

Biodiversity and Ecosystem Informatics Research, Technology Transfer, or Application Development?

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Panelists

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At VLDB 2000, a keynote speaker and a panel session urged database researchers to help solve critical problems in biodiversity informatics. A subsequent Spring 2001 report of a National Science Foundation Workshop on Biodiversity and Ecosystem Informatics (BDEI) suggested that the next-generation CS/IT applications that would be needed to understand complex, ecosystem-scale processes would require significant, ground-breaking CS/IT research¹.

Considerable interest in this application domain has materialized, but as Maria Zemankova, NSF Program Officer, reported to the BDEI Workshop organizing committee after a talk at the National Library of

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¹ See <http://bio.gsfc.nasa.gov/>

Medicine: definitions of key terms and the list of research issues were not immediately "jumping out". Some have even suggested that the BDEI report is on the "nice" side rather than "hard-core". In short, before researchers or funding agencies get involved, they want to know more detail about how current research would transfer to this domain, and whether there are genuine research issues, or "just" complex application development. Certainly, at the time the BDEI report was written, we knew that there were domain problems, not what research might be required. In other words, we could identify general research areas, but not articulate specific research details. Some have asked whether these (admittedly critical) domain problems need:

- original research
- off the shelf applications or different (general) DBMS
- organizational infrastructure for supporting data re-use
- training for ecologists to use technology that already exists
- more ecologists to do the domain research

Workshop participants felt that it is not possible to look at these problems in a cursory fashion and decide whether research would be required to solve them – that one must actually try. Thus, in the summer of 2001, the NSF granted \$1.25 million in grants to fifteen researcher groups (see attached table) to initiate planning projects and research initiation efforts in BDEI. By summer of 2002, the principal investigators might be in a position to determine whether the projects they have outlined in the proposal require original research and if so, what is the nature of that research. Two of the panelists are principal

investigators on those NSF BDEI grants and will report on these issues; two other panelists will look at these issues from a fresh perspective.

This panel will report back to the VLDB on the nature of issues in this domain. Using one or more concrete examples of BDEI (or other) funded research, panelists will present their views of where the work lies with respect to database issues (e.g., conceptual modeling, spatial and temporal databases, metadata, data mining, data integration) and whether the work constitutes 1) work in the domain by ecologists, e.g., training in existing technology, infrastructure for community databases or to support reuse, or more

ecologists doing field work, etc., 2) applying existing DBMS technology, 3) applying existing DBMS research to create new technology, or 4) original DBMS (or other CS) research.

- [1] <http://bdi.cse.ogi.edu>
- [2] <http://bio.gsfc.nasa.gov/>
- [3] <http://www.all-species.org/content/AllSpeciesResolution.pdf> at <http://www.all-species.org/>
- [3] <http://www.ecoinformatics.org>
- [4] *Science*, Vol. 294, 7 Dec 2001, 2099 – 2101
<http://www.sciencemag.org>

Principal Investigator	Title
Beard-Tisdale U of Maine	Event And Process Tagging For Information Integration for the International Gulf of Maine Watershed
Bergen U of Michigan	Radar Remote Sensing of Habitat Structure for Biodiversity Informatics
Bowker U of Cal San Diego	Designing an Infrastructure for Heterogeneity of Ecosystem Data, Collaborators and Organizations
Clark Duke U	Computation and Uncertainty in Ecological Forecasting
Cushing Evergreen St. College	Spatial Data Infrastructure for Ecological Research (Planning Grant)
Dickerman VPI	Bioinformatic Prediction of Functions of Unculturable Microbes in Ecosystems
Doruska U of Arkansas	Quantifying Forest Ground Flora Biomass and Diversity Using Close-Range Remote Sensing
Flikkema Northern Arizona U	Reconfigurable Wireless Sensor Networks for Dense Spatio-Temporal Environmental Monitoring
Gauch U of Kansas	Biodiversity Information Organization using Taxonomy [BIOT]
Henebry U of Nebraska-Lincoln	Spatio-temporal Models of Biogeophysical Fields for Ecological Forecasting: A Cross-Disciplinary Incubation Activity
Lane Acad Nat Sci of Phila	Overcoming nomenclatural complications while searching in a distributed database environment: One step toward true interoperability
Musavi U of Maine	Planning Workshop on Biodiversity and Ecosystem Informatics for the Indian River Lagoon, Florida
Stevenson U of Mass Boston	The Eco Flight Simulator: Visualizing landscape patterns, ecosystem processes and biodiversity information
Stevenson U of Mass Boston	Planning a Community Science Approach to Biodiversity Monitoring: Extending the Spatial and Temporal Scales
Villa U of Maryland	Towards an Operational Semantics of Biological Diversity: Integrating Structure and Function in a Web-accessible Knowledge Base

Table 1: NSF BDEI Research Initiation and Planning Projects (Summer 2001)