The generation gap: Managing technology-mediated personal social networks

ABSTRACT
Keeping in touch with family and friends should be easier now that we have a repertoire of communication tools available to us (e.g. SMS, IM, email, mobile and landline phones). And yet many of us continue to find it difficult to maintain and manage our personal contacts. Why is this so? This paper describes a study that looked at how a range of different social groups manage their personal networks and what types of technology-mediated communication tools they use. A key finding was a ‘generation gap’; teenagers have quite different communication patterns than people of their parents’ age and older. ADSL users were also found to have developed quite different ways of communicating. We discuss our findings in terms of how to more effectively support people to manage multiple modes of communication.

Keywords
CMC, contact management, communication, social networks, ADSL users, teenagers, personal information management

INTRODUCTION
We all know how difficult it is to maintain social contact with all our family and friends. Besides the close friends and family who we have regular contact with, communication with others is sporadic and less frequent than we would like. Typically, it requires a special occasion (e.g. Christmas, a wedding) to get us back in touch again. In the past, we have done this through sending cards, letters and making occasional phone calls. Nowadays, we have a much wider repertoire of technology-based means to do this. Email, virtual cards, SMS and instant messaging (IM) are available. A sales pitch often used by telecomms companies, to promote such products and services, is their relative ease of use for getting in touch; for example, sending a mobile phone photo message or firing off an email takes much less effort and commitment than calling someone up or writing a letter.

Given the range of opportunities now available for people to keep in touch with their social contacts, is there any evidence that people are finding it easier? Our paper is concerned with how people actually use different technologies and services to keep up with their social contacts, especially those outside of work. A particular focus is on how those who have access to broadband technologies use them at home for socialising. Does having switched to being ‘always-on’ change the way they communicate with their contacts and, if so, in what ways? Another key variable we are interested in is age; do different generations communicate differently, having been brought up with different genres of technologies? A further interest is the extent to which a major change in a person’s life can change the way they keep in touch with their contacts: for example, what do people do when they retire from work?

To this end, we looked at (i) the different kinds of social networks people have, (ii) whether there are differences among social groups in their usage of communication tools, and (iii) what problems different social groups experience when using different kinds of communication technologies. We carried out an in-depth study of the communication patterns of different social groups, who varied in terms of age (teenagers and over 50s), lifestyle (working and retired) and new technology adopters (ADSL users in their late 20s and early 30s). We asked them, firstly, to describe and visualize their social networks and, secondly, to describe how they contacted different people in their network.

A key problem we identified is the potential costs of having multiple ways of keeping in touch: using more tools to communicate potentially increases the amount of ‘housekeeping’ activities that need to be carried out, such as saving messages, deleting messages, and updating
addresses and phone numbers, for the different devices used. Hence, while having a wider repertoire of communication methods potentially makes it easier to get in touch, the effort involved in keeping in touch can, ironically, increase.

Although various systems have been developed to help people manage their social networks more effectively, they have been designed primarily for work colleagues to use in office environments (e.g. [6, 23]). While there are overlaps between work-based, social networks and other kinds of social networks, there are likely to be many differences in the motivations and ways people keep in touch with each other and the effort involved. The second part of our paper discusses the costs of keeping in touch with personal networks and how contact management could be better supported. Based on our analysis, we propose design recommendations for an interactive visualisation tool, intended to provide more enjoyable and effective ways of managing personal social networks and the communications within them.

BACKGROUND
A number of recent studies have focussed on teenagers’ use of communication media [4, 18, 20, 10]. The studies have shown how IM, email and SMS texting have provided a whole new way of keeping in touch with friends, especially close ones, for example, by providing a way of online flirting and sending personal ‘gifts’ (treasured messages). The way mobile phones are used has also been the focus of much research; a general way of online flirting and sending personal ‘gifts’ (treasured messages).

Studies of more senior person’s use of the Internet have found that they have improved their connections with their family (e.g. [8, 16]. Hence, there is much evidence of increased communication, especially among close friends and family – all of which is likely to incur additional costs to manage. Indeed, a number of studies have shown how maintaining online relationships and the consequential multiple sources of contact data that evolve can be a very onerous task [3, 14, 15]. The need for more effective contact management tools has been identified as a real need, but as of yet has received very little attention [18].

