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DIGITAL CONTACT TOOLS IN PROFESSIONAL LIFE: WHAT GOVERNS THE CHOICE?

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Introduction

During the 1990's the use of e-mail and mobile phones for personal communication became commonplace in the Nordic countries. Starting in the professional environment it was diffused into the private sphere. In the early 2000's a similar development of text messages (SMS) and instant messaging (IM) could be observed, however, with a reversed pattern of diffusion: usage became popular first in the private sphere, particularly among younger people, and then was spread into professional life.

A pilot study in Sweden (Selg 2010) based on 20 expert interviews indicated emerging new contact patterns in working life. In contrast to the media picture, focusing on controversial uses of social network sites ('Facebook') by young employees during working hours, the experts downplayed the significance of such conflicts. On the contrary, the situation in both public and private organisations was characterised by intense experimentation with the new contact tools in order to adapt them to daily tasks. As examples, SMS's were replacing phone calls for shorter messages, and IM was used to maintain low frequent background dialogue in parallel with other task being carried out.

Several interviewees indicated the emergence of new 'codes of conduct'. In this process users were exploring the kind of contacts and the contexts in which a particular tool was considered suitable, and when it should be avoided. Given the importance of role expectations in professional life, the questions arose as to how the new tools should be implemented and, considering the wide range of contact tools available, which particular tool should be used in which situation(s)?

An online survey was carried out among members of Swedish Computer Society[1], many of them with educational background in computer sciences and active in ICT related professions. The survey questions related to the use of contact tools such as voice calls (fixed-line telephony, mobile telephony and VoIP[2]), and text (e-mail, SMS

[1] Sw. *Dataföreningen*
[2] Voice over Internet Protocol

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and IM) in different contexts: professional or private context, contacts with well-known or unknown persons, aim of contact, etc.[3] The study was carried out in 2010—2011.

The funding bodies[4] required a rapid dissemination of the results to professionals nationwide by the use of a variety of information channels, and in collaboration with relevant stakeholders. Accordingly, in addition to the written report (Selg 2011b) the findings were presented in various media such as printed press, broadcasting and television, and through lectures at professional gatherings.

The aim of this article is to present the results obtained to an academic audience. For this purpose I have arranged the study that was originally directed to practitioners on a national level to comply with the scientific requirements on form and content on an international level. However, scientific work and publishing is far from a homogeneous matter, not least in social sciences (see e.g. Nowotny, Scott, and Gibbons 2001). But if I am to suggest some impressions about how my original report differs from most AoIR-articles I would indicate the following:

- Problem-driven rather than theory-driven study
- Research questions that derive from practitioners' experiences rather than from scholars' suggested future research
- Methodology matters and processual content such as tables are allocated in appendix rather than in the focus of the arguments
- Vernacular language

In recomposing the study I have rearranged and translated the contents of the original report into English, and in addition, I have attempted to provide a more ambitious framing of the study together with a literature review.

The article is structured as follows:

1. The framing in which the study and its associated research questions is projected against a background of organisational and technological change and the impact of this dynamics on crucial aspects on interpersonal communication.
2. A literature review, thus carried out *a posteriori*, and as a consequence with no impact on the research questions of the study, but of interest for the discussion of the results obtained.
3. Presentation of the study: aim of knowledge, research questions and methods including the sampling *rational,* questionnaire, respondents and features of the statistical analysis.
4. Results: frequency of use, factors influencing the choice of tools, and graphical presentations.
5. Concluding remarks including an overview of results and perspectives on the findings.

[3] Another set of questions referred to the use of social network sites and with results presented in a separate report (Selg 2011a).

[4] Project funding was provided by VINNOVA, the Swedish Governmental Agency for Innovation Systems, and Swedish IT-user Centre, NITA.

The framing

The economic restructuring of the 1980's induced a number of reorganising strategies in business firms (Harrison 1994; Castells 2000). Deregulation of domestic economic activity, liberalisations of international trade and investment, and privatisations of publicly controlled companies had brought about a stiffened competitive environment. In the 1990's this process was reinforced by the rapid diffusion of information and communication technologies favouring the knowledge management and information processing essential to the performance of organisations in a global economy. A third factor was rising short term performance requirements, manifested in higher de facto hurdle rate of return imposed on managers by boards of directors and by the big institutional stock holders (Harrison 1995).

The global competition triggered a technology/management race between companies all over the world (Castells 2000). Measures aiming at enhanced flexibility, a buzzword used to describe a wide range of organisational practices, were launched to cope with the uncertainty caused by the fast pace of change in the business environment (Sayer and Walker 1992). Output volume had to be calibrated with market demand. The focus on core competencies became a common strategy. As a result part of former in-house resources were replaced by external suppliers, and the full-time labour force was reduced in exchange for temporary or subcontracted labour services. Downsizing, outsourcing, lean production, and networking became popular descriptive terms (Harrison 1994). As a major consequence of this restructuring trend the departments and units that were not considered to represent a core competency or value-added link in the production chain were eliminated. Instead, activities perceived as peripheral – when needed – were provided by other firms on the market. In this way the organisation itself was assumed to stay more flexible and lean (Jaffee 2001).

This restructuring process has been characterised as a shift from vertical bureaucracies to the horizontal corporation or network enterprise (Castells 2000). Organisational focus has moved from hierarchies and tasks to teams and projects. Across organisational borders emphasise is made on partnerships and joint ventures. The *virtual organisation* represents an extreme case. It is enabled by information technologies that allow interaction, communication, and collaboration to take place without face-to-face contact in a common physical location (Davidow and Malone 1992).

The organisational changes meant that those workers who were retained are now faced with a new situation. Professional knowledge management and information processing – or 'coordination' in a less abstract terminology – were formerly carried out with colleagues and co-workers, often well-known persons. Such activities are increasingly administrated within a wider range of unfamiliar personnel from other firms (Jaffee 2001). Castells (2000) speaks of *connectedness* as a fundamental attribute of the network enterprise, which implies communication and coordination.

So what matters if patterns of communication shift from an intra- to an inter-organisational context? As one answer, the concept of *trust* has to be reconsidered. In any interpersonal relation trust is an essential element. The concept of trust may be defined and described in a number of ways (Kramer and Tyler 1996) but in a few words

it is about not expecting harmful behaviour from the other. For society as a whole trust is a cardinal attribute. Simmel (2011, 191) notes that very few relationships are based entirely upon what is known with certainty about another person. Without the general trust that people have in each other society itself would disintegrate. What is lacking in knowledge is compensated for by trust. This is also true in business relationships made up by a wide range of interpersonal transactions.

