GIScience Knowledge Web

UCGIS Executive Committee
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Interest in geospatial data, information, evidence, and knowledge continues to experience world-wide growth as such interests address our need for understanding of ever more complex problems. Among such problems are global change in relation to regional sustainability, or environmental health and environmental systems that change across various spatial and temporal scales, or regional food security tied to regional economies that change with the dynamics of resource availability to name only a small number in relation to the need. Natural and technological hazards in light of local and regional governance challenges send perturbations through complex systems with tremendous amplifying effects for considerable time to prolong disasters. Knowledge of the systems, about what to do, and of unexpected outcomes are all challenging given our current state of how we work with knowledge. Knowledge of how to organize the knowledge is even more challenging. GIScience knowledge developed from the interplay of data, information, and evidence forms a *GIScience Knowledge Web* (GISKW). GISKW is difficult to characterize using narrowly-defined approaches. Hence, diverse perspectives are required for composing a knowledge web, particularly when such knowledge attempts to foster shared understanding about complex science-society problems.

Why should members of UCGIS take an interest in a GISKW? A GISKW could link an on-line version of the UCGIS research agenda (research) and the GIS&T BoK (education) with NSF's Vision of a DataNet. Creation and publication of the UCGIS Research Agenda was the first major activity to bear substantial fruit for UCGIS members and beyond (McMaster and Usery 2005). The process of creating the agenda was probably as beneficial to members as the final result – published in book form. The GIS&T Body of Knowledge monograph edited by the education committee editorial group was the second major product (DiBiase et al. 2007). A third was product was a research monograph about geographic dynamics (Yuan and Stewart Hornsby 2008). Those three products continue to provide value to the GIScience community and others. What if members of UCGIS could develop and use a digital platform to sustain this focused effort and at the same time spin off topics that gain strength on their own? An environment similar to that suggested in the National Science Foundation call for a "DataNet" is one way to generate such synergy (NSF 2008). A Geospatial DataNet could be a component, a first step, and in fact perhaps the foundation, of the GISKW. NSF's vision of a DataNet is the next logical step of data infrastructures, whereby data is seen as all digital products in need of data curation and preservation. Digital products of many types are resources at the core of teaching, research, and service that involve information, evidence, knowledge and understanding.

The National Science Foundation research initiative called DataNet supports curation and preservation of digital information – all types of information. By the end of 2009, five DataNet partners' projects will have been selected to move the country forward with digital data curation. What institutions will form the beginning basis of DataNet partners will not be known until early September 2008. However, it can be said that a need for broad-based and easy access to geospatial information products is shared by all UCGIS members. The spatial data infrastructure and metadata efforts of the past decade are aligned with that effort, but they have not gone far enough. Geospatial datasets on campuses across the country support teaching and research

activities in major ways. Forming a UCGIS DataNet is a way to learn from the NSF initiative and at the same time provide insights about the needs for geospatial data curation. Having access to versions of geospatial data has been long sought after. The continued interest in spatial-temporal data analysis and data models makes the current time an appropriate time to embark upon a grand challenge of geospatial information science; how can scholars and those influenced by geospatial scholarly activities, handle spatial-temporal data more efficiently, effectively and equitably than we do now? The GIS&T Body of Knowledge is itself an underpinning of cyberinfrastructure; it is a basis of a GIScience Knowledge Web (call it Geographic Information Science, Geospatial Information Science, GeoInformatics or other).

Through this initiative, UCGIS has an opportunity to improve the "value" it provides to its institutional members. Delegates who represent institutional members are finding it increasingly difficult to justify membership dues and participation in UCGIS. Members need a reason to engage. The increment of time invested for an individual costs a lot more than what is returned. UCGIS must find a way to leverage contributor's time, so that the synergy benefit created is of higher value than the time cost in making the contribution. An overarching initiative that can provide many avenues for engagement is what UCGIS call the GIScience Knowledge Web, with a foundation based upon a Geospatial DataNet.

A GISKW, like the DataNet effort, can find its foundation in digital libraries. Libraries have always been the foundation of knowledge in society. A new kind of digital library should provide a foundation for moving knowledge into action in research, education and service. Geospatial data play a significant role in most GIScience areas of study and education. Making the connection between research and education in UCGIS is important for contributing to the foundation of geospatial information sciences – plural rather than singular given the diversity of the field. It is a grand challenge. GRID computing is improving access to high performance computing as part of a recent NSF grand challenge. Democratizing access to data through a DataNet is an NSF grand challenge as well – compute cycles and data. Democratizing access can support more diversity in complex systems science as a grand challenge. Digital Earth development can be considered a part of that grand challenge, and in fact is most like at the core of complex systems science on across spatial-temporal scales.

