

Tickertape: Notification and Communication in a Single Line

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Abstract

This paper outlines an awareness application called Tickertape. Tickertape is a tool that displays event notifications in the form of scrolling messages across a single-line window. The Tickertape message window provides an interface to a world of highly tailorable transient information. We provide an overview of Tickertape features and then discuss its specific use within a semi-commercial research organisation. We note that although Tickertape's evolution was incidental rather than purposeful, it is being extensively used within our organisation. Usage data and interviews suggest that there is a select core group of users who use Tickertape for both work and leisure. Other more casual users use the tool sporadically for leisure purposes only. We highlight our current goal which is to optimise Tickertape usage within the work environment. We hope to achieve this by enhancing the Tickertape user interface and encouraging its widespread use within the organisation. Our long-term vision involves the incorporation of Tickertape into Orbit-Gold, our collaborative working environment and to make the tool accessible to external organisations.

Keywords

CSCW, Awareness, Social Filtering, Notification Services, User-Driven Design.

Introduction

Throughout our daily activities, we often need to collaborate with other people in face-to-face (FTF) situations. In such circumstances an awareness of other people and the tasks that they are working on is gained naturally through the process of collaboration, for example through speech. The notion of "awareness" is an ambient concept that in simple terms relates to the idea that we know what other people around us are doing. In a work environment we are specifically referring to the

tasks people are working on and the artifacts that they require for their work.

In distributed environments, where people are working apart from each other, such FTF communication is less easy to arrange and awareness is harder to attain. In order to support distributed working and maximise the awareness that we have of other people, we can make use of a wide range of communication media such as the telephone, chat tools and video-conferencing. These are designed to help us maintain an awareness of other people in the absence of FTF collaboration and function to provide information about the current state of activities and artifacts around us. Work is ongoing in the development of specialised awareness displays for groupware systems. For example, Gutwin *et al.* [1, 2] explore the use of separate widgets in the support of awareness of people and shared workspaces.

The focus of this paper is on Tickertape, another awareness widget that provides users with an awareness of specially tailored events. Tickertape differs from other awareness tools in that it is lightweight and takes up minimal screen space; traditional awareness tools such as video and messaging systems are heavyweight and occupy a lot of screen space. In contrast, Tickertape offers a wide variety of functionality in a single line. We outline Tickertape and its functionality and discuss how Tickertape can be used within a work environment. We note that although Tickertape evolved by accident, people within our organisation have been using it extensively. We discuss our findings from a study carried out to monitor Tickertape usage and discuss how we can improve usability features.



Figure 1: The TickerTape interface showing two exemplary scrolling messages

TickerTape: An Overview

In this section we describe the TickerTape interface and its functionality. We outline how users can create, subscribe and post to message groups by generating event notifications. We explain that the users themselves decide what type of information they wish to receive and which groups they would like to subscribe to, highlighting the fact that TickerTape is a highly tailorable application.

TickerTape: A Brief History

TickerTape evolved by accident as an application designed to 'show off' the capabilities of a newly developed service called Elvin. Elvin is a distributed notification service and hence is designed to provide a mechanism for signaling an event occurrence and then informing interested parties of this event [3]. Elvin employs a publish and subscribe architecture in which applications can be Producers and/or Consumers. Producers generate events, but do not send them to any particular consumers. Instead, consumers choose to receive events. In this way, the production and consumption of events are decoupled.

TickerTape is built on top of Elvin and functions as both an event consumer, receiving awareness information in the form of events and an event producer which enables TickerTape to be used as a communication application. TickerTape provides the user with the ability to decide which event notifications they wish to receive, allowing them to tailor the event subscriptions (and hence the information) that they are interested in receiving from Elvin, by both event type and by event content.

The TickerTape Interface

The TickerTape interface (Figure 1) consists of a single resizable, rectangular window which takes up minimal screen space, allowing users to continue to work with TickerTape visible in the background. User-selected events that are generated into colour-coded TickerTape messages, scroll across the screen from right to left. Each message consists of the group the message is posted on, the name of the originator, together with the dialogue. The message is colour coded so that the group name is blue, the name of the person is red and the scrolling information is green, facilitating the identification of the information. Users can change the appearance of notifications as they age.

