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Downsizing electronic mail can optimise company communications

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Improving the Communications Process: The costs and effectiveness of email compared with traditional media

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Abstract

A cost-benefit analysis of the use of email was carried out at the Danwood Group at Lincoln in the UK. This was a pilot exercise forming part of a larger exercise to evaluate the costs and benefits of the whole IT infrastructure at the company.

The times taken to read, write and carry out other functions with the email were measured for a sample of employees. The email content was also monitored to determine which emails were business related. It was found that nearly two thirds of all emails sent were non business related and the pattern of behaviour when sending and receiving these emails was quite different to that for the business emails.

Overall the findings indicate that despite the fact that only one third of email use was productive, the time taken is still worthwhile compared with other, traditional communication methods. However, it was not possible to fully quantify the benefits of email over these other methods, as the data for the alternatives has not yet been collected. The study showed that further research is necessary in this respect.

The paper concludes that the analysis has been a useful learning experience for the company showing the value of cost-benefit research and highlighting the difficulties involved. It has also identified the possible benefits that could be obtained by educating employees in the best practice for the use of email.

Introduction

Through communicating we exchange our thoughts, ideas, opinions, feelings with other people, at work, and in every other part of our life. The communication process is so commonplace that it becomes second nature, though by analysing the process it is seen to be much more complex, and much less efficient, than it is normally assumed. By understanding the communication process we can select the optimum communication medium to increase the efficiency of our communication, with benefit to the productiveness of our work. As communication pervades nearly everything we do, even small improvements in the effectiveness and cost of our communication processes can have significant benefits.

Research carried out by R Solingen [1], into communication interrupts showed 15-20 percent of an employees effort is spent dealing with interrupts and in real terms 15-20 minutes per interrupt. An interrupt is defined as "any distraction that makes a developer stop his planned activity to respond to the interrupt's initiator". There were 3 types of interrupts defined, personal visits, telephone calls and emails. Personal visits and telephone calls caused 90 percent of all interrupts and email caused the rest. The results showed the effort spent on interrupts required approximately 20 minutes for occurrence and handling combined and that the average developer receives three to five interrupts per day which consumes roughly 1 to 1.5 hours per day of the developers time. DeMarco [2] reported that the recovery time after a phone call interruption is at least 15 minutes, thus increasing the amount of time spent on interrupts a day. Both organisations used in the study set up and promoted an interrupt e-mail policy after the findings. It was discovered that developers handled email interrupts more efficiently than those delivered by personal visits or telephone calls as the developer responds to an email interrupt when it suits him or her. Further, personal visits and telephone calls need more handling than email – apparently because email interrupts are usually better formulated.

Email is becoming an integral part of the communication structure within organisations, but the costs and benefits are not being assessed to show when it is a more effective communication process than traditional methods. Communication is carried out in many different forms, but the common underlying motive of communication is to improve working practices and to increase productivity. The results of the study show an educated decision when to use email will increase productivity over traditional methods just as an uneducated decision could easily prove counter productive. This paper builds on other published work, such as by Solingen [1], to identify the productivity and efficiency costs of using email.

This paper resulted from a study of the communication methods within an organisation that retails office solutions: The Danwood Group. This study is part of a wider research programme to identify the costs and benefits of the IT within the company. The investigation of the benefits of email relative to traditional communication methods forms a pilot study within the company to establish the value of such analysis. The use of IT for communication was chosen for the initial study as the organisation has rising communication overheads with the consequential reduction of employee productivity within all functions. The company expects that a basic understanding gained from this study will provide the data for communication planning and corrective actions for the problems uncovered.

As the research is still in its infancy the data has so far been captured from a small subset of employees from two of the organisation's sites. At the time of writing the employees only have access to internal email, their own telephone and the internal memo system. Though the results are preliminary, some conclusions have been drawn and the cost of using email compared with other mediums such as the telephone has been quantified.

The Communication Perception

The evolving technology aimed at the 'paperless office' is focusing on people productivity, which means better use of their time. Companies seeking better communication processes often invest in email to reduce communication costs and to increase employee productivity. Email is perceived as a tool for cutting down on paper and telephone bills. Email is attractive according to IBM because it's becoming universal, it's incredibly cheap, it can be personalised by computer, it can target groups, companies or regions and mass marketing requires very little effort. Since the 1970s, email has evolved into the communication tool of choice for information technology academics and professionals, yet little research has been undertaken to establish the effects of email in the workplace. By the 1990s, the popularity and ubiquity of email throughout the rest of academia and high-tech industry established it as a communication standard. The rapid growth of the Internet means there is more email traffic now than ever before, and there will be still more in years to come as currently 10.6 million people are on-line within the United Kingdom [3].

