

EDUCATION AND PUBLIC OUTREACH OPERATIONS PLAN

For over the past decade the Voyager E/PO program has worked closely with the Sun-Earth Connection Forum to enhance the breadth and knowledge of science, mathematics, and technology for K-12 and higher education. The Voyager mission is contributing to a diverse set of programs that are improving basic scientific literacy among students. Voyager is engaging the public at large via a redesigned interactive web site, an educational based and multimedia CD-ROM, 25th anniversary video animations covering the history and accomplishments of the mission, and via on-going library and museum exhibits and partnerships nationwide.

1. **ENGAGING THE PUBLIC**

Voyager E/PO partnered with programs such as NASA/JPL Solar System Ambassadors Program (JPL), which recruits volunteers from across the nation to conduct public events in their local areas. These events include exhibits, radio programs, concerts, and town hall meetings in primarily rural locations. There are 275 Ambassadors representing all 50 states. In preparation for Voyager's 25th Anniversary, Voyager Principal Investigators taught various aspects of the mission to 25 Ambassadors. The training included the history of the Voyager mission and the Interstellar mission objectives. In 2002, ambassadors held 380 Voyager events reaching 469,000 people. Ambassador training material are archived at the ambassadors-only website.

Through partnering with The Space Place (<http://spaceplace.jpl.nasa.gov>), Voyager has designed and disseminated hands-on and web inquiry-based activities for K-6 students. The activity was awarded a SCiLink by Science Education from the National Science Teachers Association (NSTA).

In 2002, Space Place released an article based on Voyager's heliopause milestone resulting in over 14 major newspaper articles across the country (including the Washington Post; cir: 5mil and the LA Times; cir: 3.2mil) and seven Spanish language articles (including La Opinion; Cir: 128k).

50,000+ people attended the JPL Open House over a two-day period in 2001. Exhibit, models, and handouts were available for general public dissemination while team members answered

questions regarding the mission and various science objectives.



Figure 1: Voyager at JPL Open House, 2001

The Open House was not held in 2002 due to security concerns, but is scheduled to resume in May 2003. Voyager will again participate.

1.1 **World Wide Web**

On Wednesday November 6, 2002, as part of the Watson Lecture Series, Dr. Ed Stone presented "The Voyager Journeys to Interstellar Space". 683 people attend the 1-hour event at Caltech's Beckman Auditorium. The event is presently being carried as a webcast with 324 unique visits from November 2002–February 2003.

The Voyager web site at <http://voyager.jpl.nasa.gov> received 514,115 unique visits during FY2002. The largest number occurred during the month of August when there were 241,598 of unique visitors, 37,725 of those were visits to the Interstellar Mission page, which describes the objectives and characteristics of the VIM.

1.2 **Media Relations**

Cosmos Studios and Norman Star Media produced a video documentary for A&E Network titled, COSMIC JOURNEY: The Voyager Interstellar Mission and Message. This two-hour mission retrospective has many personal stories from the scientists and engineers behind the mission. Public interest in the Voyagers increased immediately after each of the two airings.

During Voyager's 25th anniversary commemoration, public interest in the mission was extremely high. In addition to the increased web hits discussed above, over 45 newspaper articles were written, including major coverage by the New York Times, the Los Angeles Times, the Washington Post, and Florida Today. Scholastic SCIENCE WORLD published an

exclusive interview with the Voyager Project Scientist that led to a 4-page color article in the November 29, 2002 issue. Scholastic SCIENCE World's circulation is $\approx 400,000$ however, because the audience is middle school classrooms the magazine reaches ≈ 1.5 million readers. In addition, there were numerous national and international radio and television interviews with key mission personnel.

1.3 "Sun Rings" Concerts

Sun Rings is an orchestral composition by Terry Riley in collaboration with Don Gurnett, Voyager's Plasma Waves instrument principal investigator. The Kronos Quartet performs the music. The production, commissioned by the NASA Arts Program Office, is based on the sounds of space collected over a 40-year period. This production was featured in the November 10, 2001 LA Times Calendar section in an impressive 3-page color spread. The Kronos Quartet has performed in Houston and will be performing in 4 additional venues this year.

2. INFORMAL EDUCATION

Voyager has piloted a Student Interview program to provide an opportunity for students to learn about all aspects of an operating mission through one-on-one interviews. Students conduct research, formulate related questions, conduct the interview with a project manager, scientist or operations person and prepare a class presentation on what was learned. This is a leveraging program where a few interviewers, through their presentations, teach many more students. Voyager personnel participation has resulted in presentations to over 500 students during a 12-month period.



Figure 2: Interviewer teaching her class

In 2002, Dr. Gary Zank, developed a Voyager CD-ROM "*Voyager's Discovery: A History in the Making - Unraveling the Secrets of the Solar Wind*".

The CD-ROM consists of an element heavy on science that is meant to inform scientists of other disciplines about heliospheric science and the contributions Voyager has made to our understanding of the heliosphere. A second element, meant for high school and college students, contains a history of the Voyager mission and discusses Voyager discoveries in the planetary system and the solar wind beyond Neptune and Pluto. It also outlines the expected future Voyager science results.

