(2)

STORY-BASED TEACHING (SBT)/DART INTEGRATION PROTOTYPE

SPECIAL TECHNICAL REPORT
ON
INITIAL EXPERT PLANNER
VIDEO INTERVIEW WORKSHOP

27 March 1992

Sponsored by

Defense Advanced Research Projects Agency
Software and Intelligent Systems Technology Office
The DARPA Knowledge-Based Planning & Scheduling Initiative
ARPA Order # 8327 Program Code # n/a
Issued by DARPA/CMO under Contract # MDA972-91-C-0052

Systems Research and Applications Corporation
331 Salem Place, Suite 200
Fairview Heights, Illinois 62208

STORY-BASED TEACHING (SBT)/DART INTEGRATION PROTOTYPE

SPECIAL TECHNICAL REPORT
ON
INITIAL EXPERT PLANNER
VIDEO INTERVIEW WORKSHOP

27 March 1992

Brian T. Thacker
Ray Bareiss
Roger C. Schank

Prepared by

Systems Research and Applications Corp
331 Salem Place, Suite 200
Fairview Heights, IL 62208

Institute for the Learning Sciences
Northwestern University
Evanston, IL 60201

Sponsored by

Defense Advanced Research Projects Agency
Software & Intelligent Systems Technology Office
The DARPA Knowledge-Based Planning & Scheduling Initiative
ARPA Order # 8327 Program Code # n/a
Issued by DARPA/CMO under Contract # MDA972-91-C-0052

ABSTRACT

The Defense Advanced Research Projects Agency (DARPA) has initiated a project to develop a vehicle for demonstrating and evaluating the utility of user-directed browsing of large scale video knowledge bases, oriented toward Department of Defense (DoD) joint operation planners. The task requires two video-taped interview workshops.

This report covers the first series of video interviews, conducted during the period 24 - 28 February 1992. During this interview workshop 14 persons with planning experience were interviewed by faculty and staff personnel of the Institute for the Learning Sciences (ILS).

These interviews provide broad coverage of deliberate and crisis action planning topics and activities, but concentrate primarily on planning and deployment issues for Operation DESERT SHIELD (ODS). The interviews emphasize operations of the U.S. Transportation Command (USTRANSCOM) Crisis Action Team (CAT).

The experience gained from this first interview workshop will be used as a point of departure for later interviews.

CONTENTS

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	27 March 1992	Special

4. TITLE AND SUBTITLE

Special Technical Report on Initial Expert Planner Video Interview Workshop

5. FUNDING NUMBERS

C: MDA972-91-C-0052
TA: 3

6. AUTHOR(S)

Brian T. Thacker
Ray Bareiss
Roger C. Schank

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Systems Research and Applications Corp. (SRA)
331 Salem Place, Suite 200, Fairview Heights, IL 62208
Institute for the Learning Sciences, Northwestern University
Evanston, IL 60201

8. PERFORMING ORGANIZATION REPORT NUMBER

TR-92-707-8711

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Defense Advanced Research Projects Agency (DARPA)
3701 N. Fairfax Dr, Arlington, VA 22203-1714

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

None

11. SUPPLEMENTARY NOTES

None

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release: Distribution is Unlimited. (Distribution Statement A)

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

A Defense Advanced Research Projects Agency (DARPA) task has been initiated to develop a vehicle for demonstrating and evaluating the utility of user-directed browsing of large scale video knowledge bases, oriented toward Department of Defense (DoD) joint operation planners. The task requires two video-taped interview workshops. This report covers the first series of video interviews, which was conducted 24-28 Feb 92, at the SRA facility in Fairview Hts, IL. During this interview workshop, 14 persons with planning experience were interviewed by ILS faculty and staff personnel. The interviews provide broad coverage of deliberate and crisis action planning topics and activities, but concentrating primarily on planning and deployment issues for Operation Desert Shield (ODS), and emphasizing USTRANSCOM CAT operations.

