

**SNF WORKING PAPER NO. 26/03**

**Identity expression in the adoption of mobile services: The case of multimedia messaging services**

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SNF- project no. 6500 "Mobile and Channel Integrating Electronic Commerce"

The project has received funding from The Research Council of Norway, Telenor, Den Norske Bank, A-Pressen, Ericsson and EasyPark.

**SAMFUNNS- OG NÆRINGSLIVSFORSKNING AS  
BERGEN, JULY, 2003**

ISSN 0803-4028

## **PREFACE**

This working paper is part of a research project funded by the Research Council of Norway, Telenor, Den Norske Bank, A-Pressen, Ericsson and EasyPark at SNF. The main purpose of the project is to provide evaluation frameworks that may be used by service providers to understand the behavioral requirements of end-users adopting mobile and channel integrating services. As part of this initiative, surveys studying the adoption of general mobile commerce services, text messaging services, mobile payment services, mobile parking services, mobile gaming services and mobile contact services have been conducted. This paper presents the results of a study of multimedia messaging services. The paper is mainly written by Professor Per E. Pedersen, but contributions from Associate Professors Herbjørn Nysveen and Helge Thorbjørnsen have also been integrated. Nysveen has also participated in the planning, organization and practical conduct of the study.

Grimstad and Bergen, July 10, 2003

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## **ABSTRACT**

This paper applies an extended model based upon the theory of planned behavior to explain the adoption of multimedia messaging services. Because multimedia messaging services are expressive and media rich services, particular attention is given to the influence of identity and identity expression in the adoption of these services. In the presentation of the extended model, identity is elaborated, different theoretical perspectives on identity and identity expression are discussed, and relevant findings from studies of mobile service adoption are interpreted within the perspective of identity expression. Finally, measures of identity expression are developed and discussed. In addition to focusing identity expression, traditional instrumental motivations, social norms and behavioral control are discussed and included in the model. A survey of multimedia messaging interested mobile phone users is conducted. The results show that adoption of multimedia messaging services is influenced by expressiveness, enjoyment, subjective norms and behavioral control. Traditional usefulness and attitudes towards use are of less importance. This is consistent with our hypotheses of multimedia messaging services being adopted for intrinsic and derived motivations rather than for traditional extrinsic motivations. The influence of subjective norms is also consistent with our hypothesis that new media services are influenced by social norms, and the influence of behavioral control is consistent with the hypothesis that new and complex services lacking interoperability are mainly adopted by users with high perceived behavioral control. Consistent with our previous studies of mobile service adoption, the complexity of the model lies in the motivational process of adopters wherein elements of expressiveness and derived motives are found as more important than instrumental extrinsic motives. These findings may be used by service developers, facilitators and operators to design, distribute and market new mobile data services that meet the demand side adoption requirements of end users.

## 1. INTRODUCTION

To obtain widespread adoption of new mobile services, a set of requirements should be met. These requirements are technological, business strategic and behavioral (Pedersen, 2001). In this report, the behavioral, demand side requirements of end users are focused. Industry reports as well as academic papers suggest three characteristics of mobile data services are of particular importance to the adoption of these services (Balasubramanian, Peterson, and Jarvenpaa, 2002; Siau, Lim and Shen, 2001; Kannan, Ai-Mei and Whinston, 2001; Younos and Gao, 2003). The first characteristic refers to the accessibility of these services at any time – the time dimension. The second characteristic refers to the accessibility of these services from anywhere – the place dimension. The third characteristic refers to the accessibility of these services by using truly personal terminals – the personality dimension. While many studies investigating the fulfillment of behavioral adoption requirements focus the first two dimensions, our research has focused particularly on the personality dimension. So far, findings on the importance of so called context sensitivity of mobile data services are mixed (Sidel and Mayhew, 2003), but our findings on the importance of utilizing the personality dimension to fulfill the behavioral adoption requirements of end users have shown rather consistent results across services.

We have previously developed a model including a set of relevant demand side adoption requirements for mobile data services focusing the personality dimension of these services (Pedersen, 2001, 2002, Pedersen et al., 2002). These requirements have been organized as motivational, attitudinal, social and situational determinants of adoption. The determinants have been used to develop an extended adoption model based upon the well known theory of planned behavior (Ajzen, 1991). This model has been tested on the adoption of text messaging services, mobile contact services, mobile gaming, mobile payment and mobile parking services. One of the surprising findings of these tests has been the consistent influence of expressiveness on perceived usefulness and intention to use these mobile data services. In this report we test the model on the adoption of multimedia messaging services. We also use this test to elaborate on the expressiveness concept and to investigate a more comprehensive set of measurement scales capturing the expressiveness concept.

## 1.1 Problems and approach

An ongoing debate in the mobile services community is how motivational, attitudinal and social processes determine the intention to use instrumental mobile services. Based upon the success of non-instrumental services like logo and ringtone download, some suggest social processes are the most important determinants and suggest developing services or including functionality in services that are based upon current norms, trends and fashions. The assumption is that the adoption of these services is determined by social norms and that existing users' adoption is determined by social norms in general. Thus, new services, whether instrumental or non-instrumental, should be developed and marketed to existing users based upon current social norms. The counterargument used by other developers and service providers is that the services adopted by current users do not appeal to current non-users. That is why these users have not adopted non-instrumental services like logos and ringtone downloads. Instead, they argue, new users will adopt mobile services if useful instrumental services are offered to them. These users, they argue, are not driven by social norms but by instrumental motivational processes focusing gratifications of usefulness, ease of use, availability and flexibility.

Previous studies in uses and gratifications and domestication research have investigated the adoption and use behavior of current mobile services users. Naturally, the findings in these traditions do not necessarily generalize to current non-users. On the other hand, findings in these research traditions consistently emphasize the importance of non-instrumental motivational factors in mobile service adoption and use (Leung and Wei, 2000, Kaseniemi and Rautiainen, 2002, Skog, 2002, Taylor and Harper, 2001a, b). Recently, we have also conducted studies in adoption research investigating the adoption requirements of current non-users (Pedersen et al., 2002). Our findings so far indicate that even current non-users are influenced by non-instrumental gratifications in their potential adoption and use of mobile services.

Studies in CMC research suggest norms are particularly important to the adoption and use of new communication media (Trevino et al, 2000). For mobile services there are however, interactions of social norms and instrumentality. For example, young people coordinate their everyday life using mobile data services like SMS. Thus, using such services may be a requirement for taking part in the social activities. In this case, norms of using such services may be identified, but variation in use may not be explained by variation in norms. On the other hand, social instrumentality is strongly related to

norms for example when services are used to connect to, signal and manage membership of a social network as well as to express self-identity, group membership and emancipation or distance from other social networks or groupings. While these motivations for using mobile services are not utilitarian in the traditional sense, they are instrumental and should not be characterized as norm based. To investigate further the relationship between traditional instrumentality, social instrumentality, social influence and subjective norms, multimedia services were chosen as a category of services primarily believed to be adopted because it involves a richer medium than SMS better suited for expressive coordination, event announcement, experiential exchange and self expressiveness.

Multimedia messaging services are also more advanced services typically requiring the appropriation of a new mobile terminal. Advanced services often require more skilled and knowledgeable end users and require that carriers and content providers better facilitate their services. How end users perceive these elements may be captured using the concept of perceived behavioral control. It is likely that perceived behavioral control will also be more important to end users intention to adopt multimedia messaging services than traditional mobile services.