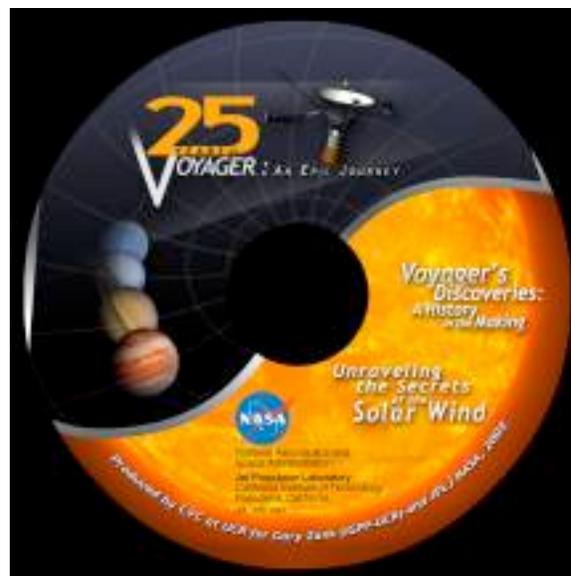


Figure 3: The Voyager educational CD-ROM

The CD-ROM has been disseminated to all E/PO partners, NASA's Educator Resource Centers and Forum partners, and has been distributed at science conferences. Dr. Zank is also using it in his curriculum at the University of California, Riverside Physics department.

Voyage of Discovery Challenge is hosted by the Challenger Center with direct sponsorship from NASA. Voyager participated in multiple aspects of the events. Among them, the Project Scientist, Dr. Edward Stone, conducted a videoconference with top students from across the country and there was a public event on the Washington Mall demonstrating the Voyagers present location using the planetary scale model stretched across the mall (Figure 4).

2.1 Educational Conferences:

Voyager is represented at the annual National Science Teachers Association (NSTA) conference. In 2002, approximately 30 teachers attended the Voyager activity in the NASA classroom and 2000 poster activities were distributed at the SEC booth.



Figure 4: Voyager on the Mall of Washington

Voyager was also represented at the California Science Teachers Association (CSTA) conference. Twenty (20) educators attended a 1-hour workshop and 500 activity posters were handed out at the Georgia Council of Teachers of Mathematics conference. At the California State University Blended Conference for Pre-service teachers, 150 activity posters were distributed and a demonstration of some of the activities was presented.

Many of the Voyager science teams perform informal outreach activities from their individual institutions. Team members do extensive classroom visits to engage students and participate in community exhibits and fairs. These activities can be viewed at the Principal Investigators' home institutions. URL links to their web pages are available at <http://voyager.jpl.nasa.gov/science/principal.html>.

3. ENGAGING THE PUBLIC- PLANS FOR FY04-FY07

The NASA/JPL Solar System Ambassadors Program is expected to expand from its current 275 volunteers (2002) by 15-25% each year with a 4-year goal of 2-3 [3 per state would only be 150 total. 4 year compounded growth would result in 8-11 per state] Ambassadors per state. Voyager will conduct a minimum of one training session each year for new Ambassadors and additional training at significant mission milestones. Ambassadors will be exposed to

key personnel while examining new science results from the Interstellar Mission.

Working with The Space Place team and Project Management, an article highlighting Voyager's 90 AU milestones will be developed and disseminated. Potential audience is estimated to be in the millions. In addition, E/PO materials and exhibits will be rotated two times per quarter to participating Space Place partners, which include rural libraries, zoos, science centers, and museums. Average exposure is expected to be 50,000 people per year at each partnering center.

"Community Nights": Working in partnership with the Arizona State University Mars K-12 Education Department, Voyager will participate in the development of Solar System kits. These kits will be beta-tested in mid-summer 2003 by 100 Girl Scout Troops throughout the United States and will include SEC science and information regarding the interstellar mission.

The portable exhibits which can be loaned to educational facilities, community organizations, and other NASA EPO partners, will be developed. The kit will also include direct information regarding the history of Voyager and the Golden record, activities to use during the exhibit, and directions on the exhibit layout.

Continue to partner with the Deep Space Network (DSN) and other JPL projects in the Barstow Space Expo for educators and students near the Goldstone Deep Space Communications Complex. (Paragraph moved from Conferences/Workshops)

3.1 World Wide Web

The Voyager web site will continue to be updated quarterly.

3.2 Public Information:

Working with NASA/JPL Media Relations office, The Voyager Project Scientist has developed a video animation for news distribution when Voyager reaches the Termination Shock. The project office, working with JPL and NASA media relations, will plan press releases and live shots at the 90 AU milestone.

4. INFORMAL EDUCATION:

Taking direction from the SEC Forum, the Voyager Project will broaden the Student Interview Program to include other SEC missions. The program would essentially create Junior Ambassadors for local school districts. Estimated exposure for SEC missions with a minimum of two student ambassadors per SEC mission per year would be ~100,000 students reached.

By providing opportunities of K-12 teacher training, enhancing curriculum and engaging students in NASA related career fields, the Voyager project plans to support Presidential Executive Order 13021: Tribal College, Tribal Pre College Initiatives. The project will work with the JPL Tribal College Initiative in the Minority Education Initiatives in the Education and Public Outreach Office.

4.1 Conferences/Workshops

Continue to support educational conferences requiring NASA Center presence, i.e., NSTA, CSTA, and Space Congress.

5. FORMAL EDUCATION

The Voyager Project Office, with support from the science teams, proposes an educator workshop at JPL around the 90 AU milestone. This workshop will consist of lectures from team members and classroom activities with the goal of providing educators an explanation and understanding of the termination shock crossing and its significance.

6. E/PO PRODUCTS

The project will develop products to support the education and public outreach programs. These will include, as appropriate, brochures, decals, educational content for web sites, and package paraphernalia for conferences and workshops. Educational products will be distributed through the NASA Education Resource Centers and through distribution to schools involved in the various E/PO programs in which the Voyager project is involved.

7. E/PO BUDGET

The Voyager E/PO budget is small of necessity – it has to be carved from a limited MO&DA budget. The allocated funds will be used for fees to participate in the various partnerships the project will be involved in and to pay for the E/PO products outlined above.

The optimal proposal would include additional funds to create additional products and to increase project participation in other education and public outreach venues.

E/PO budget is embedded in “Other Mission Operations” (Item 2c of Tables I and II) in Appendix I.