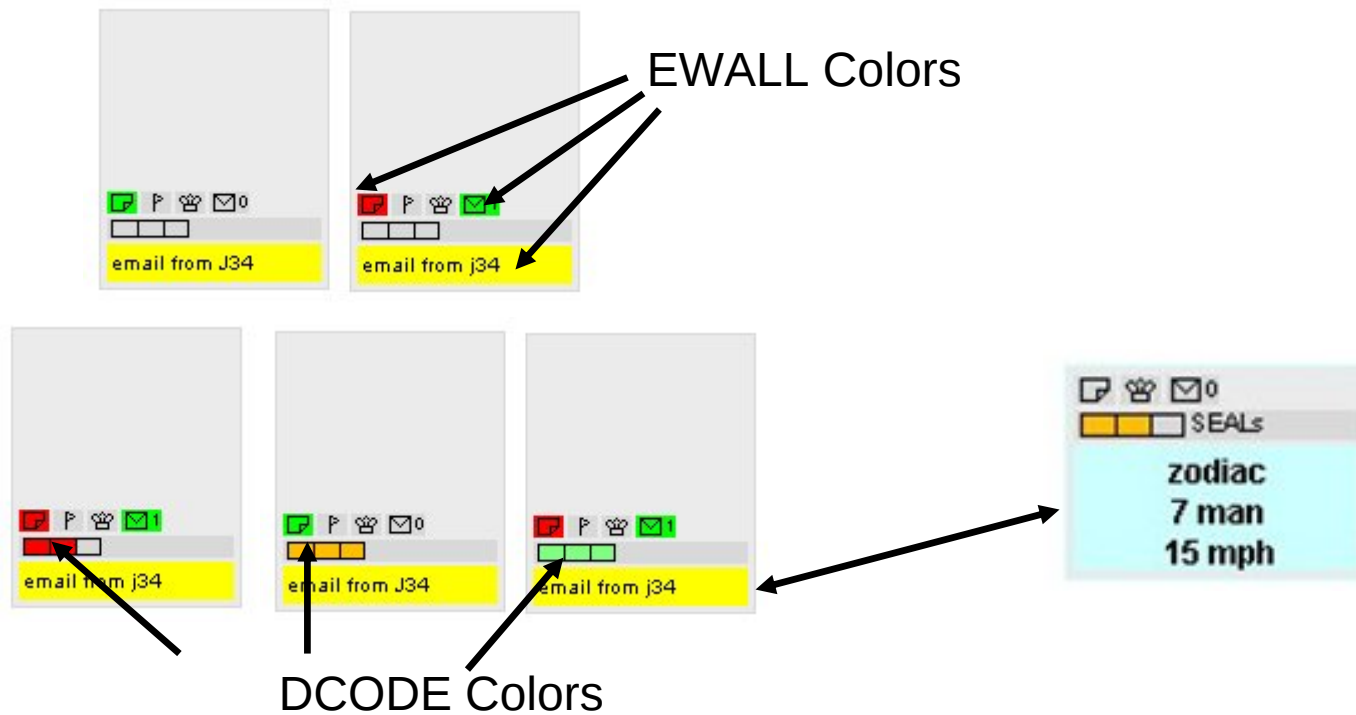
Typhoon Leoni is veering away from ops area.

Philippine Minister of Defense will run for President.



Does the IOB need a picture?
If so, what picture?
Where do we get the picture?
Is it worth the time/lost space?

Color Conflict





Organization:

- **(1) Objectives**
 - DCODE Concepts/Issues
- **(2) Experiments**
 - NPG School
 - Colorado State
- **(3) Expected Final Product**
- **(4) Demos/Validations**
 - Camtasia AVIs
 - Cortex
 - HSI Lab
- **(5) Software Development**
- **(6) Publications**
- **(7) Lessons Learned**



(2) Experiments & Findings



NPG School Experiment

18 Officers



- Display: Text vs. IOBs
- Decision: Positive vs. Negative

		Display		
		Text Only	IOBs	
Decision	Positive	N=5	N=5	N=10
	Negative	N=4	N=4	N=8
		N=9	N=9	N (tot)=18

Task:

- Volcanic disaster in the Pacific
- Should we recommend Islandia as the refugee site?
 - Sees 30 information items (randomized)
 - 5 decision criteria
 - 6 items per criteria

The Five Decision Criteria

[**COM**munications - **TSP**ortation - **LAB**or - **ADM**istration - **SAN**itation]

- **Communications Facilities (COM):** Assess the communication facilities that are available in Islandia, including land telephone systems, radio, TV, cellular phone availability and coverage, etc.
- **Transportation Facilities (TSP):** Assess the transportation facilities that are available in Islandia, including roads, docks, airports, etc.
- **Labor Pool (LAB):** Assess the labor pool that would be available to staff the camp in Islandia, including size of the pool, quality of workers, work ethic/tradition, etc.
- **Administrative Requirements (ADM):** Assess the administrative requirements needed to set up the camp in Islandia, including, permits, fees, environmental considerations, bureaucratic red tape, graft, bribes, etc.
- **Sanitation/Health/Medical conditions (SAN):** Assess the sanitation, health and medical conditions expected in Islandia, including drinking water, sewerage disposal, medical facilities, infectious diseases, etc.

Decision Tasks:

	Very Neg.				Very Pos.
COM:	☒	☐	☐	☐	☐
TSP:	☒	☐	☐	☐	☐
LAB:	☒	☐	☐	☐	☐
ADM:	☒	☐	☐	☐	☐
SAN:	☒	☐	☐	☐	☐
Overall Recommendation:					
	☒	☐	☐	☐	☐
Submit Reset					

5 Criteria Decisions

1 Overall Decision

Text Condition (9 subjects)

1/30

...A cultural tradition in Islandia is that each worker is given a single two month vacation each year, which he can take any time during the year. All the employee has to do is give the employer a one week notice before going on vacation. This has caused unexpected and disrupted work shortages when several employees elect to take the vacation at the same time....

Criterion:

COM ☐	TSP ☐	LAB ☐	ADM ☐	SAN ☐
------------------------------	------------------------------	------------------------------	------------------------------	------------------------------

Submit >

[**COM**munications - **TSP**ortation - **LAB**or - **ADM**istration - **SAN**itation]

- **Communications Facilities (COM):** Assess the communication facilities that are available in Islandia, including land telephone systems, radio, TV, cellular phone availability and coverage, etc.
- **Transportation Facilities (TSP):** Assess the transportation facilities that are available in Islandia, including roads, docks, airports, etc.
- **Labor Pool (LAB):** Assess the labor pool that would be available to staff the camp in Islandia, including size of the pool, quality of workers, work ethic/tradition, etc.
- **Administrative Requirements (ADM):** Assess the administrative requirements needed to set up the camp in Islandia, including, permits, fees, environmental considerations, bureaucratic red tape, graft, bribes, etc.
- **Sanitation/Health/Medical conditions (SAN):** Assess the sanitation, health and medical conditions expected in Islandia, including drinking water, sewerage disposal, medical facilities, infectious diseases, etc.

Read this, then assign it to one of the five criteria

(do 30 of these)

IOB Condition (9 subjects)

1/30

The environmental protection effort in Islandia is poorly organized and has had little effect. Environmental impact is not a consideration in any awarding of construction permits.

Read this, then:

Title:					
Criterion:	COM ☐	TSP ☐	LAB ☐	ADM ☐	SAN ☐
Effect:	Very Neg. ☐	Neg. ☐	Pos. ☐	Very Pos. ☐	
					Submit >

Assign a keyword

Assign it to a criterion

Evaluate its effect on the criterion

[**COM**munications - **TSP**ortation - **LAB**or - **ADM**istration - **SAN**itation]

- **Communications Facilities (COM):** Assess the communication facilities that are available in Islandia, including land telephone systems, radio, TV, cellular phone availability and coverage, etc.
- **Transportation Facilities (TSP):** Assess the transportation facilities that are available in Islandia, including roads, docks, airports, etc.
- **Labor Pool (LAB):** Assess the labor pool that would be available to staff the camp in Islandia, including size of the pool, quality of workers, work ethic/tradition, etc.
- **Administrative Requirements (ADM):** Assess the administrative requirements needed to set up the camp in Islandia, including, permits, fees, environmental considerations, bureaucratic red tape, graft, bribes, etc.
- **Sanitation/Health/Medical conditions (SAN):** Assess the sanitation, health and medical conditions expected in Islandia, including drinking water, sewerage disposal, medical facilities, infectious diseases, etc.