Individual notifications have a total timeout and their appearance changes over the life of the item, fading from colour to grey. The time-out period is user-defined; users decide how long they want the messages from each group to scroll for. Hence TickerTape provides users with a mechanism for controlling the transience of information. The multi-coloured scrolling text fades out once the message has reached the end of the designated time-out period. This helps give the feeling of age, especially when multiple messages are being displayed as there is a contrast between the new brightly coloured messages in comparison with those that are grey and have been read. Users can also chose to stop messages from scrolling simply by clicking on the message itself.

Subscribing to Groups within TickerTape

Users can customise their own events and hence define their own groups and event generators from a large number of sources. Examples include, "chat" messages, news headlines, Usenet news, and room bookings. The message events that are generated by TickerTape are tailored entirely by the user who can choose to receive whatever information they require. At present, user-driven subscriptions are defined in a user configuration file. Each basic subscription consists of a group name and the specification of the minimum and maximum time the message will scroll around the window. TickerTape supports awareness and communication by enabling distributed users to send messages to each other. These 'chat' messages can be used between a small group of people to discuss a work-related matter or to a larger group to organise a meal break.

Users select which group they want to post a message to via a dialogue box entitled "TickerTape Message" (Figure 2). This box is accessed by one mouse click on the TickerTape interface. To send messages (i.e. create an event notification) the user simply has to write in the available text fields of the menu. The list of groups you can send a message to is determined by those groups that have the menu option set in the configuration file. To post a message the user chooses which group they wish to post to from the selection and types their message in the available text field, adding a URL, sound file etc as an embedded MIME type attachment if they wish. Such files are displayed by the user clicking on the 'MIME' part of the message with their middle mouse button. Users can also configure TickerTape to automatically display MIME objects by switching on the "auto" option for a particular group in their configuration file.

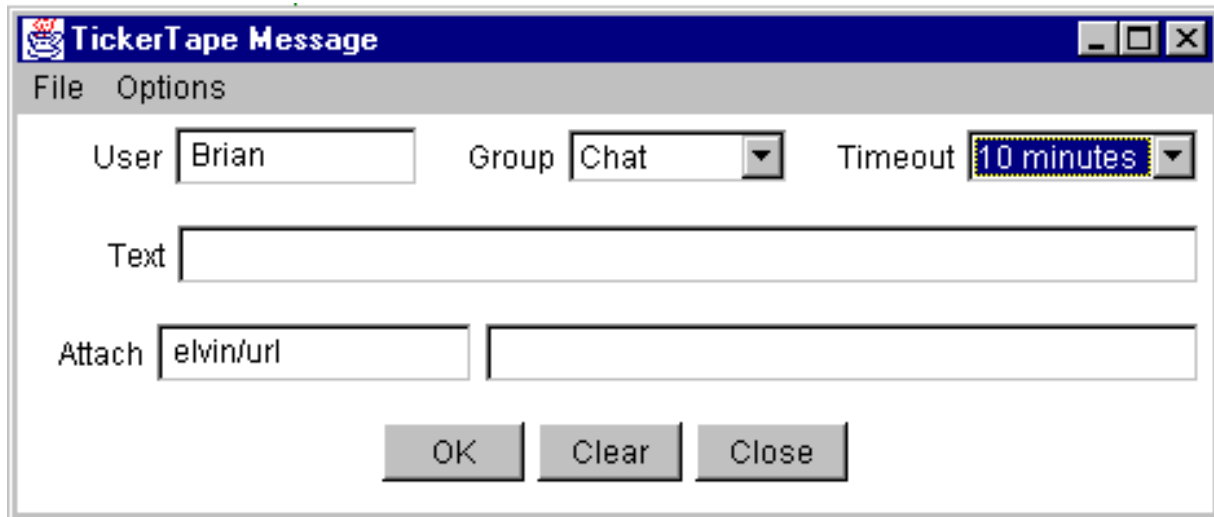


Figure 2: The Tickertape Dialogue Box. Users can type in messages in the "Text" field

Tickertape Usage

Some groups allow people to both post and receive messages. These bidirectional groups facilitate interpersonal interaction between users, increasing the awareness of what each member is doing. Unidirectional groups, which only receive events, function to supply the user with information and in doing so provide an awareness of ongoing activities. The next section provides a brief overview of the type of unidirectional and bidirectional groups that users can construct and/or subscribe to. Because Tickertape is a tool that has been user-driven, the examples given here are illustrative of a potentially wide range of uses.