14. SUBJECT TERMS	15. NUMBER OF PAGES
Story-based teaching, video interview, multimedia, prototype, joint planning, transportation planning, crisis action, Operation Desert Shield, USTRANSCOM, video knowledge base	23
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

SPECIAL TECHNICAL REPORT ON
INITIAL EXPERT PLANNER VIDEO INTERVIEW WORKSHOP

CHAPTER 1 - BACKGROUND

1.1 Summary

This is the first technical report of the DARPA Planning Initiative (PI) task, Story-based Teaching (SBT)/Dynamic Analysis and Replanning Tool (DART) Integration Prototype. This task provides a vehicle for demonstrating and evaluating the utility of user-directed browsing of large scale video knowledge bases by DoD joint planners.

This report details the first of the two video interview workshops required by this task. A second video interview workshop will be held at a later date to fill in gaps and to intensify coverage of selected topic areas.

1.2 Objectives

The end product of this task is a demonstration prototype of a large, multi-expert *ASK* system in the domain of DoD joint operation planning. (See Chapter 2 for a description of the ASK system concept.)

This prototype will operate in a stand-alone mode on a Macintosh computer system, using laser disks for video storage.

A video tape presentation of the demonstration system will also be produced.

User evaluation of the SBT concept, by potential DoD users, will be accomplished following delivery of the prototype. Future development activities will depend on the outcome of user evaluation.

1.3 Topic Area

The overall topic area originally selected for this demonstration prototype is DoD joint operation planning. This topic includes both deliberate and crisis action, as defined by the DoD Joint Operation Planning and Execution System (JOPES).

Because of the breadth of the overall topic area, the project has been focused toward specific crisis planning actions used during the recent Operation DESERT SHIELD (ODS) (1990-91). (See Chapter 4 for a discussion of changes to the topic focus.)

To the extent feasible, it is also desirable to relate actions of the typical user of the Dynamic Analysis and Replanning Tool (DART), a prototype system used by the DoD joint planning community.

1.3.1 DoD Joint Operation Planning

DoD has established a formal structure for peacetime (deliberate) planning and crisis execution in support of contingency and conventional wartime operations. This structure, called the JOPES, provides comprehensive guidance, doctrine, and procedures to personnel at all major DoD headquarters throughout the world. The JOPES includes an associated worldwide automated system for developing, coordinating, and executing operation plans.

The JOPES structure is used for planning and executing all crises involving U.S. military forces, ranging from small-scale humanitarian operations to large-scale conventional warfare. The JOPES has particular application and utility for any joint contingency operation involving DoD transportation assets. JOPES was used throughout the recent ODS, and continues in use for successor operations.

DoD personnel require considerable training, knowledge, and experience to be able to successfully adapt the JOPES procedures, policies, and automated system to address the wide variety of operations performed by the DoD. Although joint planners are assigned to all major headquarters, most of these personnel are planners only for their current tour of duty. Most have gained their experience on the job, and few will remain in that career field for very long. The turnover of planning personnel is rapid, and training for joint planners is a constant challenge.

This SBT/DART prototype is seen as a potential source for training and experience transfer to newly assigned joint planning personnel, and as a problem solving tool during actual joint operations.

1.3.2 Operation DESERT SHIELD (ODS) Experience

Although JOPES (and its predecessors) has been the operation planning and execution system for most recent DoD operations, support to the Persian Gulf operations in 1991-92 has been the greatest challenge ever undertaken by JOPES, and represents the most continuous and concentrated joint planning endeavor in recent years. As a consequence, the ODS lessons learned will form a basis for training and orienting joint planners for a long time (as well as for developing new doctrine, procedures, and systems).

Those organizations most involved in joint planning and execution for ODS, and consequently having the most experienced planning staffs, include:

- U.S. Central Command (USCENTCOM), at MacDill AFB, Florida.
- USTRANSCOM, at Scott AFB, Illinois, and the three Transportation Component Commands (TCC) of USTRANSCOM:
    - Military Airlift Command (MAC), at Scott AFB.
    - Military Traffic Management Command (MTMC), near Washington, DC.
    - Military Sealift Command (MSC), also near Washington.

And supporting commands, such as:

- U.S. Army Forces Command (FORSCOM), near Atlanta, Georgia.
- U.S. European Command (USEUCOM), in Germany.