## **1.2 Characterizing multimedia messaging services**

Multimedia messaging services may be used to mediate communication in the same way that traditional text messaging services. They may also be used for premium information and communication services in the same way that premium SMS is used. However, multimedia messaging services allows for including more text in the messages and for including audio, pictures and small video clips. Multimedia messaging services are currently based upon GPRS providing packet data services in GSM mobile networks. It is based upon WAP standards currently maintained by the Open Mobile Alliance. Content types that are supported are plain text messaging, simplified HTML and a series of specialized formats, a series of audio formats including MP3, image formats JPEG and GIF and, for some terminals and networks, video in MPEG4 format (3GP) (Trickey, 2003). The message is composed of components of content, and a special markup language has been designed for specifying the presentation ordering and sequencing of these components (SMIL). For sending multimedia messages between end users a terminal supporting these standards and including functionality to record audio, take (camera), present and often

manipulate pictures is required. The functionality of the services is similar to text messaging services in messages being composed and sent and receivers being notified of received messages. Currently, the user experience when sending and receiving messages is somewhat different from text messaging because the GPRS connection is established and kept open for as much as one minute or more depending on the size of the multimedia message. Thus, some of the perceived immediacy of text messaging is not present in multimedia messaging services use.

For premium MMS, we currently see relatively few service offerings. Examples of current services offered are color backgrounds replacing simple logos, picture services such as services for storing and manipulating pictures taken by users or chosen from an archive, and offerings from media companies repackaging existing media services into MMS-slide shows. Examples of the latter category of services are weather reports, sports event highlights, entertainment program highlights and news services. Mainly because of the larger amount of text allowed in multimedia messages we also find extended versions of the text based services delivered over SMS. Examples are alert services, classifieds and financial information services. Two elements are of particular importance to end users perception of these services – pricing and interoperability. In general peer-to-peer multimedia messaging services have been priced at rates approximately 5-10 times the rates per message of text messaging, but relatively big differences can be observed between carriers. Some carriers have also offered these services for free or by charging for the packet data only for rather long trial periods. At least in Norway, we currently see no consistent pricing policy for multimedia messaging services across carriers and content providers. Interoperability of multimedia messaging services relates to terminals (including terminal software), carriers' networking services and content providers' formatting. For example, not all terminals consistently support the SMIL format for sequencing multimedia messaging content. Network infrastructures of carriers may not currently support interconnect, and roaming agreements for GPRS services in general and for multimedia messaging services in particular are by far not as widespread as for SMS and voice services. Finally, content providers so far have little experience in adapting content to specific terminals and networks. The result is that currently multimedia messaging services are experienced by end users as a somewhat pricey service limited to the offerings and subscribers of their own carrier's network, and that is not necessarily optimally formatted or delivered to their new mobile terminals.

When characterizing messaging media, some form of media richness theory is most often suggested as a basis (Daft and Lengel, 1986, Sillince, 1997). Media richness is influenced and characterized by the ability of a medium to transmit multiple cues, immediacy of feedback, language variety and the personal focus of the medium (personalization) (Dennis and Kinney, 1998). Te'eni (2001) suggests the following characterizing medium attributes of any CMC service: Channel capacity, interactivity and adaptiveness.

*Channel capacity* is an important property determining media richness and includes the potential to transmit a high variety of cues and languages (Te'eni, 2001). Text messaging includes only one cue variety, even though simple graphics such as smileys and other context symbols are often included in the messages. Thus, channel capacity is generally low. Multimedia messaging services on the other may include text, audio and pictures. Thus the main objective difference between traditional text messaging and multimedia messaging is channel capacity.

However, communication media may be characterized by structural properties and by qualitative experiences. This illustrates that relevant media characteristics may be considered a property of the technology used to mediate the communication or a property of the technology as it is perceived by the end-user. Of the structural *interactivity* properties that are mentioned by Burgoon et al. (2000) are: Participation (active vs. passive), mediation (mediated vs. unmediated), contingency (response contingent vs. not), media richness (high vs. low channel capacity), propinquity (collocated vs. distributed), synchronicity (synchronous vs. asynchronous), identification (identified vs. anonymous), parallelism (parallel vs. serial) and anthropomorphism (humanlike characteristics vs. not). Including the perceived conception of interactivity, we may add interaction involvement (degree of involvement), mutuality (perceived sense of relational connection) and individuation (perceived richness of identity) as important properties of the service. Thus, interactivity is a multifaceted concept of many dimensions (and according to Burgoon et al., (2000), it also includes media richness). Applying these conceptions of interactivity to multimedia messaging services, these services may be characterized as offering a relatively participating, mediated, relatively contingent, media rich, distributed, asynchronous, fully identified, primarily serial and somewhat anthropomorphic service. Depending on the way the service is used it has potential for also being an involved, mutual and individuated service.

Table 1.1. Characterization of multimedia messaging

<b>Dimension</b>	<b>Peer SMS</b>	<b>Peer MMS</b>	<b>Premium MMS</b>
Channel capacity	Low	High	High
-Cue variety	Low	High	High
-Language variety	Medium	Medium	Medium
Interactivity	Interactive	Somewhat interactive	Somewhat interactive
-Participation	Participating	Somewhat participating	Not very participating
-Mediation	Mediating	Mediating	Mediating
-Contingency	Contingent	Contingent	Not very contingent
-Media richness	Low	High	High
-Propinquity	Distributed	Distributed	Distributed
-Synchronicity	Somewhat synchronous	Asynchronous	Asynchronous
-Identification	Fully identified	Fully identified	Service dependent
-Parallellism	Mostly serial	Mostly serial	Service dependent
-Anthropomorphism	Unanthromorphic	Somewhat antropomorphic	Somewhat antropomorphic
-Interaction involvement	Involved	Involved	Somewhat involved
-Mutuality	Mutual	Somewhat mutual or mutual	Somewhat mutual
-Individuation	Somewhat individuated	Individuated	Somewhat individuated
Adaptiveness	Somewhat adaptive	Adaptive	Service dependent
-Personalization	Somewhat adaptive	Adaptive	Service dependent
-Situatdness	Somewhat adaptive	Somewhat adaptive	Adaptive (service dependent)
-Timeliness	Adaptive	Adaptive	Adaptive

Finally, *adaptiveness* refers to the potential to personalize a message to a particular receiver. Multimedia messaging services may be used as one-to-one messaging services and thus, be personalized for the individual receiver. However, these messages are also used in mediated services in a one-to-many context. In this context, the adaptiveness of the service is lower, but the channel capacity of these services allows for greater adaptiveness than text messaging services. A summary of the differences between traditional text messaging (peer SMS), multimedia messaging used for

traditional one-to-one communication (peer MMS) and for mediated information and communication services (premium MMS) is shown in table 1.1.

The characterization in table 1.1 illustrates that while multimedia messaging services are richer media, multimedia messaging services involve less interactivity than text messaging. However, few premium services and few examples of use in context have been systematically investigated, so we know little so far of the perceived characteristics of these services in contextual use (for an exception, see Kurvinen, 2003). Even though our characterization gives a fairly detailed description of the characteristics of multimedia services, it is based upon characteristics of human communication (Burgoon et al., 2000) and thus, excludes important dimensions of mobile services used for mediating communication such as mobility, accessibility, immediacy, distribution, distribution control and access control. However, the characterization of text messaging and multimedia messaging is very similar along these dimensions except for immediacy. Two final elements contributing to a significant difference in end users perceptions of multimedia messaging and text messaging services are pricing and roaming. These elements have been briefly discussed above.

In the rest of this paper, we suggest and empirically test a model of the adoption of multimedia messaging services. This model is presented in section 2 with a theoretical discussion of the main concepts used in the model as well as proposed hypotheses of their relevance to multimedia messaging services. In section 3, the design of the study used to test this model is presented. In sections 4 and 5 the results are presented and discussed, respectively.

