Decision Making Constructs in a Distributed Environment (DCODE)

Dr. Robert A. Fleming, SSC-SD, Principal Investigator

619 553-3628, rfleming@spawar.navy.mil

Dr. James W. Broyles, SSC-SD, Co-Principal Investigator

619 553-4688, jbroyles@spawar.navy.mil

Dr. Michael Letsky, ONR 342, Program Manager

703 696-4251, letskym@onr.navy.mil

15-17 January 2002

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
JAN 2002		**00-00-2002 to 00-00-2002**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Decision Making Constructs in a Distributed Environment (DCODE)	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
ONR TC3 Workshop, Cognitive Elements of Effective Collaboration, 15-17 Jan 2002, San Diego, CA.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**14**	

Agenda

- Background
  - Problem
  - Objectives
  - Approach
- Discussion of Proposed Experiment
  - Concepts, models, tools & demo
- Group Feedback

DCODE: Background/Problem

- Many military decision making environments consist of:
  - Distributed participants (time/place)
  - Participants that have both shared (public) and uniquely held decision-relevant information
- Research (Stasser et al) indicates that uniquely held information is often not exchanged between the participants (emphasis is on the public information)
- Result is that decisions are based on missing and partial information.
  - Particularly serious in “hidden profile” situations.

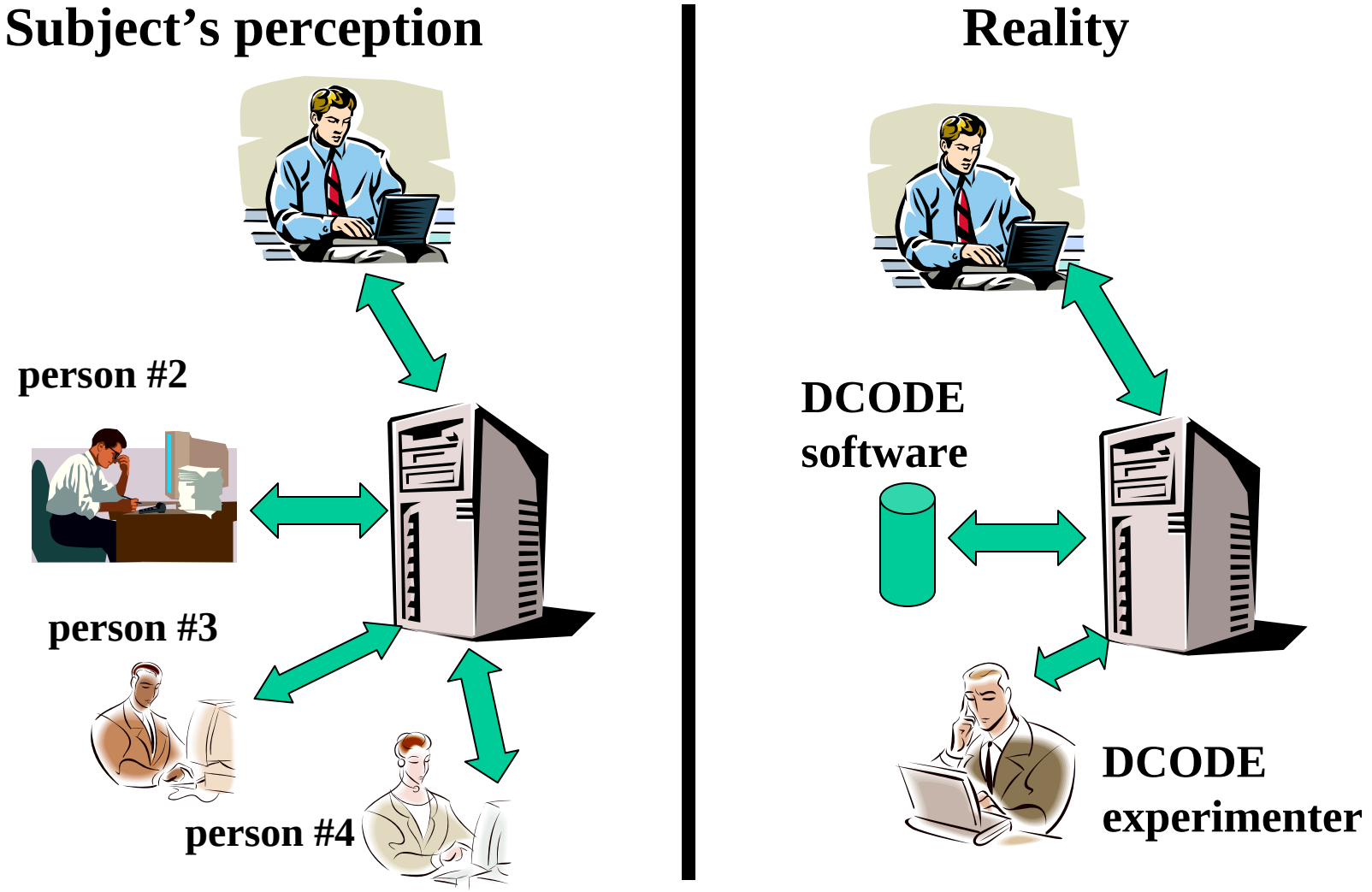
DCODE Objectives

- Stasser's work is based on traditional face-to-face meeting situations.
  - Determine if the results are the **same for decision making in a time/place asynchronous collaborative environment?**
- In a computer-based, on-line distributive decision making task, **develop procedures and technologies that enhance the exchange of decision-relevant uniquely held information.**
- Have group decision makers reach "Collective Intelligence", i.e. **all relevant, uniquely held information is moved into the shared, public domain**.

DCODE Approach

1. Develop simplified on-line knowledge elicitation (KE) techniques that tap a participant's
   - **Categorization of an information item**
     - What decision factor does it relate to?
   - **Assessment of the effect of the item**
     - Positive, negative or neutral influence on taking a COA?
   - **Importance/Relevance of the item**
     - High, medium or low importance to decision?
2. Develop GUI for group input of KE results such that each participant can easily
   - **Detect significant areas of disagreement**
   - Select appropriate relevant unique items of information to exchange (transmit/receive) with other participants to **reconcile differences and reach Collective Intelligence**

Experimental Design



Experimental Design

- Subjects
  - Experiment will be web-based and use 20+ participants taken from SSC SD or University setting.
- Scenario/Stimulus Materials