Trust in professional contexts is assumed to be shaped by previous experience. Information about other's behaviour is accumulated over time. The better we know the other person the more accurately can we predict what he or she will do in a certain situation or context (Lewicki and Bunker 1996). Another kind of trust is based on collective identification with joint values and goals of a particular organisation. Such a group membership fosters mutual understanding to the point that each can act for the other (Lewicki and Bunker 1996).

It goes without saying that trust based on knowledge about the other and/or collective identification will be more difficult to establish in a professional environment characterised by loosely interconnected relationships. Nevertheless, business activities do not seem to be hampered by the increase in perceived risks that could be expected. Meyerson et al. (1996) observe that temporary systems exhibit behaviour that presupposes trust, yet traditional sources of trust are not obvious in such systems.

Then, if there are no antecedent information of a professional contact available, how can trust in a person that is about to be approached be possible? What is the trust-building mechanism? The explanation according to Meyerson et al. (1996) is that the object of professional trust is no longer the person with her or his individual properties and capacities, but the role she or he enacts in the professional context. She or he is seen as representing a certain professional category of which there is accumulated information. This information involves a set of roles expectations based on the type of organisation, occupational specialty, and the associated stereotypes. Thus, people interact with roles rather than personalities.

To conclude, trust is established and reinforced when people live up to these expectations associated with their roles and behave in a manner consistent with their professional category. Inconsistent role behaviour and 'blurring' of roles tend to heighten uncertainty that will hamper the building of trust (Meyerson, Weick, and Kramer 1996). This is the contextual frame to bear in mind when new digital contact tools are implemented in professional life.

Literature review

Studies of the use of digital contact tools display a varied picture. The purpose of this literature review is to highlight some of the characteristics of this field of study rather than to provide a systematic presentation.

There has been a rapid diffusion of new tools since mid-80's, either with origins in the professional world (e.g. e-mail) or among adolescents (e.g. IM). Early studies involve e-mail along with face-to-face contacts, fixed-line telephony and written media such as

memo (e.g. Trevino, Lengel, and Daft 1987). Later studies such as Kim *et al*. (2007) also include IM and SMS but with fixed-line telephony replaced by mobile telephony, and with no written media.

In addition to the diverging sets of contact tools that are studied, the investigators also differ with respect to scientific approaches, probably reflecting different academic origins. Studies of user-to-user interaction are typically carried out within the domain of interpersonal communication, often inspired by symbolic interactionism (e.g. Schmitz and Fulk 1991). Some studies are carried out in a mass communication tradition based on a uses and gratification approach and with roots in media effect studies (e.g. Dimmick et al. 2007).

Another tendency is a shift from a technological orientation to a focus on the social context. Many early studies were inspired by *media choice theories* that assign importance to the characteristics of a particular media for guiding use in a particular social situation. Thus *contingency theory* argues that the effective users match their choice of medium to the requirements of the communication situation (Steinfield 1992). Other theories such as *social presence theory* (Short, Williams, and Christie 1976) and *media richness theory* (Daft and Lengel 1986) hold that the attributes of the media, such as the speed of feedback and the capacity to mediate nonverbal cues, make them more or less appropriate for certain types of interactions. According to these theories certain kinds of mediated communication should be preferred or avoided, depending on the nature of the message. For instance, when several interpretations of the message are possible then information-rich medium such as face-to-face communication are called for. In contrast, routine information exchanges where consensus about meaning already exists make less information-rich text messages more suitable (Sproull and Kiesler 1986).

Contingency theory, social presence theory and media richness theory attempt to explain media choice as a function of media characteristics and actor rationality. A less technologically deterministic perspective is offered by the *social affordance approach*. From their study of computer-mediated communication (CMC) use in a professional environment Quan-Haase & Wellman (2006) argue that technologies themselves do not determine work relations. ‘Rather, CMC provides possibilities, opportunities, and constraints for the formation and maintenance of work relations…’(Quan-Haase and Wellman 2006, 288). The social affordance perspective posits that individuals will choose to use particular kinds of communication media when there is a congruency between the opportunities that they provide and the characteristics of the relationships with those whom they communicate (Wellman et al. 2003; Boase 2008).

According to *constructivist* views, expectations of how and when people will use CMC systems should not be tied directly to the physical characteristics of the medium. Rather, it appears that social and other contextual influences are more important in the media selection process. A wide range of empirical evidence suggests that other factors besides task requirements and media characteristics influence the choice of a medium in any given situation, including time and distance constraints, social and organisational norms, symbolic meanings attributed to the medium itself, and media experience (Trevino, Lengel, and Daft 1987; Fulk et al. 1987; Steinfield 1992). For example, in a

professional context, a particular text may be perceived differently depending on if it is communicated via a business letter, an e-mail or a text message. 'In this way', say Trevino et al., quoting McLuhan (1964) 'the medium itself is a message' (1987, 559).

So how much does it matter whether focus is on technology or sociology? Quite a lot actually. The media characteristics approaches suggest that patterns of media use should be relatively homogeneous when distribution of access is even and communication task requirements are similar. However, such theories fail to explain a number of studies that have found differences in attitudes or patterns of use across groups using the same medium. In contrast, the *social influence model* (Fulk et al. 1987; Schmitz and Fulk 1991) understands the media choice as a subjectivist process where co-workers' opinions and attitudes are of at least equal importance as media characteristics. Here, the underlying assumptions of users' behaviour are inspired by *social learning theory* (Bandura 1977) according to which individuals acquire skills and new behaviour patterns by observing the behaviour of other individuals. In a similar way the *social information processing approach* (Salancik and Pfeffer 1978) suggests that job attitudes are shaped by co-workers' influence and consequences of past actions. Thus the social influence model predicts different patterns of use across groups due to differences in social norms and interaction patterns, even though communication tasks and media options are comparable. As a consequence, Fulk et al. (1987) argue that the choice to use a medium that is otherwise considered inefficient may be quite rational, in the light of the social context.