## **2. MODEL**

Four different traditions have been identified as relevant to understanding the adoption and domestication of mobile services. Diffusion research has its foundation in marketing and economics, and studies the aggregate diffusion or adoption of a technology or service in an industry, in a community or in society in general. Uses and gratifications research has its foundation in media and communication theory, and studies the gratifications sought by adopters of media of different kinds. Adoption and media choice research has its foundation in information systems research, and studies the adoption and use of information and communication technology in general and in organizations in particular. Domestication research has its foundation in sociology, and studies the adoption, use and domestication of technology in society with a particular focus on the societal consequences of technology domestication.

In this section, a model integrating many of the relevant findings from the uses and gratifications, adoption and media choice, and domestication traditions is presented and discussed with reference to multimedia messaging services. Relevant concepts are first explained and findings from the above mentioned research traditions are next integrated to develop hypotheses of the relative influence of each variable in the model on the intentions to adopt and use multimedia messaging services.

### **2.1 Model**

Research on the adoption and use of mobile services indicates that traditional adoption models dominated by instrumental motives for adoption need to be extended with attitudinal, social and situational control elements. It also suggests that motivational processes should be reconsidered when refocusing traditional ICT-adoption to the adoption of mobile services. Research also suggests adoption models differ across mobile services and segments. We suggest applying a re-specified and extended model based upon the theory of planned behavior (TPB) to explain the adoption of multimedia messaging services. In figure 2.1, the modified TPB-model is illustrated. We use this illustration as a basis for the presentation of model concepts and to discuss why the general TPB-model is extended and modified.

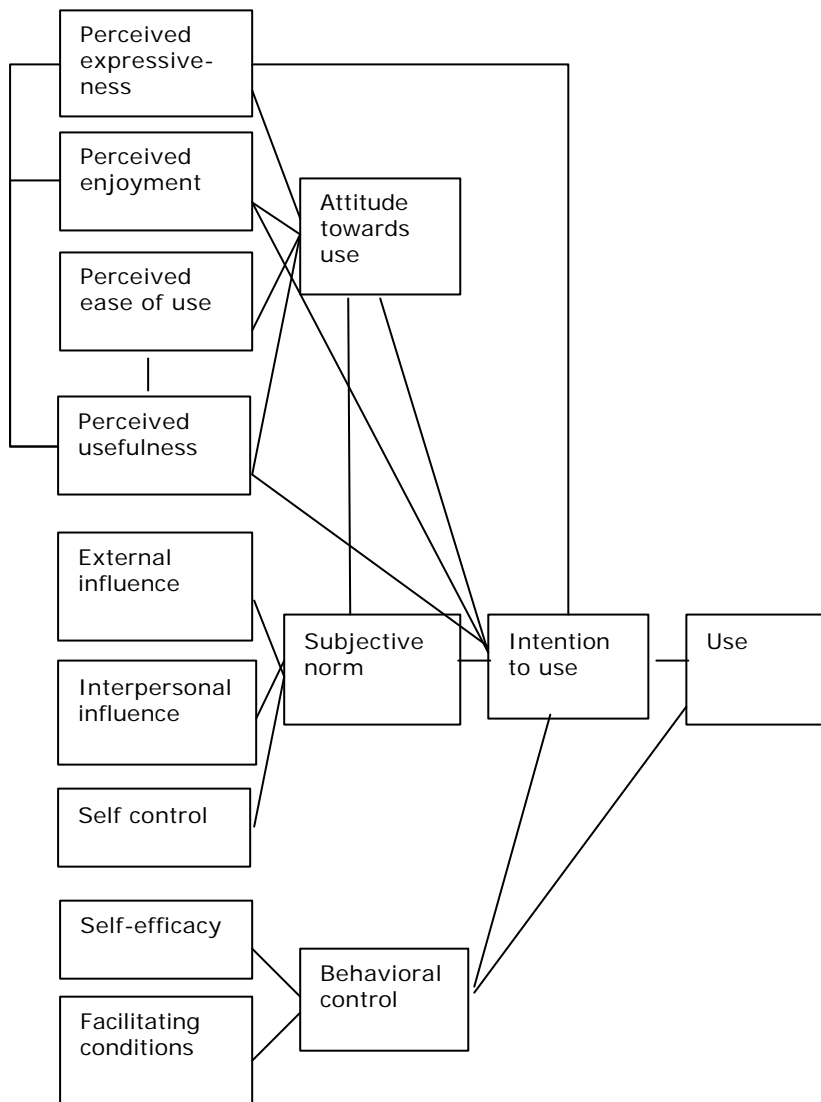


Figure 2.1 Proposed model of mobile service adoption

## 2.2 TAM and extended TAM concepts

When applying the TPB-based adoption model of figure 2.1 to study the adoption of mobile services, findings from the research directions reviewed above suggest modifications and extensions, and also provide a basis for proposing adoption model differences across service categories and user segments. Two issues are of relevance with respect to *ease of use* in the model. Because many early adopters of mobile services are expected to be younger, more skilled and more innovative, the higher competence of these users and their more exploratory and advanced use of service functionality suggest ease of use should have less influence in adoption models of new mobile data services. However, studies also report a more playful use of mobile phones among younger and innovative users and consequently, they are more focused on exploring the functionality of a service.

For example, the practice of personalizing the phone or service is typical among young users (Oksman and Rautiainen, 2001). This also indicates that younger and innovative users may perceive ease of use differently. For example, if personalization, filtering and adjustment of initial settings are not offered by an application or service, its user friendliness may be perceived as low. Studies have also indicated a relationship between digital capital and symbolic capital suggesting that services designed for young users should not be too easy to use (Taylor and Harper, 2001b) because then, no status would stem from being able to handle the device, application or service. This explanation may also generalize to innovative users. These findings indicate that even though ease of use in general is believed to be of little importance to mobile services (Ling, 2001b), it may be even less important to young and innovative users. The other issue is that of service differences in the importance of ease of use. For example, studies applying the perspective of "flow" and "telepresence" have shown that to provide intrinsic motivation, some services must represent a certain challenge to the user. Challenge positively influences flow through increased telepresence (Novak et al, 2000; Hunter and Kalafatis, 2001). This, implies that we might expect a negative effect of ease of use (challenge inversed) on perceived enjoyment for highly involved users and for services which are used for reasons of intrinsic motives. Multimedia messaging services are different from gaming services suggesting that "flow" and "telepresence" arguments of a reversed relationship between ease of use and usefulness are not that relevant. Supporting this suggestion is also the fact that currently multimedia messaging services suffers from a lack of interoperability and stability. Thus, we suggest that ease of use is important in the determination of perceived usefulness as well as attitudes towards use.

Perceived *usefulness* was originally seen as a fairly simple concept including components such as effectiveness and efficiency that are mainly related to extrinsic motivation in work contexts. Later, researchers have included elements of intrinsic motivation in the definition of both ease of use and usefulness (e.g. Thompson, Lim and Lai, 1999). However, intrinsic motivation has mainly been associated with ease of use and extrinsic motivations with usefulness. As seen from uses and gratifications studies, the extrinsic motivations of mobile services are not limited to effectiveness and efficiency. Motivations of accessibility, flexibility, sociability and security have all been mentioned in these studies. These motivations are not limited to mobile services, but are typical of many communication (as opposed to information) services. In addition, motivations of enjoyment, fashion,

and status, and expressiveness have all been mentioned. Some of these motivations are intrinsic, but other may perhaps best be characterized as derived, meaning that they provide an instrumentality or gratification that was not intended or anticipated during design, and that perhaps also was not considered or anticipated by the user at the time of the adoption (Pedersen, 2002, Pedersen et al., 2002, Anderson et al., 2002). For example, intrinsic motivations of enjoyment lead to skills which provide users with digital capital, which in some social networks increases both symbolic and social capital. Thus, the traditional usefulness concept should be modified and extended when trying to explain the adoption of mobile services, especially among young users.

