Proposal Number:	1062572
NSF Program:	Advances in Biological Informatics
Principal Investigator:	Cushing, Judith B
Proposal Title:	Collaborative Research: ABI Innovation: RUI: From Data to Knowledge in Grand Challenge Environmental Science Research: The VISualization of Terrestrial-Aquatic Systems (VISTAS)
Panel Recommendation:	Outstanding

Panel Summary:

INTELLECTUAL MERIT

Strengths: The 3D visual system proposed here would contain more data options and connectivity than existing GIS visualization tools. The panel felt that rapid 3D visualization would make a significant contribution to biological fields ranging from ecology to resource management. The universality of the system would likely also impact fields outside of biology. The interdisciplinary team assembled for this project is impressive. The panel was particularly impressed with the social science component that studies interactions among people through the process of technology development.

Weaknesses: The PIs may have underplayed the potential problems with data heterogeneity. It was unclear how many data types the system could import and how they will be displayed.

BROADER IMPACTS

Strengths: The broader impacts of this project are very strong. In addition to the contribution to the scientific community, the project will actively involve middle school students (especially girls) and both students and faculty from the Native American Studies program.

Weaknesses: The panel did not identify significant weaknesses in broader impacts.

Responsiveness to review criteria specific to innovation or development: The project met the requirement of both the RUI and ABI Innovation calls for proposals.

Summary and basis for recommendation: The panel was unanimously impressed with this well-crafted, innovative, integrative and timely proposal.

This summary was read by the assigned panelists and they concurred that the summary accurately reflects the panel discussion.

[The *Panel Recommendation and Summary* above was written by the NSF Review Panel. Three reviews independent of the above summary, from individual panel members, were completed prior to the panel discussion of the proposal, and follow below.]

Review #1

Rating: Excellent

What is the intellectual merit of the proposed activity?

Strength

This proposal aims to develop visual analytics that span spatial and temporal scales, and has three objectives: 1) Conduct EcoInformatics research to enable the required visual analytics and implement proof of concept software tool (VISTAS); 2) Co-develop VISTAS with environmental scientists who will use it in studies spanning spatial and temporal scales; and 3) Apply social science methods to study the co-development and usability of VISTAS and its visual analytics. A newly created six-member panel, The Northwest Computer Science Consortium to Enhance the Study of Climate Change, will advise PIs and enlist the CS research community in the project. This is an ambitious proposal which is well-written and well documented. The topic is extremely important. The research and work plans are well documented. If successful, the project would be used by a wide variety of ecologists. The team is excellent and productive. In and of itself VISTAS, is successful, would be of tremendous use. A unique aspect of the proposal is the social component, which not only will investigate which visualization works for which purposes, and with which audiences, but also will investigate what makes the development of such tools successful, and how to train domain and computer scientists to that end. The proposal is generally well-written and most aspects are well documented. The interdisciplinary team is outstanding.

Weaknesses

Due to the complexity of the proposal, some important sections on the tool development are necessarily short and do not describe all details.

What are the broader impacts of the proposed activity?

Strength

All aspects of the educational plans are excellent. The program would benefit from the collective experience of the PIs and of existing programs.

Weaknesses

Having measures of success would have been nice.

Summary Statement [none]

Review #2

Rating: Excellent

What is the intellectual merit of the proposed activity?

The proposal describes development of VISTAS, a visualization tool for complex spatial and temporal ecological data. The PI has laid out clear objectives and measurable outcomes. An experienced interdisciplinary team has been assembled for the project. Success of the tool with particular audiences (e.g. scientists, policy makers, students) will be assessed using social science inquiry. The feasibility has been demonstrated with a pilot project.

What are the broader impacts of the proposed activity?

The tool could be used by a variety of audiences. The outreach to middle school girls and Native American students is well justified. There is a clear plan for dissemination and technology transfer.

Summary Statement

With the carefully laid out plan and the team that has been assembled, the probability of successful outcomes for this proposal is high.

Review #3

Rating: Very Good

What is the intellectual merit of the proposed activity?

The proposal supports the development, application and study of VISTAS, a flexible data integration and visualization system. This system will circumvent challenges associated with assembly of heterogeneous data and multi-type, multi-scale visualization. The pilot applications will center on the H.J. Andrews Experimental Forest, and will be conducted by 5 affiliated groups and five additional solicited researchers. The proposal includes a strong social science component that will evaluate the process of creating and using VISTAS through a series of formal interviews as well as observation of development and user trials. The project proposes a strong organizational and review structure, featuring annual panel review. The proposal has high potential to increase accessibility to and the 'explorability' of complex environmental datasets.

I felt that the main weakness of the proposal was that the CI development component may under-play the challenges associated with data integration – a flexible, portable system is proposed and data heterogeneity will be problematic. A formal data ontogeny is implicit but not elaborated here. Data processing and transformation will also be not-insignificant components of a fully functional system, and should be handled in a robust, extensible way to maximize the future utility of the system.

Distribution of VISTAS as a desktop application will be adequate for researchers, but will likely limit its usefulness to the non-research community.

What are the broader impacts of the proposed activity?

Broader impacts of the proposal include development of tools that will be distributed through community clearinghouses, development of new curriculum, and integration of results in two established programs that engage middle school girls and Native Americans in science. The project will convene a review and advisory board, and together with the social science research component of the project this should lead to better understanding of the uses challenges to creating science visualization CI.

Summary Statement

This is a well-structured project by a team of experienced PIs that promises to advance the ability of researchers and non-scientists to access and visualize complex environmental datasets. It proposes a wide-reaching plan that could lead to fundamental advances in a number of areas, but some challenges related to the actual development of a widely useful software system may be undersold.