Bidirectional Groups

Bidirectional groups function to provide awareness through interaction. For example, a bidirectional group such as 'chat' can be used for bursts of semi-synchronous conversation. By specifying a short time-out of messages, users partake in informal, short and 'bursty' interactions that are similar to the informal nature of a genuine FTF conversation. The telephone is an entirely synchronous mechanism for informal conversation and email which can also be used for chatting is entirely asynchronous. In contrast, Tickertape incorporates the synchronicity and immediacy of the telephone with the asynchronous nature of email, whereby you are not obligated to look at a message immediately. Tickertape is therefore an extremely powerful messaging tool that enables messages to persist for a short while only, ensuring that only relevant information persists. Messages are thus of an

ephemeral, floating nature that users can choose to attend to at will.

Unidirectional Groups

Unidirectional groups provide users with awareness through notification rather than via interaction. Events generated such as news headlines or room bookings, function to notify users of work and non-work related activities. Unidirectional groups benefit from the time-out feature as it is particularly useful for the awareness of temporal event. An example is the generation of reminder messages from a room booking event which details the booking time, room-number and purpose of a meeting.

Programmers can make use of the unidirectional generation of events for debugging code; system messages are captured and then displayed by Tickertape. This reduces the need for extensive programming with a visualisation tool.

Usenet news events have also been generated through Elvin and then displayed on Tickertape. Usenet news consists of discussion groups and traditionally requires a newsreader application to read posts. Tickertape allows you to configure a news file so that you can subscribe to a specified newsgroup. Usenet configuration can be achieved in two ways; either via a special configuration file as for the bidirectional groups, or via a pop-up "Configure News" menu that is accessed via the message dialogue box. The message subject will scroll across the Tickertape window whenever there is a post to the specific group that the user has subscribed to.

Tickertape is also capable of filtering Usenet articles in order to ensure that users only receive articles that interest them. For example; a person looking for a particular piece

of hardware may only want to read the newsgroup *comp.ads.forsale.computers* to search for incidences where this piece of equipment is being sold. The user can specify that they want to receive messages only for items in this news group concerned with the sale of this particular item of hardware. This Tickertape feature has been appropriately nicknamed the *News watcher* service.

WWW filtering is also possible. An example of a WWW filtered group that is heavily subscribed to in our organisation is *abc.news.international*. This produces messages consisting of 'headline' news. Users can read the whole article if interested by clicking on the attached MIME file; by reading articles via Tickertape you are gaining information with minimal distraction.

A Preliminary study of Tickertape Usage within an organisation

Having outlined the basic features of Tickertape we now describe our investigations into the usage of the tool within our organisation.

Our study was motivated by our increasing awareness of the extent to which Tickertape was being used within its founding organisation; a semi-commercial research centre. The current state of Tickertape is a result of user-driven evolution. As previously mentioned, the application was developed to test the capabilities of the Elvin distributed notification service and was never intended to be employed as an application in its own right. However, the by-product of this is that since being introduced to workers 9 months ago, Tickertape has been used extensively within the workplace, even though it was not specifically designed for this purpose. Our experimentation is based on the specific use of Tickertape over a 3 month period. During this period, over 20,000 messages were handled by the system.

Our rationale behind the study was to find out what was so good or useful about Tickertape that made people use it on a daily basis. Also we wanted to find out what we needed to do to broaden the appeal of Tickertape, with a view to getting all members of the organisation using it. We wanted to find out what usability features, if any needed refining.