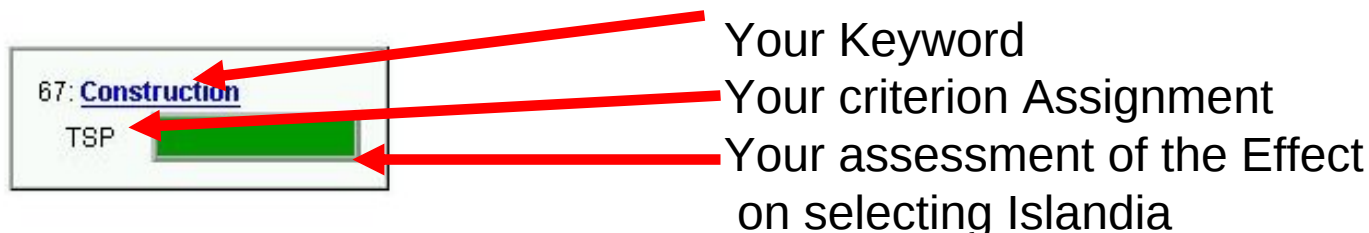
(This experiment uses only the subjective assessment of EFFECT, does not tap Importance, Credibility, etc.)

IOBs Explained

INSTRUCTIONS

You have now evaluated all 30 items. Your last task is to assign rating scores to each criterion, as well as one final overall rating. Your previous scoring of the items has been used to create an "Information Object" (IOB) for each information item.

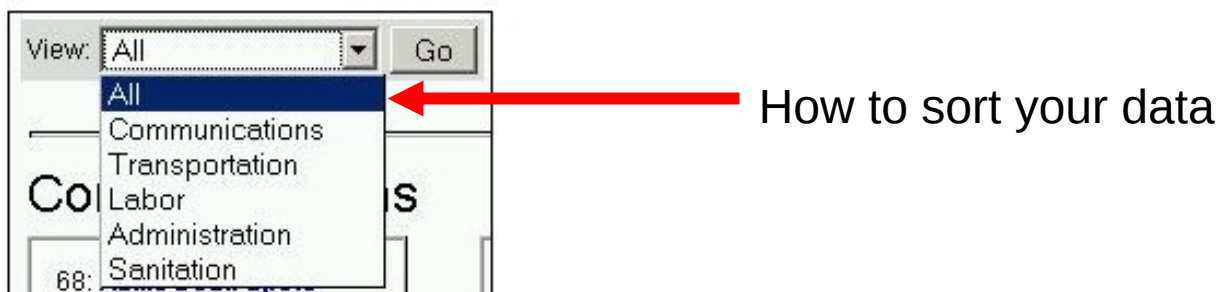
This IOB includes the information you previously assigned, i.e. the key words, the criterion and the rating. The key words are hyperlinked to the original text item so that you can call it up for review by simply clicking on the key words. When you do this, the text will appear in a window to the right of the display. The effect you selected for each item is represented by the color bar in the IOB. A sample IOB is presented below:



The image shows a sample IOB window with three red arrows pointing to specific elements:

- Your Keyword:** Points to the text "67: [Construction](#)".
- Your criterion Assignment:** Points to the text "TSP".
- Your assessment of the Effect on selecting Islandia:** Points to a green horizontal bar.

The IOB items are available to you for review using a drop-down sorting menu that can present all the IOBs associated with all the criterion or you can elect to see only the IOBs associated with one individual criterion.



The image shows a drop-down sorting menu with a red arrow pointing to the "All" option:

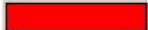
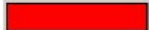
- How to sort your data:** Points to the "All" option in the drop-down menu.

The menu also lists other options: Communications, Transportation, Labor, Administration, and Sanitation. The "View:" label and a "Go" button are also visible.

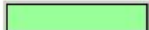
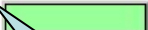
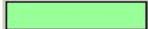
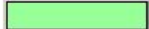
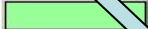
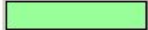
Decision Display: IOB

View:

Communications

104: 77 COM 	109: 99 COM 	95: 666 COM 
114: 567 COM 	121: rtttt COM 	99: 11 COM 
120: ertt COM 		

Transportation

100: 22 TSP 	105: 775 TSP 	96: 777 TSP 
94: ports TSP 	93: 666 TSP 	92: 66 TSP 
112: 777 TSP 	118: dfgg TSP 	

Very Neg. Very Pos.

COM:					
TSP:					
LAB:					
ADM:					
SAN:					
Overall Recommendation:	    				
Submit Reset					

Click on the hyperlinked titles in the IOB to display the original text here.

Hyperlinked

Decision Display: Text

View:

Communications

The environmental protection effort in Islandia is poorly organized has has little effect. Environmental impact is not a consideration is any awarding of construction permits.

A recent disaster simulation exercise in Islandia showed that the Emergency Medical were very inadequate in terms of handling anything other than the smallest disaster situation.

".... The major ports of Islandia are less than three days sailing from the primary disaster recovery supply center at Naha. Naha also has three supply ships that are permanently loaded to be used in quick response assistance...."

Every small town in Islandia has at least one phone

"...The major air route to Islandia is from Chenche. That route, however, requires that we fly over the nation of Gambist, and Gambist has denied permission to fly over their airspace. The two options are to modify the flight plan or to use another departure airport. Both of these options results in excessively long flights, limits cargo capacity, and reduces the daily amount of supplies that can be transported to Islandia..."

Very Neg. Very Pos.

COM: ☐ ☐ ☐ ☐ ☐

TSP: ☐ ☐ ☐ ☐ ☐

LAB: ☐ ☐ ☐ ☐ ☐

ADM: ☐ ☐ ☐ ☐ ☐

SAN: ☐ ☐ ☐ ☐ ☐

Overall Recommendation: ☐ ☐ ☐ ☐ ☐

The items the subject assigned to the Communications criterion



IOB Subjective Assessment

One Last Request: Please select one of the options below in terms of how useful the IOBs were in making your scoring decision (this would be as versus just seeing the text listing of the items you assigned to each criterion)

Somewhat distracting	No Effect	Helped Somewhat	Helped a lot
☐	☐	☐	☐
			Submit



Positive vs Negative

$\frac{1}{2}$ of Subjects should make
a decision that is **Positive**:

3 of 5 criteria are Positive

$\frac{1}{2}$ of Subjects should make
a decision that is **Negative**:

3 of 5 criteria are Negative

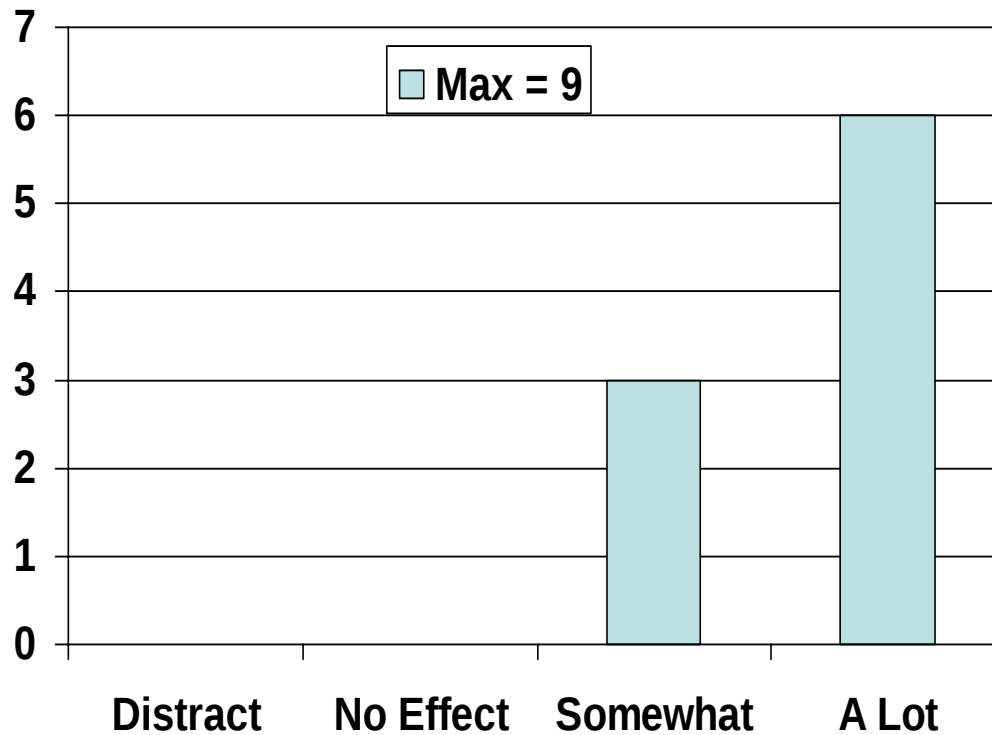
Positive Criterion: 4 of the 6 statements are positive