First, traditional usefulness, such as efficiency and effectiveness may be less important in services designed for everyday life use. Thus, one is lead to the hypothesis that traditional extrinsic motivations are less important. However, extrinsic motivations identified in uses and gratifications research should be included in the usefulness concept. Thus, effectiveness and efficiency should be related to availability, flexibility and security, but these concepts may be interpreted as determinants of usefulness of a service or as components of usefulness. We find that by redefining and modifying the usefulness concept, these conceptions of usefulness may be included as components of usefulness. We see no need to replace the usefulness concept with more specific instrumentality concepts to cover the differences in extrinsic motivations of mobile and traditional (ICT) services, but suggest adapting the usefulness concept and its measurement to the context and functionality of the mobile service. Traditional elements of usefulness are proposed to be of little importance to young users' adoption of MMS. It may be argued that MMS will never be perceived as useful services among young users. However, our line of argument is based upon the fact that instrumentality of new media like MMS requires time to develop their genre. We have seen the same situation for SMS where young girls are now the innovators of this communication genre (Ling, 2003), but this has taken time to develop. Thus, we propose that currently, traditional usefulness is not influential in young users intention to adopt these services.

However, studies suggest that the usefulness concept should be extended and supplemented to cover the issues of intrinsic and derived motivations discussed above. For example, *enjoyment and entertainment* go beyond ease of use and usefulness, and are perceived as instrumental of services primarily designed for entertainment (mobile games, mobile video and audio streaming, chat and flirt services) (Leung and Wei, 1999a,b, 2000). The instrumentality of these services is enjoyment and

entertainment in itself, not the efficiency or effectiveness of being able to access mobile entertainment services ubiquitously. This indicates that enjoyment should be included in adoption models developed for users of mobile services as a separate concept contributing both to perceptions of usefulness, ease of use and attitudes towards use. Based upon recent approaches including emotions in ICT-adoption models (Venkatesh, 2000) and consistent findings in the uses and gratifications literature on the influence of enjoyment on the adoption of mobile services, we propose that enjoyment will be an important determinant of the adoption of multimedia messaging services.

*Attitudes* are generally believed to be the results of personal and social influences. However, in the technology acceptance model (TAM), attitudes towards use are determined by personal influences only. When including subjective norm in the model, it is possible to create a relationship between norms and attitudes that may be particularly relevant to young users' adoption of mobile services. However, it is also important to conceptually discriminate norms and attitudes in adoption models. Thus, we suggest accepting an influence of subjective norm on attitudes, but reject including influences of external and interpersonal influence on attitudes directly. We also suggest extending the determinants of attitudes towards use from purely instrumental determinants to intrinsic and derived determinants such as enjoyment and expressiveness as well. However, the attitude formation process is believed to be similar for usefulness, ease of use, enjoyment and expressiveness in that the individual sees a service as instrumental in fulfilling intrinsic, extrinsic and derived gratifications, and consequently develops a positive attitude towards using it. The relationship between attitudes and intentions may be different for different service categories. For example, for services that are widespread and well known, it is easy to obtain information on other users' experience and also to gain experience from actually using the service oneself. This indicates that for established services, instrumental and experiential motives are the most important explanations of user intentions. On the other hand, if services are new and unknown, intentions to use services may be based upon general attitudes and less on experientially derived motives. Thus, we expect that attitudes towards use will be influential in the adoption of multimedia messaging services.

### **2.3 Identity and expressiveness**

Identity as a determinant of micro and macro behavior has been given considerable attention in a wide range of disciplines such as personality and cognitive psychology (Markus, 1977), social

psychology (Abrams and Hogg, 1990), microsociology (Stryker, 1980), macrosociology (Mead, 1934, Giddens, 1991), political science (Wendt, 1994) and marketing (Belk, 1988). In particular, attention has been paid to the idea of individuals having a perception of self-identity, and that this perception of self-identity inhibits behavior believed to be incongruent with one's self-identity and stimulates behavior believed to be congruent with it. On the other hand, self-identity may also be determined by behavior, and thus, the status of self-identity as an explanatory concept is considered somewhat problematic. However a dyadic relationship with behavior is not limited to self-identity but is typical of many attitudinal concepts. The relationship between macro behavior and self-identity is often given a social interpretation based upon Mead's and Goffman's theories of the social construction of the self (Mead, 1934, Goffman, 1959), a structuration interpretation based upon Giddens's theories (Giddens, 1991), or a role and situation contingent personality interpretation (malleable self). In the first case, self-identity is the result of social identification, in the second case it is the results of the interaction of social identity and repeated actions maintaining a "personal biography", and in the final case it is a more rational frame of reference for behavioral decisions (action).

In a review of *perspectives* on self-identity, Reed (2002) suggests the self-concept has been viewed as the result of introspection, behavior, cognitive processes, social cognitive processes and social relationships. Some authors suggest the self-identity concept may be studied at different *levels of analysis* by investigating the personal, relational and collective self-concepts (Brewer and Gardner, 1996). Again, other authors distinguish between different *forms* of identity, typically personal versus social identity (Abdelal et al., 2001; Fearon, 2002).

*Identity theory* (Stryker, 1980, Stryker and Burke, 2000) assumes global identity is the result of multiple role identities organized hierarchically. Identity is related to behavior through identity salience – the "*likelihood that an identity will be invoked in diverse situations*" (Hogg et al, 1995, p. 257) and commitment to the role in which the identity is invoked. Thus, behavior depends on a situation invoking an identity and a commitment to the role representing that identity. *Social identity theory* (Abrams and Hogg, 1990) is more focused on social categories as the basis for one's identity, the processes of self-categorization, and interpersonal behavior explained through the process of self-categorization (e.g. in-group and out-group stereotypes and depersonalization of

self). It is less occupied with the motivational elements of identity as a concept explaining general behavior.

In *consumer behavior* self-identity has been used as an explanatory concept in self-congruity theory (Aaker, 1997) and by applying models based upon identity theory (Kleine et al., 1995, Laverie et al., 2002, Arnett et al., 2003). Self-congruity theory suggests consumer behavior is determined by congruence of invoked identity and the perceived personality of the product being consumed. Instead of explicitly specifying the invoked identity, identity and social identity theory based consumer behavior focus on the influence of identity importance and commitment on the consumption of products. The idea is that self-identity is a valuable explanatory concept even though the specific invoked behavior stimulating the observed behavior may not be known. For example, products may be consumed to express identity and the identity expressiveness of products may increase explanatory power even if we do not know the underlying self-identity being expressed (Belk, 1988). Congruity principles have also been applied in communication studies using the concept of self-construal. The idea is that the independent self-construal represents others independent of the self whereas the interdependent self-construal includes self in the representation of others. For example, men are presumed to generate independent self-construals whereas women are believed to generate interdependent self-construals (Cross and Madson, 1997). Thus, behavioral differences may be explained by different types of self-construals. Recently, self-construal research has been criticized for lack of validity (Levine et al., 2003). In CMC-research similar principles are applied for self-expressiveness. Expressiveness is compared to instrumentality as two styles of communication (Boneva, et al. 2001). Expressiveness is used of communication in relationships of emotional intimacy and sharing, while instrumentality is used of communication in relationships based on common activities. For example, Boneva et al. (2001) believe female communication to be more expressive, whereas male communication is believed to be more instrumental. Based on these assumptions, services that communicate expressiveness in this form are more likely to be appreciated by female users.