  - You are part of a "new business" planning staff for a medium-sized US manufacturing company. You, and three other members of the staff have been asked to examine the advisability of establishing a new manufacturing plant in the country of Islandia.
  - Receives information on 5 evaluation parameters (some items shared, some unique)
    - Labor Pool
    - Salary/Benefits
    - Political Stability
    - Infrastructure
    - Red Tape/Incentives
  - Use information items to assess Yes/No aspect of each parameter (7 point scale)
  - How would you reconcile differences between yourself and the other analysts?

Experimental Sequence

Subject reviews information

-Instruction set provides task instructions
-Receives 5 Common or shared information items
-Receives 15 uniquely-held information items
(5 positive, 5 negative, 5 irrelevant)

Completes scoring of The parameters

-From review of shared & uniquely-held information, participant makes judgment of each of the 5 constructs

Transmits judgment to group, sees group judgment

-After judgment on each parameter, sends decision input to others

Reviews group inputs

-Participant reviews group feedback

Selects prioritized queries to be sent

-Who?
-What Construct?
-Share which item?

What the S gets:

- 5 items of information listed as SHARED items
  - 1 for each construct
  - 1 is Neutral, 2 are Minus, 2 are Positive
- Followed by 15 more items listed as UNIQUE items:
  - 5 are irrelevant
  - Remaining 10 are divided as:
    - 2 for each construct
    - Could be Minus/Minus, Positive/Positive, Minus/Positive
- There are 3 items related to each construct (total 15)
- There are 5 irrelevant, filler items

Sequence of inputs:

Change:		First (shared)	Two Unique Items	
Sup	M	Minus	Positive	Minus
Rev	P	Minus	Positive	Positive
Sup	P	Positive	Positive	Minus
Rev	M	Positive	Minus	Minus
None	N	Neutral	Positive	Minus

Research Questions:

- Does the change in shared to unique information content influence the direction/priority of information exchange?
  - e.g are the MPP or PMM triads shared more often than PMP or MPM ?
- Does the degree of difference between participants scores influence the direction/priority of information exchange?
  - e.g. do larger score discrepancies get more attention?
  - Is the size of the discrepancy most important or is its relationship to the score of the shared item that most influences information exchange?

Research Questions (cont.):

- Do people select the correct (most relevant) information items to share?
- Does the sequence of arriving information influence judgment?
  - e.g. are the triads MPP and PMP scored the same?
- Is one GUI better than another for display of group judgment information

Research Questions (cont.):

- Do people exhibit internal consistency?
  - e.g. does overall ranking track with scores on individual parameters?
- Can people ignore irrelevant items?
- Do Neutral items get a neutral score?
- Is this modified Repertory Grid a viable KE design?
- Can people complete this type of a task in a reasonable amount of time?

Discussion/Comments