Some studies of social uses of new media have more specifically looked at relationships between media use and participants' social networks. The choice of contact tool is assumed to mirror the strength of relations and social roles. Although not always explicitly stated these studies seem to build on the *theory of social structures* (Wellman and Berkowitz 1988) along with the *theory of strong and weak ties of networks* (Granovetter 1973). With this perspective Licoppe and Smoreda (2005) discuss such networks in terms of 'relational economies'. The choice of a particular medium of communication becomes a tool of reaffirming and reshaping roles, hierarchies and forms of power in such relational economies.

Baym, Zhang, and Lin's (2004) study of multiple media use among US college students found that face-to-face interactions and telephone calls, rather than be threatened by contacts made on the Internet, were supplemented by the new digital contact tools. In her studies of media use among members of academic research groups and among distance learners Haythornthwaite (2005) concluded that individuals use more types of media to communicate where the tie is stronger between individuals. *What* was communicated also depended on the nature of the relationship. There were no particular types of communication that systematically linked to particular media. Nor did Mesch's (2009) examination of Israeli adolescents' choice of communication channels indicate any channel preferences as regards the content of communication. The findings suggest that origin of the relationship is an important factor so that face-to-face communication is preferred for ties that were initiated face-to-face and online communication for ties that were initiated online. In contrast phone communication was found to be a more neutral channel so that relationship origin did not affect its use. Kim, Kim, Park, and Rice's (2007) studied Korean individuals' choice of media channels

with respect to social roles. They found e-mail distinctive for organisational workers and mobile phone for home workers, while students presented a multi-channel patterns including IM, SMS and mobile phones.

Employing a *uses and gratifications approach* (Blumler and Katz 1974; Palmgreen, Wenner, and Rosengren 1985), Dimmick, Ramirez, Wang, and Lin (2007) examined the relationship between network characteristics and frequency of use of three communication tools (fixed-line telephony, e-mail and IM) among US college students. The results indicate network characteristics to be what most influence the choice of communication tools. The telephone seems to be preferred in close relationships whereas e-mail and IM are used for interaction with those who are perhaps less intimate. Using a similar approach in a study among US college students Ramirez Jr., Dimmick, Feaster, and Lin (2008) suggest a hierarchical order of different media with mobile phones at the top, followed by IM, that in turn is superior to e-mail and with fixed-line telephony as least gratifying.

In the coming sections some topics from the literature review will be discussed in relation the research questions and the empirical results of the study.

The study

Aim of knowledge

Deregulations of national and international economies, rapid diffusions of ICT applications and increased ROI requirements have challenged business managers from 1980 and onwards. The relative increase of uncertainty induced by market dynamics have enforced a change in organisational focus from planning and control in vertical structures to rapid adaptation to market changes through networking strategies. Cross-border coordination replaces internal routines. The trust necessary in business relations is contingent on actors accomplishing with their role expectations.

With cross-border communication as a key factor to create, maintain and reinforce business relationships, the advent of a range of new digital media channels affects the business environment. An overview is presented in Table 1.

Table 1: Developments in digital media channels including telephony during later years (Selg 2010).

Number of persons contacted	1995	2010
One or a few	Fixed-line telephony Mobile telephony E-mail	Fixed-line telephony Mobile telephony Voice over IP (VoIP) Short Message Service (SMS) Instant Messaging (IM) E-mail
Several selected	E-mail	Facebook LinkedIn Intranet E-mail
Several, not selected	E-mail lists	Blogs Twitter YouTube E-mail lists

From interviews with 20 experts (Selg 2010) it appeared that in many organisations active attention was paid to new digital contact tools, normally used in one-to-one (or dyadic) contacts. They included voice calls (fixed-line, mobile and VoIP telephony) and text communication (SMS, IM and e-mail). The interviewees reported a vivid experimentation in order to find out in what contacts and contexts these tools were to be preferred or avoided.

Following the experts' observations of emerging 'social codes', this study is based on the assumption that the choice of a particular contact tool is the product of a social process where the participants gradually learn what is to be considered as an appropriate action. As regards social patterns in general, there tend to be an intuitive understanding of what contact tool is to be preferred in a given situation. Depending on whom is about to be contacted and in which context and situation, this intuitive understanding leads the contacting person to choose the most suitable tool, but without being able to explain why.

The aim of this study is to go beyond this intuitive knowledge by making the factors influencing the choice of tools transparent. Through a survey among experienced users the choice of suitable contact tools against situational characteristics of the contact will be highlighted. The results from the study will be communicated to practitioners in their roles as users of the wide range of digital contact tools.

Research questions

The interviews generated a number of specific questions for research:

- The diffusion and use of new contact tools; for example, are VoIP and IM common in professional contacts?
- With a number of contact tools available what makes us choose one or another?

The preliminary conclusions from the interviews point to the importance of a number of factors influencing the choice of a particular contact tool:

- If the contact is made in a professional context or if it is of private nature.
- If the individual to be contacted is an unknown or well-known person.
- It the contact takes place in a formal or informal context? One may be inclined to equate professional relationships with formal contacts on the one hand, and private relationships with informal contacts on the other. However, this is not always true; there may be informal contacts between colleagues as well as formal contacts in private contexts.
- If the motive for the intended contact is to give or receive information (one-way) or to reach some form of agreement (two-way).
- If the contact is due to an urgent matter or not.

These factors, indicated above, that will serve as hypotheses for this study are summarised in Table 2. Fixed-line phone, mobile phone and VoIP have been put together under a common label 'voice call'. Whether a phone contact is more or less suitable in a given contact situation is not assumed to be influenced by the transmission technology.

Table 2: Overview of contextual factors influencing the choice of contact tools.

Situation / Contact tools		Voice call	SMS	IM	E-mail
Context	Professional/Private				
Relationship	Unknown/Well-known person				
Type of contact	Formal/Informal				
Motive for contact	To inform/To agree				
Temporal aspects	Urgent/Not urgent				

Notwithstanding the importance of the suggested influencing factors, several of the interviewees emphasised the individual variations in their patterns of use. One explanation that was put forward was that a contact with a specific person often includes combinations of contextual matters. This also implies that various tools may be used in parallel in the ongoing contacts between two individuals. Some interviewees also stressed the fact that an individual, or groups of individuals, may select different tools despite similar contextual situations.

By focusing on purely factors of social codes, other determinants of usage are omitted. Economy is such a factor. Economic conditions influence the access to the tools in terms of purchasing power regarding computers, mobile phones, subscriptions fees and rates per minute. As an example, the popularity of SMS among adolescent users is due to the relative steep price of mobile voice call tariffs relative to the cost of texts. Perceived ease of use and skill in the handling of the diverse tools is another factor influencing the use. In addition the interviewees also mentioned that both parties having access to the tool is a necessary condition of use, 'it takes two to tango'.