In information systems research surprisingly little attention has been paid to the concept of identity and self-identity. For example, structural approaches focus on the more general idea of adaptive structuration as an interaction of structure, social individuals and technology, rather than technology and structure as given. They focus less on the importance of self-identity as an

explanatory concept in this process (Giddens, 1991)<sup>1</sup>. Furthermore, in symbolic interactionist approaches the importance of symbolic use of technology and services has been focused. Concepts including “image”, “status”, “symbolic message carried by media channels” and “presentation management” have been used to explain how various media, systems and services may be used to provide an additional communication channel of symbolic value (Trevino et al, 2000). However, little attention has been paid to the concepts of identity and self-categorization that is typical of other structural interactionist approaches to behavior (Stryker, 1980). Finally, adoption studies have been adding concepts of subjective norm and perceived behavioral control inspired by developments in social psychology (Ajzen, 1991). However, recent trends in this literature demonstrating that identity related concepts add explanatory power to these models (e.g. Sparks and Guthrie, 1998) have so far been given little attention. The few examples of this line of research applying it to the adoption and use of technology are instead found in mainstream social psychology (e.g. Manetti et al, 2002).

A few exceptions are however found in the information systems literature. Manning (1996) investigated the use of mobile phones by police officers and suggested applying a dramaturgical approach. He found indications of countersymbolization (underuse of a technology due to symbolic effects), counterappropriation (secret or modified use) and counterdelegation (excessive reliance on a technology to provide delegation and coordination) as results of mobile phone use. Schlosser (2002) studied the use of handhelds in organizational contexts and used a framework of analysis consisting of four elements based upon self-identity confirmation and administration – imaged self, relational self, integrated self and isolated self. She found that adoption and use could be illuminated by these four elements of self-identity, but it is difficult to see from this ethnographic study that self-identity confirmation was the most important explanation of adoption and use because no attempts were made to compare alternative explanations. This is a practice found in most ethnographic studies applied to the use of mobile services. Unfortunately, no guarantee can be provided that the explanations (or illuminations) provided by these studies explain large proportions of variance in adoption and use behavior. Still, the study represents a relevant empirical study focusing on the importance of self-identity in the adoption and use of mobile services. The suggested framework also provides a suggestion for integrating self-concepts into an adoption framework where self-

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<sup>1</sup> For an exception, see Walsham, 1998.

identity, social identity, role integration and ideal identity elements are included. Handhelds has also been investigated in a recent study by Mennecke et al. (2003). An experiment was set up with the use of handhelds and paper by the presenter and with the presentation of a positive and negative story. Self-categorization theory was used to suggest that the positive story and the use of the handheld would interact to impose a positive impression of the presenter whereas the negative story and the handheld would interact to impose a negative impression of the presenter. These findings confirmed the hypotheses and are also consistent with similar findings by Walther in a series of studies of self-presentation and impression management when using electronic media (Walther, 1996).

In social psychology, recent contributions have suggested replacing self-identity as a determinant of intended behavior with self-expression (Mannetti et al., 2002). To get access to symbolic and social capital by using a service, a requirement is that it has some element of identity *expressiveness*. It should be possible to express style (in all Ling's (2001b) conceptions of style) using the service. In addition, many mobile services are communication services primarily, and thus, the extrinsic motivations for using the service are communication-related. In addition, the requirements of expressiveness suggested by domestication research also include using the communication service to communicate at several levels, to demonstrate participation in several networks maintaining different roles, and to share and collect prior communication sessions. These are all expressive elements of communication that originate in the derived motivations discussed above. When applying the term identity expressiveness here we focus the importance of behavior as something that may be interpreted by others in the social construction of identity and by oneself in the repeated self-construction of identity. Thus, identity expressiveness is a more operational concept applied to the use of technologies or services or the consumption of products and services that is important to both social identity and role-oriented self-identity. Consistent with this conception of expressiveness, consumer psychology characterizes value-expressive products as expressing the consumer's identity both in social networks and to oneself. We discuss some of these conceptions of expressiveness in section 3, but suggest that expressiveness in terms of both the social expression of identity and self-identification are important elements in the adoption and use of mobile services. Expressiveness influences usefulness and partly attitudes directly. For information services, identity expressiveness is an unanticipated service characteristic. Thus, we should expect that expressiveness is more relevant

when explaining the adoption of communication services than information services. The term expressiveness also includes elements of personal identity expressiveness not covered by the social conception of the term presented above. Personal identity expressiveness was suggested in domestication research as an important element in mobile services use particularly among young users (Taylor and Harper, 2001a,b; Pedersen and Nysveen, 2003; Ling, 2001b).

## **2.4 Social norm concepts**

Above, we have discussed one of the two aspects of *external influence*; the symbolic capital derived from style in all its conceptions. The other aspect is that of external influence on the development of subjective norms. The first aspect of external influence is how a user of mobile services uses these services to more or less consciously express style and increase symbolic capital. The second aspect is how external influence represents an external pressure on the user to develop a specific norm and consequently, show a specific behavior. The two aspects have also been characterized as the "reciprocal influences" of mobile phones by Alexander (2000). External influence also represents an important determinant of expectations, and may influence perceptions of instrumentality as well. However, as technology gets domesticated, expectations are replaced by the generalization of experiences, and for explaining the adoption and use of mature services, expectations are believed to be less important. For less domesticated services, however, expectations are more important, but in the adoption process, these expectations are also reflected in attitudes. Thus, the difference in the influence of attitudes on intention to use a service may be explained by expectations, but it is difficult to trace this particular influence in an adoption model. The second aspect of external influence, the determination of subjective norm, is believed to be particularly important to young users (Leung and Wei, 1999a, b; Ling, 2001b). Young users may be more affected by external influence because their subjective norms are developing and changing, they may be more exposed to the sources of external influence, such as general mass media, and they are more directly approached by persuasive advertising by terminal vendors and operators (Townsend, 2000). Thus, for services particularly focused at young users, we may find external influence more important than for other services. External influence may also differ by service category. Some services are mainly communicated using word-of-mouth mechanisms while the introduction of other services is accompanied by large advertising budgets of providers and operators.

*Interpersonal influence* has been suggested as important in explaining the adoption of communication technologies in CMC-studies, and in the adoption of mobile and messaging services in domestication research. However, there are issues of instrumentality that must be separated from issues of social influence in communication services. We have discussed issues of instrumentality related to the management of and access to social networks, and related to symbolic capital above. Interpersonal influence is the influence of others in developing norms that the use of a particular service is expected. In principle, this concept differs considerable from instrumentality. Almost all explanations in domestication research introduced above include elements of interpersonal influence. For example, the suggestion that some users are more subject to social influence because they are at a stage of social development and learning (Ling and Yttri, 2002), the suggestion that some users' social networks are more dynamic and thus exposed to influence than other users' (Oksman and Raitiainen, 2001), or the interaction between symbolic and social capital that makes instrumental motivations and social influence interrelated for communication services. Consequently, interpersonal influence is assumed to be more important when explaining the adoption of communication services and the adoption of services that is particularly directed at young users, but of less relevance to the adoption of services particularly directed at grown-up users.