Negative Criterion: 4 of the 6 statements are negative



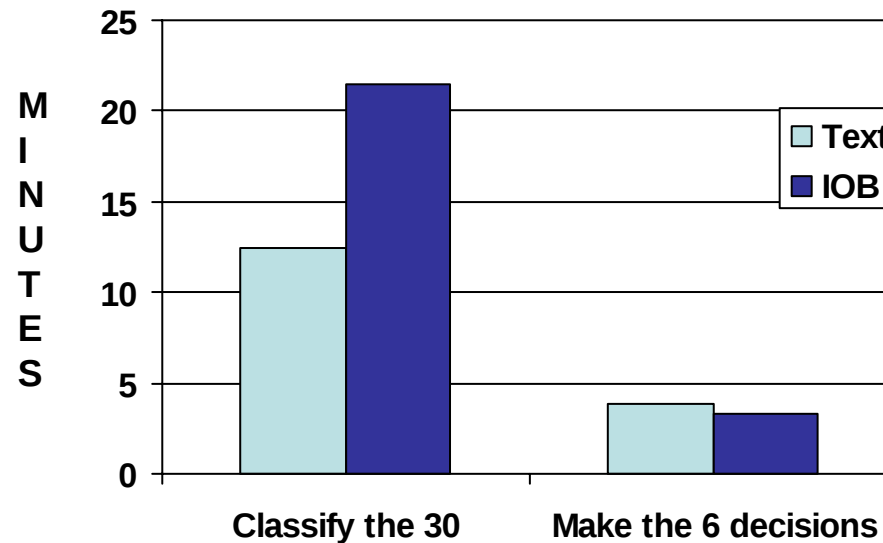
RESULTS

Subjective Assessment



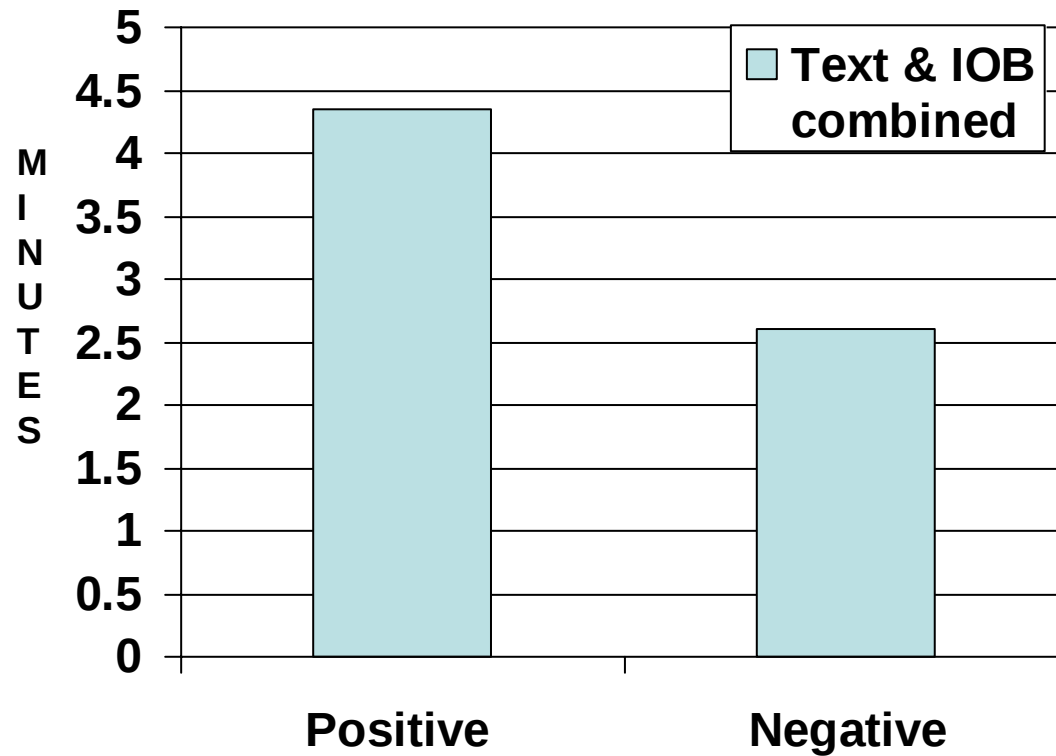
IOBs HELP?

Time Factor



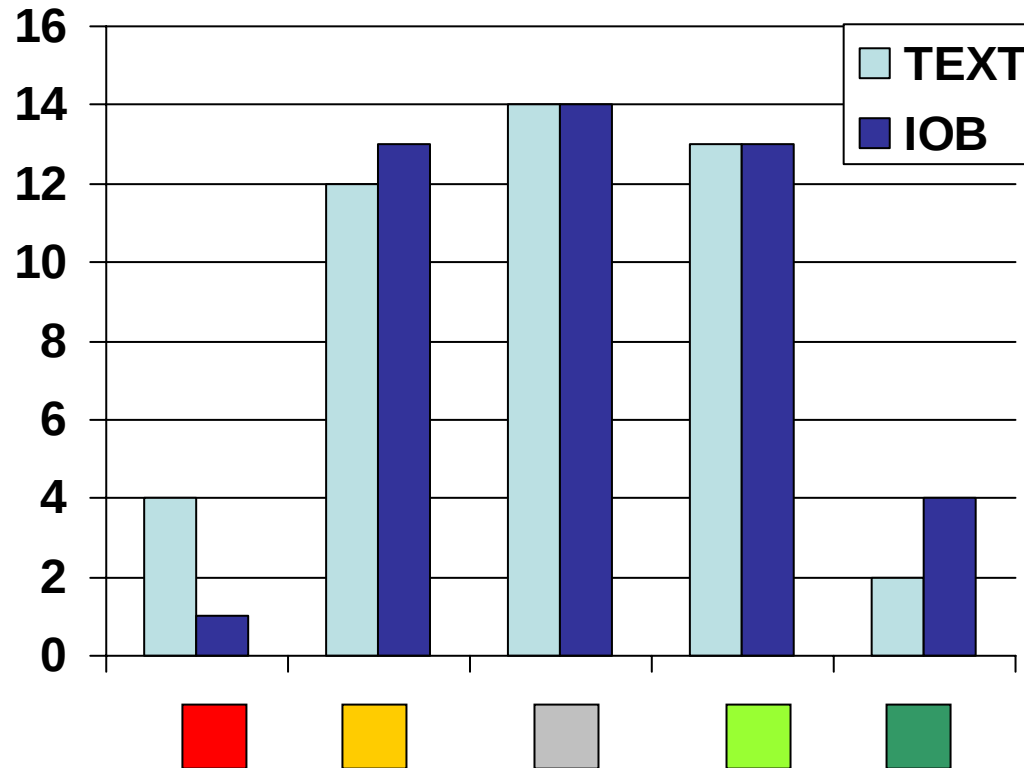
IOB subjects took an average 18 seconds longer per item to enter keyword and make evaluation

