Avoiding Information Overload
- A Study on Individual’s Use of Communication Tools
Mehdi Raoufi
Mid Sweden University
Department of information technology and media
S-851 70 Sundsvall, Sweden
Phone: +46 60 148843
Fax: +46 60 148830
mehdi.raoufi@mh.se

Abstract
Today, we are living in a so-called Information Society. People as members of this society use different kinds of communication and information technology-based tools, which provide them with a variety of ways for exchanging information. On the other hand, the use of such tools by individuals may result in problems such as information overload. By doing a qualitative study, nine groups of factors that affect people’s use of communication tools have been identified. Further, as people value these factors differently, two types of values and expectations could be identified: personal- and shared values and expectations. This study even showed that people’s choice of communication tools works almost as a personal filtering mechanism (PFM). Thereby, by bringing the transferred information by different communication tools into the line with an individual’s values and expectations, the PFM could be used for avoiding an overload of information.

1. Introduction
Today we are living in a so-called Information Society. People as members of this society use different kinds of communication and information technology-based tools, which provide them with a variety of ways for sending, receiving, and sharing information. The effect of information and communication technology (ICT) on individuals and the mismatch between an individual’s information needs, and the quality and quantity of the received information often results in problems such as over- and under stimulation, as well as information overload. An overload of information occurs when an individual is presented with an amount of information, which exceeds his or her cognitive capacity [15].

In many researches the increase of the amount of information in today’s society is often addressed as the reason for occurrence of information overload. The reports, published by The National Post and Telecom Agency\(^1\) (PTS), confirm this statement. According to PTS [19] during the year 2000 as many as 494 million SMS\(^2\) messages have been sent in Sweden. During the same period, 3426.3 million letters have been distributed [20], while by the end of the year 2000, the number of Internet connections, which in turn provided people by a variety of ways for sending and receiving information, such as E-mail and WWW, was 2,530,000 [19]. By compare these numbers with the numbers published in the same agency’s recent report [21], a dramatically increase of information exchanged between people could be identified. In their latest report, the number of the sent SMS messages during the first six mounts of the year 2001 was 463 million and the number of internet connections by the end of the same period was 2,767,000. During the same period of time, as many as 3334.7 million letters have been distributed. [22]

These numbers even show that the correlation between the amount of information exchanged between people and the number of communication tools indicates a differentiation in needs that people by using different kinds of communication tools try to fulfill. In other words, people, in order to achieve their goals, choose and use a communication tool that supports their actions. Thereby, their choice of communication tools should be on the basis of some qualitative factors.

Many studies, e.g. Olson [12], Tanner [16], Baron [2], Maynor [10], McDaniel, Olson and Magee [11], have already pointed out some characteristic features and qualities in spoken (including face-to-face conversation) and written language (including computer mediated conversation), and their differences. Other researches were more focused on different scenarios, e.g. Johansen [6], Baeker et al [1], and the use of information technology in order to improve the quality of job and

---

1 The Swedish National Post and Telecom Agency, Post- och Telesbyrelsen, PTS, is the authority that supervises activities in the radio, telecom and datacom areas.

2 Short Message Services
cooperation between people, such as Wiberg [17], Ljungberg [9].

The purpose of this paper, as a part of the AVANTI project, is to study people’s use of four text-based communication tools (i.e., SMS, E-mail, letter and WWW), in order to identify those factors that individuals take into consideration when they evaluate and choose among these tools. Knowledge about these factors will help us to find out if it is possible to avoid an overload of information, caused by the mismatch between users’ values and expectations and the communication tool in use. Today, the boundary of many of information systems is not limited to the physical shape of the system, without a system’s users have possibility to communicate with it through different kinds of communication tools. Thereby, the identified factors, could build a foundation, by help of which a system’s designers would be able to design the system in such way that the communication channels between the system and its users agree with the users’ values and expectations.