Instead, research into supporting domestic communication has focussed more on designing innovative prototypes and services which can provide new forms of awareness (e.g. [1, 5, 13, 19]). Within work settings, a number of visualizations have been designed to show the nature of the relationships within social networks, e.g. KrackPlot [7, 9, 17], Personal Map [2] and ContactMap [23]. KrackPlot utilises graph theory to automatically plot social networks as a collection of nodes that represent network members and links to represent the relationships between them. Similarly, Personal Map is automatically generated but based on a user’s past email behaviour to determine whom the user is closest to [3]. A web-like representation of people’s names is displayed; the people most frequently emailed are placed towards the centre.

These visualizations have primarily been designed as effective ways of abstracting relationships from raw data, rather than as tools to help people manage their social contacts. In contrast, ContactMap was developed specifically to help people manage their work contacts through providing an appealing visual interface [23, 24]. Representations of contacts are displayed side by side on the screen as small virtual cards, consisting of a photo of the person and other details. Users decide who to add to their ContactMap and where they should appear in relation to each other. Colour coding is also provided to help group them.

A main benefit of this kind of customizable, spatially organized visualization is that it enables users to rapidly scan and be reminded of whom they have to contact and what for. As well as designing for efficiency, other usability factors, like enjoyment and ease of use, seem critical for personal contact management. However, little is known as to how people manage their personal contacts and what aspects they consider to be tedious or pleasurable.

METHOD
We carried out an in-depth study of the communication patterns of different social groups. The demographic variables we were interested in were age, lifestyle and early technology adopters. We selected four groups to represent these:

- Teenagers between 16 and 19 years
- People over 50 who are working
- People over 50 who are retired
- ADSL users in their late 20s and early 30s

Obviously, there are other age groups we could have looked at, or ways of categorizing them, but we were interested in seeing if there was a ‘generation gap’ effect. We decided, therefore, to have two quite distinct age groups. Similarly, there are other life changes or technology adoptions we could have looked at. However, we considered retirement and ADSL adoption to be highly significant and representative of these two categories.

We interviewed six people in each category about their social networks and communication behaviours with members of their social networks. A common technique used in the social sciences to tap into people’s social networks and, which we also used, is to ask them to draw a map of their contacts [18, 21]. Externalising in this way allows people to remember who is in their network and to readily see the various relationships they have with the members of their social network. The participants were given various materials to use to draw their social network maps, including coloured pens, a large sheet of flipchart
paper, stickers and post-it notes™. They were told to place the names of their social network members on the paper in a way that was meaningful to them. They were also asked to overlay them with the kind of communication methods they used with each member. A key was provided for them to use to do this (F = face-to-face; P = phone; E = email; L = letter or card; T = text message, IM = instant messaging).

Participants were then given their social network maps to take home and asked to amend or add any further names if they thought of them. This was to allow them to add names they may have overlooked or forgotten during the session. They were given a week to do this and a follow-up session was arranged at the end of that week. In the second interview they were asked to review their social network map to identify which names they had added (or taken off), followed by describing who they would communicate with and how during a typical half-day’s communication. They were then presented with a hypothetical activity to get them to think more specifically about who and how they would contact people in their network. A scenario was presented: they were told they had won the lottery and to plan a party to celebrate it. They were asked to describe whom they would get in touch with and, afterwards, whether they found their social network map useful in planning the event. Interview sessions were held in the participant’s home or at their workplace, depending on where they did most of their social communicating.