These sites are viewed as primary sources of experienced personnel for interviews for this project. Other headquarters supported ODS as well, and personnel from those sites may be interviewed as schedules and circumstances permit.

1.3.3 Dynamic Analysis and Replanning Tool (DART)

The DART system is a prototype developed by DARPA and USTRANSCOM to demonstrate improved capabilities for manipulating and analyzing planning databases using modern workstation-based graphics tools. DART has interfaces to the JOPES for accessing JOPES data and interfaces to other planning analysis systems.

DART was developed specifically to support the high-intensity ODS planning activities, and continues in development and operational use today as a testbed for new planning technology. There are both functional and programmatic relationships between DART and other planning prototypes, such as this SBT prototype.

1.4 Project Organization

1.4.1 Systems Research and Applications Corporation (SRA)

SRA provides overall project management. In addition, SRA provided initial training to the ILS staff on the joint planning process and the DART system, and, as required throughout the project, will provide other domain expertise to ILS personnel. SRA coordinated the necessary planning experts for the first planning expert video taping interview workshop, and provided facilities for the interviews.

1.4.2 Institute for the Learning Sciences (ILS)

ILS is responsible for the design and development of the SBT/DART prototype, including software and media. ILS provides the video taping equipment and personnel for the interview workshops, and conducts the interview workshops to acquire the expert user video material.

1.5 Schedule

The SBT/DART Prototype Integration task is scheduled to run from January through August 1992. An abbreviated timetable is as follows:

ACTION	DATE
ILS Domain Training	Completed
Initial Interview Workshop	Completed
Second Interview Workshop	6-10 Apr 92
Initial Demonstration of SBT/DART Prototype	15 May 92
Final Prototype Delivery	10 Jul 92
Final Technical Report	14 Aug 92

CHAPTER 2 - STORY-BASED TEACHING (SBT) AND ASK SYSTEMS

Researchers at ILS believe that experts teach effectively by telling stories. Their expertise, especially its intangible aspects, is bound up in the stories these experts tell. A story embodies the personal experience of the expert making an important point about his or her domain. Consequently, an instructional system can only succeed in communicating expertise to a student if it has a huge memory of appropriate expert stories. Furthermore, ILS believes that video-based presentation of stories is more vivid and memorable to a contemporary audience than text-based presentation.

One of the ways in which ILS is implementing its theory of story-based teaching in the form of an *ASK* system. An ASK system is a hypermedia system that provides flexible access to a database of short video clips extracted from interviews with experts, as well as archival video and textual material.

The goal is to construct systems that enable students to gain access to information which answers their questions, as they arise, and to structure students' interaction with a system in a way that reproduces the most important benefits of conversation with a human expert. In particular, an ASK system provides user-directed browsing of information within a framework that provides a coherent model of the domain under investigation, and that enables users to assimilate answers to their questions, and then use those answers to solve problems.

ILS has constructed ASK systems in domains as diverse as trust bank consulting, global industrial policy, tax accounting services, managing corporate change, and contemporary American history.

CHAPTER 3 - VIDEO INTERVIEW WORKSHOPS

3.1 Need

The SBT process depends upon access to large scale video knowledge bases, compiled from many hours of video-taped interviews with experts in the appropriate fields.

For this particular project, video interviews must be conducted with knowledgeable personnel having DoD joint planning experience.

3.2 Process

Two series of video interviews have been scheduled for this project, each series lasting approximately five days. Each individual interview includes one or more experts, and lasts several hours.

The interviews are recorded on color video tape, under professional studio quality conditions.

The initial workshop was held at the SRA facility, Fairview Heights, Illinois, from 24 - 28 February 1992. This workshop provided 24 hours of raw video tape of interviews with 14 planning experts.

3.3 Interview Participants

The first interview workshop was directed primarily toward personnel who were available in the Scott AFB area. This resulted in a predominance of individuals from USTRANSCOM, whose headquarters is located at Scott AFB.

Fourteen persons were interviewed during the first interview workshop. Their background and experience include:

- USTRANSCOM CAT Chief during ODS.
- USTRANSCOM CAT, special management functions during ODS.
- USTRANSCOM CAT, Operations Team Chief during ODS.

