

National virtual observatory (nvo): a needs assessment study of the art community

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The results of a needs-assessment study of the Art community recently conducted at CSE@SSL at UC Berkeley - which investigated how large databases of space science imagery and data analysis tools can be used for Education and Public Outreach purposes - have highlighted the artistic community's strong interest for greater involvement and exposure to space science. Artists expressed their desire to have access to space science research and data, and to participate in the process of creating compelling space science related tools and interfaces. New approaches have been suggested by them as regards the presentation of information on a multi-sensorial and intuitive way, all pointing to more effective methods of space science knowledge acquisition.

Art, space science, web design, astronomy, public outreach.

Introduction

The National Virtual Observatory (Hanisch, 2002) — a ten-year initiative sponsored by the National Science Foundation and NASA — will bridge the vast yet separate collections of astronomical data from space and ground-based observatories, providing rapid and seamless access to our knowledge of the Universe. The NVO will enable new modes of scientific investigation and reveal phenomena that have not been detectable to date.

Over the past two years, the SEGway Project at the Center for Science Education @ Space Sciences Laboratory, UC Berkeley, has conducted needs assessment studies of how large databases of space science imagery, spectra and data analysis tools to be provided by the National Virtual Observatory project (NVO) can be used for Education and Public Outreach purposes.

As part of this project, a user requirements study was conducted in 2002, which focused on the needs, interests and demands of the art community (including both traditional-media and electronic-media artists and students, and art-related professionals working in science museums). The rationale for surveying the art community as a potential user of the NVO program encompasses the opportunity to reach out to the non-traditional art community directly, as well as using their recommendations and creative thinking to identify the diverse interests of a segment of the public that would not otherwise be engaged in space science (Spitz et al, 2003).

Methodological aspects

The core research team of this study was composed of one electronic artist and five astronomers. Fourteen invited professionals from diverse art institutions and organizations and science museums in the San Francisco Bay served in the capacity of focus interest group and consultants, who gave on-going feedback during the project.

A national cadre of thirty artists was selected to be interviewed for this survey suggested by the members of our research team, focus interest group and/or by our consultants. Because the NVO is a long-term, ten-year initiative demanding futuristic ideas and innovative tools, a major criterion for the selection of interviewees was their professional expertise in areas such as interface design, scientific visualization, exhibit design, and web-related projects, who would potentially contribute to the project with their updated, broad and futuristic perception of the possibilities and challenges of NVO. Specifically, the

selection of the interviewees was based on the nature and diversity of their art and digital art background, their professional practices, and on the institutions and organizations they represented.

Semi-structured interviews were conducted in consonance with a qualitative methodological approach. We allowed each subject to expand freely on different aspects of the problem. The interviews also aimed at collecting data on the subjects' previous knowledge of space science issues and imagery, and on their interest in space science.

Outcomes and Recommendations

The interviewees' responses reflected their communities' unique perceptions on space science and astronomy and specific needs and demands for tools and data. A cross-analysis of the responses highlighted the following outcomes, which express the interviewees' major desires, requests and recommendations for the NVO project:

- Foster and enable diverse forms and methods of online and offline collaboration between different users and/or groups of users

 - Allow information to be adjusted to users' skills, level of knowledge, needs and interests

- Provide interactive, dynamic tools and activities, as a means of engaging the audience in constructing their own knowledge about space science and astronomy that goes beyond mere acquisition of facts and information

- Provide information on a multi-sensorial way, including as many data dimensions as possible (3D, animations, sound, etc.), as a means of facilitating knowledge acquisition on space science and astronomy

 - Develop specific astronomy-related search engines

- Provide a description of the data sources and of the process, methods and criteria for image creation and manipulation

 - Provide historical, cultural and artistic information on space science and astronomy

 - Provide both virtual (web based) and non-virtual (printed) NVO related materials and information

- Include the participation of artists, science museum professionals and science educators in different stages of the NVO project

- Enable the discussion of philosophical and conceptual issues in the domain of space science and astronomy

- Use NVO to bring back the "moon landing era" excitement of space science and astronomy to the general public

Conclusions

The input and responses we received from the interviewees indicate that artists can play three different and important roles in the NVO project:

Artists as potential NVO collaborators:

Artists have the knowledge and skills to help devise tools, metadata and interfaces in accordance to the needs and expectations of a broad range of audiences. Most of the interviewees have expressed their desire to participate in the process of creating compelling and innovative tools and interfaces. New approaches have been suggested by them regarding the presentation of information and tools, methods for navigating in a more intuitive or pragmatic way, and possible ways of establishing collaborations between users and scientists - all pointing to more effective and appropriate methods of knowledge acquisition.

Artists as potential users of NVO:

Artists have expressed their desire to take advantage of the offerings of the NVO project on a frequent basis, since they believe NVO has great potential in being able to present scientific data in a more interactive and multi-sensorial way, aiming at engaging non-traditional users of space science and astronomy web sites. They understand NVO will provide access to a large scope of space science and astronomical related aspects and issues, providing the audience with a broader and more complete view about the Universe.

Artists as potential promoters of NVO:

Another important role artists can play is as potential promoters of the NVO project. The art community's practice informs the general public on new discoveries, ideas and concepts, and has the potential of multiplying and extending the dissemination of knowledge on space science and astronomy.

It is therefore crucial that these professionals participate in different stages of the NVO project - from the early stages of brainstorming and structuring of preliminary ideas, to the advanced stages of implementing, using and testing resources - so that creative solutions may emerge and be adequately and efficiently developed for use by different segments of the general audience.

Acknowledgements

"Engaging Non-traditional User Communities Through NVO Education and Public Outreach" survey support was provided by The Science Education Gateway II program, a NASA - Applied Information System Research Program (AISRP) Grant, NAG5-10314, to the Space Sciences Laboratory of UC Berkeley.

The author would like to thank to the other members of the core research team, to the consultants, to the Focus Group and for the interviewees for their time and input for this project, and to Darlene Park for her careful transcription of interviews and Karin Hauck for her editorial help. She would like to thank Pontificia Universidade Catolica do Rio de Janeiro (PUC-Rio, Brazil) for her sabbatical leave, during which this research was conducted.

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