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Instant Messaging Implications in the Transition from a Private Consumer Activity to a Communication Tool for Business

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Abstract

Used to communicate important information and provide contact outside of lectures to great effect, email has emerged as the communication medium of choice. However, Instant Messaging is fast emerging as a favourable world-wide method of communication with its interactive nature and appealing user interfaces. However, can it be as effective within the organisation and more importantly the university as the now established email? This research paper will explore how Instant Messaging is advancing from a private consumer activity to a tool capable of improving communication within the university and organisations.

Through the development of a controlled experiment the paper examines the way in which Instant Messaging is being adopted and how it compares to other forms of communication, including its associated interrupt recovery time. The paper also looks at the extent of disruption that Instant Messaging has on users and how users reacted differently to new messages via different notification settings.

1. Introduction

Human communication is relying more and more on the capabilities of technology rather than the first or second class post. Communication has progressed and evolved dramatically through the developments of telephones, fax machines and electronic mail. It can be commented though that with each progression in communication that has enabled us to send and receive information quicker, we still have a requirement for something even quicker than before. This impatient human requirement for instantaneous communication was the catalyst for the development of the phenomenon which is now Instant Messaging. The ability to send a written message via a PC and then receive a reply as soon as the recipient has finished typing a response is the most significant communication adaptation taking place amongst internet users worldwide alongside the transfer to high speed

internet. Instant Messaging increases the communication possibilities by overcoming boundaries of distance, cost, time and effort.

This method of communicating was first widely adopted by teenagers who wanted to 'chat' with each other inexpensively in comparison to sending messages or talking via their mobile phones. The appeal of Instant Messaging (IM) is the ability to engage in synchronous (or near synchronous) text messaging (Grinter and Palen, 2000). This is unlike the text messaging that can be carried out with a mobile phone, where conversation time takes longer as the sender first needs to be in a area of good network reception before their message is sent and then the same would apply to the recipient before the recipient would receive the message. Although in 2002 almost 70% of IM users in the USA and 64% of IM users in the UK were aged between 12-17 years old (Nua Internet, 2002), similar to email, the appeal of IM across age groups is becoming much more universal.

The way in which the world-wide internet community have taken to IM can be depicted by the belief that it is 'now an assumption that you can contact someone by IM' (Bird, 2003). Instant Message accounts, usernames and IDs are fast becoming as commonplace as telephone numbers, mobile numbers and email addresses. It was difficult to imagine this sort of response to IM from its initial humble beginnings as an application that university students would use to 'ping' computers from other universities in order to get the attention of the user of that computer.

The application was further developed into something slightly more interactive by concept Unix OS and Digital Equipment Corporation's Vax OS, and was given the name 'Talk or Phone'. This worked by splitting the users' computer screen into two and having one side for the sender comments and the other side for the recipient's comments. This version was not as interactive or fast as IM clients of today, as it merely produced text with a very limited graphical interface and did not reveal the online or offline presence of its chat participants. It was not until 1996 that an Instant Messaging client was introduced that would pave the way that has lead to the development of the widely used clients of today.

It was in 1996 an Israeli consortium of programmers known as Mirabilis created a client known as ICQ which was a play on the words 'I Seek You'. It allowed users with an internet connection to download the ICQ client for free and then send Instant Messages to other users who had the client. Word spread and ICQ quickly gained cult status amongst internet users who wanted to try and be part of this new and exciting form of communication. ICQ was also receiving attention from other more recognised internet corporations such as AOL Time Warner, MSN (Microsoft) and Yahoo. These companies were quickly alerted to the amount of interest that Instant Messaging was attracting and realised that this niche market had the potential to change communication as we know it for the foreseeable future at least.

The potential that the Mirabilis client possessed was realised most by AOL. They may have even seen the ICQ client as a threat to their own IM client that they had been developing. In the world of IT where imitating – the greatest form of appreciation – could land you with a lawsuit, AOL took the next best step and bought the Mirabilis consortium out. In June 1998 AOL acquired the Mirabilis company in a deal that was worth $287m plus $120m in performance incentives. AOL now had all the ingredients they needed to be able to progress further into the position they find themselves in today as not only the Internet's leading service provider but also the leading Instant Messaging provider.

IM has the capabilities to improve communication within the university or within industry, on the proviso that it is implemented correctly with the necessary features and does not become more of a hindrance rather than a seamless support tool to the current communication options. However, for IM to be deployed effectively into any environment, a greater understanding of it's effective on the workplace needs to be determined. This papers looks at the effective of IM on the workplace and how it compares to other communication media.