FINDINGS
The findings of our study are described in terms of three core themes:
(i) Patterns of communication across social groups
(ii) Size and structure of social networks
(iii) Communication management

(i) Patterns of communication
Each social network map was analysed by calculating the total number of people communicated with through each communication mode as a percentage of the total number of names on that social network. As might be expected the most common communication modes used by all groups were face-to-face, phone and email (see Figure 1). However, there were quite distinct patterns across the social groups, especially across the different age groups. A main finding was that the teenagers communicate with proportionally more of their friends and family in face-to-face mode (85%), whereas the over 50s (both retired and working) communicated with proportionally more of their contacts using the phone (71% and 64% respectively) and email (23% and 56% respectively). Teenagers used the phone (29%) and email (8%) much less than adults; and IM (15%) much less than ADSL users. However, they reported they would regularly have SMS text message conversations over a number of hours in an evening. This suggests that teenagers spend a lot of time physically with their friends and family, and when they are not with them, use a variety of technologically-based communications to maintain their contact.

In contrast, the ADSL users were the most multi-modal in their usage of communication means, and, interestingly, were the only group to report not using face-to-face as their most frequent means of communicating (59%). On average, they used instant messaging (IM) with 29% of their social network, postal communication with 23% and SMS text messaging with 20% of their networks. Having the opportunity to be ‘always on’, therefore, appears to have had a significant impact on changing the way this group communicate.

![Figure 1: The main methods (face-to-face, phone and email) used by groups when communicating with their contacts in their social networks. (Percentages refer to number of people out of total number in network that were contacted using a given method).](image-url)

The selection of communication mode was often constrained by people’s views on the pros and cons of each one, rather than availability. For example, 66% of the retired over 50s group had access to email at home but did not use this to communicate with many people in their social networks. Uncertainty as to whether messages got through often acted as a deterrent: “I see great value in email, it is so quick and easy to communicate with people, but you do rely on people accessing their messages”. They also thought that other modes were more convenient “…[it is] just as easy to phone. Being the older generation I suppose I’m not in the email mode”.

In contrast the over 50s, who were still working, preferred using email, particularly when at work. They found it was the only way to get in touch with some friends and family members who lead busy social lives, for example, one participant said, “Where people have got email I do communicate by email. Like my son and daughter in their working – I get more information emailing them during the day than by trying to phone them in the evening.”

When we asked people about their communication patterns over a typical half-day, a striking finding was the volume of communication that took place, much of which overlapped for the teenage and ADSL groups. Frequent
incoming text messages, emails and phone calls were often competing for attention with face-to-face interactions. Text messages and emails, although asynchronous in modality, would often be responded to immediately (cf [20]). The working participants (over 50s and ADSL) spoke of using a wide range of communication modes in a single half day, including: face-to-face meetings; landline phone calls to friends, family and colleagues; mobile phone calls; passing of hand-written notes; emailing from home and work; IM conversations; SMS text conversations and letter writing.

Some teenage participants noted that it became difficult when communications overlapped with each other such as being spoken to by someone else face-to-face when in the middle of a phone conversation and being in the middle of writing an email when someone called. ADSL users often found themselves having multiple IM conversations at the same time. In contrast the over 50s, who were not working, did not report these communication overlaps and demands on their attention.

(ii) Size and structure of social networks

The average size of a person’s social network, as indicated by the names placed on their map was 36 people (n=24). This is twice the average size (18, n=53) found in Vronay and Farnham’s study of general public members [21]. We found, however, considerable difference across the social groups. The largest number of contacts was for the teenage group, averaging about 70 (SD=26.2) per person, which was significantly greater than any of the other groups (see figure 2). They included school, college and work friends; family; internet friends; club friends; their parents’ friends; and friends they no longer saw regularly. The least number of contacts was found for the over 50s groups, who averaged 20 (SD=5.8) for working and 24 (SD=10.0) for those who were retired.

Some of this variation can be explained by personal differences in the number of people contacted regularly; but we also found a difference in the definitions the groups used as to what constitutes a member of their social network. For example, the over 50s tended to include only close family and friends (cf. [12]), whereas some of the teenagers were much more open-minded as to who counted as their friend, and included people they had met at a nightclub, their virtual friends or the corner shop assistant who frequently served them.

A range of ways of visualizing one’s social network were used by the different groups, including canonical network diagrams and lists. One or two used bubble drawings, where groups of like-minded friends and family were placed together in circles. These were depicted as being separate and sometimes overlapping. Groupings and category labels were also quite diverse and showed differences across groups. Common category types were friends, family and work or school friends with other types including social activities, geographical location, club and neighbours.