2. A short definition of information overload

There are different opinions about when people first started noticing information overload. What is obvious is that attention directed more towards information overload as a serious problem, by the end of the last century. Some researchers view it as a result of our entry to a new period called “Network period”. This period can be characterized by a convergence of computer technology, telecommunication technology and media technology [3]. This convergence together with the acceleration of technological development resulted in an increase in the amount of medium, such as e-mail, fax machine, television and radio, and at the same time, a decreasing of the time required for sending, receiving and processing data.

But this does not make this phenomenon (information overload) unique for the network period, without it has been noticed by researchers from different disciplines, such as medicine, social science, and psychology for a long time ago. One of the researchers who studied information overload was George Simmel. His studies on this issue showed that information overload does not occur in work places only, but we face it almost everywhere in our everyday life. For example he found this phenomenon among people living in large cities. According to him they try to limit the interface between themselves and their environment intentionally in order to avoid “indiscriminate suggestibility to protect themselves from an overload of sensations, which results in an incapacity...to react to new situations with the appropriate energy.” [18]

Nowadays most researches on information overload are focused on work-related activities and especially decision making in information intensive organizations, where many believe that information overload occurs mostly.

H. M. Schroder, M. J. Driver, and S. Streufert [14] are three researchers who studied the occurrence of information overload in decision-making processes. They presented a model, which describes the effect of information overload on individuals. According to this model every one possesses a limit for information processing. They add, increasing of information received by a decision-maker will result in improvement of the task performance. This until the amount of information exceeds the decision-maker’s cognitive capacity to process them. Accordingly, the level of information processing follows a U-shaped curve plotted against information overload.

Also, according to S. R. Hiltz and M. Turoff [5] as well as Sorensen and Ljungberg [15] the concept of information overload defines situations where an individual is presented with an amount of information, which exceeds his or her cognitive capacity.

Even if the amount of information is known as the reason for occurrence of information overload, other researches show that the effect of other factors, i.e., a) human-related factors such as a person’s cognitive capacity, knowledge, interest, and time, as well as b) data-related factors like the type, relevance and the content of information, should not be ignored. [13]

3. Theoretical background and the challenge

It is possible to distinguish human being by their ability to develop tools in purpose to solve problems they face. Consequently, these tools are designed to solve one or some specific problems. As Kaptelinin and Nardi [7] put it:

“Tools usually reflect the experience of other people who tried to solve similar problems before and invented/modified the tool to make it more efficient and useful.”

In order to communicate with each other, people choose and use one or some of communication tools available to them. By that, the communication made by people could be viewed as an activity. In order to describe activity, V. Kaptelinin and B. Nardi [7] write:

“Leontév, one of the chief architects of Activity Theory, describe an activity as being composed of subject, object, action, and operations [8]. A subject is a person or a group engaged in an Activity. An object (in the sense of “objective”) is held by the subject and
motivates activity, giving it a specific direction. “Behind the object “he writes, “there always stands a need or a desire, to which [the activity] always answers”.”

Further, according to them, actions are:

“…goal-oriented processes that must be undertaken to fulfill the object. They are conscious (because one hold a goal in mind), and different actions may be undertaken to meet the same goal.”

Since, communication (e.g. informing a friend about an event) could be viewed as an activity consisted of actions, or goal-oriented and conscious processes, (e.g. sending an e-mail), and as a specific goal could be met by undertaking different actions (e.g. sending an SMS instead of sending an e-mail), the question that rises is: on which basis do people choose a specific communication tool?

In order to find answer to this question, a qualitative study on ten people’s use of four similar tools has been done. The method used in this study is going to be described in the next section.

4. Method

To attain the aim of the paper, which is identification of qualitative factors in people’s use of four different communication tools (SMS, Web, Letter, and E-mail), this study has been undertaken in form of a qualitative research. The use of qualitative research is because of the study’s explorative character. During the study the chief ambition has been to identify factors (why?) that in some way affected the interviewees’ choices regarding communication tools (what?).