- USTRANSCOM CAT, Operations Team Chief during ODS.
- USTRANSCOM CAT, Deployment Management Team Chief, and USEUCOM & USCENTCOM (Forward) during ODS.
- USTRANSCOM CAT, Deployment Management Team during ODS.
- USTRANSCOM CAT, Plans & Analysis Cell during ODS.
- USTRANSCOM CAT, Plans & Analysis Cell during ODS; and deliberate planning.
- USTRANSCOM CAT, Sealift Operations during ODS.
- USTRANSCOM CAT, and liaison to USCENTCOM, during ODS; and deliberate planning.
- USARPAC during ODS; and deliberate planning.
- HQ MAC/XP, MAC CAT (Airlift) Operations during ODS; and deliberate planning.
- U.S. Army Division Transportation Officer during ODS.
- U.S. Air Force and joint command deliberate planner, and DART system experience.

CHAPTER 4 - IMPORTANT FINDINGS AND CONCLUSIONS

4.1 Interview Process

The results of the first interview workshop provided the interview team with considerable insight into how to improve the interview process.

4.1.1 Facilities

The initial interviews took place in a small room with the interviewee facing the interviewer and other staff people, who sat (off-camera) behind a table.

This arrangement had too much of the feel of a formal military board, and made the interviewees seem ill-at-ease. It was quickly abandoned in favor of an arrangement where the interviewer sat near, and directly in front of, the interviewee without an intervening table.

Also, the small size of the room made the presence of the camera very obtrusive. By moving the interviews to a larger room, the camera could be placed much further away from the interviewee, which made the camera presence less obtrusive. The larger room also provided greater flexibility in setting up camera angles and lighting.

4.1.2 Interview Preparation

Interview preparation was found to be an important step in facilitating and motivating interview participants, and in establishing direction for the interviewing staff.

Interviewees benefit from knowing more in advance about the goals of the interview process and the envisioned functions of the target system.

The interviewers benefit from having greater in-depth knowledge of the particular interview subject's job, and the kinds of things that he (or she) is qualified and comfortable to talk about. This preparation also minimizes the possibility of disclosure of classified information.

Among the recommended changes are that interview participants be contacted in advance by telephone, to provide them with initial familiarization; and that short demonstrations of an ASK system, and perhaps of previous interview material (if available) be provided to participants.

4.1.3 Additional USTRANSCOM Knowledge

Because of the increased emphasis toward USTRANSCOM topics, the interviewing staff needs to gain more depth and understanding of the role of USTRANSCOM during ODS.

Possible sources for this information might be additional discussions with members of the USTRANSCOM Crisis Action Team (CAT) staff, and perhaps further discussion with the USTRANSCOM Command Historian, who has been conducting oral history debriefings on similar topics.

4.1.4 Interview Scheduling

The normal interview rate, of three subjects per day, seemed to be appropriate. About two and a half hours should continue to be allocated per subject.

However, rather than the original schedule of half an hour for familiarization followed by two hours of interview, the interview process might be more effective if the time was divided into three distinct phases:

- Half an hour of interviewee familiarization with the process, and identification of appropriate topics for the interview.
- One and a half hours of videotaping.
- Half an hour of post-analysis by the interview team prior to the arrival of the next subject. This added time will provide the team with valuable insights for further interview directions.

4.2 Topical Focus of Prototype

Based both upon topic analysis prior to start of the first interview workshop, and from data obtained during the workshop, the focus of the prototype subject matter has been somewhat modified. This will have some effect on the direction of the remaining interviews, and on the ultimate potential utility (and hence on the evaluation community) of the delivered prototype.

4.2.1 Topic Analysis

During project definition, it was well understood that overall joint operation planning was far too broad a topic for a short prototype task, and that the prototype subject matter had to be limited to a few selected areas of deliberate and crisis action planning.

An analysis was made, as part of this task, to determine which specific planning activities would be appropriate topics for the prototype. Topics were selected in both the deliberate and crisis action planning areas, based on the following guidelines:

- Potential utility and interest to the joint planning community (in particular, but not limited to, USTRANSCOM and other joint combatant commands).
- Widest possible coverage of the spectrum of deliberate planning and crisis actions.
- Actions performed at both USTRANSCOM and other joint commands.
- Actions performed during the recent ODS operations.
- Investigate DART-related activities.