Figure 2: Average number of contacts per network (standard deviation shown).

The social groups that used the most diverse range of visualizations were the teenagers and the ADSL users. They also used lots of colour and developed quite sophisticated coding schemes for grouping and labelling their contacts. Teenagers tended to categorize their contacts in terms of school friends, parents, siblings, family friends, clubs and social activity. ADSL users grouped their contacts by country, work, whether they had met them over the internet, or were family or friend.

Several teenagers had extensive buddy lists of people they IMed with, which they viewed quite differently to their mobile phone lists, for example. One teenager reported that his IM buddy list, while comprising 90 names, was actually filled with old, outdated names, many of whom were rarely online to communicate with.

Figure 3: Examples of teenager’s and ADSL user’s social network maps

Figure 3 shows typical structures that were used. One uses lists for each group of contacts; with the colour coding representing how each contact is communicated with. The second uses bubbled areas to identify each group, however groups labels were not explicitly added.

In contrast, the two over 50s groups tended to be much more conservative in how they visualized their contacts; using one of two map structures, either conveying their contacts as a set of lists (see Figure 4b), with some groups indicated by colour coding, or as a network of interlinked people (see Figure 4a). In general, colour and group
names were used minimally, with few differences between the layouts of retired and working people. Family were always in their own groups, and a common category used for friends was geographic area, where they were often separated into local/distant or country, if abroad. For the retired group, work contacts still remained a part of their social network. In addition, they added other groups of people they had met after retiring, including neighbours and members of their local community.

Figure 4: Schematic examples of the over 50s social network maps, (a) link-based and (b) list-based

(iii) Communication management

The act of drawing out a social network map often led people to comment on the (perceived) size of their social network and the amount of communication they found time for. One over 50 and working participant commented, “looking at my map, it is clear I don’t communicate as much as I feel I do… I would like to talk more with people, but I just don’t have the time”. Participants also mentioned their feelings of guilt at not contacting more friends and extended family, and at losing touch with old school friends. This was especially the case with the older groups, who were likely to have made more friends, but whom had moved away, during their lifetime. Reasons given by the over 50s for not keeping in touch included a busy family life, college and school changes, job changes and home location changes. Retired people with more time, contrary to our expectations, made less effort to re-establish contacts, maintaining most of their links with close friends, family and hobby related contacts via phone and face-to-face. They wrote emails and letters to far fewer of their contacts than their working counterparts.

The ADSL group found themselves using IM a lot more than when they had not had ADSL, pointing out how they adapted their mode of communication to being in ‘always-on’ mode. They often relied on IM status messages (I’m available, I’m away, etc.) to decide whether to initiate conversations with others, and to indicate their own availability. They were very conscious of the potential to distract others, in the same way they found it distracting to be interrupted, themselves. One participant spoke of how he used IM, “I tend to use it opportunistically. I am always logged in, and with the ADSL I can see people coming on and off [line]… it makes a noise and shows me when someone’s coming online. I use it in the same way as if I am working in the room and someone walks in and I’ve got a particular question at that time that’s relevant to them, or I just feel like downing tools and saying ‘hello’, and so I’ll just send an instant message and say ‘hello, how’s things?’ ”

Such a high degree of visibility, however, can be very overwhelming, as pointed out by one participant, “it got to the point where I’d go online and everyone would see you online and start chatting and I would go nooo!” At the same time, ADSL users find themselves getting addicted to the medium, finding it very difficult to log-out and turn off their computer.

Many ADSL users and teenagers commented that they spend far too much time dealing with incoming emails, IM and SMS text messages. Their PC desktop was often used as a pot-pourri area, where files were placed as they came in, many of which remained there indefinitely, rather than being stored in named folders. As a result, desktops got very cluttered rapidly. A coping strategy used was to archive a batch of messages and files in one chronologically labelled folder when it got too much. One ADSL person commented that sometimes it was easier to re-contact the person who had sent them the file than to search for the information in their archive.

Many people resisted throwing away old emails, and kept them for years, especially if they were treasured messages from their loved ones (cf. [20]). Several talked about the pleasure they got from reviewing their sent and received emails.