Next we are interested to know whether the results obtained are controversial or not. Do the respondents agree on that the tool X is the most suitable in situation Y? Have socially accepted rules been established? And in the case of discrepancies, are we able to discover if the unanimities are related to social background factors such as gender, age or education?

Summing up our research questions:

1. To what extent are new digital contact tools used in professional contexts?
2. To what extent have socially accepted rules regarding this usage been established?
3. In the case of diverging attitudes, can they be related to social background factors such as gender, age and education?

Although our primary interest lies in the professional use of contact tools, the corresponding statistics for usage in private contexts will be presented in parallel. Whether the suitability rankings in professional and private contexts coincide or diverge will hopefully stimulate the discussion.

Discussion

Here it might be the moment to make a pause for a comparison of how the hypotheses derived from the interviews with the practitioners relate to what was exposed in the literature review. Without getting too deeply into such a discussion it is obvious that the picture expressed by the interviewees are in line with the social influence model (Fulk et al. 1987; Schmitz and Fulk 1991), that stresses the importance of co-workers' influence and attitudes. We recall that this model is based upon Bandura's social learning theory (1977) that states that individuals acquire skills and behaviours by observing the behaviour of others, and Salancik & Pfeffer's (1978) social information processing approach that emphasises co-workers' influences and experiences from past actions.

We may also recall the importance assigned to contacts of formal or informal nature. This view aligns with Goffmans' (1959) metaphorical expressions of 'front stage' and 'backstage' to illustrate when a certain appearance is required or not. In both professional and private contexts, the presence of observers, who they are and roles we agree to assume before each other is decisive for our actions (Goffman 1959).

Nevertheless, the suggestions brought up during the interviews also give support to theories that assign importance to the characteristics of a particular contact tool for its use in a specific situation. Actually the hypotheses present the view of an effective user that knows how to match the choice of contact tool to the requirements of the situation.

Method

The study was carried out in an early stage of the diffusion process and with the explicit aim to investigate the emergence of related patterns of usage in professional life. A quantitative survey was chosen in order to test the qualitative results from the pilot study.

The sample

The population could be considered as all individuals in the Swedish population with an occupation that includes the use of contact tools. Due to its explorative nature the study did not aim to provide a representative picture. In *theoretical sampling*, cases are chosen based on theoretical (developed *a priori*) categories that are likely to replicate or extend the emergent theory (Glaser and Strauss 1967; Eisenhardt 1989). The survey was directed to the members of *Swedish Computer Society*[5], a professional association that can be considered as an early adopter category (Rogers 2003), many of them with educational background in computer sciences and active in ICT related professions.

By addressing this target group it was expected to reduce the possible problems of tool handling to a minimum so that the patterns of usage displayed by the survey statistics would reflect the relative advantages and disadvantages of the contact tools with respect of social contexts and contact situation. We then have firm reasons to assume that lack of access to computers and mobile phone, as well as related usage skills, would not impact on the survey results.

The questionnaire

An on-line questionnaire (EasyResarch) for e-mail distribution was designed. Two draft versions were tested.

At first the respondents were asked to indicate their estimated frequency of use of a particular communicative tool. The response alternatives in everyday language, included a range from ”Several times a day” to ”Never”. To allow for statistical operations, weights were then assigned to the expressions by a scale running from 0 to 5 (Table 3).

[5] Sw. *Dataföreningen*

Table 3: Frequencies of use with assigned weights

Frequency of use	Several times a day	Everyday	A few times a week	A few times a month	Less often	Never
Weight	5	4	3	2	1	0

In the next set of questions the respondents were asked to grade the suitability of four contact tool for use in different contact situations in professional life using a 7-point Likert scale with 1 = 'Not at all suitable', 4 = 'Both/and', and 7 = 'Very suitable'. The same questions were repeated for private contexts, see Table 2. In all there were 14 questions (7 situations in 2 contexts). Thus each question implied the ranking of 4 tools, producing 56 rankings (14 x 4).

The third set of the questions was dedicated to social background factors; gender, age and education.

To each question there was an attached field for commentaries. Many respondents made use of this opportunity, generating 397 comments. The comments provided a substantial qualitative contribution that facilitated the interpretation of the statistics.

The respondents

The survey was carried out in the spring of 2011. Just over one thousand complete responses were obtained. The respondents represented an age range from 18 to 82 years, with a normal distribution and a mean value ≈ median = 50 years. 73% of respondents were male and 27% female, well representing the male domination among the members of the Computer Society. 80% of the respondents had post-secondary education.

The statistical analysis

Mean values have been calculated as a basis for a ranking of the contact tools with respect to frequency of use and suitability. The *standard deviations* indicate the dispersion of the answers. By looking at the standard deviations we are provided a measure of how established the usage is. A small number tells us that the respondents are using a tool in a similar manner with the underlying assumption that a common 'code of conduct' has been established. In contrast, if the respondents' ratings are distributed over the entire scale, there is an indication that the usage of the tool is controversial in the sense that the popularity among certain users is combined with negative attitudes among other users. A high standard deviation value thus indicate that a common norm is yet to be established. Additionally the *number of respondents* is used as a complementary measure of how established is the use of particular contact tool.

Statistics indicating greater variations (= higher standard deviations) in the use of contact tools call for an examination if certain patterns of usage could be observed as regards social background factors. Two measures of correlation are used, Pearsons' chi-square and the F-test.

Pearson's chi-square ($\chi 2$) is used when the social background factors (nominal scale) are combined with response alternative such as 'Several times a day', etc. (ordinal scale). A contingency table (or cross tab) is set up with e.g. male/female in the columns and frequency of use in the rows. The chi-square is calculated as the difference between expected and observed data. A small chi-square value indicates that the difference in use, for example between women and men, is small.

F-test (ANOVA, Variance analysis) is used on the data produced by the use of Likert scales. The aim is to check whether the mean values of attitudes e.g. among women and men significantly differ from each other. In the first place all group mean values (gender, age groups, and education categories) have been tested. In the next stage those categories with significant F-values have been further analysed. In many cases the differences in mean values, although being significant, are small. Moreover, statistical significance does not automatically imply that a deviation in mean values is of interest for the research question. As a rule of thumb, differences in group mean values < 0,5 have been disregarded.