TIME TO MAKE THE 6 DECISIONS



Significant Difference

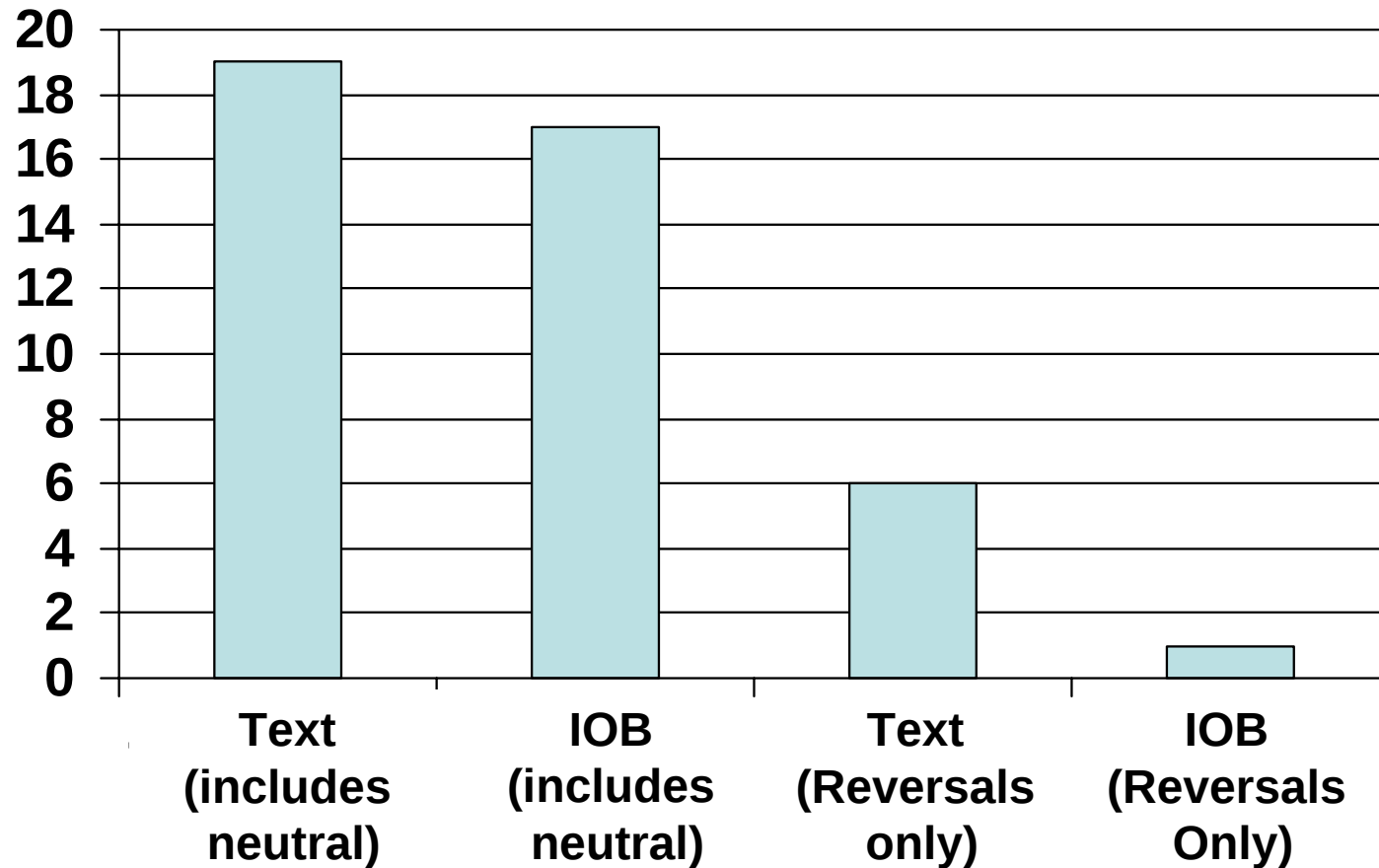
Score Assignment to Criteria



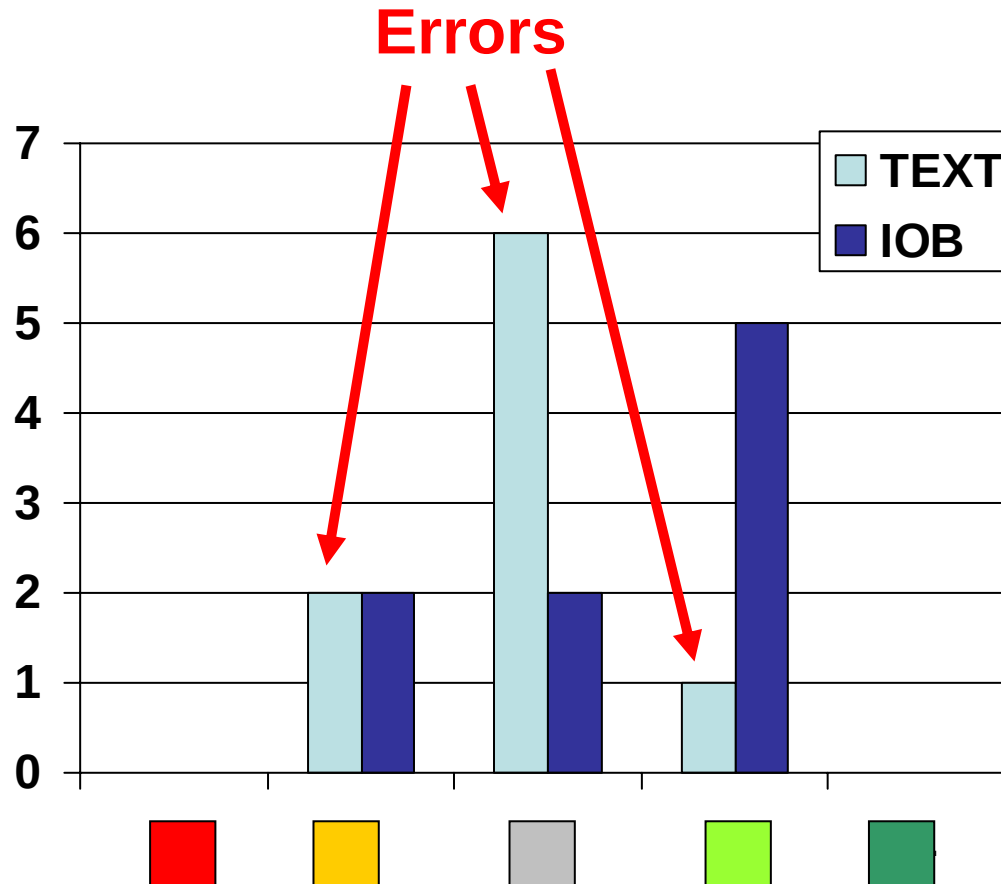
Errors:

- All criteria should have been scored as either positive or negative
 - Assignment of a **neutral rating is scored as an error**
 - For the IOB subjects, whether the correct decision was Positive or Negative was based on the subject's ratings
 - For the Text subjects, correct decision was based on experimenter's classification
 - **Reversal Error (most serious):** Positive group of information given a Negative rank (or vice versa)

