



GIScience Knowledge Web

UCGIS Executive Committee,
Board, and Committee Chairs
on behalf of the consortium

GIScience 2008
Cyberinfrastructure Workshop
September 23, 2008



GISKW document collaborators

Officers

- President: Robert McMaster, University of Minnesota
- President-elect: Timothy Nyerges, University of Washington
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- Education: Steven Prager, University of Wyoming
- Research: Dawn Wright, Oregon State University
- Policy and Legislation: Greg Easson, University of Mississippi
- Research Projects: Tom Cova, University of Utah
- Membership: Andre Skupin, San Diego State University
- Sponsored Projects: A-Xing Zhu, University of Wisconsin, Madison
- Nominating: Sean Ahearn, Hunter College, City University of New York
- Young Scholars: Tarek Rashed, University of Oklahoma

Interested delegates



Outline

- About UCGIS
- GIScience Knowledge Web – GISKW
 - 3 components for leveraging opportunities
 - Body of Knowledge
 - Research Workshops
 - Model Curriculum
- Relationship to cyberinfrastructure
- Next Steps



About UCGIS

- Premier research and education organization in the US for GIScience
- 77 member (as of June, 2008) universities and colleges, federal agencies and industry partners
- Delegates are the representatives of the member institutions



UCGIS Mission

Three primary functions, to....

- (1) serve as an effective, unified voice for the geographic information science research community,
- (2) foster multidisciplinary research and education; and
- (3) promote the informed and responsible use of geographic information science and geographic analysis for the benefit of society.



UCGIS

Researchers and Educators

- address complex scientific questions at a wide-range of spatial and temporal scales.

Some examples...you can suggest your own...

- global change in relation to regional social, economic, and ecological sustainability
- Increasing fragility of environmental health systems
- regional food security tied to dynamics of regional economies
- other space and time problems of geo-significance



What we all know...

pervasive increased use of geographic/geospatial/geo...

- data,
- information,
- evidence, and
- knowledge

...to foster understanding and explanation

...often in interdisciplinary ways



Geographic Information Science (GIScience) Knowledge

- ... for research and education
- ... develops as interplay among data, information, and evidence
- ... forms a *GIScience Knowledge Web (GISKW)*
- ...to support explanation and understanding



Vision for GISKW...

- update the UCGIS-developed GIScience and Technology (GIS&T) Body of Knowledge
- develop an on-line UCGIS research agenda motivated by and motivating research workshops - organized by the research committee
- develop a model curriculum activity - organized by the education committee
- take advantage of the National Science Foundation's Cyberinfrastructure Vision for 21st Century Discovery.



GISKW

as a knowledge infrastructure takes advantage of UCGIS' experience with organizing and developing...

- 1) Research Agenda book
 - 2) GIS&T Body of Knowledge (BoK) monograph
 - 3) Research workshop monographs
- ...a cyberinfrastructure opportunity



UCGIS activities result in valuable products...

- McMaster, R. B., and E. Lynn Usery. 2005. *A Research Agenda for Geographic Information Science*, CRC Press, Boca Raton, FL.
- DiBiase, D., M. DeMers, A. Johnson, K. Kemp, A. Taylor Luck, B. Plewe, and E. Wentz 2007. *Geographic Information Science and Technology Body of Knowledge*, Association of American Geographers, Washington D.C.
- Yuan, M. and Stewart Hornsby, K. 2007. *Computation and Visualization for Understanding Dynamics in Geographic Domains*, CRC Press, Boca Raton, FL.
- Stewart Hornsby, K. and Yuan, M. (eds.) 2008. *Understanding Dynamics of Geographic Domains*, CRC Press, Boca Raton, FL.



NSF's Cyberinfrastructure Vision for 21st Century Discovery

...promotes scientific discovery and innovation in four areas:

- 1) high performance computing,
- 2) data, data analysis, and visualization,
- 3) virtual organizations for distributed communities, and
- 4) learning and workforce development.



CI-based GIScience examples...

- GIScience research as high performance computing
 - GEON, GISolve, and many others
- GIScience research as data, data analysis and visualization
 - links to the spatial data infrastructure (SDI) and metadata efforts
- UCGIS as a virtual community of interdisciplinary research and education scientists
 - an organization of organizations doing transdisciplinary work
- GIScience education as learning and workforce improvement
 - BoK being used in recently NSF-funded National Geospatial Technology Center of Excellence, whereby a 2-year to 4-year college transition option for geospatial education will be articulated.



CI-based GISKW for research and education...