In the majority of companies, email is thought to be an efficient communication process by both the employees and most importantly employers, but the word efficient is never quantified. The real costs of using computers to communicate aren't analysed within companies because of the attitude, "Our competitors are using them and they work well for them". One of the authors asked the Secretary of State for Culture, Media and Sport, Chris Smith (MP), the following question regarding company communication and employee productivity.

With ever-increasing pressure put on companies to communicate via email and the Internet do you think employee productivity is decreasing because of these added distractions?
"That's a matter for individual businesses to make their own decisions. Businesses use email for internal communication - we do in this department to a large extent - and that can greatly increase efficiency. Far from hindering employee productivity, use of email and the Internet can enhance it." [4]

With many organisations having the same unquestioning belief, little research has been undertaken on email and its cost effectiveness within companies. The case study exercise has proved to be a useful education for employees and employers within the company to show that doing everything by computer is not necessarily beneficial in terms of effort or cost. It has also been a revealing illustration of the benefit of producing an empirical analysis of IT processes.

Recording the Metrics

As some companies have email usage policies, it was important to research a company that had no email restrictions, so the results weren't biased. The Danwood Group currently has no email policy to restrict the employees, however the users do know email metrics are recorded for research purposes. In order to record the

metrics a special email application [Figure 1] 'The Danwood Mail', was written by one of the authors to analyse the users activities whilst using the package for communication. The program records how many words are in a message, how long it takes the user to read or compose the email, the subject of the message, who it is to, the author, the time and date the email was sent. The 'The Danwood Mail' replaced the Microsoft Windows Messaging application. Though not as sophisticated as Microsoft's Windows Messaging application 'The Danwood Mail' received good feedback from the Danwood users for its speed and user friendly interface.

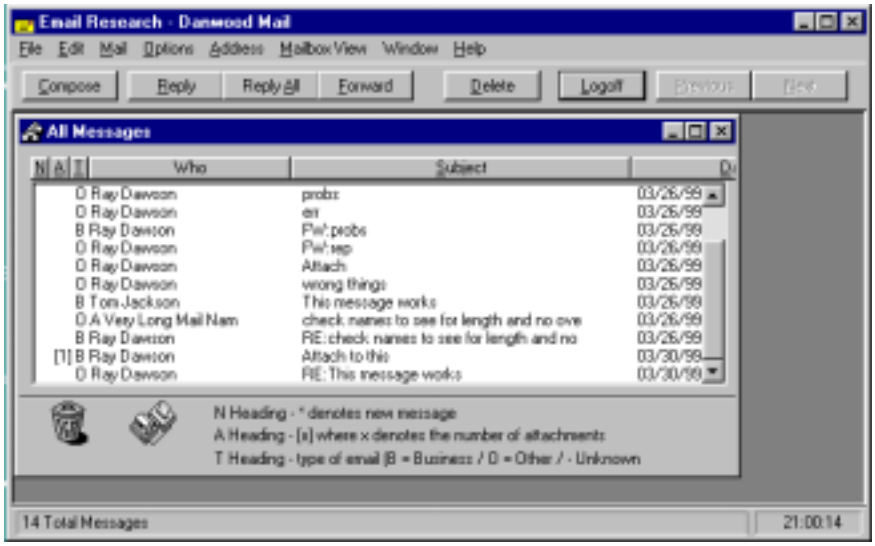


Figure 1 – The Danwood Mail Application

A timer is started when a read or write message window is activated and calculates the time a user takes to read or write a message. The timer is paused when the user changes focus from the window and restarted when the window focus is regained. The deletions of emails are not timed, as the time taken is insignificant.

The telephone metrics used in the paper have been obtained from itemised bills provided by the telecommunication carriers. It has only been possible to obtain the amount of time and calls made to external phones, as internal and received calls are not shown on the bill.

Analysis of the Communication Process

Email is undoubtedly a versatile communication tool capable of sending a message anywhere in the world within seconds regardless of the time boundaries. Recently email was installed at Whitehall and other British embassies around the world,

speeding up internal channels of communication. Instead of the old fashioned telegrams, email enabled them to pass information more quickly and securely, reducing the amount of paperwork and making them all more effective [5].

Email like any other communication tool can be used for both personal and business communication. One difference between email and other communication mediums is that email is discrete, unlike the telephone. In a working environment everyone surrounding you can hear your telephone conversation, which makes it harder to use the telephone for personal calls.