2. The Impact of Instant Messaging on the Workplace

To determine the influence of Instant Messaging on staff and students performing real-world tasks at their desktop machines an experiment was devised by the author. In order to determine influence it was important to record information about the subjects whilst they used Instant Messaging within their regular working day. The subjects were monitored over a 15 working day period (Monday – Fridays only) and had one of three methods of Instant Message notification. The choice of notification was pop-up window, audio alert or task tray flashing alert. The number of subjects chosen was 10 as this was a manageable number for analysing any collected data over the limited timescale. The 10 Student-Staff chosen as subjects were from the Loughborough University Campus and were selected due to their availability at the time the experiment was being carried out and also they were in regular contact with each other as their respective departments; student welfare, student discipline, student entertainment and student sports relied upon each other. The information recorded concerned the number of instant messages they received in a day, the number of words per message, the time taken for a recipient to react to a new message and also the time taken for a recipient to return to the task they were partaking before the message was received. It was also important to record whether or not the subjects were taking any notice of the availability of the presence detection and whether or not users were setting their online status in accordance with their real-space status as this would influence another user's decision to send a message and also the number of messages received overall. It was also important to see whether or not features such as the conferencing or the multiple message facilities were utilised at all.

2.1 Monitoring Considerations

There were important considerations to be taken before the monitoring could be undertaken. The IT Technical Manager had to be reassured there were no extra vulnerability issues due to the running of the experiment and no regulations were to be breached. Another issue to overcome was the privacy issues with recording or monitoring messages of the subjects. This had to be overcome by the signing of consent forms by the subjects allowing the author access to any information recorded from their desktop over the 15-day period for the purpose of the research. In accordance with the acceptable IT usage regulations of the university, the subjects were aware that they could be monitored at any time. It became apparent though that the subjects may try to use other communication methods during the monitoring period if they felt that every message would be scrutinised, so they were made aware that merely quantitative data such as number of messages received per hour would be collected for the purposes of the research. They were also told that they would only be monitored for one hour each day but were not made aware of the hour. This was done as not to make them self conscious as they utilised their messenger clients as this would affect the results even further.

Collecting a record of the data was another issue that had to be overcome as there were a number of ways, each having there own advantages and disadvantages and different levels of intrusion. The main requirement was to keep the level of intrusion to a minimum while also collecting accurately as much data as possible. Unlike similar research undertaken by Jackson, Dawson and Wilson (2000) at the Danwood Group where video recorders were utilised in addition to monitoring software, due to limitations of time this was not feasible for this experiment as the footage would have been at least 120 hours long. For this reason, using a web-cam on each work station was also ruled out. It was decided that the best method was to use a piece of monitoring software that would record the usage of each subject's computer over the 15 day period. The most suitable software for this purpose was '007 spy software' which was chosen due to its ability to work in a stealth mode that made the subjects unaware of when they were being monitored. No icons appeared within their system tray and a pre-determined combination of keys had to be pressed to check the monitoring software's operation each day, a combination that the subjects were unaware of. Each subject's computer had the software installed and all activities were accurately recorded. The subjects were unaware of the name of the software and its location and all icons relating to the software were hidden. Extra steps were taken to password protect the file as a precaution so settings could not be accessed, changed or removed. The log files were saved on an independent machine that was connected to the network of subject computers, but not used by any of the subjects. As a precaution settings were activated to automatically email these log files to an email address at the end of each hour. The monitoring software was used in addition to the logs produced. The logs recorded all messages with information relating to time of message sent or received, message sender, message recipients and the actual message itself. The monitoring software recorded keystrokes and the running of any application, allowing for easy identification of what a subject was doing before and after they received a message. The monitoring software logs the opening of messages and the logs from

the message archives help to record how quickly a message is responded to. For extra information and for validity purposes, snapshots of the subject's screen were also taken by the monitoring services at regular intervals, to confirm everything that had been logged especially programs and documents that were open while messages were being sent and received corresponded to the logs. The monitoring software was also set-up so that it did not archive or log anything that took place on a machine outside of office hours (9am-5pm) as this information was deemed irrelevant for this particular research.