Correspondence analysis (CA) is a multivariate technique to analyse the relations between variables in a contingency table (see e.g. Ekbrand 2006; Hair et al. 2006). The chi-squared values are transformed into a metric measure of distance that can be positioned graphically in a *perceptual map.* The content in columns and rows of the contingency table – in our case the contact tools and situations – may then be displayed in one graphical presentation. The closer to each other two contact tools are positioned in the map, the more they resemble each other as regards their usage. In the same way, when the co-ordinates of the situations are added into the map, we easily discover which are the tools and situations that 'go well together'. It is important to note that the distance between co-ordinates, for example a particular tool and a specific situation, does not have any inherent meaning in itself. It is the difference in distances between a particular tool and the situations that is of interest.

The SPSS software was used for the statistical analyses.

Results

Recalling our research questions:

1. To what extent are new digital contact tools used in professional contexts?
2. To what extent have socially accepted rules regarding this usage been established?
3. In the case of diverging attitudes, can they be related to social background factors such as gender, age and education?

First the general picture of the contact tools examined based on frequency of usage will be presented. Variations related to background factors are commented. In the next stage the ratings of the contact tools as regards their suitability in different contact situations are presented. Differences in attitudes related to social background factors are discussed. Perceptual maps as an alternative way to display the results will then be presented and discussed.

Due to space limitations, the presentation will be accompanied by a few selected tables produced by the statistical analysis that are considered particularly illustrative. The original report (Selg 2011b) contains the complete set of the tables.

Frequency of use

In Table 4 the six contact tools are presented as a ranking list with respect to frequency of use (Remember that 5 = 'Several times a day', 4 = 'Everyday', … 1 = 'Less often'). We can see that e-mail and mobile phones are used on a daily basis in both professional and private contexts by a majority of respondents.

Table 4: Ranking of contact tools in professional and private settings with respect to frequency of use (Mean value).

Contact tool	Mean value		Std. Deviation		N	
	Professional	Private	Professional	Private	Professional	Private
E-mail	4,87	4,34	,451	,890	1243	1266
Mobile phone	4,53	4,27	,857	,869	1264	1291
SMS	2,91	3,64	1,327	1,104	1225	1265
IM	2,34	2,15	1,891	1,705	1123	1164
Fixed-line phone	2,28	2,71	1,952	1,360	1001	1171
VoIP	1,50	1,55	1,665	1,462	798	890

At the bottom of the list we find VoIP and, perhaps surprisingly, fixed-line phones. In fact IM is more frequently used for professional matters than the fixed-line phone, however, the difference is small. The mean value of SMS is close to 3 in professional use, indicating 'a few times a week'.

A closer look at the mean values indicates that professional contact patterns are more specialised than what is the case for private contacts. The frequencies of use of the most popular tools such as e-mail and mobile phones are higher for professional contacts than for private. A contributing fact may be that a higher number of professional contacts are made during a day. The opposite tendency is observed for the less frequently used tools; SMS, fixed-line telephones and VoIP, which receives higher scores in private contacts. The exception to this rule is IM, which, again surprisingly, is more frequently used in professional than private contexts.

The standard deviations indicate high similarity in usage patterns with respect to mobile phones and e-mail, both in professional and private contacts, while major differences are found in the use of fixed-line phone and IM.

As a general tendency, the number of users of the various tools is slightly higher for private contacts than for professional. The communicative repertory seems to be broader in private relations than in professional.

Finally a comparison of the dispersion of the use indicates a higher degree of standardisation of professional e-mail and mobile phones than for private use. For the other tools the adverse tendency is observed. The variation in use of SMS, IM, fixed-line, telephony and VoIP is higher in professional settings than for private contacts.

Our next question is if these tendencies are homogenous as regards sex, age and education of the respondents. To find out the results are cross tabulated with the social background factors and checked with a Pearson's Chi-Square tests.

Table 5: Results from Chi-Square tests of cross tabulations of contact index with social background variables.

	Professional Contacts			Private Contacts		
	N	df	Sig.	N	df	Sig.
Gender	1041	2	,241	1059	2	,704
Age	1039	6	,000	1057	3	,000
Education	1038	4	,665	1057	4	,266

In Table 5, we observe that only the age factor seems to have importance for the frequencies of use. The tendency is the same in both professional and private contacts. Further data analyses (see Selg 2011b) indicate patterns of reduced contact frequencies with increasing age, and with almost identically tendencies in professional and private contacts.

Tools and situations

The respondents were asked to grade the suitability of the 4 contact tool for use in different contact situations (Remember 1 = 'Not at all suitable', 4 = 'Both/and', and 7 = 'Very suitable'). In Table 6 and Table 7 the calculated mean values and standard deviations are presented together with the number of respondents. The higher the mean value, the more suitable is the contact tool for that specific situation. Mean values between 4 and 7 express positive attitudes whereas values below 4 reflect scepticism.

In professional contexts *Voice calls* are generally considered very suitable contact tool in any kind of professional situation. In all situations the means obtained are high, often the highest (Table 6). Its only drawback according to respondents' commentaries is that the information transmitted and agreements made are not automatically documented. In most situations there is a high degree of conformity of opinion which is indicated by low standard deviation values.

Table 6: Ranking of contact tools as suitable in different professional situations (Mean values, standard deviations and number of respondents).

Situation	Tool	Mean	Std. deviation	N
Unknown person	Voice call	6,75	,741	1184
	E-mail	6,38	1,128	1182
	SMS	2,03	1,485	1154
	IM	1,99	1,530	1107
Well-known person	Voice call	6,81	,658	1166
	E-mail	6,80	,627	1164
	SMS	6,07	1,415	1156
	IM	5,55	1,913	1074
Formal contact	Voice call	6,83	,610	1214
	E-mail	6,74	,688	1212
	SMS	4,08	1,868	1194
	IM	3,37	1,997	1120
Informal contact	E-mail	6,82	,588	1195
	Voice call	6,81	,659	1195
	SMS	6,27	1,305	1184
	IM	5,84	1,807	1105
Give or receive information	E-mail	6,78	,711	1139
	Voice call	5,91	1,570	1139
	SMS	5,47	1,867	1131
	IM	4,00	2,233	1036
Come to an agreement	E-mail	6,56	1,067	1118
	Voice call	5,80	1,676	1116
	IM	3,10	2,033	1037
	SMS	2,87	1,904	1094
Urgent matter	Voice call	6,87	,620	1122
	SMS	5,98	1,672	1116
	E-mail	4,28	2,207	1111
	IM	4,15	2,425	1012

Similar to voice call *e-mail* is highly suitable in most professional contacts. For the one-way and two-way communication situations the e-mail gets even higher scores. From the comments of the respondents we get the explanation: e-mail offers the advantage to generate printable documents as by-product which is highly estimated in professional contacts. The weak point of e-mail is that it may not be suitable in urgent situations. Similar to voice calls the use of e-mail is characterised by low dispersion, that is; the usage of the e-mail tool is a well-established social activity.