It was expected that interview topics would be anchored to the formal JOPES model of joint operation planning taught at the military staff colleges, and documented in the DoD training manual *Armed Forces Staff College Publication 1*, known as the *Purple Book*.

Due to the predominance of USTRANSCOM personnel in the initial interviews, further key topic areas were added based on USTRANSCOM *ODS Lessons Learned* documentation.

4.2.2 Interview Results

Early in the course of the interviews it became apparent that the connections between textbook doctrine and actual practice were too tenuous and distant to capture through interviews with staff-level planners. Although the DoD as a whole might generally be following the formal JOPES process, that process was largely invisible to planning personnel and had little impact on day-to-day performance of their jobs during the ODS operations. (This may have been due in part to a lack of documentation, supporting procedures, and training in the more formal process(es), during the JOPES transition that was in progress.)

The effect of this problem on interviews is that the original top-down *start with the big picture* approach has been reoriented in favor of a bottom-up approach. The interviews now concentrate on what staff-level personnel in the CAT at USTRANSCOM (or other command headquarters) actually did during ODS; how they did their jobs and, more specifically, with whom and how they communicated both within and outside of the CAT.

4.2.3 Potential Changes to Prototype Utility

The original intention of this task was to provide an educational and experience-based resource that might be used by a newly assigned planning officer, and which would assist that planner in understanding how the formal planning model, as taught by the military staff schools, related to actual practice.

As noted above, establishing a connection to the formal planning model has proven to be difficult. The potential utility of this prototype, therefore, must be seen as slightly different from that originally expected. The subject matter emphasis has changed from a formal joint planning (JOPES) orientation to a headquarters dependent CAT staff operations orientation. (Whether this change in orientation and emphasis will need to continue into the future, after JOPES doctrine and procedures become more widely known, is a question that needs to be addressed.)

Due to the reorientation of emphasis, the stories, experiences, and advice gleaned from the actual interviews can be used to construct a system that is projected to be useful to three distinct types of users:

- An officer newly assigned to USTRANSCOM who needs to understand the nature of the planning job in a crisis, and how to get that job done effectively, in particular how to understand and fulfill the expectations of external agencies such as the supported command, transportation users, and the TCCs.

- An officer at another command who must interface with USTRANSCOM, who can benefit from an in-depth understanding of how USTRANSCOM functions in a crisis, and how to interact with the USTRANSCOM CAT most effectively.

- A student at a Service school who can benefit from the exploration of how a military organization actually functions in a large-scale crisis such as ODS.

The interviews have also provided a more limited, but still valuable, set of supporting material:

- General information on the deliberate planning process, and guidance on advantages and pitfalls of using off-the-shelf plans in a crisis.

- General information about the DART system which explores its utility in evaluating the feasibility of plans.

CHAPTER 5 - PLANNING FOR THE NEXT INTERVIEW WORKSHOP

5.1 Facilities

The second interview workshop will be held at the SRA facility, Fairview Heights, using the large conference area found to be more conducive to productive video interviews.

5.2 Interview Schedule and Preparation

The interview schedules will be organized in accordance with the suggested timetable.

Additional time will be scheduled for interviewee preparation. If possible, samples of interview material from the first workshop will be available for viewing on a TV monitor (via video-tape).

Time will also be scheduled for post-interview reviews.

5.3 Topic Coverage

The revised topic focus will drive the topics and personnel selected for the second interview workshop.

First, information will continue to be gathered about the functional organization of the USTRANSCOM CAT. Gaps in the current interview coverage will be addressed.

Second, high-level command personnel from USTRANSCOM, if available, will be interviewed (or re-interviewed) to obtain a more global view of USTRANSCOM's role in the joint structure.

Third, personnel from external entities who interfaced extensively with USTRANSCOM (for example, USCENTCOM, FORSCOM, USEUCOM, MAC, MTMC, MSC, and end-users of transportation) will be interviewed to the extent possible. This will provide a balanced view of communication within the joint structure, as well as detailing external expectations about the role of USTRANSCOM.