Studies in domestication research have also focused on the importance of individuality and the relationship between individuality and social pressure as both a determinant and consequence of mobile service use (Fortunati, 1998; Skog, 2002). Thus, determinants of individuality and resistance to social pressure should be included as components or moderators of subjective norm. We suggest including the concept of *self-control* as an extension of the self-efficacy concept of TPB and as an additional determinant of subjective norm. While self-efficacy (related to adoption) is an individual's self-confidence in that adoption will lead to the desired behavior (Bandura, 1982), self-control is often believed to include self-efficacy, but also go beyond it (Rosenbaum, 1980). For example, self-control is related to time dependence when an individual chooses not to consume something today because the utility is believed to be higher from consuming the good at a later point in time. Self-control is traditionally considered the individuals ability to "*alter it's own states and responses*" (Baumeister, 2002). Self-control is believed to be affected by standards, monitoring and capacity to change. Even though these standards are typically believed to be desired emotional states, norms may also provide standards for behavior to control or exert. Monitoring may refer to self-monitoring

that has been investigated in consumer behavior research on self-congruence (Aaker, 1997). In some perspectives on self-control, self-centeredness is also believed to be a component (Grasmick et al., 1993), thus self-control is believed to be part of one's personality as well as something being monitored by self-awareness. In a study of mobile commerce service adoption (Pedersen, 2001) and a study of text messaging use (Pedersen, 2002), self-control was identified as an important determinant of subjective norm, improving the explained variance in subjective norm with approximately 10%. In addition, elements of self-control and individuality are included in many qualitative studies as particularly important when understanding mobile service use among young users. For example, Oksman and Rautiainen (2001) have shown how the mobile is used by parents as an instrument in the emancipation process of adolescent users. Simultaneously, it is used as a symbol of increasing individuality and self-control by young users. Thus, self-control is believed to be an important component or moderator of subjective norm, and its influence is likely to vary with the age of the user. In addition, self-control is most important as a moderator of subjective norm for services where interpersonal influence is believed to be the most important determinant.

*Subjective norms* are the norms developed through external and interpersonal influence. In general, Webster and Trevino (1995) suggest social influences, and thus, subjective norms to be more influential in explaining the adoption and use of new media. The question, however, is which services should be considered new media in the Norwegian market for mobile services. In an international setting, most mobile services may be considered new media, but in Scandinavia, many mobile services are now well integrated in the everyday lives at least of young users. Consequently, even though social motivations for adoption may be important, these motivations may by now be more instrumental than norm based, and should be identified through instrumental determinants of attitude toward use rather than through subjective norm. To give an example, young users may find text messaging instrumental in social coordination because all other members of their social network use it, but still feel little social pressure towards using text messaging services as a norm. However, some mobile services are still at an early stage of development and may be considered new media. One example is multimedia messaging services. Thus, subjective norm is generally believed to influence the intention to use multimedia messaging services, particularly among young users. In addition, our arguments for a difference in the influence of external and interpersonal sources of influence between communication and information services suggest subjective norm may be more important to

communication services than to information services regardless of the degree of service novelty. This argument suggests that the adoption of multimedia messaging services may be influenced by subjective norm also when these services are no longer considered new media services.

## **2.5 Behavioral control concepts**

As indicated above, *self-efficacy* in service adoption contexts is the individual's confidence in that adoption of a service will lead to the desired behavior (Bandura, 1982). However, self-efficacy is also relevant to self-identity. Self-efficacy is included as a component of self-esteem (Cast and Burke, 2002). While self-efficacy is the competence dimension of self-esteem, self-worth is the affective component. In many of the theories of self-identity, self-esteem is an important concept through the process of self-verification (Cast and Burke, 2002). For example, self-esteem is believed to function as a buffer for maintaining self-identity when self-verification is problematic. Thus, self-identity may be maintained for users seeing themselves as innovators in mobile service use even though self-efficacy is threatened due to lack of service facilitation or user friendliness. Furthermore, self-efficacy is related to user friendliness because ease of use may influence self-efficacy. Still, research has shown that for some users services must be challenging for self-efficacy to be influenced by services use as well (Novak et al., 2000). The determinants of self-efficacy are typically found in attributes of the individual adopter, such as experience, skills and education. Young and innovative users are generally believed to be among the more experienced and skillful users of these services (Ling, 2001c; Skog, 2002). For example, Oksman and Rautiainen (2001) found that adolescents found mobile phones to be a more controllable technology than PC's. Thus, one may expect that self-efficacy in general will be higher among young and innovative users than among other users in general, and thus, of less importance as a determinant of adoption. Self-efficacy will also be of more relevance to services that require skilled or experienced users. Accordingly, the influence of self-efficacy on behavioral control will be greater for services with some degree of complexity, services that require integration with a service infrastructure outside the providers' network, and services that includes challenge as an integrated part of its gratification. Thus, self-efficacy is believed to be particularly important to multimedia messaging services at their current state of development, lacking interoperability and network and terminal transparency.

In general, lack of *facilitation* is believed to reduce the perceived behavioral control of a service or technology. Examples of facilitation are price, service and terminal availability, support, roaming and interconnect, security issues and service compatibility. In general, these conditions are controlled by the facilitators (operators, service providers) and individual users (through their resources). For example, Carroll et al. (2002) mentioned the issue of hidden costs that appear after users' appropriation as a particularly important determinant of what they call disappropriation - that the users stop using a service after an initial adoption. Thus, behavioral control will be more influenced by facilitating conditions for services of greater complexity and for services requiring infrastructure integration. Also for services requiring new or specific terminal types, expensive services, and services with hidden costs, the influence of facilitating conditions on behavioral control will be greater. Consequently, we suggest facilitating conditions as an important determinant of behavioral control for multimedia messaging services.

The inclusion of *behavioral control* in TPB has been an important contributor to its explanatory power. In general, we have argued that the determinants of behavioral control are believed to be less important to young and innovative users than other users because of their experience and skill in using mobile services and the providers' facilitation of mobile services such as text messaging services to the young user segment. Financial resources and pricing, however, are indirectly believed to be important determinants of behavioral control due to both limited resources among young users and recent findings that these users are more price sensitive than previously assumed (Karlsen et al., 2001). Behavioral control is a general term composed of elements of individual traits and perceptions of operators' and providers' facilitation. It is also likely that the influence of behavioral control will vary across mobile services. In general, we have argued that the influence of self-efficacy on behavioral control is greatest for complex, new, integrated, expensive and terminal demanding services. The same may thus be argued of the influence of behavioral control on intention to use services. For example, the adoption of technically complex services, services requiring advanced terminals, services with hidden costs, and generally expensive services will be more influenced by behavioral control than simple and cost efficient services. On the other hand, behavioral control will be more relevant to the less skilled and price sensitive user than to the innovative and price insensitive users. Multimedia messaging services are now in an early stage of diffusion. However, their adoption is currently spreading to the early majority users rather than the innovative users.

Thus, we suggest behavioral control to be a very important determinant of multimedia messaging services.

### 3. METHOD

To estimate and test the proposed adoption model presented in section 2, a survey of potential multimedia messaging services users was designed. This survey was made possible through participating with three providers of mobile messaging services; Djuiice, Eurobate and Rabbit. Djuiice is a mobile portal subsidiary of Norwegian operator Telenor. Eurobate is a service provider of SMS and MMS services as well as mobile advertising services. Rabbit is a provider of branded mobile services for the publishing company Aller. In this section, the research design, procedures, sample and measures of the study are presented.

#### 3.1 Design, procedure and sample characteristics

The survey was designed as a simple one-group posttest design. Respondents were recruited at the MMS-services pages at the web sites of Djuiice, Eurobate and Rabbit. A set of buttons was designed to recruit respondents with an interest in or opinion on MMS-services. By clicking on the buttons, the respondents were given an introduction to the study and presented to a service context including the use of multimedia messaging services. All subjects were recruited during a period of 28 days in April and May 2003. A total of 1774 subjects clicked on the buttons to get to the study introduction. Of these subjects, 563 respondents completed the entire survey, giving a response rate of 31.7%.