References

NSF (National Science Foundation) 2008. Sustainable Digital Data Preservation and Access Network Partners (DataNet) http://www.nsf.gov/pubs/2007/nsf07601/nsf07601.pdf

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.

M. Yuan and K. Stewart Hornsby 2008. *Computation and Visualization for Understanding Dynamics in Geographic Domains*, CRC Press, Boca Raton, FL.

GIS & T: B of K 2.0

A Cyberinfrastructure approach

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GIS & T: B of K 2.0

- UCGIS is proposing a new version of the GIS & T Body of knowledge called GIS & T 2.0 Wiki
- The idea is to transform the current GIS & T which is static by nature of the medium (i.e. book form) into a dynamic web-based Wiki 2.0.
- The vision is to create a virtual environment for knowledge building, problem solving and intellectual discourse in the field of Geographic Information Science and Technology.

Goals

The project would accomplish two goals:

- it would lead to the creation of the GIS&T Wiki 2.0 which would not only fuel advancements in the field but would act as a continuing source of knowledge, information, training and state of the art developments for academia and the federal government.
- it would act as a capacity building program for agencies in the field of GIS & T

Plan

- Three phases for the GIS & T Wiki 2.0
  - **planning**
  - **implementation**
  - **continuing development**

Planning Phase

- In Phase I we will convene a planning meeting of UCGIS and agency personnel to discuss the ontology of the GIS& T, the structure and function of the Wiki 2.0 environment and the organizational structure of the management GIS&T Wiki 2.0 team.
- At this meeting ”Editors” would be chosen to manage different domain knowledge which would be contributed to by the broader UCGIS community.
- Of central importance is how to accomplish the twin goals of creating the GIS&T Wiki 2.0 and insuring capacity building for participating agencies.

Implementation

- The idea is to use a series of workshops that have the dual purpose of developing aspects of the GIS&T while simultaneously acting as capacity builders for agency personnel (Figure 1).