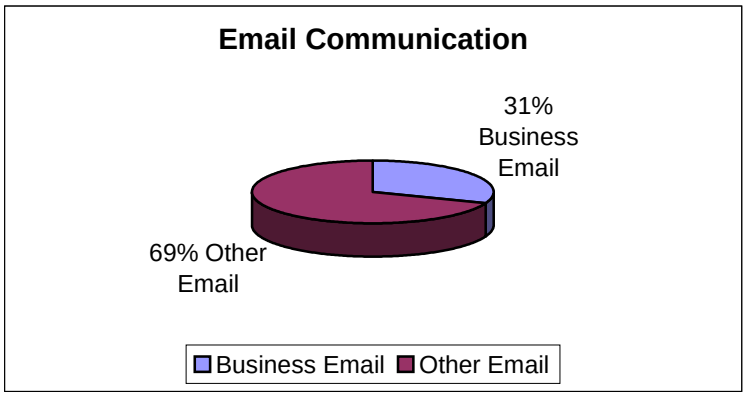


Figure 2 – A breakdown of email messages dealt with by the average employee

Analysis of 'The Danwood Mail' metrics shows email isn't as productive as first anticipated. Firstly, as shown by figure 2, the average employee uses email mainly for non-business purposes, for example sending jokes or telling their colleague to make the tea. The reason for such high non-business usage of email could be the ease of use and privacy that email offers. Only 31% of the messages dealt with are business related.

Converting the percentages from figure 2 shows that 54.12 hours a working year (48 weeks) per average employee is spent on non-business communication in figure 3. This means 14 minutes per average employee a day is wasted on non-business email, in addition, recovery time has to be added for each interrupt. There are currently no figures for how long it takes an employee to recover from an email interrupt.

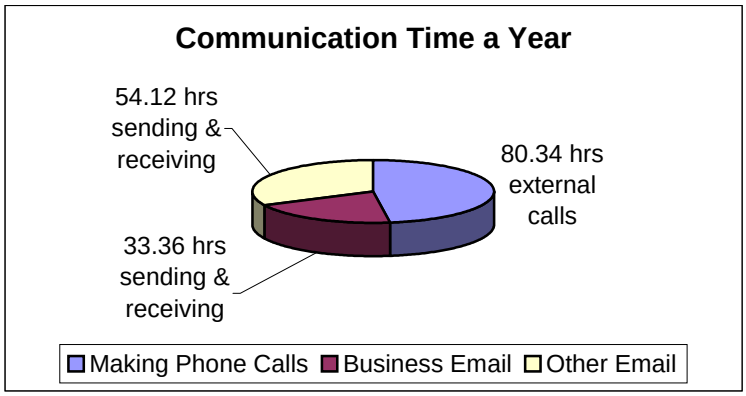


Figure 3 –The amount of time the average employee spends on communicating a year

The research carried out on 'The Danwood Mail' shows the average employee reads 11 non-business emails a day. It is clear that further research is required into calculating how long it takes an employee to recover from an email interrupt as the 54.12 hours a year could greatly increase. If it takes 15 minutes to recover from a phone call, according to DeMarco's research [2], it is clearly going to take some time to recover from an email interrupt. The extent of the recovery time will vary from person to person, many employees appear to react to an incoming email immediately, implying the recovery time is likely to be similar to the recovery time after a phone call for these employees. Other employees wait until a more convenient moment and then deal with several emails together. This type of reaction will result in a much shorter recovery time. However, even if it takes an average of only one minute to recover from an email interrupt, this nearly doubles the amount of time spent on non-business email and would effectively be giving an employee a further 2 weeks holiday a year.

Increasing Communication Productivity

In order to make email more productive, the 69% of non-business emails need to be reduced to save some of the 14 minutes plus recovery time lost per employee a day. This would save a medium size company of approximately 500 employees, 27060 hours a year on non-business communication even before recovery time is taken into account.

Trying to reduce the amount of non-business email can be difficult and can become very controversial. The email privacy issue came to light recently when employees discovered employers read their email. In one case, when an employee of Pillsbury sent what he thought was a private email communication to a co-worker labelling Pillsbury as "back-stabbing bastards", he was fired for "inappropriate and unprofessional comments." [6]

Some companies are becoming increasingly concerned about their email being used for non-business purposes and have started to introduce email policies. For example: -

- ***Intel.*** Email is monitored to ensure employees are not engaging in personal activities on company time.

- ***Kmart.*** All email messages are subject to review. Personal use of email is considered a breach of company resource policy possibly resulting in denied access to the company computer system or termination.

- ***Epson.*** Email is considered company property and subject to review, printing, storage, and dissemination by management.

Other companies, such as Apple, have no corporate policy.

