Design before you code:
Using wireframes in support of interactive and web-based mapping

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Cartography and coding increasingly are intertwined. Unprecedented demand for interactive and web-based mapping applications has left many cartographers scrambling to update their coding skills in order to remain relevant on such projects. While coding indubitably is essential to today's mapping workflow, cartographers can continue to make substantial contributions to these projects without writing a line of code. We argue that cartographers are well-positioned to take on the role of the user experience (UX) designer on large-scale mapping and GIS projects. Rather than (or in addition to) contributing to the development (coding) of these applications, cartographers should be enrolled to complete the *design* and *evaluation* of wireframes and prototypes in order to streamline the development workflow, and ultimately to promote a positive user experience with the application.

In this paper, we explore the potential of wireframe design and evaluation for Interactive Cartography and Geovisualization through a case study on water level visualization. Specifically, our research informed development of the NOAA Lake Level Viewer, a map-based visualization tool supporting adaptive management of coastal hazards related to future water level changes in the Great Lakes. We completed two evaluations on early wireframe designs with the targeted end-users of the Lake Level Viewer: (1) a cognitive walkthrough study on early, 'lo-fi' wireframes and (2) an online survey on pixel-perfect, 'hi-fi' wireframes. The wireframe designs and evaluations were organized according to two fundamental aspects of the user experience: (1) cartographic representation, or the graphic encoding of geographic information in the map, and (2) cartographic interaction, or the supported methods for manipulating the provided map representation. The pair of wireframe evaluations led to a series of revisions to the functional requirements of the Lake Level Viewer, and generated multiple recommendations for leveraging wireframes in support of large-scale mapping and GIS projects.