Method

The users of Tickertape were interviewed by means of semi-structured interviews involving a list of questions that were adhered to loosely; the informal interviews were often user-led, sometimes digressing into longer

conversations. We also logged Tickertape usage and analysed the exchanges of conversations between people.

Results

We looked at Tickertape usage within one site where 66 people are distributed across rooms and buildings, half of whom have access to Tickertape on their machines. Of these people, 20 are Tickertape users: 12 use Tickertape frequently and the remaining 8 use the tool sporadically for leisure purposes only.

Types of Users

It became clear from the interviews that users could be divided up according to their patterns of Tickertape usage. A core group of users was identified. These people use Tickertape daily for both work and leisure purposes. In contrast sporadic users primarily perceive the application as a fun tool and hence only use it occasionally during their workday. These users are happy to read and send chatty messages concerning food breaks and humorous banter but do not have any desire to use Tickertape for their work. For some people this is because they have no need to collaborate with a distributed colleague as all their immediate coworkers share a room with them. Some people argued that configuring the groups was too much trouble and expressed the opinion that configuration needed to be possible via a menu. They do not want to waste their valuable work time configuring groups. These users are also dissatisfied with the lack of on-line help and would be more inclined to use Tickertape if it were clearer and easier to use; many sporadic users are not fully aware of Tickertape's full functionality. These issues were also in part why ex-users of Tickertape had stopped using the tool; they either had problems with the installation/configuration of Tickertape or they were frustrated by the lack of menus and on-line help.

How Tickertape is Being Used

(1) Work

Tickertape is a particularly useful tool for facilitating interaction between co-workers, adding another option to their existing media of communication. There are several Tickertape groups subscribed to by people engaged in a specific work task. One such group have commented that they have found Tickertape to be an indispensable part of their co-working. These particular two users used to initially work together in the same room. However, when one of them was relocated to the other end of the building they found that they missed their close interaction as they were used to constantly asking each other questions. They started using Tickertape for quick interactions with each other and now have an agreed protocol whereby they

know that both of them will be running Tickertape every day. This enables them to arrange breaks with each other as well as discuss their work. Table 1 shows an excerpt of dialogue between two people on the workgroup that they have set up and use for daily collaboration with each other.

Time	Person and Dialogue
15:15:32	Arnie: Added __EXTENSIONS__ to all gcc platforms incl NT. ok???
15:16:14	Brian: fine I think???
15:16:23	Arnie: leave it for now ...
15:17:17	Brian: uh oh. see email ...

Table 1: An interaction from a Tickertape group created for collaborative working.

The interaction times show how fast and ‘bursty’ the conversation is. It also shows us that the two people involved use email in adjunct to their chat; Tickertape is used for short messages and email for more detailed descriptions about the work they are doing. They would like to incorporate Tickertape with video to further increase their awareness of each other.

Many users commented that the room booking event was a useful work tool as it served as a reminder of when and where their meetings were being held. The feature also functioned to let them know that a specific group of people were currently engaged in a meeting and hence is a valuable awareness feature. The ‘rooms’ group has also been useful for supporting distributed awareness between buildings; there are some members of the organisation who do not work in the main building. This feature gives them a way of ‘keeping an eye’ on some of the activities going on at headquarters that they would otherwise not know about.

(2) Social Activities

Tickertape can be used to facilitate social interaction and provide a sense of group cohesion in a variety of different ways: Tickertape has proved to be useful for organising meal breaks/exchanging in humorous banter with colleagues. Table 2 is an example of how Tickertape is frequently used to arrange meal times. This particular dialogue took place on the general “chat” group.

Again, the short time lapse between messages shows how quick the interaction is. Tickertape in this instance has functioned to gather a crowd of people together for the purpose of having a sociable lunch break. McDaniel *et al* [4] argue that computer-mediated conversations have

some of the informality of ordinary speech but some of the deliberateness of writing. Tickertape’s written ‘conversations’ are therefore similar in nature to ordinary speech because there are shorter delays between messages which allows for reciprocity and feedback.

Time	Person and Dialogue
12:30:05	Troy: Lunch?
12:30:54	Peter: YUM!
12:31:40	Neil: Let’s get down to it boppers
12:32:06	Beryl: Yippee

Table 2: An exemplary dialogue between colleagues arranging lunch.