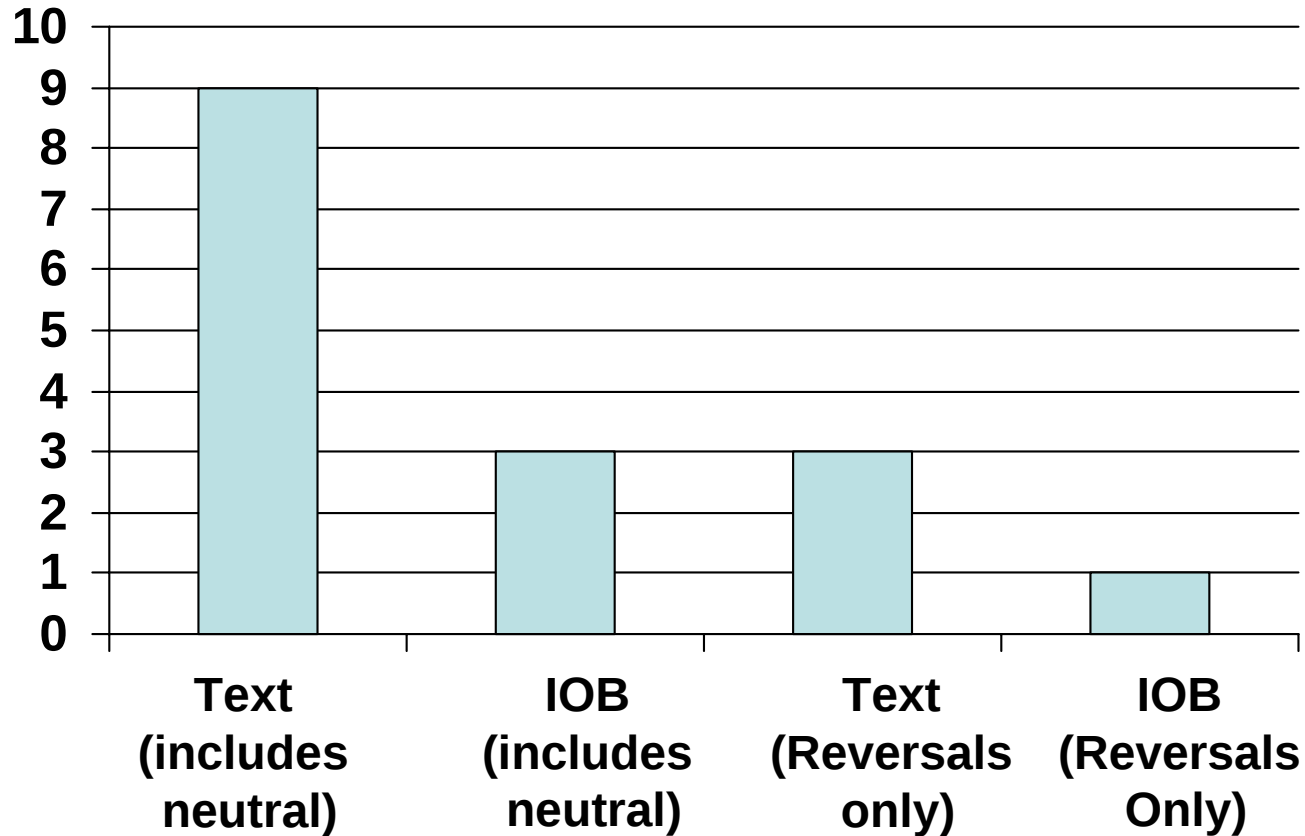
Errors in Criterion Scoring



Score Assignment to Overall

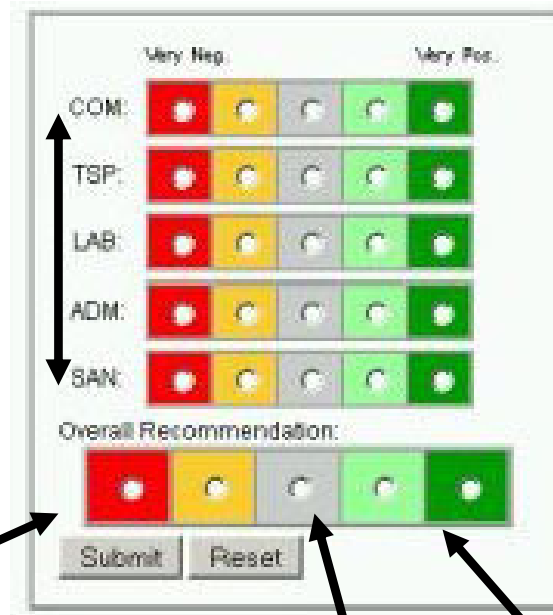


ERRORS OVERALL



Summary of Results

No Differences between
Text and IOBs



Six of the 9 IOB subjects
made the correct assignment.

None of the 9 Text subjects
made the correct assignment.

6/9 of the IOB subjects
showed unwillingness to commit
to a decision. Other 3 made
reversal errors.

Summary

- No members of the Text group made a correct Overall decision:
 - Preferred the neutral rating
- Six of the nine IOB group made a correct Overall decision
- Subjects took longer to make a decision when preponderance of data was Positive
- IOB subjects gave favorable ratings to use of IOBs in decision making



The use of Information Objects (IOBs) and DCCODE in decision making (Experiment at Colorado State 4/04)

Task

- Select the best company to invest in out of a group of three.*
- Read a report about each company
 - Profits, work force, CEO, new markets, etc.
- Create IOBs about each company
 - Instructed on how to create and use IOBs and the DCODE color bar options.
 - Creation, layout, contents, & DCODE options totally under subjects control.
- Make a final Rank Ordering of the 3 companies.
- \$ incentive for best performance

* A published, standardized task, correct answer based on consensus of SMEs



Overview

- 36 subjects participated
 - 14 Females
 - 22 Males
- 15 of the subjects used the DCODE color bar option

Subjects

	Males	Females	
DCODE Option available	13 (13)	8 (2)	21 (15)
No DCODE Option	9	6	15
	22	14	36

(XX) = # of subjects that actually used DCODE color Bar

DCODE/No DCODE

best

☐ P ☐ ☐ ☐ 0

Advertising

A

☐ P ☐ ☐ ☐ 0

debt rating

not very but
dominant in
market shares

☐ P ☐ ☐ ☐ 0

product/service

plans to expand
worldwide

☐ P ☐ ☐ ☐ 0

future

4.4 billion - 2003

☐ P ☐ ☐ ☐ 0

earnings

1:8 managers to
workers

☐ P ☐ ☐ ☐ 0

ratio

\$4.4 billion in 2003
Expects 12%
increase in 5 years

☐ P ☐ ☐ ☐ 0

earnings

Expand its US and
foreign food
market

☐ P ☐ ☐ ☐ 0

expansion

dominant market
shares in
detergents soaps
disposable diapers
and shampoo

☐ P ☐ ☐ ☐ 0

market

increase research
and development
spending on new
low calorie food

☐ P ☐ ☐ ☐ 0

Untitled

High and stable
volume of sales

☐ P ☐ ☐ ☐ 0

sales volume

A - good
low debt

☐ P ☐ ☐ ☐ 0

Untitled

Example:
Use of
DCODE
color bar



12% over next 5
years

☐ P ☐ ☐ ☐ 0

earnings

7.3 years

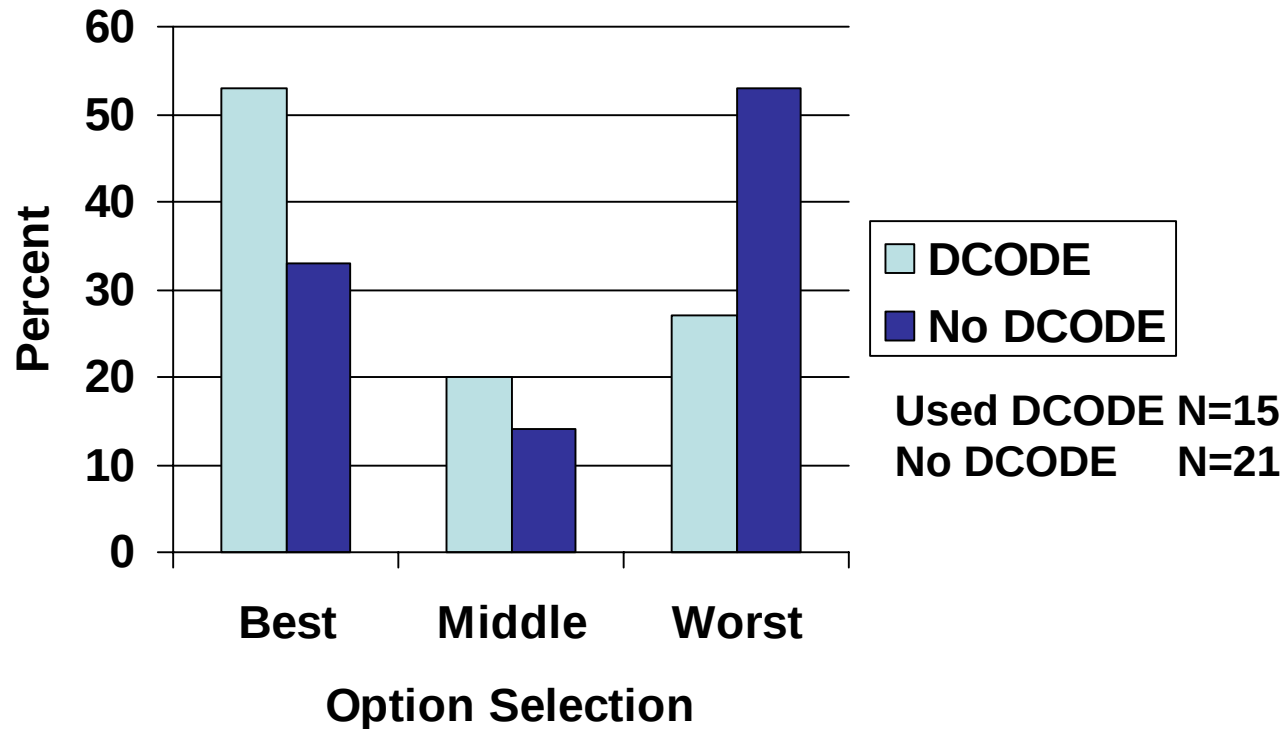
☐ P ☐ ☐ ☐ 0

employment

Example:
No usage of
DCODE
color bar



Use of DCODE: Decision Performance (M & F combined)