- generating and vetting a next generation research agenda that links to the BoK
 - systematizing approaches to interdisciplinary research
 - developing education models bridging 2-year to 4-year programs
 - systematizing approaches to interdisciplinary education
 - moving cutting-edge research into applications and education
 - disseminating software systems from research into education
 - evaluating software systems that work and describing why
 - increasing the intellectual capacity of member organizations to more effectively compete for resources
- ...enabling researchers and educators to collaborate more effectively



GISKW...three components

- BoK - Research and Education
- Workshops and Agenda - Research
- Model Curriculum - Education



GISKW BoK R&E Component

Short-term Developments

- a connection between GIScience research and education activity
- enhanced Wiki-like Citizendium, transforming the current BoK from static document to dynamic web-based document; but unlike the anonymous, non-vetted authorship of Wikipedia
- Virtual environment for knowledge building, problem solving and intellectual discourse
- Managing editors being sought
- Spring 2010 completion – AAG is the publisher



GISKW Research Component

Short-term Developments

- Support for multidisciplinary research workshops
 - research workshop topics
 - Updated research agenda chapters tied to workshops
- Support Interdisciplinary research teams
 - How does GIScience play the role of “glue”?



GISKW Research Component

Medium-term Developments

- Executive Summaries of UCGIS Research Agenda Topics
 - timely, updated research material linked to workshops
 - “Research Showcase” - a summary of completed research;.
- Application Booklet
 - Communities of Practice for application topic areas
- GIScientists Expertise Directory
 - directory to find member GIScience expertise; searchable with keywords
 - “Ask a GIScientist” feature
- UCGIS Publications
 - Information and direct links to UCGIS books, workshop reports, related National Academy of Science reports
 - Open journal of GIScience



GISKW Research Component

Long-term Developments

- Repository for testbed datasets and algorithms; software code for research, undergraduate and graduate labs and seminars as well
- Make algorithms accessible in java, freely available, creation of software infrastructure; building apps with algorithms that are then peer-reviewed
- *Spatializations of the Knowledge Web* – spatializations of academic disciplines and other abstract information spaces to show which topics and trends are rising and falling within a discipline



GISKW Education Component

Short-term Developments

- Model curriculum version 1
- Concepts not addressed in BoK v 1.0 in cooperation with BoK v 2 development
- 2-year to 4-year college transition options



GISKW Education Component

Medium-term Developments

- Existing real/virtual community of multidisciplinary GIS scientists from the 77 member institutions
- Curriculum models and pathways (templates) for two-year community colleges and four-year colleges
- On-campus program certification
- Examine coherence of programs
- Testbed datasets, smaller in size than research datasets.



GISKW Education Component

Long-term Developments

- *Model Curricula 2.0*
- Substantially more involved reformulation of both the BoK and the whole model curriculum v 1 concept.
- Capacity-building infrastructure implemented in both an evaluative and planning capacity.
- Capacity to produce/analyze/evaluate pathways
- Interface would allow for the description of everything from curricular content to progression through the material.
- Learning objectives serve as basis for supporting self-evaluations for individuals and/or institutions
- Envisioned interface and objectives would appeal to employers; identify GIScience relevant to operation.



GISKW Information Architecture

- Envisioned to consist of primary and secondary organizing strategies...
 - Primary organization based loosely on the BoK, where one navigates through a hierarchy of domains within the field. BoK contains the major domains of GIScience knowledge.
 - Secondary organizational structures are based on the resources that the system provides.



GISKW architecture supports...

- Open exchange of ideas that facilitate development and operation of (interdisciplinary) research teams
- Open exchange, development, refinement, and operation of (interdisciplinary) education models spanning campuses, disciplines, departments, colleges, and universities
- Broad, multidisciplinary GIScience teaching and research community; links to industry about state of knowledge
- Open input from many users, but at the same time has an element of peer review/quality control



GISKW architecture details...

- Not specified as yet
- Service-oriented architecture is a clear a candidate
- What do you think it can/should be?
- Basis for a major NSF proposal



UCGIS seeking partners for three component effort...

- Institutions partner and individuals team
- National Science Foundation because of the CI potential for research and education
- Federal and state agencies and industry partners with similarly shared research/education interests...
 - USGS National Mapping Division has been supporter of UCGIS activities over the years, particularly for junior scholars.
 - National Geospatial Intelligence Agency sponsored the successful geographic dynamics workshop (Stewart Hornsby and Yuan 2008, Yuan and Stewart Hornsby 2008).
 - Environmental Systems Research Institute and Intergraph have been significant research and education partners over the past decade.



Immediate-term Next Step Discussions

Proposal opportunities for three components...
one or more proposals for each...

- BoK
- Research Workshops
- Model Curriculum

...discussion later this afternoon



Near-term Next Step Discussions

- UCGIS 2009 February meeting
- NSF visitation to discuss proposal efforts
- Presentation of proposal efforts



Thank you
Comments/Questions