Tickertape is also a useful announcement tool. For example, on one occasion a hail warning was posted to an internal newsgroup. One person commented that he found this useful because the message prompted him to pack up and drive home early to avoid the hailstorm. He liked the immediacy of the message; the instantaneous help and admitted that he may not have read the message if he not caught sight of the Tickertape message.

(3) Leisure

Tickertape is used as a leisure tool. The reading of headline news, mentioned previously, is one example. Another way in which Tickertape has been used extensively is for sport-related fixtures. During a recent international cricket series, a cricket fan wrote an event generator that relayed ball-by-ball scores from an on-line cricket site, thereby making use of the WWW filtering feature. Users report that this reduced their need to find out the results by ‘surfing’ the Internet for this information.

(4) Newswatcher Service

Several users read messages posted to Newsgroups through Tickertape for both work and leisure purposes with a large overlap between these two polarities. Tickertape allows users to filter events so that only information that the user finds useful and/or interesting gets to them. This filtering system is used extensively for the filtering of Usenet News. Konstan *et al.* [5] argue that each user of Usenet News values a different set of messages. Tickertape’s Newswatcher service acknowledges this predicament and functions to ensure that users only receive the information that they are after. People are using the Newswatcher service primarily for filtering computer-related Newsgroups although some other groups are filtered such as those that involve goods for sale.

The Newswatcher feature has also been used for the social filtering of information. We define social filtering as making use of the shared interests and knowledge of other people. People within this organisation monitor the posts from specific people sending messages to (as an example), the Newsgroup *comp.lang.corba*. These people may post messages that are relevant to other members of their workgroup. The Newswatcher service thereby enables people to receive messages that contain information with a high likelihood of interest to them because it is of interest to a colleague. The Tickertape Newswatcher service saves time as people do not have to wade through copious amounts of information that is not of interest to them. It also provides users with a lightweight mechanism for extracting the shared knowledge and interests of their co-workers.

Related Projects

Other systems have been designed to deal with the concept of information filtering and event notification.

An example of such a product is Khronika [6-8], a software event notification service that was designed to support the selective awareness of planned and electronic events. The project drew attention to the fact that information about events is often time dependent and therefore needs to be received at a relevant time. Tickertape is similar to the Khronika system in that they both increase peoples' awareness of what was going on around them by improving the effectiveness in which event information is dispersed in a work community. However, Khronika mainly provided support for machine generated unidirectional events, where as Tickertape offers both unidirectional and bidirectional generated events.

'PointCast'¹ is a commercial product that makes use of externally generated news and information. PointCast is similar to Tickertape in that it is tailorable. However, Tickertape offers a finer-controlled event notification service as Elvin supports content-based subscriptions. Tickertape is also bidirectional, whereas PointCast messages are unidirectional only.

Tickertape's Usenet filtering feature is also similar to popular News filtering systems such as 'Deja News'². Other systems {see [5], [9], [10]} have been developed to make use of the notion of 'Collaborative Filtering', which like social filtering enables people to make use of the knowledge and interests of others. However, the

collaborative filtering of information requires explicit effort as users are often required to make ratings for the benefit of other people. The social filtering of information in Tickertape does not require this kind of cognitive effort from users.

Discussion

We have described a highly tailorable awareness tool that can provide access to a vast range of information in a single scrolling line. In this organisation, Tickertape is used to facilitate collaborative working between distributed individuals and to filter information of interest from the WWW and Usenet. Tickertape is also used to facilitate social interaction. It reduces the isolation that distributed users feel in their work cubicles by promoting a feeling of group cohesion and an awareness of other people's movements and activities. Such interactions have promoted the development of serendipitous collaborations between co-workers.

Our study has shown that there is an emerging group of core Tickertape users who are willing to put in the work to make Tickertape suit their needs. Around the periphery of this core user group are the occasional users, many of whom would use Tickertape more extensively if it were easier to configure and if they knew more about its functionality.