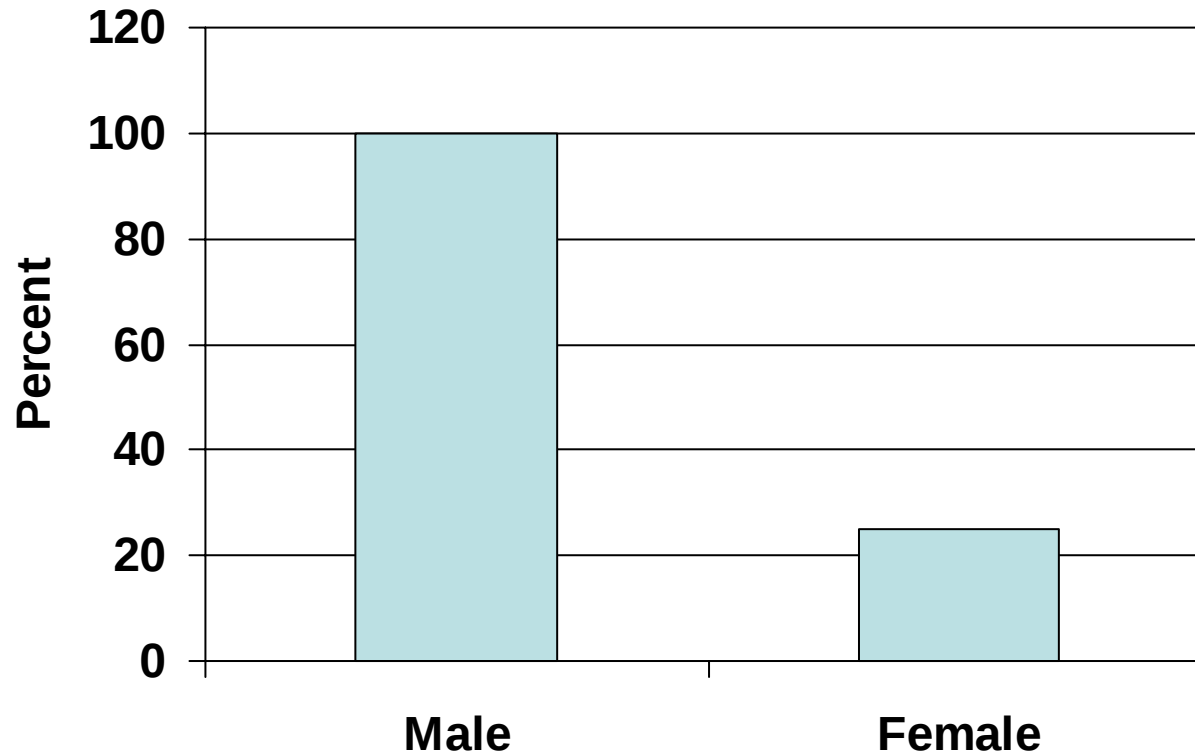
54% of DCODE users ranked Best choice as #1

33% of non-DCODE users ranked Best choice as #1

28% of DCODE users ranked Worst choice as #1

54% of non-DCODE users ranked Worst choice as #1

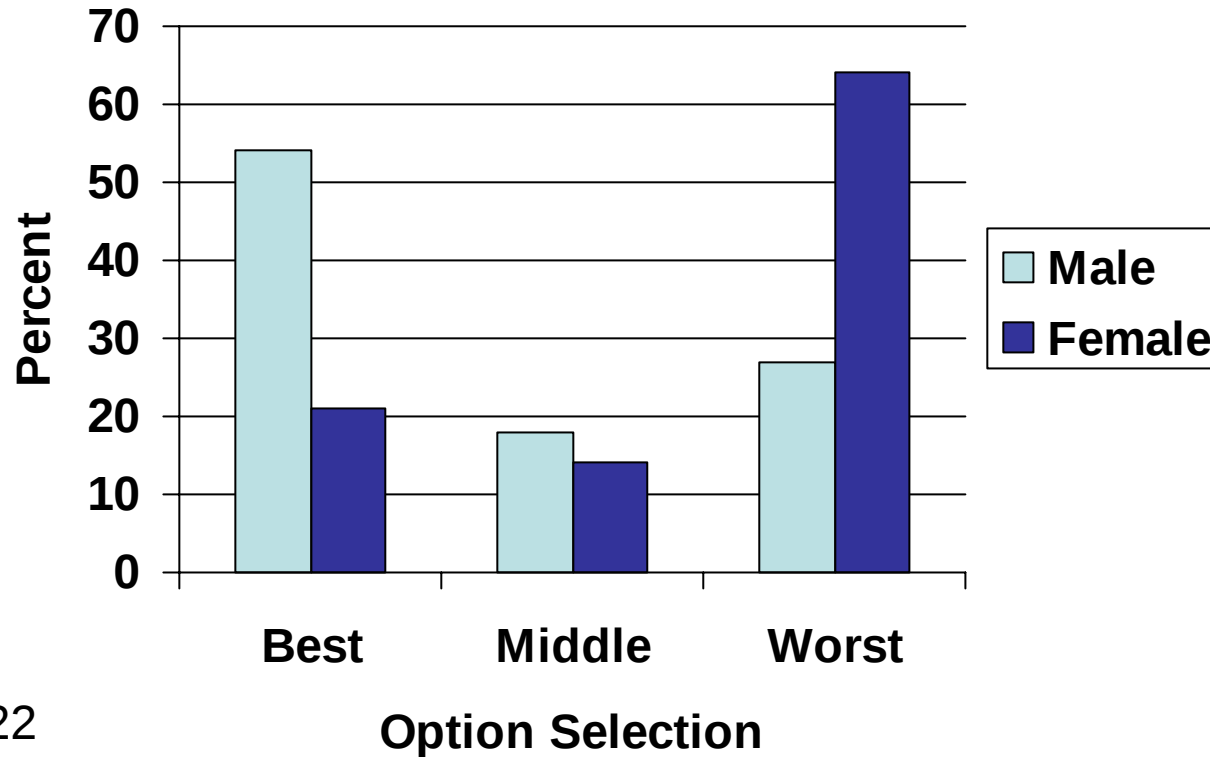
Male vs. Female Use of DCODE color bar



Male: N=13 13/13 100%

Female: N=8 2/8 25%

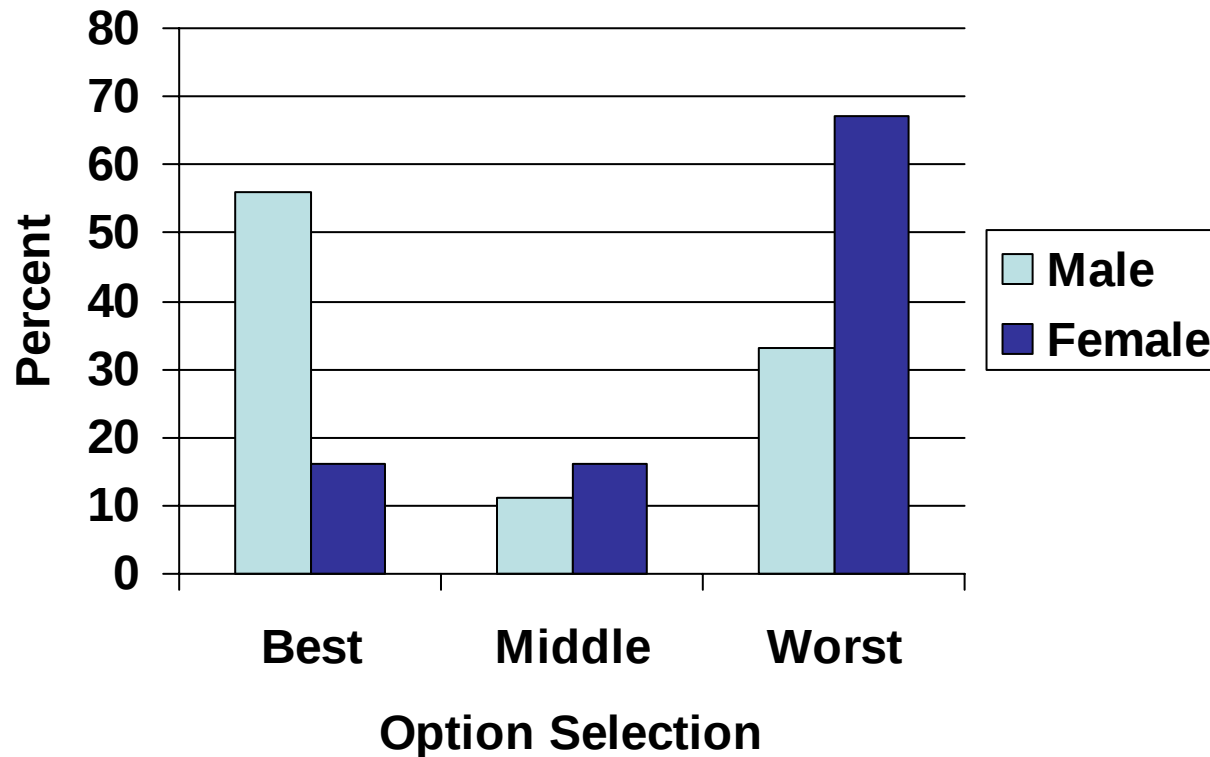
Decision Quality Male vs. Female



Male: N=22

Female: N=14

Male vs. Female (no DCODE)



Male: Rankings of the 9 males who did not use DCODE

Female: Rankings of the 12 Females who did not use DCODE

SUMMARY

- People made better selections using the DCODE option
- People were better at avoiding the worst option when they used DCODE
- Females were less likely to use DCODE
- Comparing performance of males vs. females who did not use DCODE, females performed more poorly than males.



