

Supporting Informal Communication and Closeness Through Video Snapshots

J M Thorne†

†University College London and BT Group CTO

Abstract: As organisations grow and the physical distance between individuals increases, the simple informal communication that is essential for creativity declines. This paper presents a prototype system that was designed to increase informal communication by restoring awareness between physically distant employees. The key representation of individuals within this prototype was through frequently updated video snapshots. Users of the system reported feeling 'closer' to each other. We also suggest further experiments to assess the effects of video snapshots on trust.

1 Introduction.

Within a small company it is easy to talk and to share embryonic ideas, as the entire team can be co-located. Mutual awareness lowers barriers to communication leading to informal conversation. This sharing and cross fertilisation of ideas allows start-ups to be creative and agile. As the company grows, the knowledge in the heads of the founding individuals and the relationships between them, becomes formalised in explicit processes and information channels between parts of the organisation [1]. In a maturing market with declining returns, the company's focus is on efficiency and incremental innovations that help keep ahead of the competition. Formal processes and information flows around a carefully structured organisation can deliver this efficiency.

However this efficiency is at the expense of that early creativity. Often large businesses are organised along functional lines - engineering occupy one floor, marketing another. For someone in marketing to check out a new idea they must send an email, pick up the phone or arrange a physical meeting. The ease of just turning and talking is lost.

Allen [2] showed that as physical distance increases - different room, floor, building - communication frequency decreases. In research labs [3], collaboration also falls with increasing distance, as awareness of others and chances of meeting decrease. Architecture has taken these ideas to design spaces that increase the likelihood of chance encounters. For example, designing buildings around a central open space so that employees are more likely to meet while travelling from one part to another [4]. However organisations change shape faster than buildings and frequently co-locating the key groups of people becomes too costly and time consuming.

The efficiency of large organisations leaves them vulnerable to radical innovations that attack the same market but with a step change in technological performance [5]. For example Google's emergence from a Stanford University dorm [6] to almost complete capture of the market held by the established AltaVista and Yahoo search engines. Through their fixed structures and information channels, large companies may not recognise the new technologies for what they are and be too slow to respond. Here one solution is to adopt start-up like practices within the main organisation, rapidly pulling together virtual teams on demand, within which high creativity can flourish. The speed required may again make physical co-location of the team impractical.

2 Prototype.

To address these difficulties and allow individuals who are not co-located to enjoy the creative benefits of easy, informal communication, we have developed a prototype desktop communications client. This client seeks to replicate the sense of reciprocal awareness shared by, for



Figure 1: Frames of video within a single video snapshot.



Figure 2: The user interface to the client application. Each contact of the user is represented by a video snapshot, rendered semi-transparently over the desktop. Offline contacts are represented by static images. On entering a video conversation the image becomes larger and opaque.

example, two employees working in the same office. It also seeks to enable easy transition from that state of awareness into and out of conversation.

Each user sees representations of their contacts while sharing similar representations in return. This is similar to instant messaging "buddy lists", which display status information - offline, away, do not disturb, available etc., determined either by automatic activity detection or deliberate user settings. However we adopt the much richer representation afforded by video.

Providing continuous, live video streams would present a privacy problem as it would allow contacts to sit and snoop on each other - you could watch someone else without it being apparent that you were doing so. We reduce intrusion through sampling the video stream to create video snapshots. Every 10 seconds the client application captures 1 second of video. This is distributed to the user's contacts where it is looped continuously until the next snapshot arrives. These samples are sufficiently short that the practicality of snooping is reduced while still allowing strong appreciation of current activity and gradual changes over time. Using short snapshots also requires less bandwidth to transmit than continuous video.

Repeatedly jumping back to the beginning of the loop is visually distracting. To reduce this distraction, the snapshot is played first forwards then in reverse. Most human movements while sat at a desk - stretching, turning to one side, lifting a cup - are semi-cyclical and this seems to appear quite natural, though it must distort the dynamics of the clip. The snapshots are rendered semi-transparently in a floating window so that they can always be visible on the desktop, allowing continuous peripheral awareness without conscious effort or distraction from other work. Figure 1 shows the set of frames within a single snapshot, Figure 2 is a screenshot of the interface to the system.

To enable easy transition to and from conversation in our prototype, a single mouse-click on the representation of a contact transitions into a full two way video conversation. Another single click returns to snapshot mode.

3 Related Work.

Images have been used before to represent status or provide presence. The Portholes system [7] used static images of users updated every few minutes. The current version of Yahoo Messenger [8] allows users to share their webcam - as low frame rate video - with others. However the use of video snapshots also allows the perception of subtle motions. Human peripheral vision is better at detecting motion than detail, so motion within a snapshot may attract the user's attention and cause them to become more aware of the contact. Schiano et al.[9] has also shown that motion is important for the perception of affective state. Motion has also been used to bring life to the traditionally static photographic portrait. Orit Zuckerman has created wall mounted works [10] that are ostensibly static photos of faces, but whose subjects react if approached e.g. backing away if the viewer gets too close.

More advanced methods for creating continuous video from short snippets have been suggested by Schodl et al.[11]. While Karahalios and Donath[12] suggested an alternative method of protecting the privacy of participants in an always on video link, by abstracting or cartooning the video.

4 Evaluation.

The prototype has been in use for several months by five users, spread over three buildings and at times two continents. The users were all close contacts of the author so any findings should only be taken as preliminary evidence for areas worthy of further investigation.

A short, ad hoc, questionnaire was administered via email after the system had been running for two or three months. All users reported that they glanced at the interface often, did not find it distracting, and they felt 'closer' to and more aware of their contacts. However they used the system to hold video conversations at best occasionally.

This failure to increase the number of conversations held could be due to a number of factors: the level of awareness is still too low such that there still remains a barrier to entering conversation, the transition into conversation as implemented here could be awkward, the level of awareness is sufficiently high that the need for some conversation is reduced - for instance questions such as is the contact at work, have they been to lunch? already have an answer.

The sense that the system makes users feel 'closer' to each other is of interest. Further study is needed to determine what they mean by closer, which aspects of the system contribute to this sense of closeness, what practical benefits does this bring and are they applicable to a wider population than this small pool of users. We intend to conduct laboratory experiments to isolate and assess the effects of video snapshots.

This sense of closeness could be equivalent to experiencing an increased level of presence between the users. Lombard [13] describes presence as the illusion of non-mediation. That is users do not notice the connecting technology, but instead feel as if a window has been opened connecting them together. One potentially useful effect of presence is to increase the level of trust between participants [14]. Games for assessing trust without requiring user opinions, are well established. Zheng et al.[15] describe a two player game disguised as an online trading task. In repeated rounds representing a day's trading, participants are given a fixed sum to invest. If both participants invest in a shared account then they both make a profit, but if only one invests then the other reaps the reward, thus how much they invest gives some representation of how much trust there is between them.

We intend to conduct a similar experiment in which the only visibility a user has of the other participant's attitude and behaviour is through a visual representation either as a static portrait, frequently updated images, or video snapshots. The hypothesis is that representation through video snapshots will lead to a higher level of trust.

5 Conclusions.

We have presented the need to create systems to foster informal communication within large organisations and a prototype client to address these needs. This client tries to replicate peripheral visual awareness through the use of video snapshots. So far we have not demonstrated an increase in communications, but users have indicated that they feel closer to each other through use of the system.

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