SMS and IM receive generally lower ratings by the respondents. This is particularly the case for the IM tool for which somewhat fewer respondents are reported. *SMS* is considered suitable in contacts characterised of less degree of formality and with well-known persons. In urgent situations SMS is the second best alternative after phone calls. SMS is also considered fairly suitable for one-way information. The *IM* ratings closely mirror those of SMS but at a lower level of mean values. It is considered suitable for informal contacts and for contacts with well-known persons. The SMS and IM are considered less suitable in the contacts with unknown persons and in situations when an agreement is supposed to be made.

The ratings of SMS and IM are considerably more dispersed than for voice call and e-mail which may be interpreted that less agreement on the usage is established. As a general tendency, the dispersions of attitudes related to IM reach their highest values meaning that its relative suitability is a controversial matter.

The attitudes with respect to the tools in private contacts and whether they are suitable or not in different situations coincide closely with what was observed in the professional context, see Table 7.*Voice calls* and *e-mail* receive high ratings with mostly low standard deviations. But there are nuances of differences. The superiority of the e-mail is slightly lower in most of the private situations compared to the professional.

On the other hand both *SMS* and IM get higher scores in the majority of private situations, but at the same time the dispersions demonstrate similar variations in attitudes as in the professional context.

Table 7: Ranking of contact tools as suitable in different private situations (Mean values, standard deviations and number of respondents).

Situation	Tool	Mean	Std. Deviation	N
Unknown person	Voice call	6,34	1,263	1065
	E-mail	6,26	1,292	1061
	IM	3,08	2,026	980
	SMS	3,02	1,964	1034
Well-known person	Voice call	6,92	,421	1073
	E-mail	6,85	,558	1073
	SMS	6,76	,804	1066
	IM	6,33	1,531	996
Formal contact	Voice call	6,73	,798	1085
	E-mail	6,71	,842	1084
	SMS	2,46	1,865	1049
	IM	2,30	1,852	989
Informal contact	E-mail	6,70	,767	1075
	Voice call	6,68	,905	1076
	SMS	5,53	1,924	1053
	IM	5,36	2,045	990
Give or receive information	E-mail	6,69	,881	1064
	Voice call	6,49	1,124	1065
	SMS	6,05	1,536	1055
	IM	4,93	2,202	976
Come to an agreement	Voice call	6,80	,667	1050
	SMS	6,35	1,370	1044
	E-mail	5,32	2,017	1032
	IM	5,08	2,320	955
Urgent matter	Voice call	6,89	,522	1061
	SMS	6,26	1,444	1054
	IM	4,56	2,371	956
	E-mail	4,02	2,254	1038

With a few exceptions voice calls and e-mails report mean values with very low standard deviations which signal shared attitudes about usages and situations among the respondents. Much higher rates of dispersions are observed for the SMS and IM indicating a relative lack in consensus compared to voice call and e-mail. Again, most divergence of opinions is reported about the IM tool.

In order to examine if the dispersion of the ratings can be related to social background factors F-test were made on the mean value differences between gender, age and educational background groups. As a general impression the tests did not add much of

explanatory value to the analysis[6]. With respect to *gender* the tests indicate great similarities in the attitudes between men and women in professional contacts. Among the few discrepancies observed women are more reluctant than men to use SMS in formal contacts. In addition, men are somewhat more inclined to consider voice call suitable for coming to an agreement in a two-way communication. On the other hand, women seem more apt to use IM for informal contacts.

In private contexts the tests indicate a higher gender-related variability in the use of contract tools, although in most cases the differences are small, indicating weak tendencies. In the remaining cases female are rating SMS and IM higher than men in typically informal contexts and with well-known persons. The reverse tendency is obtained in the case of formal contacts where men, just like in professional contacts, consider SMS more suitable than what women did.

When testing the mean differences for different *age groups*, the number of significant F-statistics is considerably higher than in gender tests. However, in a majority of cases the tendencies are weak. Leaving the weak tendencies aside, for all contact situations there is a declining appreciation of the IM tool with increased age, just as in professional contacts. Also in the case of SMS use for private contacts there is a lower degree of appreciation among users in upper ages.

Finally, tests of differences in mean values related to *education* do not provide any tendencies worth mentioning, neither in professional nor in private contexts.

