Position Paper: CyberGIS and the GIS&T Body of Knowledge

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The recent evolution of geographic information science and technology (GIS&T) has been characterized by diversification in nearly all respects, whether regarding the level of centralization or distribution of computational resources, the range of computational devices, the degree to which software code is made public, or the feature and performance expectations among different constituencies. In order to fulfill its promise to serve as the foundation of a reference system for the actors, activities, and artifacts of the GIS&T domain (Ahearn et al 2013), the GIS&T Body of Knowledge (BoK) has to reflect this diversification of approaches and viewpoints. One such approach and viewpoint is that which postulates the existence of a coherent subdomain that has variously appeared under such titles as CyberGIS, cyberinfrastructure-enabled geographic computing, and others. For the purposes of this position paper, I will use the term CyberGIS, leaving open the question to which degree it is truly distinct from "conventional" GIS, as opposed to being inextricably linked to it via evolutionary, conceptual, and organizational ties.

Perhaps the cleanest and easiest way to capture CyberGIS's internal conceptual structure would be to deploy certain elements of a recent project aimed at developing foundations for the evolution of the GIS&T BoK (Ahearn et al, 2013). For example, the BoKWiki component (http://gistbok.org/) could be deployed in one of two ways:

(a)   starting from an empty BoKWiki shell, CyberGIS practitioners could collaboratively develop a concept structure of the CyberGIS domain

(b)   starting with the BoKWiki representation of BoK1, the conceptual structure of CyberGIS could be developed in conjunction with ongoing BoK evolution

While the cleanliness and clarity of the first option are attractive, I would argue that it is more appropriate for a domain for which there could be reasonable agreement in the community on it being conceptually *distinct* from the existing conceptual structure of the GIS&T domain. A topic like sustainability, for example, could reasonably be approached like that. However, for CyberGIS the second option seems ultimately more useful, since embedding the articulation of its conceptual structures within the evolution of the BoK would help avoid the sometimes accidental, sometimes willful ignorance of existing theory and practice that has recently accompanied certain neologisms in the vicinity of GIS&T.

The nature and specific structure of the relationship between CyberGIS and the remainder of the ever-evolving GIS&T domain is an important research question in itself. That is already true in the case of a wikified environment aimed at eliciting the internal knowledge of the domain community, but the issue becomes crucial when one wants to engage highly computational means to capture evolving knowledge structures. Considering the wide disciplinary reach of GIS&T, including CyberGIS, it is crucial to combine the internal knowledge captured from individuals with conceptual structures extracted from the externalized knowledge held in domain artifacts. Contemporary natural language processing (NLP), neural computing, and visualization can be usefully leveraged to that end, even for much larger domains

(Skupin 2013). However, if the goal was to model both the internal structure of CyberGIS and its relationship to the broader domain, then I would propose as a first step the creation of a CyberGIS-tagged corpus of GIS&T artifacts. This would be the result of a predictive model, with a classifier specifically aimed at CyberGIS. The very process of creating this predictive model would be useful in gaining an understanding of how well delineated CyberGIS is internally (i.e., through the eyes of its professed practitioners) and externally (i.e., as seen by the broader [GIS&T] community). It may well turn out – absent of an existing study I have to speculate on this – that there is indeed a distinct intellectual *core* to CyberGIS, the internal structure of which could be inserted into the BoK. Meanwhile, delineating a possible CyberGIS *periphery* through the creation and application of a CyberGIS classifier could be the basis for elaborating linkages between CyberGIS and the GIS&T BoK and thereby allow positioning the former in the latter.

References

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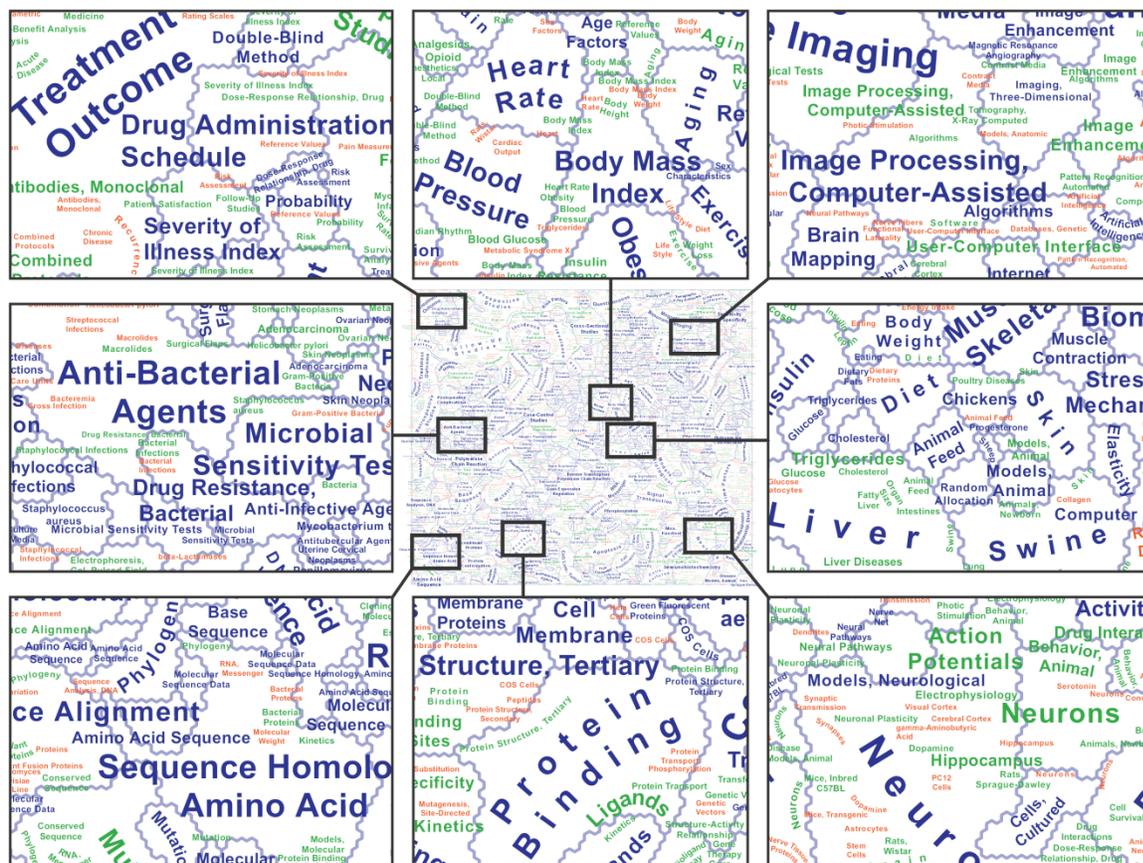
Figure 1. Example for how the topical structure of a large knowledge domain can be explicated through a combination of natural language processing, neural computing, and visualization (from Skupin et al. 2013).