# Event Maps: A Collaborative Calendaring System for Navigating Large-Scale Events

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## Abstract
Event Maps is a novel, rich and interactive web-based system targeted at improving the experience of attending and organizing large, multi-track conferences. Through its zoomable *Tabular Timeline*, users can navigate the conference schedule, seamlessly moving between global and local views. Through a compact decoration widget named *Active Corners*, Event Maps enables contextual asynchronous collaboration before, during, and after the conference. Organizers can easily create or import conference schedules via a backend interface, and also use the provided analytic toolkits to get insights from visiting patterns and statistics.

## Keywords
Temporal Data, Information Visualization, Collaborative Visualization, Computer Supported Collaborative Working (CSCW).

## ACM Classification Keywords
H.5.2 [Information Interfaces and Presentation]: User Interfaces; I.3.6 [Methodology and Techniques]: Interaction Techniques.

## General Terms

Design, Human Factors.

## Introduction

Attending conferences and trade shows is important to our professional and social life [8]. Large conferences often have many concurrent sessions, and it may be challenging to get a good sense of all available activities and plan one's attendance. Having a personalizable guiding map can help tremendously.

Online schedules on traditional conference web sites [4] are built as a static collection of hyperlinked pages, where users may have to click multiple times and go back and forth to locate the information they need. Such a design makes it difficult to simultaneously explore both depth and breadth, and the user loses context rapidly.

Exchanging information with other conference participants, a key objective while attending conferences, is also not supported by this design. Although many conferences do provide complementary blog/wiki systems, they are generic to the conference and not tightly coupled to specific sessions.

Event Maps is a rich internet application we are building to address these shortcomings in navigation, collaboration, personalization, and organization. It aims to make the experience of interacting with an online conference calendar engaging, productive and intuitive. It supports seamless navigation between broad and deep views of the schedule information, asynchronous collaboration in the context of individual sessions, and the ability to tailor preferences and favorites. As such, it suggestively sets up the conference calendar as a focal point for interaction and data mining for participants, organizers, and any other interested parties, which has value before, during and after the conference is held.

Event Maps also makes it easier for conference organizers and administrators to maintain an updated conference schedule. The system also provides analytic administrative tools that help get insights from visiting patterns and statistics.

We have been focusing our attention on the applicability of Event Maps to multi-track conferences. However, its design makes it more broadly suited for handling rich schedule-related data such as group calendars and personal calendars.

## Related Work

Research in group/collaborative calendaring systems has explored topics such as scheduling a group activity based on the availability of each team member, ambiguous time constraints [3] or special audiences such as family members. However, less research has been devoted to addressing the needs of conference participants.

Fisheye style zoomable visualization techniques have been used to visualize menu [1], 2d tables [7] and calendar information [5]. Bederson *et al*. [2] later extended this idea and built a scalable visual fisheye calendar named DateLens. Event Maps differs from DateLens in several ways: First, DateLens focuses on personal events while Event Maps is targeted at multi-track conference events with selective expansion of more than one track. Second, DateLens is a single user application while Event Maps supports asynchronous