In order to identify these factors, ten peoples between ages 13 and 49 have been interviewed. All interviewees had a good experience of using all four tools, i.e. E-mail, Letter, WWW, and SMS. Three of Interviewees was from other countries than Sweden and at the time this inquiry was carrying out were living in Sweden. The occupation of interviewees varied too, i.e. five of them were fulltime students at Mid Sweden University, two part time students, one was student at upper secondary school, one studied at upper level of compulsory school, and one worked as standby educationalist in schools in the municipality of Sundsvall.

The total time of interview became about six hours. All interviews have been carried out in form of unstructured interviews. A. Fontana and J. Frey [4] describe the differences between structured and unstructured interviews as bellow:

The structured interview “… aims at capturing precise data of a codable nature in order to explain behavior within preestablished categories, where the …[unstructured interview]… is used in an attempt to understand the complex behavior of members of society within imposing any a priori categorization that may limit the field of inquiry.” (p. 366)

During the data-gathering phase, almost all conversations have been recorded on magnetic tapes. Just in one case that the interviewee did not gave permission for the use of a tape recorder, the conversation has been noted down. As during these interviews personal and private information could have been discussed, all interviewees have been informed that after the analyze process, all recorded tapes will be erased and no information that in some way could be traced to them would be published.

After every interview, the recorded data has been written down and analyzed. The aim of this process was to identify those factors that the interviewees considered as important when they choose and use a communication tool. During this process, the quality of a factor was in focus rather than the number of times one factor have been referred to by interviewees. Afterward, Base on the result of the analyze process, the identified factors have been clustered into nine groups. Of course a further grouping of the factors included in each group could be possible. For example, the tool related factors could be divided into properties and features.

5. Results

In this section, the founded factors during the study are presented. These factors, as it have been discussed before, in the method section, are clustered into nine groups.

5.1. The tool –related factors

Factors included in this group could be directly related to a tool and describe its quality. These factors could be divided into two different categories; properties and features.

Properties, here, means those qualities that deal with the physical part of a tool, like shape, weight, design and ergonomic. These factors affect the way tools could be used. For example how well designed a tool is, results in how easy it could be used. One of interviewees described the disadvantage of SMS as bellow:

“Maybe it is a good function on a mobile phone, but the problem is that you have to click on a button until you find the letter you are looking for. This makes it slow and tricky.”

Even a tool’s portability could be counted in this category. An interviewee in the favor of letters said:

“A letter is good because of its portability that one can take a cop of coffee, sit down and read it relaxedly.”
Features, on the other hand, mean those supports in form of functions or applications that a tool offers. Some examples to features are functions for replying, editing, forwarding, and saving massages, as well as reminder and confirmation, and support for different languages. As these features often are in some way hidden, the knowledge about their existence and the way they work, to a great extent, depends on how informed a user is, as well as the user’s previous experience of similar features. A good example to this issue could be one of the interviewees who expressed her desire for existence of a confirmation feature in mobile phones, by using of which she could be informed about the time a SMS massage reaches its destination. In fact, this feature already exists and could be used for free in Sweden.

5.2. The information-related factors

During this study, the factors related to the transferred information showed to have an effect on the interviewees’ choice of communication tools. Here, from a receiver’s point of view and based on the receivers role, the received information could be divided into two categories; push and pull information. In the former one the receiver is the victim, the one who have been targeted. In this case, he cannot affect the choice of tool that suits his values best. The only choice the receiver has is to inform the sender so that in the future, the communication goes trough the preferred tool. In the case of pull information, the receiver of information is the orderer. In other words, the receiver is the person who has caused the exchange of information, and as an orderer he has possibility to choose the communication tool that is preferred.

The content and the amount of the information are two other factors that could be included in the property of information. The content of information refers to the purpose of communication; e.g. to inform someone about something, to ask a question, to explain something, or to discuss an issue. Some of these categories are time dependent and thereby require to be delivered faster, as in case of a discussion. In such cases SMS, or E-mail that have a faster delivery time are used than a letter.