After the context and purpose of the study was presented, the stimulus setting was introduced with the following statement: *"We now like you to focus on MMS-services (multimedia messaging services). By MMS-services we mean the sending or receiving of MMS-messages from other mobile users or MMS-services used to send pictures, sound and text as an MMS-message from a mobile content provider (e.g. TV2, djuiice, FINN, Rabbit). Please answer the questions based upon your own experience. If you have no experience, please answer the questions based on what you know or believe about MMS-services"*.

Of the 563 respondents completing the entire survey, 30 were eliminated due to careless response. Careless response was defined as using less than three minutes to answer the three pages of questions presented in the questionnaire. Thus, the final sample consisted of 533 complete

responses. Of these respondents, 39.2% were recruited from Djuice, 56.3% from Eurobate and 4.5% from Rabbit. Sample demographics of the respondents are shown in table 3.1.

Table 3.1 Sample demographics – multimedia messaging study

Age	N=525	Income (NOK)	N=514
0-19	43.4	<200'	66.1
20-29	39.8	200'-399'	26.7
30-39	11.6	400'-600'	6.4
40-49	3.4	>600'	0.8
50-59	1.7	Sex	N=508
60 and above	0.0	Male	65.6
Education	N=527	Female	34.4
Primary	21.8		
Secondary	46.3		
University <3	19.4		
University >=4	12.5		

From table 3.1, we see that the sample consists of more young and low income users than the general mobile user population. The sample also consists of more male users than the general mobile user population. However, the sample seems to represent the user population suggested by mobile operators, service providers and analysts to be early adopters of multimedia messaging services. Thus, as a basis for modeling the adoption of multimedia messaging services, the sample reflects groups of potential multimedia messaging users and as such is well suited for revealing the adoption process of these users. As further discussed in section 5, however, generalizing our model to the general population of mobile phone users is not advisable based upon this sample.

### 3.2 Measures

The model presented in section 2 includes 14 concepts: Ease of use, usefulness, expressiveness, enjoyment, attitudes towards use, external influence, interpersonal influence, subjective norm, self-control, self-efficacy, facilitating conditions, behavioral control, intention to use and actual use. Most of these concepts are well founded in adoption, uses and gratification, or domestication research literature. Consequently, the construct validity of these concepts is in general considered acceptable. To measure the concepts, a questionnaire was designed containing multiple measures of each of the 14 concepts. In general, the concepts were measured by the subjects indicating their agreement with a set of statements using a seven-point scale ranging from "strongly disagree" to "strongly agree".

Some concepts were measured using seven-point scales of bipolar adjectives. For each measure, the items were adapted to the multimedia messaging service context of the study. A copy of the online questionnaire is found in appendix A.

Of particular interest in this study was the measurement of identity expressiveness which in our previous studies was found to be of consistent influence to the adoption intention of mobile service users. For multimedia messaging services, expressiveness was believed to be of particular importance. In addition, the service context was considered particularly well suited to explore the dimensions of the identity expressiveness concept and its measurement. Thus, we first discuss the exploratory investigation of the expressiveness concept and next report the reliabilities and validity indicators for the rest of the 14 concepts measured.

The term expressiveness has been used in social psychology of individuals' general ability to express their emotions or identity. For example, in family relationship studies it is used as a measure of how well emotions are expressed by parents and children and how this influences family relationships (Cassidy et al., 1992). In research on identity formation and personality, it is used as a measure of the relationship between what a person believes about herself (what her potentialities are, see Schwartz et al., 2000, p. 507), and how she expresses herself, using the concept of "personality expressiveness" (Waterman, 1993). In this line of research, a person expresses herself through activities, and expressiveness is measured by subjects indicating how important these activities are in expressing their identity. In this study the particular activity we are focusing is the adoption of multimedia messaging services. Thus, all operations focus this activity.

In consumer research, the expressiveness concept has been extended from individuals to products indicating how well a product expresses values beyond instrumental utility (Mittal, 1994). Thus, value-expressive products are seen as expressing the consumer's identity. While the expressiveness concept in consumer research covers gratifications of prestige, fashion, pride and mood stimulation, it primarily focuses issues of how products are used to "express my personality" and are "compatible with how I like to think of myself" (Mittal, 1994, p. 258). Thus, an item measuring these conceptions of personality expressiveness has been included with the wording "Using mobile services like MMS is part of how I express my personality". In addition, expressive gratifications have been identified in uses and gratifications research. For example, Arnett (1995) included "identity formation" as a

particular gratification of young users, Leung (2001) included "express affection", "fashion" and "inclusion" as gratifications of ICQ-use, and Leung and Wei (1999b, 2000) included "fashion and status" as a gratification of both pager and mobile phone use. From these studies, a status-related expressiveness item was suggested with the identity expressiveness wording "Other people are often impressed by the way I use MMS". Studies of text messaging use have shown how one of the most important ways of expressing ones service use is to discuss the service with others and to share it with others (Larsson, 2000; Grinter and Eldridge, 2001; Kaseniemi and Rautiainen, 2002). Thus, two items referring to this particular form of expressiveness were included with the wording "I often show MMS messages and services to others" and "I often talk to others about MMS". Similar items, measuring the gratification of sharing technology use with others - social interaction, have been included in studies of video games as well (Sherry et al., 2001) and TV (Lee and Lee, 1995).

Arguments for including past history as an element of self-identity are generally found in Locke's theory of identity and suggest past history may be relevant in measuring identity expressiveness. For example, Markus (1977) proposed that "self-schemata are cognitive generalizations about the self, derived from past experiences, ..." (Markus, 1977, reprinted in Baumeister, 1999, p.124). Following this line of reasoning, an item with the wording "Mobile services like MMS has been part of my personality for a long time" was included.

Both the review by Fearon (2002) and theoretical studies of identity in consumer behavior (Belk, 1988) suggest pride as an important element in identity expressiveness. People take pride in being part of social groupings and in their possessions. Based upon these arguments, we suggested two items with the wording "I am proud of being able to use MMS" and "I am proud of having learnt how to use mobile services like MMS". The first of these items is directly related to pride whereas the second includes an element of interaction between past history and pride.

A group of studies have been investigating the expression of a particular self-identity, such as considering oneself as an ethical or environmentally oriented individual. This group of studies has shown that expressing personal values is part of self-expression. In these studies, self-expression is typically measured by subjects indicating the extent to which they consider themselves as identifying with and expressing these personal values. Similar operations have also been applied in studies applying identity theory (Stryker and Burke, 2000). In these studies, identity salience is the most

often applied concept typically measured applying the identity salience indicators developed by Callero (1985) (Fekadu and Kraft, 2001; Arnett, German and Hunt, 2003). In our study, we applied some of these to design the item “I use MMS to express my personal values”. Kleine and Kleine (2000) have focused on the communication of self-identity in consuming products but have still tried to avoid focusing on the self-identity as something that is only socially constructed. They suggested that a global self schema is constructed of ones individual identity schema, ideal identity schema and role schema. Whereas role schemas are socially constructed, ideal identity schemas are partly socially, historically and individually constructed, and individual identity schemas are mainly individually constructed. To capture these elements of ideal identity in self-identity expression, we suggested the item “I use MMS to express who I want to be”.

Papacharissi (2002) investigated personal motives for designing home pages on the web, and proposed self-expressiveness as an important motive. In his final measure of self expressiveness, two items were included with the wording “To tell others a little bit about myself” and “To provide personal information about myself”. While the last of these items focus instrumental motives like providing information, the first of the items was used as a basis for suggesting the item “MMS makes me express who I am to others” in our study. Jensen Schau and Muniz (2002) identified four dimensions of identity expression in online brand communities – subsumed identity, super member, community membership as identity component and multiple memberships. Based upon the third of these dimensions, we suggested the item “I use MMS to show others what group I am a member of”.