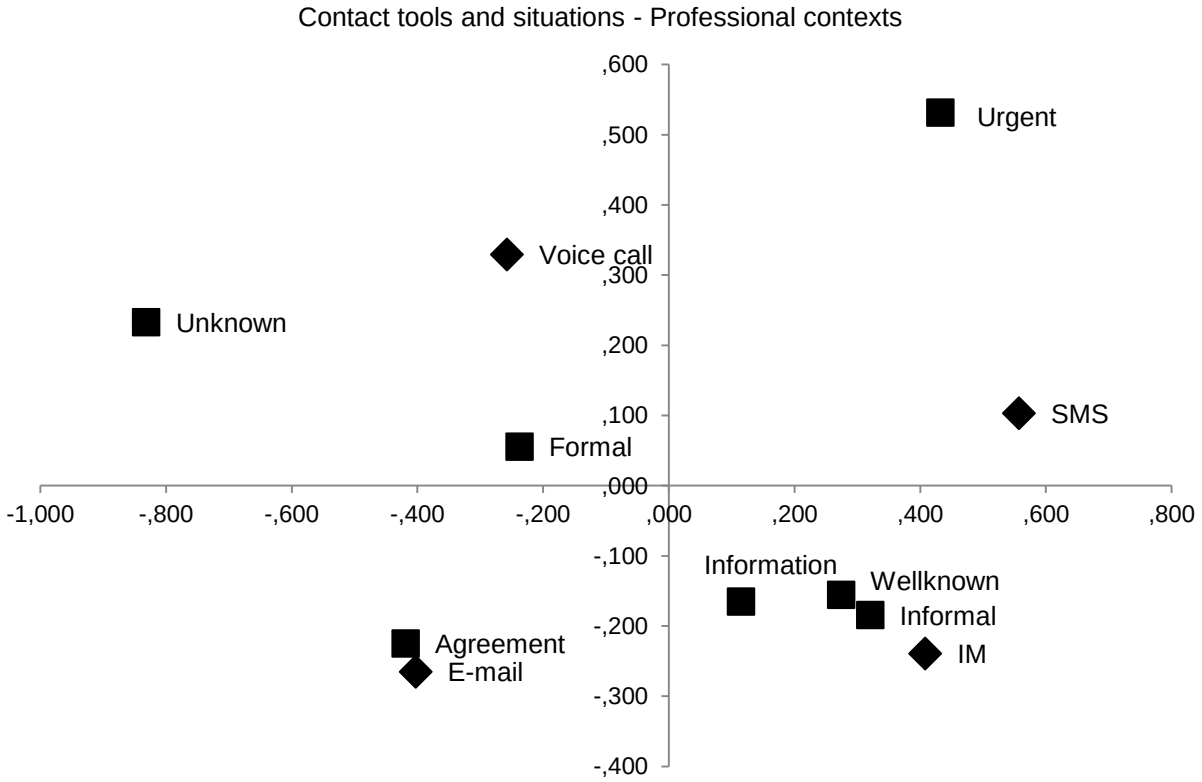
Mapping the results

In Figure 1 displaying professional contexts we can observe that each contact tool (the ‘diamonds’) is distributed in a separate field. This is an indication that they present different characteristics with respect to their usage in different situations. Turning to the situations (the ‘squares’) several of them are positioned close to origo, representing an imagined average value. These situations explain a minor share of the variance of the observations and they therefore offer less explanatory strength with respect of the choice of a particular contact tool. To give an example, for contacts with a well-known person, any contact tool will do (Figure 1).

At the longest distance from origo we find unknown persons and urgent situations, respectively. This should be read that these situations are particularly decisive for the choice of contact tool, meaning that certain tools are suitable whereas other tools are clearly unsuitable. In statistical sense these two situation explain the major part of the variation in the observations. This information also serves the purpose of interpretation of the co-ordinate axis. Thus the horizontal axes represent the dichotomy ‘unknown/well-known person’ and the vertical axis ‘urgent-not urgent matter’.

[6] Due to the space demanding nature of the tables produced in combination with their meager explanatory contributions, the tables are not included in this article.

Figure 1: Perceptual map of contact tools ('diamonds') and situations ('squares') in professional contexts.



Some tools and situations are positioned at close distance to each other, indicating that these combinations 'go well together'. This is evident in situations with the aim to reach an agreement and where the e-mail tool seems to be superior. Similarly, the IM tool is interrelated to contact situations of informal character and with well-known persons. Accordingly, a long distance between a tool and a situation indicates that the contact tool is unsuitable in this particular situation. For example, the use of e-mail for urgent matters is considered less suitable.

Looking at the position of voice call we can see that no situation is positioned at a very close distance, but on the other hand, the distances to the various situations are fairly even. This can be interpreted as that the phone serves as a universal tool; a phone call may not be the most suitable contact tool in a given situation, but it is never wrong.

To get an estimate of the relative suitability of the contacts tools for a given situation we can compare the distances. Then it appears that voice call and e-mail are the most suitable for contacts a) of formal nature, b) with unknown persons, and c) when the aim is to come to an agreement. IM is reserved for the opposite situations, that is, for informal contacts, with well-known persons, and when the aim is to give or get information. Urgent situations are best dealt with by SMS. To use e-mail for urgent matters is as inappropriate as to address unknown individuals by IM.

So far we have discussed the separate tool-situation relations, just as in the tables on pp. 16,18, however, now as position on the map. In addition correspondence analysis allows us to identify the most suitable tool for a contact characterised by a combination of situations. This is achieved by summing the distances of the implied situations for each contact tool. The contact tool with the shortest aggregated distance then is ranked as the most suitable. To allow such a calculation the distance measures must be normalised. The SPSS software includes such a function.

In Table 8 some of the normalised distances of the CA are presented as an example with a ranking of contact tools as regards suitability in a formal contact with a well-known person and where the aim is to reach an agreement.

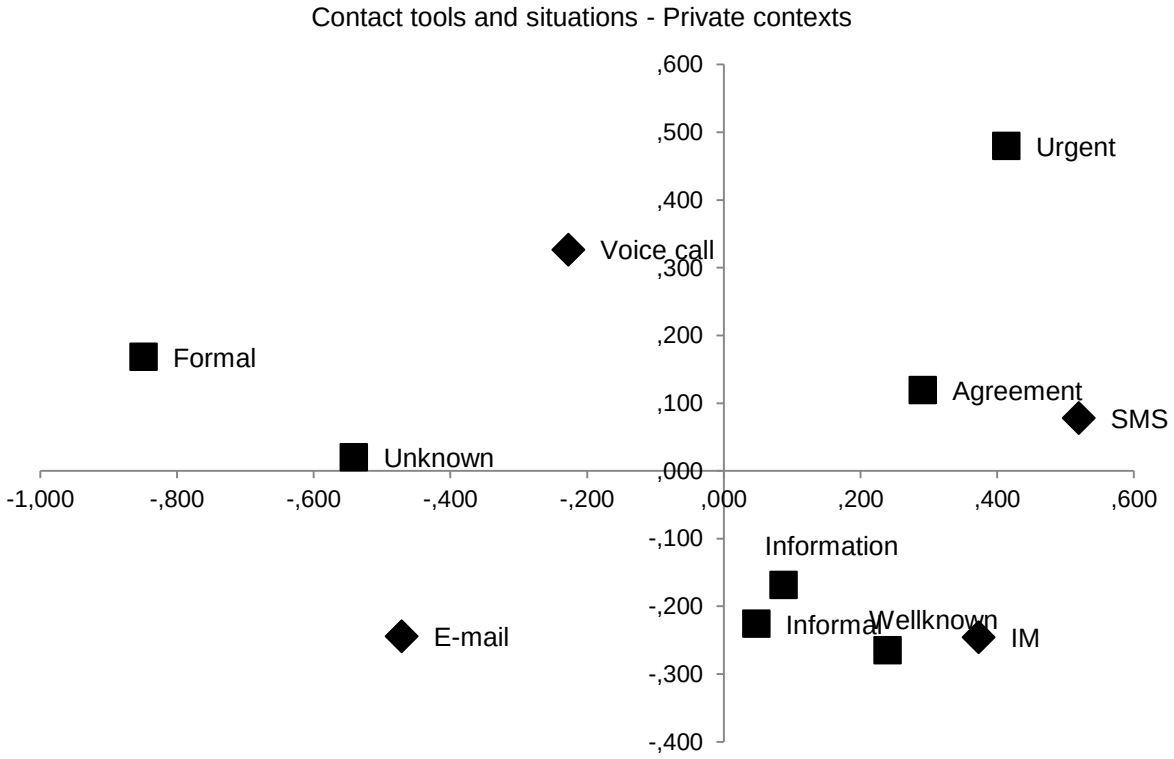
Table 8: Example on how to use correspondence analysis in compound situations.

