Improvise is an information visualization builder and browser (developed as a part of my Ph.D. dissertation research in computer science at the University of Wisconsin—Madison) that has been used to explore census data (shown at right), election results, particle trajectories, network loads, music collections, the chemical elements, and even the dynamic coordination structure of its own visualizations in situ.

In Improvise, users construct and explore highly-coordinated visualizations with multiple views interactively. By coupling a declarative visual query language with a shared-object coordination model, users gain precise control over how navigation and selection affects the appearance of data across multiple views, using a potentially infinite number of variations on well-known coordination patterns such as synchronized scrolling, overview+detail, brushing, drill-down, and semantic zoom. As a result, it is practical to build visualizations with more views and richer coordination in Improvise than in other visualization systems.

Improvise is a fully implemented Java application. Building and browsing activities are integrated in a single, live user interface that lets users alter visualizations quickly and incrementally during data exploration. Improvise visualizations are saved to and loaded from disk as serialized XML documents in a self-contained, platform-independent format.

Ongoing work in Improvise includes application of highly-coordinated multiple view techniques across multiple tables of space-time information. The screenshot at left shows an Improvise visualization of county-level election results in Michigan from 1998-2004. The data consists of a data set describing political parties, a data set describing counties (including the shape of their boundaries), and parallel data sets for each race in each election year. Selection in the “Races” list determines which of these data sets is shown throughout the rest of the visualization. A matrix view (top center) compares results for selected candidates pair-wise, aggregated over the selected subset of counties. Counties can be selected—in terms of name, population, vote distribution, or geographic location—by brushing in several views, such as by geographic lasso selection in the main or inset map views. Drill-down to specific vote results is possible in a table view (which supports multi-column click sorting) or by mouse-over in a scatter plot (sorted on voter turnout).

Our goal is rapid exploratory visualization of complex abstract-space-time data by on-site teams of collaborating technicians and analysts. Most Improvise visualizations evolve from conception to operation in a matter of days through a process of visual exploration by and feedback from GeoVISTA members.