Organization:

- **(1) Objectives**
 - DCODE Concepts/Issues
- **(2) Experiments**
 - NPG School
 - Colorado State
- **(3) Expected Final Product**
- **(4) Demos/Validations**
 - Camtasia AVIs
 - Cortex
 - HSI Lab
- **(5) Software Development**
- **(6) Publications**
- **(7) Lessons Learned**

(3) Expected Final Product

- Overall “concept of operations” of how to best use EWall-DCODE for selected decision making paradigms/tasks.
- Set of AVIs on how to create, sort and share IOBs.
- High-level marketing brief on application of DCODE to military/intelligence decision making.



Organization:

- **(1) Objectives**
 - DCODE Concepts/Issues
- **(2) Experiments**
 - NPG School
 - Colorado State
- **(3) Expected Final Product**
- **(4) Demos/Validations**
 - Camtasia AVIs
 - Cortex
 - HSI Lab
- **(5) Software Development**
- **(6) Publications**
- **(7) Lessons Learned**



(4) Demos/Validations of Technology

- **Cortex**

Third Fleet Flag Briefing and Collaboration Facility (on Point Loma). Four Major packages:

1. Display Space Management (DSM)
2. Information Services ("KWEB")
3. Geospatial Collaboration Service (GCS)
4. Geospatial Replication Service (GRS)



- Both an innovation and AND an operational command center.
- Expect to introduce DCODE technology into Cortex on a test basis in 2005

Composeable FORCEnet Human Systems Integration Laboratory (CFnHSI)



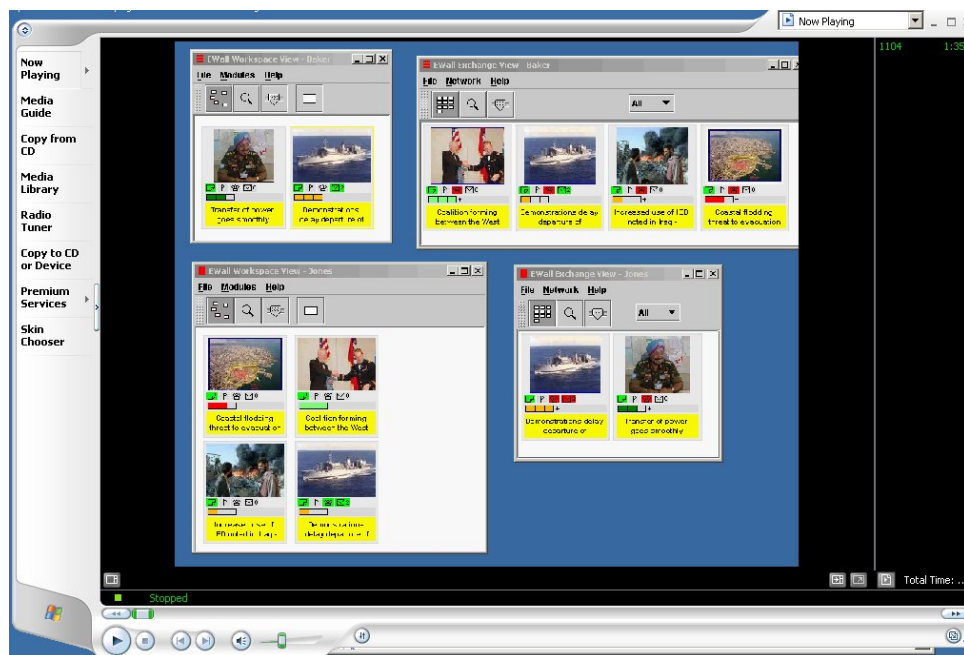
Located at SPAWAR Systems Center, San Diego, operated by SPAWAR Systems Command. EWall/DCODE already installed in facility, which is well designed for both individual and group testing of DCODE usability concepts.



Instructional AVIs



The good news: EWALL has many options (very flexible).
The bad news: EWALL has many options (a lot to learn).



DCODE will produce a number of AVI tutorial aids to simplify the learning process.

-  DCODE intro
-  Creating IOBs
-  DCODE Template
-  Sorting IOBs
-  Sharing IOBs
-  Consensus
-  Other Applications



Organization:

- **(1) Objectives**
 - DCODE Concepts/Issues
- **(2) Experiments**
 - NPG School
 - Colorado State
- **(3) Expected Final Product**
- **(4) Demos/Validations**
 - Camtasia AVIs
 - Cortex
 - HSI Lab
- **(5) Software Development**
- **(6) Publications**
- **(7) Lessons Learned**

(5) Software Development and Other Supporting Tools

- Software development and configuration management is controlled by MIT.
- DCODE project has supplied software design recommendations for use and display of DCODE assessment template.
- DCODE has created a variety of AVI instructional videos introducing the DCODE concepts.



Organization:

- **(1) Objectives**
 - DCODE Concepts/Issues
- **(2) Experiments**
 - NPG School
 - Colorado State
- **(3) Expected Final Product**
- **(4) Demos/Validations**
 - Camtasia AVIs
 - Cortex
 - HSI Lab
- **(5) Software Development**
- **(6) Publications**
- **(7) Lessons Learned**

(6) Recent & Planned Publications

- **Fleming, R. & Cowen, M. Improving Individual and Team Decisions Using Iconic Abstractions of Subjective Knowledge. Paper presented at Command and Control Research Technology Symposium (CCRTS), San Diego, CA, June 2004.**
- **Cowen, M. & Fleming R. A Knowledge Management Tool for Collaboration: Subjective Tagging of Information.” Paper presented at the 2004 TTCP HUM-TP9 Human Systems Integration Workshop, Ottawa, Canada May 2004.**

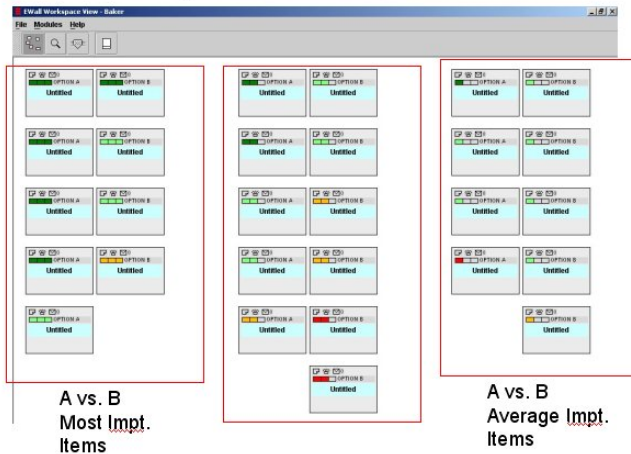


Organization:

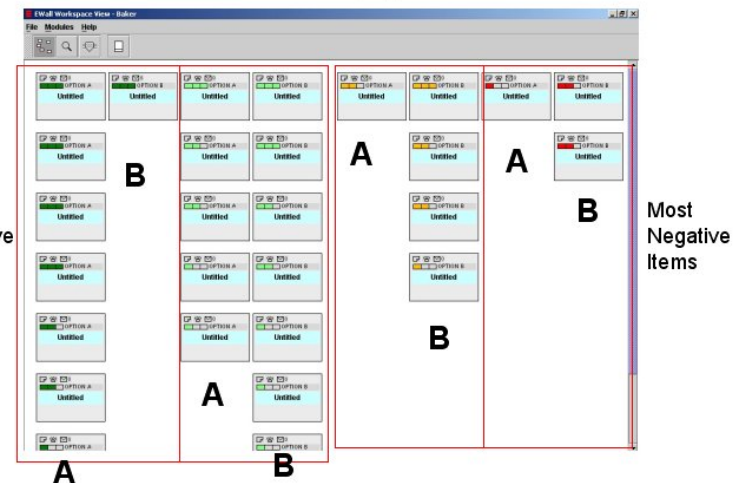
- **(1) Objectives**
 - DCODE Concepts/Issues
- **(2) Experiments**
 - NPG School
 - Colorado State
- **(3) Expected Final Product**
- **(4) Demos/Validations**
 - Camtasia AVIs
 - Cortex
 - HSI Lab
- **(5) Software Development**
- **(6) Publications**
- **(7) Lessons Learned**

(7) Lessons Learned

- Critical Missing Feature to DCODE is the **Absence of Automated Sorting Algorithms.**



Most
Positive
Items



These were moved and **sorted by hand.....**

Possible Sorting Interface

Wide variety of possibilities.

