Motivation
Software projects are notoriously difficult to manage because of the multitude of developers working together with a multitude of artifacts that are interdependent on each other. Managers, typically, have to use tools that are not geared towards project management such as, bug trackers, email archives, personal experience, and even memory to track project dynamics. These tools present only snippets of information that need to be filtered and integrated to make sense. Even then information regarding past development efforts is many times lost and a holistic view of the project difficult to attain. Effective project management requires awareness of both the current state of the project, as well as the historical data of development activities. Information visualization can be an effective technique for conveying large amounts of project data in usable, as well as useful, forms.

Goal
We are building a tool, the workspace activity viewer, to visualize and explore workspace activity and evolution on a project-wide basis. We have chosen a three-dimensional metaphor because it naturally focuses the viewer on the important places (large, front and center), while maintaining peripheral awareness of other activities (small, back and to the side). Figure 1 explains the dynamics of the visualization. We believe this visualization gives managers a comprehensive view of all project activities.

Project Playback
Since our tool stores all the workspaces’ events, we can visualize the evolution of workspaces—and the emergent project evolution—either live or postmortem. This gives the user a movie-like ability to replay, pause, rewind, and visually inspect the project at any given point in time to find trends, problems, and other patterns of interest. The history can be played backward or forward in time, and the period of time that needs to be visualized can be limited by either using the age or absolute date filters. Other filters can highlight parallel work, different artifact types, etc.

Evolution of an open-source project: FreeMind case study
Figure 2: Four snapshots of the FreeMind project. Active artifacts (modified within the previous month) are colored green.

April 2001: Project founder active during the first year.
March 2003: Stagnation after founder does nothing for two years.
November 2003: New developers join the project. One becomes the lead, while the other contributes mainly graphics.
March 2004: After six months, that new developer has clearly become established as the major force behind the project.

Future Work
Scalability. As shown in Figure 3, we are migrating our visualization to tiled displays. This allows us to see very large projects in their entirety, enabling the discovery of emergent development patterns.

Automation. We will enhance the filters to match sequences of events over time, instead of only single events and immediate state. We are also investigating optimal standard configuration templates to include with the visualization, to immediately provide meaningful functionality to new users.

Actual use. We are investigating and visualizing the development data (both at the workspace and the repository) of a commercial distributed environment.

Figure 1: An annotated picture of the workspace activity viewer. Italicized text explains the features of the visualization.

workspace activity viewer on tiled displays
Figure 3: The Gaim open-source project on six screens. Each artifact type (code, graphics, etc.) has a unique color.

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