The amount of information, on the other hand, refers to the number of characters in a message. Here, even a tool’s limitations brings into focus. For example, unlike other communication tools in this study, it is impossible to send a message longer than 160 characters by SMS. An interviewee explained this matter as bellow:

“The SMS’s disadvantage is that you can write only a short message; you have not the possibility to present any information. You have to present what ever to say in just three meanings, and that’s it. It could only be used for short and quick messages. By using a letter, on the other hand, you can receive a large amount of information, but if you want more information or want to take contact with the sender, it would be lengthy.”

These interviews showed that this issue could be influenced by a tool’s property, such as the display of the tool. For example an interviewee said:

“I prefer to receive information trough E-mail, but if it is long, I’ll print it out.”

5.3. Cultures traditions, and laws

During the study, it has been founded that current cultures, traditions and laws, in a society affect not only the choice of tools, but also the way these tools possibly could be used. These factors that appear as guidelines, further, could be divided into four different levels:

a) Society

Guidelines in this level describe how for example a text in different occasions, situations, and aimed to different persons should be formulated. These even affect the choice of tool for transferring the massage. As an example the notion of an official letter within a society could be named. Traditionally, an official letter refers to a text written, or printed, on a paper, which is signed and sent by mail. Therefore from some of the interviewees’ point of view, a text sent by E-mail was not accepted as an official letter. One of them explained this issue as bellow:

“I think if I receive an official letter by e-mail, I would not take it seriously. May be it is something traditional that one receives such letters by mail.”

b) Organization

In an organization beside society’s current traditions, cultures and laws, additional internal guidelines could have been applied. These guidelines, as a part of the organizations policy and information system, describe how and when different communication tools should be used and sometimes how messages should be formulated. For example one student explains his frequently use of E-mail as bellow:

“I use E-mail and WebCT to discuss my problems with other students and my professors. This is because of our department’s policy.”

c) Personal

At personal level, guidelines and rules occur mostly in form of ethics and personal values. Of course these guidelines could be colored by the society’s current culture and traditions too. In this level the meaning of the used sentences and words, as well as the way these could be delivered are in focus. An example could be the way feelings, such as love, describes in form of a text message and the way the whole message, including the senders feelings transfers. A good example could be an
explanation made by one of interviewees about her use of E-cards. She said: Mostly, I use E-card to send congratulations to my friends. But when the receiver is for example my grand father, I use a postcard. I think it is improper to send an E-card to him. Beside I have to express myself differently too.”

d) Tool
A tool’s advantages are not limited to the physical and functional advantages that it offers. There even counts the cultural and ethical possibilities that are valid within a smaller community, i.e., its users. An example to such advantage is the e-style⁴, which is allowed to be used in E-mails, or uncompleted meanings and combination of characters like “:)” in SMS messages.

“I prefer to use e-mail when I want to write about my feelings. It is because I can write for example 4 A4 pages, what I can not do in an SMS. Beside it is easier to write an e-mail then a letter. There I have possibility to express myself as I want.”

5.4. The degree of personality

The study showed that the tool by which a message has been received could affect the receivers understanding of it as personal. In other words, same information received through one tool could be experienced more personal than the other. During the interviews, different explanations for such behavior have been given.

For example, according to an interviewee, two reasons that make a letter more personal are: a) unlike digital messages a letter is touched by its sender, and b) no exact copies of it are available. Thereby, people’s use of communication tools, in some extent, depends on their understanding of the degree of the personality of messages delivered by them. Figure 1 shows a picture of the interviewees’ opinion about how personal a message could be understood if it is delivered by the relevant tools in this study.

5.5. Time

One of the issues that the interviewees often referred to as an important factor in their choice of a communication tool was the delivery time. As a matter of fact, what they called delivery time showed to be a combination of five different periods of time which each and one could be related to a specific activity. Figure 2 shows these time periods and their relation to each other followed by a short description of each one.