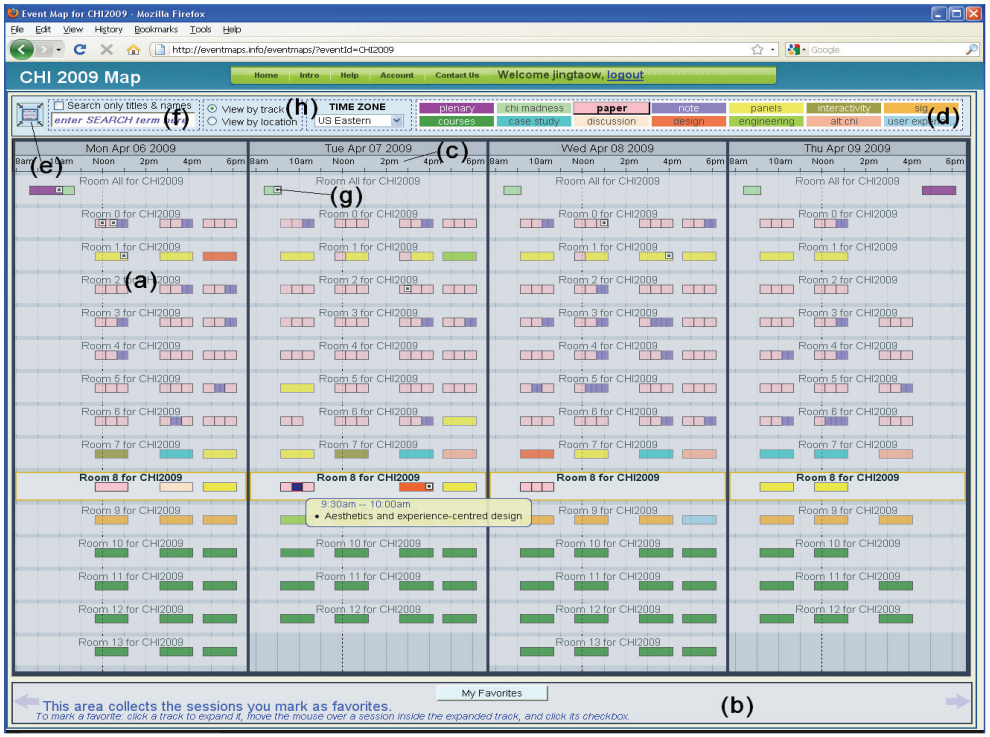


**figure 1.** The Event Maps System. (a) Map area in global overview state. (b) Region for saving a user's favorite sessions. (c) The X-axis is a zoomable timeline. (d) Color-coded session category labels. (e) Reset view button. (f) The search box. (g) Collaboration corner widget. (h) Timezone switches.

collaboration [6] in the context of conference sessions. Finally, as DateLens is not a web-based application, it lacks facilities for user tracking and data analysis to help administrators and system developers.

Recently, we have seen the emergence of collaborative visualization systems like Many Eyes, sense.us [6], and Swivel [9], which support creating visualizations from statistical data, and also provide text comments, tagging and view-sharing through bookmarking. Our work extends some of these principles to the arena of multi-track conference schedules.

## The Event Maps System

The major features of the Event Maps system include:

- A zoomable interface that allows quick transition between views at different levels of detail, and simultaneous viewing of multiple levels of detail.
- In-place support for asynchronous collaboration features such as highlighting, and commenting directly in the context of conference sessions.
- Functions for conference organizers to create and import conference schedules, keep them updated, and obtain insights from visiting patterns and statistics.

Our greatest challenge in designing Event Maps has been to support the rich feature-set in a clean, intuitive and efficient interface. Quick event navigation and location is supported via a zoomable interface coupled with features such as progressive searching, brushing, and details on demand. Contextual personalization and collaboration are supported via compact decoration widgets. Event Maps encourages spontaneous interface exploration by mapping frequent operations to mouse hovering and clicking.

### *User Interface*

The primary interface for Event Maps is shown in Figure 1. In the center region is a zoomable widget named *Tabular Timeline* to display all the activities in a conference. The top panel provides a button to set the *Tabular Timeline* to its original state (figure 1.e), a search box (figure 1.f), widgets for selecting the