Very few people used the group functionality, provided by email systems, intended to make it easier to communicate with multiple people. In contrast with business settings, where mailing out to group aliases is acceptable, it was felt rude to do this for personal social networks, even when sending out a party invite to lots of people. The importance of personalization was often stressed. For example, one person who was over 50 and working said, “I don’t [communicate via group emails] because it would drive me insane, insofar as I think it is rude. I think it shows a distinct lack of social skills to start blank emailing people the same thing… I would write them all individually because it’s a personal touch and in any event each of your personal relationships is not the same. You don’t write the same way, in the same tone.”

DISCUSSSION

Our study has presented a number of findings concerning the communication patterns of different social groups. Most striking was the large number of contacts teenagers include in their personal networks, and that the way they keep in touch with them is primarily through face-to-face. When away from their friends and family, they use a combination of text messaging, email and IM. Although many of them had virtual friends whom they IMed, they were considered only a small part of their personal network. In contrast, older people tend to keep in touch
with their personal contacts more by using the phone and email – a main reason being that they have much less time to physically be with their friends, due to work and family commitments. Another interesting finding was how people’s communication patterns change when they become always-on at home. The ADSL users interviewed were found to spend far more of their time keeping in touch with their contacts using a wider repertoire of methods than any of the other groups.

As we predicted, one of the main problems identified in our study was the extraneous work involved in managing online contacts. ADSL users and teenagers, in particular, spend a lot of time working out what to do with their incoming messages and attachments (i.e. whether to save and where to place them). This was most notable with email, but also occurred with SMS and instant messages. The same dilemma is well known in work-based communications [6, 22]. However, there appears to be quite different motivations behind why people decide which messages to keep and which to throw away in the different contexts. People tend to file their work-related emails and attached documents into nested folders that cover a whole range of categories and topics, including projects, reports, events, companies, archived material, pending, inbox and sent (e.g. [2]). In contrast, our findings showed that personal email tends to be saved using far fewer categories and, usually, by the person who sent them.

Because of the highly restricted interface and memory limitations of mobile phones, only a few text messages can ever be kept. Hence, many people are forced to save their favourite messages using a stack-based model, where they have to prioritise them, and decide which to remove from the stack to allow for new messages to take over. There may be much reluctance to throw away treasured messages (cf. [20]). This suggests to us that, like photos, people want to be able to store and review their collections of text messages in more extensive and flexible ways.

Current folder-based and list-based models of saving and organizing messages were seen as limited and cumbersome to use. Saving, reviewing and deleting messages arising out of different communications are done as separate activities, even though the same friend may frequently be contacted using a variety of communication means. Clearly, there is much scope for better supporting people to manage their multiple modes of communication.

While the housekeeping tasks of saving, organizing, deleting and locating messages were seen as time-consuming and constrained, many people also pointed out how much they enjoy the process of reminiscing and revisiting their sent and received online messages. This suggests to us that we could exploit this positive aspect more, by finding ways of transforming what normally is perceived as tedious into a more enjoyable experience; where the computer-based tasks of storing, deleting and accessing files are redesigned around a conceptual model of collecting, sorting, looking and reminiscing. Thus, instead of saving attachments as files in folders, the activity could be metaphorically re-badged as placing the items that have been received and sent (e.g. photos, music tracks, jingles, video clips, recorded messages) into various collections. These could be linked to a representation of the person that sent them and also as part of a collection of their kind (e.g. photos could be placed in an album and as part of the collection of memorabilia associated with the person in their network that sent it to them).

Another finding from our study was how useful many people thought an interactive visualisation of their network could be in helping them remember events and providing them with a way of storing specific information next to the individuals in their network. This was especially mentioned by the over 50s group, who felt they need to be reminded more. They felt that for an interactive social network map to be a useful visualisation it needed to be dynamic, with pop up reminders (e.g. birthdays, events, communication with contacts is overdue), and to enable other information, such as personal details to be overlaid over their map (e.g. full contact details, activities each member enjoys).

