Computer models play a central role in meeting the science challenges facing hydrology and other water-related sciences because we need them to test hypotheses, and ultimately to provide simulations that guide policy and decision making. Despite their importance, aspects of simulation tools are far from ideal and this has motivated recent workshops and projects to seek improvements. The Community Surface Dynamics Modeling System (CSDMS) project, and the proposed Community Hydrologic Modeling Platform (CHyMP) are pursuing ways to advance scientific discovery by developing new computational models. OpenWEB is a project in Europe designed to create new models by linking components with OpenMI. Those efforts share a common theme in that they seek to develop new simulation capabilities. We propose that existing simulation capabilities are under-utilized and that significant advances can be realized simply by *improving access and usability of existing resources*. This would increase the value of a huge body of electronic resources, and it would compliment projects, like CSDMS, CHyMP, and OpenWEB, by improving accessibility of the innovations they develop.

The objective of this project is to create web-based, collaborative infrastructure for science and engineering fields broadly related to water. The new website will be called *HydroHUB*. The primary mission of HydroHUB is to improve access to, and usability of available resources for research and education in water-related disciplines. For example, the site will provide the ability to run simulation codes interactively through an ordinary web browser. Any code deployed on HydroHUB can be run by anyone with permission who has access to the internet. The codes will be contributed by the community and selected from model repositories operated by federal agencies, national labs, professional societies, and other sources. This will create a comprehensive library of water-related simulation codes, all of which can be run interactively. Moreover, the codes can be transparently dispatched to Open Science Grid, the TeraGrid, and other participating computational resources, providing a highly scalable computational backend that will facilitate access to high performance computing. Thus, HydroHUB will improve access to modeling resources, while providing a simple way for code developers to contribute to a community-wide simulation capability. Both model users and model developers will benefit.

HydroHUB will also improve teaching by providing resources to run codes in the classroom that can then be used by students after class. The teaching/learning resources will go far beyond simulations, however, because the site will also provide multimedia materials (e.g. voice + powerpoint, or video) from college courses, workshops, named lectures, continuing education courses, and the like. Learning will also be facilitated by a Model Gallery, where calibrated models are described and tagged so they can be studied by other investigators for ideas and calibration data in their own models.

The site will be built by integrating the best available software solutions. The primary architecture will be constructed from HUBzero technology, a software platform developed with NSF funds that is ready to deploy today. Capabilities will be expanded by collaborating with the CSDMS project to develop a shared, cooperative repository of codes, and to bring new simulation capabilities on line.

The community has come together in four recent workshops that concluded community activities are key to improving modeling capabilities. It has spoken specifically about HydroHUB in a recent survey we conducted to learn more about the needs and interests. More than 150 scientists responded to the survey and their collective voice was clearly in support of the concept of the site. The survey also provided detailed information that will guide the initial design and construction of the site toward meeting community needs.

The **intellectual merit** of this proposal is that it will improve access and communication, and reduce the time required to learn new simulation capabilities in water-related sciences and engineering. This will benefit model users by providing more time to pursue science, and it will benefit model developers by advancing the impact of their codes. Nearly everyone in the broader hydrology community uses or develops models, so the benefits of the proposed project will be widespread.

Broad impacts of the proposed project include advancing the training and education of anyone, from K-12 through college students, professionals, and the general public in water-related science and engineering. The site will be a focal point of on-demand streaming educational material explaining the simplest concepts to the most advanced theories about water to a worldwide audience.