Our current goal is to concentrate on more purposeful user-driven evolution of the system as opposed to the consequential way that Tickertape has developed to date.

Tickertape is being made more widely available within the organisation. We have just finished porting the application to a range of different platforms to ensure that everybody has access to Tickertape on their machines. It is anticipated that a greater understanding of Tickertape's functionality will help users shift from the periphery to the core, from being occasional or non-users to using Tickertape daily. Training sessions are currently being developed to this end.

We plan to enhance the usability of the interface features in an attempt to broaden the appeal of Tickertape. Top priorities include the provision of on-line help, as well as configuration menus that are accessible from the application itself. The use of differentiated audio cues for event notification is also being explored.

Work has already begun on extending the functionality of Tickertape. For example, many users requested notification of email through Tickertape. A new 'biff'

¹ Available at <http://www.pointcast.com>

² <http://www.dejanews.com>

feature has now been developed which alerts you when you have new email; the email subject and a MIME attachment containing the message scrolls across the Tickertape window.

In the longer term, we aim to explore the usefulness of Tickertape as part of a collaborative environment. We have already started to integrate Tickertape into our own collaborative system, Orbit-Gold [11]. It will be interesting to see how Tickertape is used in conjunction with video and audio capabilities to promote group awareness and interaction.

In conclusion, despite its incidental evolution, Tickertape has been successfully tailored for a diverse range of uses from unidirectional notification of events to interactive communication for both work and leisure. It combines all of these functionalities through a simple unobtrusive one-line interface. We anticipate that with more purposeful evolution, the usability and functionality of Tickertape will be strengthened.

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References

- [1] C. Gutwin and S. Greenberg, "Workspace Awareness for Groupware," *CHI '96 Conference Companion*, pp. 208-209, 1996.
- [2] C. Gutwin, Greenberg, S., and Roseman, M., "Supporting Awareness of Others in Groupware," *CHI '96 Conference Companion*, pp. 205, 1996.
- [3] B. Segall and D. Arnold, "Elvin has left the building: A publish/subscribe notification service with quenching," *Proceedings AUUG 1997*, Brisbane, Australia, 1997.
- [4] S. E. McDaniel, Olson, G.M., and Magee, J.C., "Identifying and Analyzing Multiple Threads in Computer-Mediated and Face-to-Face Conversations," *Proceedings CSCW '96*, Cambridge, MA, pp. 57-58, 1996.
- [5] J. A. Konstan, Miller, B.N., Maltz, D., Herlocker, J.L., Gordon, L.R. and Riedl, J., "GroupLens: Applying Collaborative Filtering to Usenet News," *Communications of the ACM*, vol. 40, pp. 77-87, 1997.
- [6] L. Löfvstrand, "Being Selectively Aware with the Khronika System," *Proceedings ECSCW '91*, Amsterdam, The Netherlands, 1991.
- [7] W. Gaver, Moran, T., MacLean, A., Löfvstrand, L., Dourish, P., Carter, K., and Buxton, W., "Realizing a Video Environment: Europarc's RAVE System," *Proceedings CHI '92*, Monterey, CA, pp. 27-35, 1992.
- [8] P. Dourish, Bellotti, V., Mackay, W. and Chao-Ying Ma, "Information and Context: Lessons from a Study of Two Shared Information Systems," *Proceedings COOCS '93*, CA, USA, pp. 27-35, 1993.
- [9] P. Resnick, Iacovou, N., Sushak, M., Bergstrom, P. and Riedl, J., "GroupLens: An open architecture for collaborative filtering of netnews.," *Proceedings CSCW '94*, Chapel Hill, NC, pp. 175-186, 1994.
- [10] L. Terveen, Hill., W., Amento, B., McDonald, D. and Creter, J., "PHOAKS: A System for Sharing Recommendations," *Communications of the ACM*, vol. 40, pp. 59-62, 1997.
- [11] T. Mansfield, Kaplan, S., Fitzpatrick, G., Phelps, T., Fitzpatrick, M., and Taylor, R., "Evolving Orbit: a progress report on building locales," *Proceedings Group97*, Phoenix, AZ, pp. 241-250, 1997.