3. Experiment Results

The results raised a few surprises but on the whole showed that Instant Messaging was an important part of working day of the subjects involved. Each subject was competent using their Instant Messaging client using the status settings to relay to the other users of all changes in their availability, initiating multi-contact conversations and also conferences. All subjects completed the 3 week period consisting of 15 working days. Each week the notification settings of the subjects IM clients were changed in order to simulate the different preferences that users have and also to identify whether different settings affect the amount of messages sent and received and also the way users react to incoming messages in a controlled environment. At the end of the experiment the subjects were asked to pass comment on their view of Instant Messaging usage and possible improvements.

3.1 - Week 1 – Using Pop-up Window Notification

In the first week, the notification alert for new messages was a pop-up window that appeared instantly overlaying any documents or application window, in order for the message to be read. Users had no option but to read the message as soon as it appeared unless they chose to minimise the window when it appeared for reading at a later time. When messages appeared in this way a staggering 86% of messages were read instantly with only 14% minimised for reading later. Of those that were minimised 80% were read within 30 seconds and the remainder within 1 minute. On average users took between three and ten seconds to read their messages depending on the length of the message and reading speed of the user. Messages that required a reply were composed, sent and received by the recipient within an average of 8 to 15 seconds. The least number of messages were sent between the hours of 9am and 10am as only a few of the subjects had arrived into work. However, the majority of the subjects received a greeting message upon arrival as the presence awareness linked with the IM client would relay their arrival to the other users upon starting up their machine. The second least number of messages were sent between the hours of 4pm and 5pm when the subjects were preparing to leave for home. Most messages were received during the lunchtime period between 12 noon and 1pm where most of the messages were non-work related, even though the majority of the subjects would meet for lunch for at least 30 minutes they still felt compelled to return to their machines to communicate via Instant Messaging. On day one, IM was used to make arrangements for lunch, taking the message count for that hour to 118 messages amongst the 10 subjects. In the first week the

average number of messages received per hour was 51 between the 10 subjects which meant that each subject received on average 5 messages per hour. The recovery time for an instant message was estimated to be between 11 and 25 seconds which is substantially lower compared to a telephone call at around 15 minutes and lower than an email which is estimated to be around one-minute (Jackson et. al., 2003; DeMarco and Lister, 1999). The IM recovery time was calculated by processing the IM logs and the '007 spy software' logs.

If a user was interrupted by telephone as the same as the 5 instant messages an hour, then there would be a large amount of time needed for users to recover. Hypothetically speaking if a user was to be interrupted via telephone 5 times every hour, during the working day that would accumulate to 32 phone calls which would mean they would possibly need 8 hours to recover. Their productivity would obviously be very low. The results from Week 1 show that due to the very low recovery time for Instant Messages, users were able to communicate often without putting too much strain on the workload. However this does not take into account the effects of message fatigue (Zijlstra et. al., 1999).

3.2 - Week 2 – Using Audio Alert Notification

In the second week the notification alert for new messages was adjusted so that the subjects heard an audio alert whenever they received a new message giving them the opportunity to respond to the message in their own time. It made a significant difference to the way that the subjects were handling their messages. Most messages (80%) were reacted to within 5 seconds and 90% were reacted to within 60 seconds. Even though the alert was slightly more salient and did not interfere with any current desktop tasks unlike the pop-up window, users still answered quickly, with response times similar to those of telephone calls showing the importance with which they regarded the messages. Messages took slightly longer to compose between 9 and 17 seconds as users seemed to write a little more in their messages given the slightly longer time they had to respond to them. The average message in the second week consisted of 12 words compared to the 8 words of the messages composed in the first week.

The recovery time for messages was estimated to be between 9 and 23 seconds as the audio alert was not as obtrusive as the pop-up window and enables the user to make a choice of when it is a convenient time for them to read the message, which also affected the speed to which they returned to their work. In the second week the subjects changed their lunch hour slightly to between 11:30 am and 12:30pm which was identified in the results as most messages were received during the hours of 11am and 12pm. The results show that 20% of all messages were received during this time. Again the least number of messages were received at the beginning of the day with an average of 11.4 messages being received between the 10 subjects between the hours of 9am and 10am. It seemed the change in the notification did make a difference with the volume of messages being sent and received. The average number of messages each user received per hour reduced to 4.1 messages. There was a marked reduction in the total number of messages received in the second week to 1641 messages, a reduction of nearly 400 messages.

The reduction brought about a reduced number of interruptions and the possibility that the subjects may have been more productive in Week 2 than they were in Week 1.