Our research has shown that an overwhelming need for all groups is better support for the management of social contact and received content arising out of the mix of online communications people engage in. Furthermore, this should be able to transform what is normally perceived as time-consuming and onerous tasks into ones that are viewed as being more enjoyable pottering kinds of activity. This seems most relevant for people, such as teenagers and ADSL users, who find themselves having to cope with excessive amounts, resulting from using a range of devices. Such ‘high volume’ users are likely to build up lots of contacts, via email, SMS, and IM, that required them to constantly be updating their details, e.g. adding, changing or deleting details about friends who are new, peripatetic or short-lived. What kind of support might be appropriate?

Instead of the existing hierarchical-based folder model and the list-stacking model, we propose a people-centric conceptual model, where messages and sent items are linked to the person they originate from, or relate to. In so doing, it should allow the range of media and items people receive, including pictures sent from mobile phones, to be stored in a flexible and personalized way.

A core part should be to provide a visualization of a personal network map. This should be linked to a centralized resource, where messages, files, photos, etc., can be sent from different communication devices and applications. For example, people should be able to download messages and pictures from their mobile phones onto their network map. The updated visualization
should then be viewable on a number of devices, like a TV or PC.

The application should also provide certain ‘push’ functions that can be configured if desired (especially aimed at busy and forgetful types of people), and that include reminders to contact people after a specified time between communications, indicators of who is yet to reply to their communications, and reminders for events, birthdays and anniversaries.

To illustrate how these might be realized, we describe below a potential design for a contact and content management tool aimed at teenagers.

The design is based on a conceptual model that is person-centric, as shown in Figure 5, which is visualized as a set of planes, suspended in a virtual space. Each plane is designed to represent an area of functionality: for example, contact information and social network visualisation, meeting places and a personal area. The planes are connected to each other by a central column to form a structure that the user can configure and shape (see figure 5). The top ‘people’ level is the contact management hub for a person, where a personalised network visualisation provides access to relevant communication methods for each member of their network. Contacts appear as photos or icons and are either grouped with related members and reside on a surrounding plane or are uncategorized and reside on the centre plane.

The ‘location’ level is where a person can choose which meeting places to add in, depending on where contacts in the people level are encountered. It can also provide a schedule mapping the person’s path for the day through any relevant locations. Reminders can be set up to be triggered at various locations and/or times in the day. To organise an event, network members are dragged and dropped into a particular location (e.g. restaurant) to set-up an invitation to the collection of members for an event.

The ‘personal’ level is where content is managed i.e. where attached files are received. Files are stored by media type (video store, music emporium, picture gallery) and archives of communication are also stored here. These areas are designed for browsing leisurely in a similar way to how people browse a personal book, photo or record collection. The person who sent an item is attached to each file so that the name-tag can be used to help locate items at a later date. Sent and received content, that has been saved, can also be viewed beside the person they are associated with at the people level.

Drifting balloons are also displayed, to provide a novel way of creating messages to be sent to contacts in the network. Balloons can float between levels to send messages to contacts and can float up onto the recipient’s screen. The recipient’s photo or name is tagged to the balloon for the sender, and the sender’s photo or name is tagged to the receiver’s balloon. Message attachments are represented as parcels tied to the bottom of the balloon’s string.

Figure 5: Plane talking design showing different planes and the customisation tool panel

The left hand tool panel provides the means to customise the user interface through selecting from a gallery of available ‘skins’. It is also used to access additional fun items for supporting communication, e.g. emoticons, and a quick list of favourite buddies.

CONCLUSIONS

Our study has shown a generation gap in the ways communication tools are used by different social groups. The way teenagers keep in touch with their contacts is quite different from senior people, which in turn is different from the late twenties/early thirties group who have become ADSL users. A key finding of our study was that people were using multiple ways of getting and keeping in touch. However, the cost of doing so was the extraneous work involved in managing friends and family as online contacts. We proposed a set of design recommendations to address this dilemma. We suggested a new conceptual model is needed that facilitates contact management, while also transforming housekeeping tasks that are normally perceived to be tedious, into interactions that are more enjoyable and akin to reminiscing and collecting type activities.
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