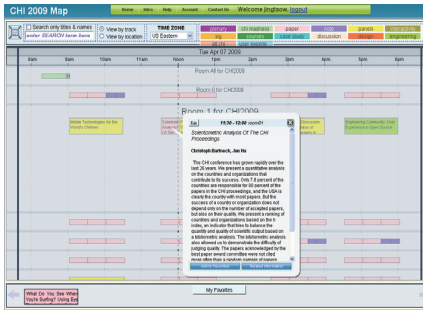


**figure 2**. The *Tabular Timeline* zoomed into the day view, with one track expanded and the details pop-up open.

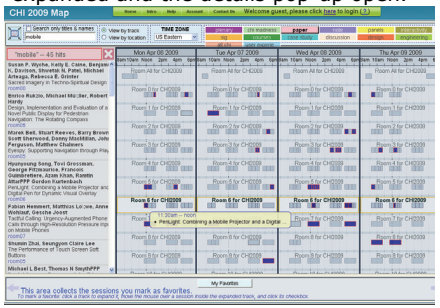


**figure 3.** The search feature of Event Maps.

current view and time zone (figure 1.h), and color-coded session-category labels (figure 1.d). The bottom panel (figure 1.b) is an area for managing the user's "favorite" sessions; sessions with time conflicts will be marked in red in the "My Favorites" region. The rectangles inside the Tabular Timeline are conference sessions, color-coded by their associated categories. The top-left and top-right corners of each session are called Active Corners, and are used to support personalization and asynchronous collaboration.

*Tabular Timeline*

Most interactions happen inside the *Tabular Timeline*. The initial view of *Tabular Timeline* is an overview of the entire conference, with each of the tracks collapsed. Our *Tabular Timeline* widget is a combination of traditional calendar visualization and a zoomable timeline. Tabular Timeline differs from existing zoomable timeline visualizations in that it uses a tabular layout to maintain the "look-and-feel" of a calendar rather than a scatter plot. At the same time, regardless of the zooming level and the state of the system, time information is always represented on the horizontal axis in a timeline fashion. This behavior differs from existing calendar interfaces such as MS Outlook, Google Calendar or DateLens [2], where the time representation may jump between axes depending on the viewing mode (day, week, month etc.). Both informal feedback and our user study show that maintaining a consistent timeline in a zoomable interface helps maintain a consistent user experience.

Along the vertical axis of Tabular Timeline are tracks which can be independently expanded and collapsed via mouse clicks. The colored rectangles within tracks correspond to sessions. When a track is collapsed, concurrent sessions are collapsed into a single rectangle. Clicking on a session in an expanded track will bring up its details pop-up (figure 2). Clicking on the "Related Information" button on the details pop-up creates a large frame populated with an external web page pertinent to the session. This frame can be closed to return to the previous visual context, or detached to a separate browser tab.

In addition to discrete zooming (by clicking on different regions of the view), the Tabular Timeline supports continuous zoom and pan via mouse dragging. Hovering over a category label on the top right region highlights corresponding sessions on the Tabular Timeline. With this quick action the user can see how sessions of a certain type are distributed throughout the conference.

Regardless of the current zoom level, clicking the "reset view" button (figure 1.e) on the top left will reset the *Tabular Timeline* to its original global overview state.

*Embedded Search*

When the user types into the search box, search results, updated on each keystroke, show up on a panel on the left, and corresponding sessions are highlighted on the map (figure 3). For example, typing in "Washington" and restricting the search to titles and names will quickly show the sessions for papers authored by individuals from the University of Washington. Clicking on a search result shows/hides its session details popup in place on the map.

*Active Corners*

Rather than allocating designated regions to support personalization and asynchronous collaboration [6], we

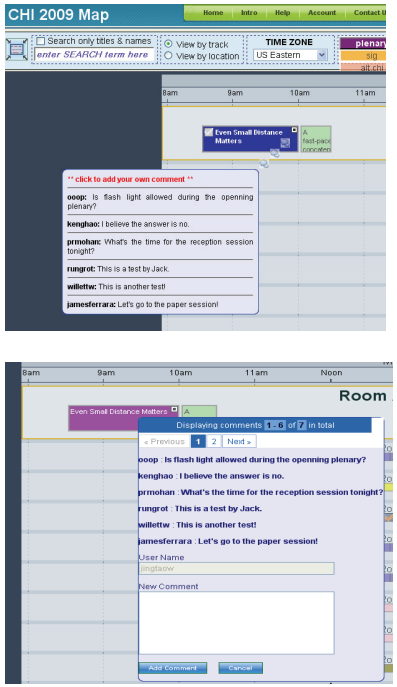





**figure 4**. Collaboration features in Event Maps. (top: a solid square on the top right corner indicates that there are associated comments; hovering over the indicator will display them. bottom: clicking on the indicator brings up a comment-entering widget)