3.3 - Week 3 - Flashing Taskbar Alert Notification
In the final week of the experiment (Week 3) the notification settings were adjusted further so that users were alerted to new messages via a flashing icon in the taskbar. This meant that they did not have a pop-up window or audio alert when a new message was delivered. The flashing taskbar alert icon is at the bottom of the screen, so compared to the other two notification devices it is the least intrusive. There was a difference in the volume of messages received in comparison to the previous two weeks and there were some similarities. Subjects handled their messages differently as the taskbar alert was certainly not as disruptive as the pop-up window and also not as obtrusive as the audio alert. Users were more inclined to wait slightly longer before checking their messages as the first few letters of the sender's name were shown in the taskbar icon alert, This meant that unlike email they would not have to open the message to know who the message was sent from and therefore could make a decision on the importance of the message. In the final week 69% of messages were answered within 5 seconds and 90% of messages were answered within 75 seconds. The majority of response times were still similar to those of telephone calls but without the long recovery times associated with a telephone call. The average number of words per message in the final week rose slightly to 13.5 words per message which meant again that users were writing slightly longer messages after taking a little longer to respond to the initial message. Users were likely to provide more information in an answer to a question to prevent the further possibility of unnecessary questions being posed. This brought the overall message count down and also reduced the average recovery time as the interruptions were less and also users were able to on average wait a little longer before responding to messages, preparing themselves better for recovery after reading their message. The recovery time for messages in week 3 was between 8 seconds and 21 seconds. Again the hour between 9am and 10am produced the lowest percentage of messages with just over 10% of messages being received within this time period and the highest percentage of messages being received between 11am and 12pm with a figure of just over 18%. The volume of messages reduced slightly in comparison to the Week 2 figures. The average number of overall messages received in Week 3 was 40.2 messages with an average number of messages each user received per hour to 4.02 messages. The average daily number of overall messages reduced to 321.8 messages with an overall total number of messages for the week being a reduction on Week 2 at 321.8 messages.

4. Experiment Analysis
The results showed that the notification settings certainly had an influence on the number of messages sent and received amongst users. Users seemed to work more efficiently when they had a choice as to when they responded to a message rather than being dictated to by the arrival of a new message that opened up instantly on

their desktop on top of other applications. This was highlighted by the reduced number of weekly messages when the audio or taskbar alerts were used. The taskbar alert provided the lowest overall message count for the week.

Overall 38.5% of all messages were received in Week 1 (2038 messages), 31% received in Week 2 (1641 messages) and 30.5% received in Week 3 (1609 messages). The total number of messages received over the 3 week experiment period was a staggering 5288 messages. The average recovery time also reduced with each week with the average recovery time being 18 seconds in Week 1, 16 seconds in Week 2 and 14.5 seconds in Week 3. Overall the average recovery time was 16.1 seconds which is lower than the estimated recovery time from email messages and a huge reduction in comparison to the 15 minutes estimated for a telephone call. Hypothetical, if a firm received the same number of telephone calls as the 5288 Instant Messages received over the experiment period, the total amount of estimated recovery time would have been 1322 hours. There would not have been enough hours in the experiment period to recover from that number of telephone calls. Instant Messaging provided just under a 75% saving in recovery time over email. The average person received around 4.4 messages per hour and 35.2 messages per day which is a manageable number of interruptions using IM, but by email or even telephone may become slightly disruptive.

The subjects found that time and disruption was reduced by the fact that unlike email, they did not have to spend anytime opening and reading junk mail as messages were highly likely to come from people they knew. The subjects found instant messages are similar to telephone calls by their nature of being random, and that message retrieval cannot be scheduled like email clients that can be set to retrieve email at regular intervals. Only the user's online status can have an influence on the number of messages that a user may receive. The subjects found that the online status settings did make a difference, especially when users set their status to 'Busy' as they either received no messages or a minimal amount of messages during that period. It was commented that knowing whether a user was either 'busy', 'away from desk' or 'available' saved time as the whereabouts and availability of colleagues could be quickly established just by viewing their online status.

The subjects utilised the multi-user and conference chat capabilities quite regularly and have found it to be a useful feature as they are able to engage a number of colleagues or contacts into discussions. At one point of the study, it was used in place of a physical meeting where a vote needed to be taken which meant that the subjects could remain at their desks and continue with their work and also contribute to the meeting as well. It was not felt that they could use IM for all meetings but it would certainly be used for some as it did not require users to stop their current tasks like a physical meeting. Also, because the conversations are already documented by the message archive, it is not necessary for the minutes of the meeting to be taken. This was another feature that the subjects highlighted as being useful, as they were able to access a record of their IM conversations if they needed to refer back to anything in a particular conversation or to clarify some

specific details. In comparison to taking notes of a telephone call or real space conversation the subjects found that using IM was a better option as there were numerous instances where they had lost notes that they had left laying around on their desks.