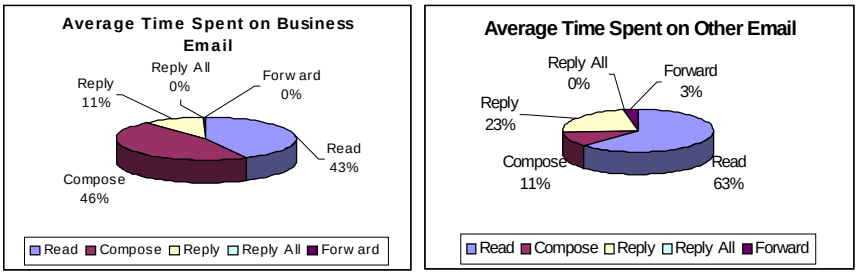


Figure 4 & 5 –Breakdown on time spent on Email Activities (4 – business / 5 – other)

Figures 4,5,6 and 7 shows the patterns of use for non-business email are quite different to that for business email. Figure 5 shows that employees spend a far greater proportion of their time reading a non business email and are far more likely to reply or forward the message to others. If an employee spends 2 minutes composing a non business related email, figure 5 shows that this represents only 11% of the time lost, the remaining 89% or 16 minutes is lost in reaction time by the receivers of the email plus any additional recovery time taken.

Trying to track down the employees that produce a high volume of non-business email isn't straightforward. With mailing groups becoming increasing popular, sending email to large numbers of people should result in employees receiving many more emails than they send. While figure 6 shows this is the case for business related emails, figure 7 shows that the number of non business emails read is comparable to the number sent, implying mailing groups are not frequently used for non business purposes. This implies the non-business emails are targeted more at particular employees who are, presumably, more amenable to receiving such email. This will make it difficult for an employer to be even aware that such emails are being sent, let alone know the extent of this email use. The only way for an employer to be able to detect the level of non business use is to monitor the content

of the emails but this comes with the risk of employee unrest over the loss of privacy this would entail.

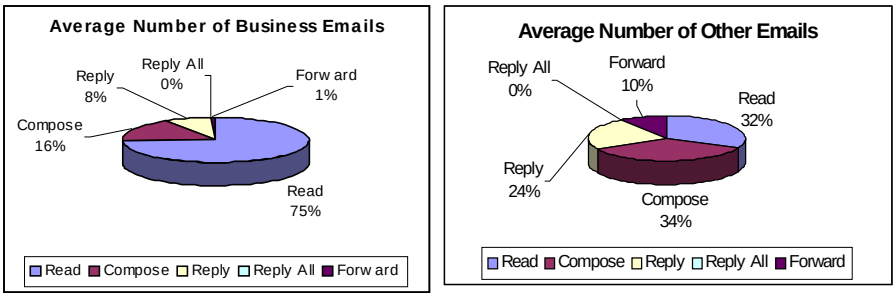


Figure 6 & 7 –Breakdown on average number of Email Activities (6 – business / 7 – other)

Assessing the Value of Email Relative to Other Forms of Communication

DeMarco and Lister describe the high impact of phone calls in engineering environments: developers routinely receive 15 telephone calls a day, which can make the whole day non-productive [2]. While the benefits of email are not as good as expected as a result of the lost time through non business use, comparisons could nevertheless show that email is more effective to communicate than other mediums, in terms of costs of interrupt recovery time. Figure 8 shows an analysis of email use over the working day and that the use of email has a peak at 8.30am and 4.30pm. This uneven distribution of communication will concentrate the interrupts at certain times of day, which is likely to reduce the overall disruptive effect. It appears that the pattern of communication for email is quite different to that of other forms of communication. Email users seem to use the communication tool at different times and for different purposes both when sending and receiving the communication. However, there is a lack of data on the traditional communication media to quantify the differences.

Communication patterns need further research to try and establish how to increase employee productivity by finding the best time to communicate during the day to keep interrupts to a minimum. In figure 8, at 8:30am there is a peak possibly due to employees coming into work and checking for new email, but the peak at 16:30 is harder to explain. The further research might show that there are two common natural times during a day when employees communicate. Companies could experiment and encourage the majority of communication to take part during these times to reduce employee interrupts.

