Spatial thinking across the disciplines may mean that spatial thinking is a well-defined thing that can be brought to bear on different disciplines, a hammer that can pound any nail. But what then is this mental procedure? Or perhaps it is not really a definite method at all but an attitude, an interest in how space and place might figure in one’s own disciplinary territory? In the broad range of the humanities there is evidence for both possibilities. Somewhat counter intuitively an example of the latter is the use of “place” in science studies to historicize early modern science, and an example of the former is a data-driven analysis of the rise of the novel in comparative literature. History, like geography itself, can accommodate both humanistic and data-driven approaches. My interests have been oriented toward approaches that will allow us to use location, distance, and scale in the analysis of in large quantities of data so that we can see change taking place across the landscape through time.

An interest in integrating space and time, as a kind of marriage of history and geography, led an interest in technologies for collecting, analyzing, and visualizing large amounts of historical data with spatial attributes; to GIS, in short. It is often held that GIS technology is merely technology, that, while it may be a sophisticated hammer, its purpose is still to pound nails. Against this I would side with the view that great advances in knowledge take place not only through shifts in conceptual paradigms and increasing specialization, but also through the spread of tools that allow us to see more than we could before. Like the microscope and telescope, GIS is a tool, but one that is particularly appropriate to a digital world and changes how we think about the world by allowing us to see more than we could before.

In the six years of its existence Harvard’s Center for Geographic Analysis has been bringing the technologies of geospatial analysis into disciplines where they had little purchase in the past and teaching a generation of graduate students how to use GIS in their research. The steadily increasing demand for instruction and support is evidence that value is being added. In terms of history and the humanities it is already clear that geospatial technologies are making new large-scale research agendas practicable in an area where empirical scholarship has traditionally been individual work from start to finish, and thus necessarily limited in scope. New and sometime unexpected questions are coming to light and researchers are finding new ways to share their work and collaborate, ways that were not possible before. Scholarship in history and the humanities is become more collaborative and more cumulative as the basic datasets with which researchers work are find a long-term home on web-based platforms.
From the perspective of history, however, there are several cyber infrastructural obstacles to facilitating the use of spatial thinking and technologies. The first is the lack of a world world-historical gazetteer. GIS is about geographic space, but in the historical record “place” matters more than “space.” A person is of a place, a religious site is located at a place, tax is reported by place, a postal station is a place in itself. Places are nodes in networks (for premodern times it is easier to find the nodes than the routes between them and reliable sources for administrative boundaries before 1800 are few). A historical gazetteer, at its simplest a listing of place names with their locations in space and time, is the bridge between history’s places and spatial analysis. The major online world gazetteers are invaluable but share a common flaw: they ignore time. This is true of the Geographic Names Information System; the National Geospatial Intelligence Agency’s GEOnet Names Server, and GeoNames, the largest nongovernmental gazetteer (see sidebar). These systems provide between two million and ten million place names, but do not track name changes over time. This has consequences. The lack of a record about when a name is changed or a jurisdictional line redrawn eventually will result in the loss of knowledge about when the attributes of that place (population, area, etc.) are valid. Information management systems that overwrite earlier data sacrifice a longitudinal record to clerical efficiency. A systematic approach to extracting vector data from historical maps could populate a world-historical gazetteer but requires either the extension of optical character recognition technology or successful crowd sourcing of the manual extraction of data from scanned maps are beginning.

For the time being georeferenced maps scans will remain the most important source for historical information about space and place. Consistent and cumulative access to maps scans requires more than the Rumsey Map Collection’s 29,000 online scanned (some 22,000 have rough georeferencing). Old Maps Online, a UK-based project, is creating a solution: a federated system for registering, georeferencing and sharing historical map scans.

Just as important is a federated system for learning about spatial datasets. OpenGeoportal.org, led by Tufts, Harvard, and MIT with many partner institutions, is a portal which with the potential to provide a single entry for searching and previewing collections of data. A concomitant to this is a system for archiving and searching historical datasets that could be joined to spatial objects in a GIS, such as the planned World-Historical Dataverse of the Center for Historical Information and Analysis at the University of Pittsburg.

The final piece of cyber infrastructure needed for a wider use of GIS is an online platform for sharing spatialized data (as both online visualizations and downloadable data files). The goal is to make the maps and data layers researchers create accessible to others, so that others can take advantage of the accumulation of spatialized data in their own work, but also to make it possible to think spatially by composing maps through combining data layers online.

There has been significant progress in the online realm. ESRI’s ArcGIS Online and ArcGIS Explorer Online allow users to create, store and share maps and datasets, manage geospatial content, and control access to volunteered content. Geocommons, developed by the GeolQ company is similar. In collaboration with the open-source web-mapping developer community, the Center for Geographic Analysis at Harvard is developing the WorldMap platform, allowing
users to explore, visualize, edit and publish geographically referenced information. WorldMap has an expanding list of functionalities it wishes to add, but it already allows researchers to upload large datasets and combine them with those shared by others, create and edit maps and link map features to rich media content, grant edit permission to small or large groups, export data to standard formats, georeference paper maps scans online, and share data with just a few collaborators or with the entire world. The promise of WorldMap is that it is cumulative; nearly five-thousand registered users are already uploading and sharing their data and maps, and 180,000 others are viewing their work. Working with MapStory, it will soon add animations, allowing vivid displays of change over time.

Historical georeferenced data is part of the world of big data that the digital environment has made part of our lives. As the cyber infrastructural impediments give way, GIS technology, federated geodata systems, and online mapping are likely to become part of the toolbox for the next generation of historians.