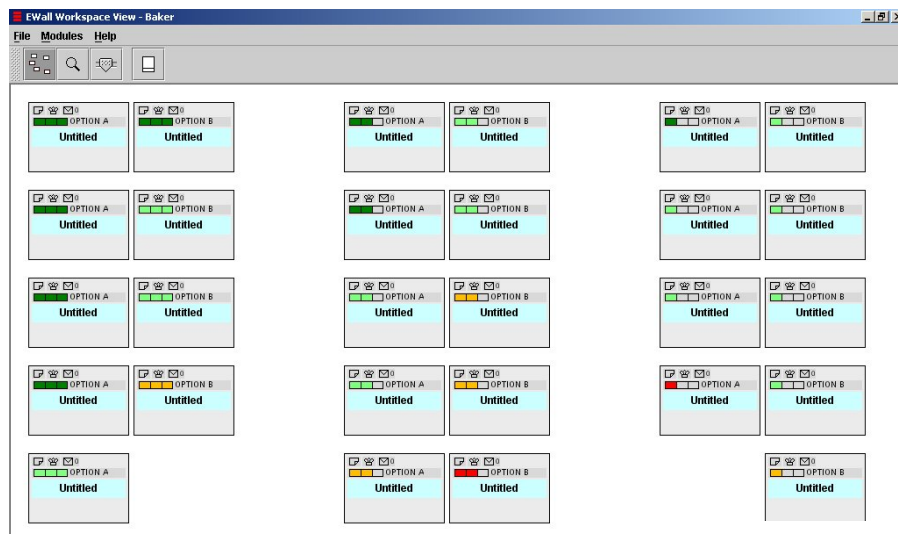
Options
Importance
Impact

<u>OPTIONS</u>		<u>IMPORTANCE</u>	<u>IMPACT</u>
☐	A	☐	☐
☐	B		
☐	C		
☐	ALL		

Compare Option A vs. Option B on Importance

<u>OPTIONS</u>		<u>IMPORTANCE</u>	<u>IMPACT</u>
☒	A	☒	☐
☒	B		
☐	C		
☐	ALL		

A vs B on Importance Parameter



A B
Very High

A B
High

A B
Average



Option A	Option B	Option A	Option B	Option A	Option B
All 15s	All 15s	All 14s	All 14s	All 13s	All 13s
All 12s	All 12s	All 11s	All 11s	All 10s	All 10s
All 6s	All 6s	All 5s	All 5s	All 4s	All 4s
All 3s	All 3s	All 2s	All 2s	All 1s	All 1s

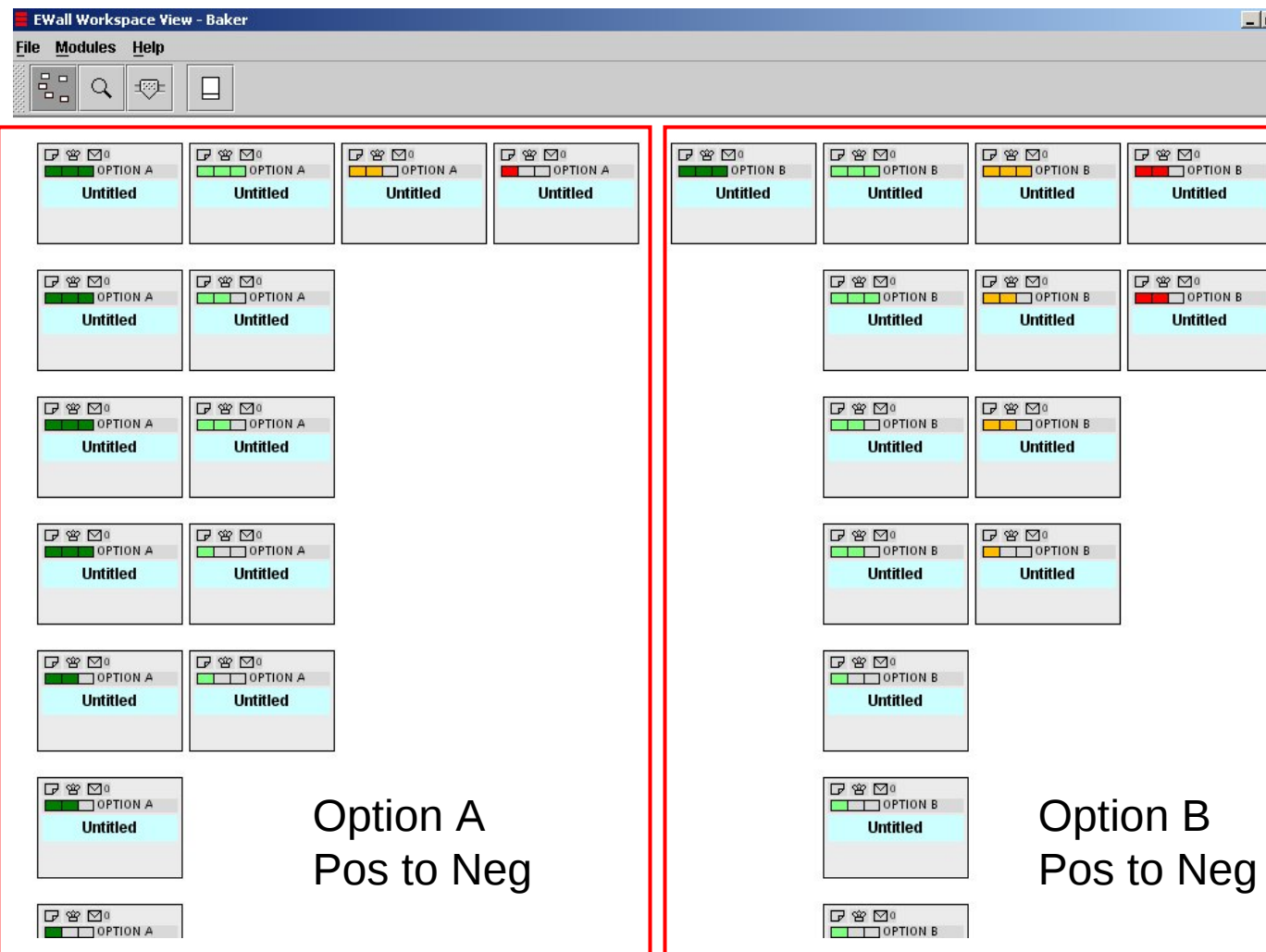
Compare Option A vs. Option B on Impact

<u>OPTIONS</u>		<u>IMPORTANCE</u>	<u>IMPACT</u>
☒	A	☐	☒
☒	B		
☐	C		
☐	ALL		

Display

EWall Workspace View - Baker

File Modules Help



The interface displays two main panels, each containing a grid of 'Untitled' modules. Each module has a status bar at the top with a green bar and a red bar, and a label 'OPTION A' or 'OPTION B'.

Option A Pos to Neg

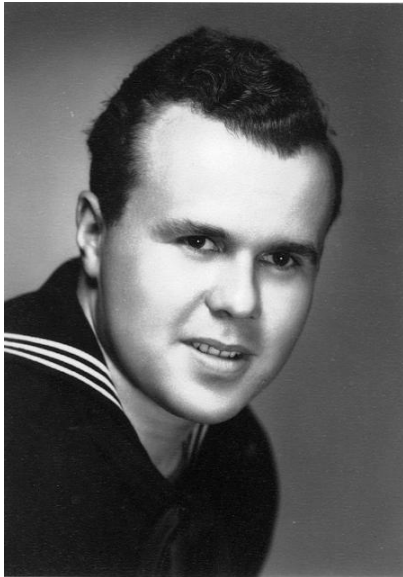
Option B Pos to Neg

Summary

- **EWall** is a highly efficient approach to the **abstraction, encapsulation and sharing** of information.
- **DCODE** brings the critical element of **information assessment** to the decision making process.
- This added element significantly enhances the ability of an **individual** to form an overall **composite opinion** as well as for a **group** to reach **consensus** on option recommendation.

The Last.....

- Slide of this brief
- Brief of this Conference
- Brief of my Career



Jan 20, 1955



Jan 20, 2005