

FactSheet



National Aeronautics and
Space Administration
Ames Research Center

Moffett Field, California 94035-1000

March 2004

SUPPORTING NASA'S AIRSPACE SYSTEMS PROGRAM

Internet-based Decision Research System

The Internet-based Decision Research System (IDRS) is a computer software system designed to allow researchers, educators, trainers, and others to study and evaluate how people make decisions in simulated realistic situations using the Internet. The IDRS is capable of reproducing simulated decision environments over the Internet and then gathering information about how people make decisions in those environments. It can remotely obtain many of the measures typically obtained in the laboratory.

Description

Functional Overview. From the user's perspective, the IDRS is composed of three parts: preliminary questions and materials, a decision simulation, and concluding questions and materials. The preliminary questions pages can be used to solicit background information or answers to questions that might be contaminated by participation in the simulation. The decision simulation consists of a series of ordered scenes. In each scene the participant has access to potentially different information and must make different decisions. Each scene simulates a real environment (e.g., office, cockpit, controller position). By using a mouse to point and "click" on an object in the scene (e.g., telephone, manual, screen, radio), the participant is able to access the information normally accessed using these objects. This information is presented in pictures, graphs, text, audio, or video. The sources of information accessed, the order of access, and the time spent accessing the information is recorded. The participants' progress may be interrupted to obtain information about their thoughts and feelings. As in real life, the participants are prevented from

returning to earlier scenes within a scenario and which scenes are encountered depends on the decisions made previously. The final portion of the IDRS is devoted to obtaining retrospective reports, evaluations, open-ended comments, and answers to questions not asked in the preliminary section.



IDRS General Aviation aircraft cockpit.

Technical Overview. The IDRS program system can be divided into two components: a client-side component that provides the simulation experience, gathers the needed data, and transmits it to a server in a secure format, and a server-side component that accepts data from the client, and then validates, processes, and stores the information in a database. Initially, a small browser application program is automatically downloaded onto the participant's computer. At various points during the experiment, the data are uploaded to a web-server. Once the simulation is completed and the browser closed, the program is erased. The client-side component runs completely within the web browser so no software

other than extensions commonly incorporated in web browsers is required. To protect the integrity of the data and the confidentiality of the participants, data may be transmitted in an encrypted format using the same security system used in on-line financial transactions. Once the data collection begins, the client-side program has complete control over the data flow. It is capable of time-stamping any action by the participant and maintaining the integrity of the data regardless of network problems. This modular approach affords a higher degree of performance than is possible using traditional web materials. The interactive use of sound, images, and video would not be possible using a conventional content-on-demand system like those commonly used in web development. The server component consists of: a secured web-server, a database application, and a middleware bridge that connects the web-server to the database.

Applications

Education & Training. The goal of many courses and training programs is to help students learn how to do new things. Yet, these programs are often evaluated only by testing facts and figures. One reason for this is that procedural knowledge – what we know how to do -- is difficult to test. It is much easier to construct tests of declarative knowledge – the facts and figures that we know. Declarative knowledge can be tested with relative ease using paper-and-pencil tests. Frequently, procedural knowledge can only be tested in a facsimile of the environment in which the learned skills will be applied. This problem is exacerbated when the training is conducted long distance. Many companies and government agencies have employees located at dispersed facilities. Considerable savings in time and money can be had from remote training using CD's sent to the employees or computer or live instruction transmitted over the Internet or video-conferencing links. In these cases, there may be no on-site instructors or the on-site instructors may not have the skills required to administer the procedural knowledge test. After all, the major advantage of distance learning is that expert instruction can be brought to students without physically moving

either the students or the instructors. The IDRS can be used to provide efficient and effective long-distance evaluations of training programs. Using the IDRS, students' procedural knowledge and decision-making skills could be evaluated in facsimiles of the actual working environments.



IDRS General Aviation aircraft takeoff animation.

Research. Researchers interested in understanding how people make decisions have frequently been deterred from studying how decisions are made in real environments because of the difficulties involved in conducting research in those environments or in constructing simulations of those environments. The IDRS can be used to conduct research remotely using many of the measures typically obtained in the laboratory without the need for bringing the participants to the laboratory or the laboratory to the participants.

The scenes included in this document are taken from an IDRS general aviation research project. The pilots participating in the project must decide whether to conduct a flight in a single engine aircraft. If the pilots decide to make the flight, they must make further decisions on the ground and in-flight at different points along the route. In the first scene, the participant is placed in a briefing room. All of the information that is typically available to a pilot is provided; e.g., a telephone to contact a briefer for a weather report, a computer to access an on-line weather service, an abbreviated aircraft manual, navigational charts, and visual cues. In the following scenes, the participant is placed in the cockpit of the aircraft at different points along the flight. Again, most of the information commonly available to the pilot is provided (e.g., flight, navigation, and engine instruments, access to Air Traffic Control, weather information, charts, and visual cues).

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