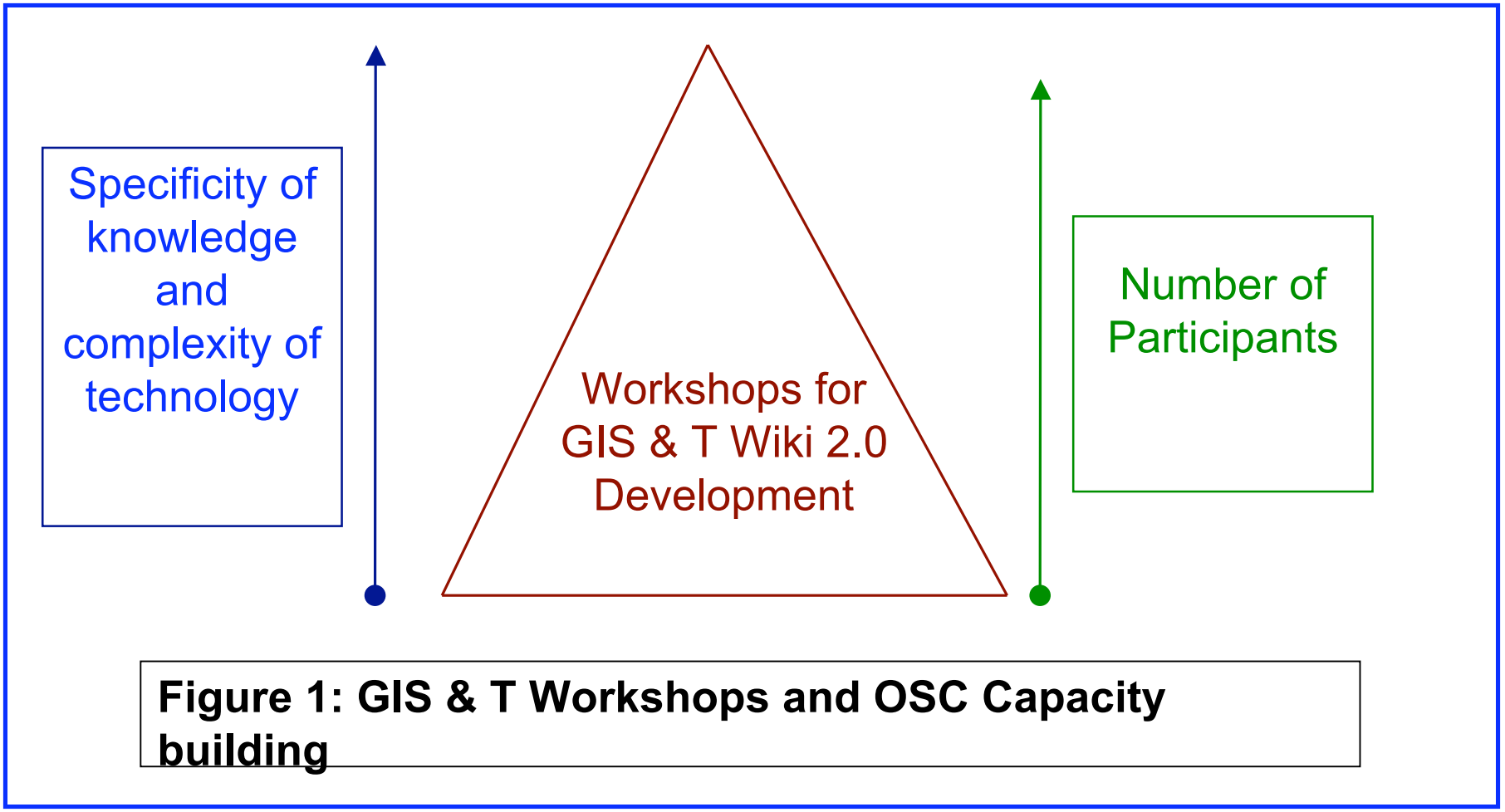

Figure 1: GIS & T Workshops and OSC Capacity building

Why UCGIS?

- Existing real/virtual community of multidisciplinary GI Scientists from 77 research institutions
- GIS & T body of knowledge and its anchor in the model curriculum
- R,W & A

GIScience Knowledge Web

UCGIS
Executive Committee

UCGIS Summer Assembly
Minneapolis, MN
June 23, 2008

Irony for UCGIS?

- Geospatial information development and use continues world-wide
- Many member institutions are challenged to justify dues
- Attendance at meetings is the same (or perhaps down) from previous years

Why the irony?

- Too many competing activities for peoples' attention, given the cost to get to meetings?
- Not enough interest in UCGIS initiatives?
- Other?

UCGIS as an Organization…

UCGIS Mission

- foster discussion of GIScience research, education, and service activities
- something different than most geospatial-oriented professional organizations

UCGIS Activity

- provide a “platform” for GIScience discussion among member institutions
- synergize research, education, and service activity within member institutions and UCGIS-wide

Successful discussions 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 in Geographic Domains*, CRC Press, Boca Raton, FL.

Each recognized and anticipated information needs.

NSF DataNet…
a new platform using cyberinfrastructure

- 2008-2009 Program sponsored by Office of Cyberinfrastructure (OCI) and Computer, Information Science, and Engineering (CISE)
- Wide-ranging digital information products for researchers and society
- foster preservation and access to digital products (data, documents, models, etc.)
- 5 DataNet sites nationwide by September 2009

UCGIS Knowledge Web

- NSF DataNet initiative points to way of treating information products
- develop a mechanism for knowledge generation to support UCGIS activity
  - GIS&T Body of Knowledge development
  - 4 UCGIS research workshops identified to jump-start a revised research agenda
- DataNet foundation for UCGIS Knowledge Web
  - One or more DataNet sites could/would likely be a partner

Recent UCGIS initiatives…

- GS.Net – Geospatial Security Net: funds not easily available through earmark
- Open Geospatial Consortium – GIScience Wiki: funds went to Iraq activity
- Both similar to the Knowledge Web idea, but narrower in scope

Multiple legs needed for a knowledge web platform

- Infrastructure – a method for stimulating discussion that scales
- Themes – topics of current and future significance
- Products – information that people (researchers and others) can use

Discussion

- Open for discussion…now

- Further discussion and initial proposal idea development at GIScience 2008, Cyberinfrastructure Workshop, Park City, Utah, September 23, 2008