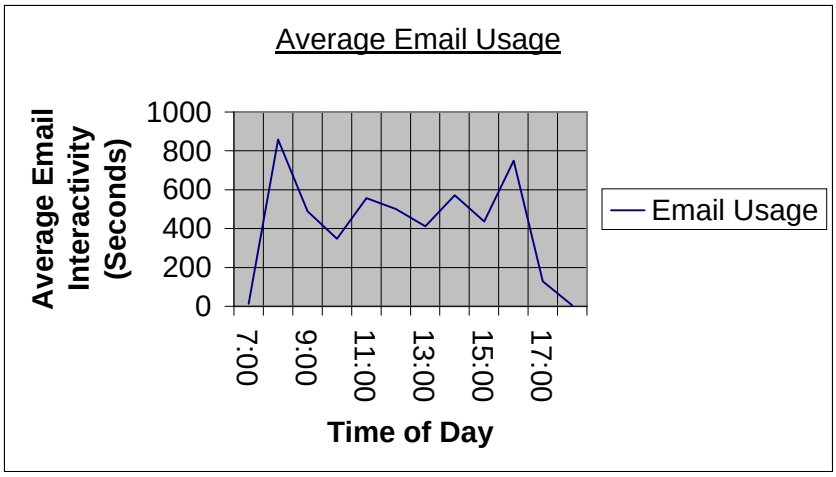


Figure 8 – Email usage throughout the day
(*The graph is measured in email interactivity, where email interactivity is classed as a user reading or composing a message including reply, reply all and forwarding*).

Educating employees about the negative effects of interrupts have decreased interrupts by 30 percent in a case study [1]. Speculatively, if the employee education of interrupt awareness was effective, a company could double the amount of useful emails without increasing the level of non-business. If this could reduce telephone calls by 4 per employee a day it would in-turn save 60 minutes recovery time as well as the time taken for the actual telephone calls. The findings of the email analysis shows that on average 90 seconds is spent per email excluding recovery time. If the recovery time is anything less than 13.5 minutes per email, there is clearly a gain in the overall time taken in the communication. Indeed if the recovery time was reduced to 3 minutes per email the overall time saved by moving 4 calls to email will be greater than 40 minutes for each employee every day.

The results of this analysis show that email is likely to be a more cost-effective communication medium than traditional communication methods. However, it has not been possible to fully quantify the research findings. More research is required about the time spent using the telephone and by making unannounced visits to other employees. Research is also required on the distribution of the traditional communication methods over the day, on the nature of the communication, and on whether the communication could have been carried out using email.

Future Work

The results highlight employee productivity could be significantly higher, but further research is required into calculating how to achieve this. In particular the following points need investigating:

1. The recovery time after reading email needs to be quantified. This may also bring to light issues of how and when people react to incoming messages. It is likely that employees who tend to react immediately to a message are subjecting themselves to a greater level of interrupt. Research into recovery time could lead to a need to educate employees in the best practices of handling incoming messages.

2. More information is needed on traditional communication methods such as telephone calls and visits. Social influence models suggest that an individual's media choice is influenced by his colleagues and other organisations [7]. Markus (1992) conducted a study in an organisation and found that factors other than people's perceptions of media richness guided their media selection [8]. Research by others [1,2] has been useful but more information is required on the nature of the communication to determine how much would be better carried out by email and how employees can be encouraged to make this change.

3. More research is required on the different nature of email communication. For example, do employees use it more for non-business use than they would use the telephone? There appears to be quite different patterns of use for email but more knowledge of patterns of use of traditional media is required to determine what effects the different patterns may have.

4. Research is also required into ways of educating employees into using email effectively for business purposes and reducing the level of non-business use. Any method of encouraging good practice in this respect without the need to intrude on the privacy of employees by reading their emails would be welcomed by the business community.

5. The effects of email on the overall level of communication need to be assessed. Email tends to open communication channels that employees using the phone or face-to-face communication wouldn't have normally used. Email is a less intrusive way of communicating and it avoids personal contact that some employees find a deterrent when dealing with managers. Email channels from the subordinate to the manager may be costly to the company if they are over used and take up too much of the manager's time. Though an email channel from the manager to the subordinate might out weight cost as managers can tap into the full talents of their subordinates and may become more productive [5].

Conclusions

The Danwood Group performed their communication measurement programs for only 2 months. The authors realise that this gives a limited data set, but the results are already of interest. Further research as outlined in the previous section is needed to fully quantify the costs and benefits of email relative to traditional communication media. However, the company has taken significant steps forward in the research and already has indications on how to increase employee productivity.

This pilot exercise has been successful in showing the value of carrying out a cost-benefit exercise on the company's IT infrastructure. While the results are not yet complete the study has already increased the understanding of use of IT within the organisation. The analysis has also been a useful learning exercise for the company. It has shown both the value of obtaining metrics on their activities and the difficulties involved. It has also shown that for a cost benefit exercise to be effective it is necessary to put as much effort into obtaining data on the alternatives to the IT being evaluated. The company has also learned that the IT cannot simply be evaluated in isolation, but as an integrated part of the company processes it must be studied in conjunction with the effects on the surrounding people and environment.

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