Another feature that the subjects were found to be utilising was the contact alert settings. The function enables users to arrange an alert when a specific user comes 'online' or back from 'away'. The choice of alert depends on the preference of the user. In one scenario one subject (A) had put an individual alert on another colleague (B). It was important for (A) to know if (B) was in or not but (A) was away from their desktop for many periods during that day and a situation may have arose where (B) came online when (A) was away from their desk and may have been offline by the time that (B) returned. Even though upon (A)'s return (B) was offline again, due to the individual setting an alert message on the desktop and also an icon in the task bar alerting (A) to the fact that (B) had been online sometime that day.

It was found that 40% of all messages received were to check a user's availability for chat or discussion, so even if a user's status was 'available' out of courtesy users felt it necessary to confirm this. The experiment highlighted that 37% of all messages were non-work related this. This could be an important consideration when firms look to setup guidelines on IM usage. It was also found that 45% of conversations replaced a conversation that would have taken place as a physical meeting or telephone conversation. This meant that IM had been chosen as the preferred option in these situations offering an advantage over other forms of communication.

5. Conclusions

Communication has no doubt evolved as human demands and requirements to 'keep in touch' have dictated. Since its consumer birth in 1996, Instant Messaging has certainly created an appeal that is fast fulfilling this demand, namely down to its 'presence' awareness, detection and management which has enabled its users to locate each other accurately. With obvious initial setup costs of machine(s) and internet connection, Instant Messaging has emerged as a cost effective global communication tool. It is clear that from its humble beginnings to the phenomenon it has become today, provision of Instant Messaging services has enhanced the profile and global appeal of the three computing and internet powers (AOL, Microsoft and Yahoo) who were rightly justified to place their resources in this area, to dominate a market of which they are poised to reap the benefits of any future progressions.

The research has shown that Instant Messaging rates highly when compared to other available forms of communication, especially taking into account the recent addition of audio and video capture capabilities. Combining these features to give Instant Messaging dynamic status it is arguable that Instant Messaging ranks a very close second to Face-to-Face contact. Even instant messaging has its advantages as Face-to-Face may offer the added benefits of touch and tension, Instant Messaging

offers the capability of logging conversations in archives providing a favourable advantage over the human brain when it comes to retention of accurate conversation details. Other benefits over other forms of communication include time and cost savings.

The experiment highlighted that Instant Messaging is making a beneficial transition from home to organisations and institutions enabling employers, employees, colleagues, staff and students to locate each other with ease, and communicate and hold conferences online. The experiment also highlighted that Instant Messaging can work within the organisation. On average users were receiving more via their IM client than they would be receiving using other forms of communication. The effects of IM interruptions on tasks was found to be low especially when compared to the same volume of messages received via other communication forms in terms of recovery time.

The alerts notification settings were found to be influential in controlling the responses of users to messages and also the overall volume of messages sent and received. Pop-up windows were found to be the most intrusive as users had no option but to read the message. The more passive alert of the system tray notification allowed users to take more time before responding reducing the disruptive effects even further. Unlike email messages, Instant Messages are received from known contacts reducing the time wasted having to read spam email.

The main restriction of Instant Messaging is that interoperability could eventually cause major problems, as a communication restriction would normally be perceived as unreasonable and users may realise that it may not be as easy to contact each other as they think. In the short term, client side interoperability through third party clients may offer some functioning solution, but it still does not address the problem. Currently users may not see interoperability as essential, mainly due to the fact that the majority of users are still teenagers, but as IM increases its universal appeal then the IM networks will have to make positive steps towards a resolution. Instant Messaging is rapidly heading towards ubiquitous status and it is important that any barriers are removed if it is to progress any further. At present the best interests of the IM network providers is to allow the current situation to continue due to the potential revenue that may be available from charging licence fees for access to their network, especially to third party clients.

Instant Messaging can and will make the transition from the success it has become amongst home users to institutions, organisations and corporations. The world of communication is in an exciting state since the emergence of Instant Messaging. As long as guidelines of appropriate use are followed and the essential features are made available, Instant Messaging will stabilize to a position as a seamless support to other communication options. The inevitable universal adoption of Instant Messaging is a reflection of the nature of the requirements that people need for their communication services.

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