implanted a compact decorator widget named Active Corners. *Active Corners* serve both as an awareness indicator and a trigger for supported features. In the current implementation, the top-left corner of an event rectangle is used as the "personalization corner" and the top-right corner is used as the "collaboration corner". In the future, the two corners on the bottom of an event rectangle can also be mapped, e.g., for showing visiting statistics. Each *Active Corner* can have three states – 1) the default state is the awareness state, shown as a small icon at the corresponding corner to indicate Boolean information such as whether this session is marked as a favorite by the current user, or whether there are comments associated with the session. 2) If a session is expanded, hovering over an Active Corner can provide a quick preview of information associated with that corner. 3) If a session is expanded, clicking on the corresponding Active Corner can trigger an action, such as modifying the favorite state of the session or popping up a widget for browsing and adding comments on the session. We describe in detail the two Active Corners currently in use in Event Maps below.

*Personalization/Favorites Management*

After logging in, a user can add an event to "My Favorites" by simply checking the check box at the "personalization corner" of a session or clicking the "Add to Favorites" button in its details pop-up. Proxies for favorite session are placed at the bottom of the screen. A user can remove a favorite by unchecking the check box the same button in the details pop-up, now labeled "remove from favorites". Any sessions that a user has added to his favorites are shown with a check mark on the "personalization corner" thus giving the user a quick indication of when she is free to schedule other activities.

*Asynchronous Collaboration*

In contrast to collaborative visualization web sites such as sense.us [6] and swivel [9][9], which were designed to support and promote collaborative sense-making, we believe that different Event Maps users may have different goals in mind. Some might only be interested in getting the schedule information they need quickly and exhaustively, while others might be interested in exchanging information or discovering interesting things from other participants. Thus, our major design principle for the asynchronous collaboration feature is that it can be ignored easily by people who do not need it, yet be discovered and accessed conveniently by interested parties.

Asynchronous collaboration features are accessed from the top-right *Active Corner* (a.k.a. "*collaboration corner*") of any session. Mouse hovering on it will display comments associated with the session (Figure 4, top). After logging in, mouse clicking on the *collaboration corner* will pop up a commenting, annotating widget (figure 4, bottom). A tiny black dot will show up on the "*collaboration corner*" of sessions with comments or user generated tags. Again, adhering to our design principle, the user does not have to go to a new destination to access the collaboration features.

Like in a wiki system, a user who has logged in, optionally with administrator privileges, can edit the event details in place by clicking an "edit" button on event details pop-up.


**Figure 5.** Screen shots of Event Maps running on iPhone (top: CHI 2009 schedule in overview mode, bottom: zoomed in view with in-place event editor enabled)

## Implementation

Excluding third party libraries and code for unit testing, the current Event Maps implementation includes a total of 11032 lines of code in JavaScript that runs in the browser and a total of 12980 lines of code in Ruby.

As a result of our decision to use only standard JavaScript and AJAX, Event Maps can run on a wide range of operating systems and browsers. For example, Figure 5 shows two screen shots of Event Maps running on an iPhone.

## Conclusion and Future Work

Event Maps is a highly interactive web-based collaborative calendaring system optimized to provide quick access to information at multiple levels of detail for large, multi-track conferences. Further, Event Maps can be used as a "collaboration space" for visualizing and collaborating on large, complex temporal data with a *hierarchical* nature.

The feedback we have received thus far on how Event Maps enhances the conference attendee's user experience has been very encouraging and we will thus be pursuing even larger deployment opportunities to gain insights into how conference collaboration substrates get used during various stages of a conference and from different device form factors, build a prioritization of the feature set based on several factors, and use the findings to allow Event Maps to meet the user's needs in various times and situations.

We will analyze and report the insights from face-to-face interviews, lab based studies and multiple rounds of real world deployments. In addition to a holistic evaluation of the overall effectiveness of Event Maps, we are also interested in getting a deeper understanding of the impact of each specific feature in its corresponding design space.

Event Maps has gone through three major rounds of design iteration up to date. It was deployed at the IEEE International Conference on Service Computing (SCC 2009 – http://conferences.computer.org/scc/2009/). A new version with several additional features and views, beyond those reported here, was recently deployed at Lotusphere 2010.

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