Time period 1: (preparing) The time expend to formulate, write and prepare the message to be send. Depend on a tool’s support for such activities and the purpose of the massage, this period of time varies in different tools. For example a massage aimed to a friend takes less time to write then writing the same massage aimed to an authority.

Time period 2: (sending) As the activities required for sending a message varies in different tools, the time expend to send a message varies too. For example an e-mail will be send as soon as the sender writes the e-mail address of the receiver and push the send button, while to send a letter, not only the address of the receiver should be written on the envelope, but also the letter should be stamped and putted in a pillar-box.

Time period 3: (delivery) The delivery time refers to the time taken for a message to be transferred from its sender to its destination. Notice that the word destination means the place where the message will be retain until the receiver becomes aware of it and picks it up.

Time period 4: (waiting) The waiting time means the period of time that a message is waiting in a message- or mailbox until it picks up by its receiver. In some tools such as mobile phones a signal is used to make the user aware of the existence of a new SMS message. This, in turn, results in reducing of the waiting time. Even the portability of a tool could be viewed as a factor that reduces this time.

Time period 5: (reply, forward, save, etc.) A tool’s support for different actions that should be undertaken depend on the purpose of the received message, such as reply, save, edit, and forward, affects this period of time.
Based on these periods of time, people choose the tool that suits the purpose and the emergent of the message to

---

⁴ Maynor (1994) characterized Computer-Mediated communication as E-style or even called written speech, where the linguistic conversation of this style differ from both spoken and written language. (Maynor 1994)
be sent. For example, to communicate with someone without disturbing him, E-mail could be used, while for sending an emergent message to a friend SMS could be viewed as a more proper tool. In relation to the made discussion two of interviewees describe their use of tools as bellow:

“E-mail is not a communication tool to use for conversation. It takes to much time to get an answer back from the other side. Beside, you can not be sure when the other person is going to read your massage.”

“An SMS is a good communication tool, because I can write a massage, send it and get answer back in a short period of time. It is a good tool for emergent matters.”

5.6. Routines and habits

The interviewees’ use of communication tools showed to be based on their knowledge about the receiver’s habits and routines in using communication tools. Some example on this issue could be a receiver’s access to a certain tool during a certain period of time, as well as the tool that is used more frequent by him. For example, one interviewee described her routine in using E-mail as a factor that affects her communication with her environment as bellow:

“I usually work in different places. Therefore, the only occasion that I can read my e-mails is when I’m back to the office by the end of the day. Consequently, those who send e-mail to me know that they are not going to get any answer back during the day.”

6.7. Security and safety

During the interviews, one of the factors that interviewees often referred to as a motivation for their choice among communication tools for transferring private or confidential information was the security of the tools. However, what they called security in fact referred to two different properties of tools, i.e. a) The security of a tool in transferring private or confidential information, and b) a tool’s safety for saving private or confidential information.

In the former one, people’s knowledge about the tool in question and the way it works showed to be of crucial importance in their judgment. Two other factors that affected their judgment showed to be their previous experiences and the way they usually used to receive confidential information. For example, people’s trust to Mail as a safe communication tool could be viewed as the result of banks’ and government authorities’ use of Mail for sending the most of the confidential information in Sweden. One interviewee describes the reason for her refuse to use E-mail and SMS for transferring confidential information as:

“I do not use E-mail or SMS to send and receive confidential information, because it is possible that someone can read them. Therefore a letter is safer, because I can save it in a safe place and even no exact copy of that is available.”

A tool’s safety, on the other hand, not only means how the saved information is safe from unauthorized, but also how safe it is from the errors and damages caused by the system itself. This issue forces people to find other solutions to this issue. For example one interviewee describes his view on this issue as:

“If I receive an important massage trough E-mail, I use to print it out and save it in a safe place. Consequently, those e-mail massages that are saved in my computer are less important.”