Situation	Voice call	SMS	IM	E-mail
Formal contact	0,275	0,796	0,709	0,361
Well-known person	0,720	0,383	0,157	0,686
Come to an agreement	0,577	1,030	0,827	0,043
Total	1,572	2,209	1,693	1,090

In our example e-mail gets the highest ranking due to its popularity in contacts aiming at agreements. The scores for voice call and IM are almost even. According to the details of Table 8 the main reason is the relative strength of IM in contacts with well-known persons, and which to a great extent compensates for its weakness in contacts of formal nature.

The results from the CA of contacts tools in private contexts are presented in Figure 2. The positions of tools and situations are in most cases similar to what could be observed in professional contexts. There are two important exceptions though. As earlier noted the superiority of e-mail in situations aiming at reaching agreements is absent in private contacts. Another difference is that formal contacts replace unknown persons as situational factor with strongest explanatory strength. This is a rather puzzling outcome that will be commented in the final section.

Figure 2: Perceptual map of contact tools ('diamonds') and situations ('squares') in private contexts.



Concluding remarks

Overview of the results

The use of contact tools in professional contexts is characterised by a high degree of *specialisation,* and with mobile phone and e-mail being used several times a day. In comparison the use of SMS, IM, fixed-line phones, and VoIP are reported to occur a few times a week or less. Moreover, the professional usage is characterised by a high degree of *homogeneity*, again as regards e-mail and mobile telephony. Both of these could be considered as standard tools for text and voice messages respectively. The other tools, not only less frequently used, display a greater degree of variation. The statistics do not indicate any clear tendencies as regards social background factors. Only for IM an age factor can be observed.

In comparison, private contacts are characterised by less specialisation, that is, the difference between the tools most used and less used is smaller. In addition, the patterns of use are more heterogeneous. Women use SMS and IM more frequently in private contexts than men, although no differences in professional contexts are observed. Moreover, the age element plays a greater role in private contexts.

The findings indicate that in professional contexts voice call and e-mail are preferred in formal contacts, with unknown persons, and when an agreement has to be reached. SMS and IM are getting relatively higher rankings in informal contacts, with well-known persons, and when information is given or received. However, the most influential factor governing the choice of tool is whether the person to be contacted is well-known or not. The statistics present the somewhat surprising result that with well-known persons, any contact tool will do, be it in professional or private contexts. With unknown persons there are clear preferences for the oral medium and e-mail.

The importance of the contacted person being well-known or not is further confirmed by 35 comments to the survey questions. Having an established relationship with the other person, which includes being familiar with her or his tool preferences, plays a decisive role for the choice of contact tool. This matter overshadows all the other elements associated with the contact.

Taken together, the findings indicate that the choice of contact tools is less contingent on contextual matters as was hypothesised. Instead the findings suggest that people choose the tool that they believe is most suitable for the person to be contacted.

Fixed-line phones out, IM in

As regards fixed-line telephony our figures point clearly to a generation element behind the variations in use. Respondents in upper ages tend to maintain their fixed-line phone contacts, particularly in private life, while many younger respondents do not use it at all. A possible interpretation may be that of private relations characterised by long established routines of social character which have a constraining impact. IM presents a reverse tendency with an increasing frequency of use that already has outpaced fixed-line telephony in professional contacts, still not yet in private. Younger age groups are in the lead.

Figures of concern?

A question mark has to be made as regards the figures indicating that in private contexts formal contacts replace unknown persons as the situational factor with strongest explanatory strength. Why a user should be more reluctant, e.g. to use IM in formal contacts than with unknown persons, is not intuitively evident. Nor did the interviews in the pilot study make such suggestions. In contrast, and as just stated, the comments supplied by many respondents emphasise the nature of relationship – unknown or well-known – as most influential factor. Then it remains to be questioned as to whether an explanation may be found in the design of the related survey questions and how they have been perceived by the respondents. Despite two tests of draft versions, such concerns cannot be excluded.

Perspectives on the findings

How do our findings relate to perspectives on media choice and results from empirical studies reported in the literature review? It is clear that the findings give some support to theories that stress the importance of the characteristics of the various contact tools for

their use. The speed of feedback, to take one obvious example, favours mobile phone and SMS communication for urgent matters while disqualifying e-mail. In contrast e-mail is the preferred tool in contacts where there is a need to have the content confirmed in a printed document.

On the other hand, any attempt to generalise the idea about a close fit between the characteristics of the contact tool and the characteristics of the communication situation is contradicted by other findings that stress the nature of the relationship as most influencing factor. In contacts with well-known persons any tool will do. From the commentaries we get it even stronger: you choose the tool that suits the other.

Then how should the preferences for voice calls with unknown person be interpreted? That with lacking knowledge about the other's tool preferences the phone is considered as the most neutral choice? This conclusion would be in line with the social influence perspective. Or that the superior richness of the language carried by voice call is appreciated in contacts with unknown persons where nuances perceived may be critical for the outcome? This is claimed by media choice theories.

It is also evident that the findings give support to the social influence model according to which the users develop their communication routines in interaction with others. The data refers to 2010. With the e-mail coming into professional use during the 1990's a consensus about its affordances, almost as strong as for phone calls, has been established. In comparison the attitudes associated to the use of the recent SMS and IM tools were much more diverging, at least in 2010.

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