Finally, as time permits, further coverage in the areas of deliberate planning, the JOPES system, and DART will be covered, especially with regard to utility in a crisis situation.

In some cases, persons from the first workshop may be invited back for additional taping.

5.4 Personnel Travel

To fulfill the above considerations, the second workshop will include more government personnel who may have to travel long distances to attend. Travel funding may become a problem. If funding is not available, personnel with wide-area experience will have to be identified from Scott AFB.

CHAPTER 6 - OTHER COMMENTS

6.1 System Design

The interface design for the system has not yet been finalized, however the following ideas are being considered.

The *zooming* interface, which allows a user to identify a general topic of interest, will probably consist of a graphical representation of the entities within the joint command structure and the lines of communication between them. (Since the idea of exploring how the textbook planning process is translated into practice has been redirected, so has the idea of using diagrams solely of the JOPES process in the zooming interface.)

The potential zooming interface may take the form of three stages or levels:

- The user's functional location or role.
- The task in which the user is engaged.
- The problem or type of problem encountered.

The *browsing* interface, which enables a user to explore by selecting logical follow-up questions, will embody eight general categories of follow-up questions that our previous experience suggests are universal in conversations about problem solving. They are:

• Context	The big picture within which a piece of information fits.
• Specifics	The details of a situation or an example of a generality.
• Analogies	Similar situations from other contexts or from the experiences of other experts.
• Alternatives	Different approaches that might be taken in a situation or differences of opinions among experts.

- Causes/History — How a situation developed.
- Results/Later Events — The outcome of a situation.
- Warnings — Advice about what can go wrong in a situation.
- Opportunities — Advice about things upon which a problem solver can capitalize in a situation.

As discussed in the project management plan, the prototype system will be stand-alone (that is, it will not be integrated with DART).

Proposed scenarios for the demonstration videotape have not been considered in detail. The general idea is that the video will consist of two parts:

- The first part will illustrate the job aiding and training potential of an ASK system that is dynamically invoked during a planning process employing a future planning tool.
- The second part will demonstrate the actual capabilities of the prototype ASK system as it exists at the end of the contract.

6.2 Significant Hardware & Software Development

None.

GLOSSARY

GLOSSARY

AFB	Air Force Base
CAT	Crisis Action Team
DARPA	Defense Advanced Research Projects Agency
DART	Dynamic Analysis and Replanning Tool
DoD	Department of Defense
FORSCOM	U.S. Army Forces Command
ILS	Institute for the Learning Sciences, Northwestern University
JOPES	Joint Operation Planning and Execution System
MAC	Military Airlift Command
MSC	Military Sealift Command
MTMC	Military Traffic Management Command
ODS	Operation DESERT SHIELD
PI	Planning Initiative
SBT	Story-based Teaching
SRA	Systems Research and Applications Corporation
TCC	Transportation Component Command (of USTRANSCOM)
USARPAC	U.S. Army, Pacific
USCENTCOM	U.S. Central Command
USEUCOM	U.S. European Command
USTRANSCOM	U.S. Transportation Command

CERTIFICATION/RELEASE/DISTRIBUTION

TITLE: Special Technical Report on Initial Expert Planner Video Interview Workshop

DATE: 27 March 1992

UNDER CONTRACT: MDA972-91-C-0052

JOB/DOCUMENT CONTROL NUMBER: TR-92-707-8711

CLIENT: DARPA/SISTO (Lt Col Steve Cross)

I certify that this product meets contractual requirements and is consistent with SRA's quality standards.

Project Manager Representative

3/26/92
Date

I certify that this product has met requirements of SRA's Quality Assurance Program.

Project QA Official

26 March 1992
Date

DISTRIBUTION:

Client: DARPA/SISTO (1 cy)

DTIC (2 cys)

SRA: ESG (1 cy)
Project File (1 cy)
Technical Library/AP (1 cy)
Technical Library/FL (1 cy)
Fairview Hts Library (1 cy)

ILS: Ray Bareiss (5 cys)