5.8. Feelings

As a part of the content of a message, sometimes it is important that feelings, like happiness, anger and love, as well as one’s position on an issue could be transferred too. This goal showed to become achieved by describing these feelings in form of text, or by using combination of characters and figures like :) or ☺. The use of these characters is more usual and allowed in some tools while in other tools is seemed inconvenient. Thereby, depend on the purpose and the kind of feelings, the tool that offers the best support for transferring them, is often choused. Two of interviewees describe their view on this issue as bellow:

“I think that it is improper to use smiles in a letter, but in a SMS massage is OK to use them.

“Letter is better, because I believe that a person’s handwriting says something about its writer too. For example you can see if she is angry, tired, etc. Beside, I when I write a letter I have possibility to draw something too.”

5.9. Costs

The cost for using a communication tool was another factor that has been identified. In other words, a tool chooses by comparing the value of the message to be sent and the cost of using each of the available tools for transferring it. This even includes the costs for subscription fees and the cost for getting hold of the required equipment for using a service. For example, one of the reasons, according to an interviewee, for using E-mail for sending and receiving jokes and funny texts that actually “one would get along without them”, is because of the low cost of its use.
6. Conclusions

The purpose of this paper was to study the tool-mediated communication among people, in order to identify factors that they take into consideration while they evaluate and choose a text-based communication tool.

By comparing people’s use of four communication tools, i.e. SMS, E-mail, letter and WWW, nine different groups of factors that affect their use of these tools have been identified. (Figure 3) Even if these factors are grouped in different categories, their effect on each other could not be ignored.

Further, this study showed that people value these factors differently. Therefore, for example SMS is used by many for sending personal information while some prefer to use E-mail. This matter in its turn builds a sort of expectation too. This means that a person expect to receive for example confidential information by Mail, because he use to use this tool in such cases.

The study even showed that apart from these personal values and expectations, even there are some values and expectations that are shared by a community’s members. These, in their turn, have an effect on the way communication tools are used by the members of a community. Therefore, one can conclude that the use of communication tools in a community, with shared values among its members, adds a sort of meaning to the transferred message. Such meaning, for example indicates how the received information should be prioritized, and how personal it is.

The existence of the both shared and personal values and expectations even could be viewed as a personal filtering mechanism (PFM). This means that people, because of these values and expectations, prefer to use different communication tools for different purposes.

However, as a person’s values and expectations neither match with the other members of the community he belongs, nor with the other persons belonging to other communities, we find a mixture of different types of information that are transferred by almost all of the communication tools. As the matter of fact, this issue is one of the known causes for occurrence of information overload. This even is the reason for people’s use of different filtering features in tools such as E-mail clients.

As a consequent, this problem even makes it impossible for a user to make an efficient use of his personal filtering mechanism (PFM). Therefore in order to make use of this filtering mechanism, designing information systems equipped with multi channel communication tools is suggested. By that users have possibility to adapt and use those channels (tools) that match with their values and expectations.

7. Methodological discussion and comments

After analyzing the gathered data, the question that remained unanswered was the level of the impact of the identified factors on an individual’s choice of communication tools. However, as in this study the number of interviewees was limited, it was impossible to find answer to this question and an additional study on a larger group consisted of representatives from different communities would be necessary.

As the aim of this study was to identify those factors that affect an individual’s use of communication tools, during the study the relationship between these factors has not been studied. Consequently, this lack of data made it impossible to find out how these factors affect each other.

8. Acknowledgments

The author is aware of the existence of additional factors like trends among members of a society that affect their use of communication tools. As these factors have not been mentioned during the interviews, they have not been mentioned in this paper either.

I would like to thank professor Olov Forsgren, for helpful and critical comments. Thanks to professor Fuat Firat, ASUW School of Management at Arizona State University, for all interesting methodological discussions and helpful comments.
9. References


Government publications:


20. The national Post and Telecom agency (PTS) (2001a) Sverige och konkurrens 2001, nr. 01-6513/39, Sweden

21. The national Post and Telecom agency (PTS) (2001b) Svensk telemarknad, första halvåret 2001, nr. 01-19841, Sweden