While identity expression is related to community or group membership and may contribute to enhanced self-esteem of group members through vicarious consumption (Belk, 1988), researchers have also shown that social identity expression through product consumption often is followed by the need to express ones self-identity as different from group member social identity by personalizing products and by consuming products that differentiate individual consumers from the products consumed by other group or community members (Fearon, 2002, p. 22; Veblen, 1899, Bordieu, 1984, Trigg, 2001). To reflect this dimension of self-expressiveness in product consumption we included the item “I use MMS in a way that makes me “stand out in the crowd”.

Thus, the 12 items used to measure identity expressiveness was developed based upon a conception of several underlying dimensions in the expressiveness concept, but mainly organized around personal identity related expressiveness, social identity related expressiveness and expressiveness as related to past history of behaviors. In an exploratory factor analysis of the 12 items, we would expect these dimensions to be reflected. However, exploratory factor analysis of the 12 items revealed a strong first factor with eigenvalue 7.3 explaining 61.0% of the variance in the items, a second factor with eigenvalue 1.0 explaining an additional 8.3%, and a third factor with eigenvalue 0.7 explaining an additional 5.8% of the variance. Thus the maximum number of factors suggested by the exploratory analysis was 2. However, the eigenvalue of the second factor also allows for a one factor implementation of expressiveness. We start with analyzing the two factor solution. In table 3.2 the factor loadings for the rotated solution with two factors is shown.

Table 3.2 Factor analysis of identity expressiveness items

Dim.	Item	Factor 1a	Factor 2a	Factor 1b	Factor 2b
1	I often talk to others about MMS (exp1)	0.404	0.731	0.411	0.757
1	I often show MMS messages and services to others (exp2)	0.133	0.867	0.134	0.882
1	Other people are often impressed by the way I use MMS (exp4)	0.401	0.792	0.343	0.814
1	MMS makes me express who I am to others (exp11)	0.681	0.574		
1	I use MMS to show others what group I am a member of (exp12)	0.620	0.480		
2	Using mobile services like MMS is part of how I express my personality((exp3)	0.750	0.320	0.801	0.363
2	I use MMS to express my personal values (exp5)	0.867	0.241	0.891	0.285
2	I use MMS to express who I want to be (exp6)	0.865	0.151	0.900	0.199
2	I use MMS in a way that makes me stand out in the crowd (exp8)	0.765	0.358		
3	I am proud of being able to use MMS (exp7)	0.703	0.404		
3	Mobile services like MMS has been part of my personality for a long time (exp9)	0.565	0.397		
3	I am proud of having learnt how to use mobile services like MMS (exp10)	0.645	0.481		

Factors indicated “1a” and “2a” represent the first factor analysis with all 12 items. If using the criteria of factor loading differences above 0.3, six of the items may be excluded from further analysis. Thus, we may retain six items and two underlying dimensions giving the factor loading pattern indicated in factors “1b” and “2b” in table 3.2. This pattern shows consistency in the factor loadings believed to represent the underlying dimensions of “social identity related expressiveness” and “personal identity related expressiveness”. Thus, we find little support for the proposed three factor underlying structure in the concept. Still, factor score differences are not sufficiently large indicating that further validation of the identity expressiveness items is required.

Another relevant issue in multidimensional concept measurement is convergence and discriminant validity. Measures may not be developed without reference to nomological structure. To investigate this structure, confirmatory factor analysis of all the items used to measure all nine concepts representing independent variables in our model was done. The results are documented in table 3.3.

Table 3.3 Factor analysis of all items included in independent variable measurement

Item	Fact. 1	Fact. 2	Fact. 3	Fact. 4	Fact. 5	Fact. 6	Fact. 4	Fact. 8	Fact. 9
Ease o. u. 1	0,05	0,15	0,84	0,08	0,26	0,07	0,08	0,01	0,04
Ease o. u. 2	0,15	0,06	0,84	0,16	0,08	0,08	0,21	-0,02	0,11
Ease o. u. 3	0,12	0,14	0,87	0,16	0,13	0,04	0,15	0,01	0,07
Ease o. u. 4	0,08	0,15	0,88	0,11	0,17	0,08	0,15	0,03	0,04
Usefulness 1	0,15	0,15	0,19	0,84	-0,01	0,12	0,11	0,05	0,05
Usefulness 1	0,15	0,17	0,19	0,87	0,06	0,05	0,13	0,05	0,01
Usefulness 1	0,20	0,23	0,09	0,77	0,10	0,13	0,04	0,03	0,12
Enjoy 1	0,19	0,83	0,16	0,15	0,17	0,13	0,18	0,02	0,03
Enjoy 1	0,28	0,79	0,16	0,18	0,12	0,08	0,17	0,06	0,06
Enjoy 1	0,26	0,84	0,12	0,18	0,05	0,12	0,13	0,11	0,04
Enjoy 1	0,23	0,83	0,15	0,18	0,16	0,10	0,18	0,03	0,04
I. express 1	0,52	0,36	-0,03	0,07	0,23	0,41	0,02	0,20	0,09
I. express 2	0,34	0,54	0,09	0,04	0,38	0,27	0,21	0,09	0,02
I. express 3	0,73	0,26	0,15	0,23	-0,03	0,17	0,05	0,02	0,10
I. express 4	0,59	0,31	0,00	-0,02	0,34	0,25	0,12	0,22	0,04
I. express 5	0,85	0,13	0,08	0,13	-0,05	0,12	0,01	0,10	0,06
I. express 6	0,80	0,09	0,08	0,12	-0,01	0,06	-0,02	0,13	0,08
I. express 7	0,76	0,18	0,10	0,13	0,11	0,15	0,06	0,07	-0,01
I. express 8	0,82	0,10	0,10	0,06	0,11	0,10	0,07	0,08	0,08
I. express 9	0,57	-0,01	0,10	0,14	0,32	0,25	0,08	0,09	0,08
I. express 10	0,72	0,19	0,09	0,13	0,14	0,19	0,13	0,05	0,03
I. express 11	0,74	0,26	0,02	-0,01	0,13	0,11	0,11	0,26	0,02
I. express 12	0,69	0,15	-0,04	-0,02	0,08	0,15	0,07	0,43	-0,01
E. infl. 1	0,12	0,04	0,14	0,06	0,01	0,13	0,00	0,06	0,88
E. infl. 2	0,10	0,06	0,05	0,08	-0,03	0,08	0,07	0,02	0,90
I. infl.1	0,36	0,15	0,10	0,15	0,06	0,74	0,11	0,09	0,07
I. infl. 2	0,46	0,17	0,14	0,11	0,08	0,72	0,06	0,16	0,13
I. infl. 3	0,42	0,20	0,11	0,13	0,01	0,68	0,09	0,11	0,18
S. control 1	0,37	0,08	0,01	0,09	0,02	0,10	0,08	0,86	0,05
S. control 2	0,35	0,08	0,01	0,06	0,10	0,17	0,08	0,85	0,05
Self-eff. 1	0,21	0,20	0,20	0,17	0,49	0,27	0,21	0,10	0,02
Self-eff. 2	0,14	0,18	0,29	0,02	0,80	-0,02	0,18	-0,01	-0,03
Self-eff. 3	0,13	0,20	0,33	0,02	0,79	0,01	0,21	0,08	-0,02
Fac. cond. 1	0,13	0,20	0,28	0,11	0,06	0,12	0,72	0,15	0,03
Fac. cond. 2	0,04	0,18	0,17	0,09	0,19	0,02	0,82	0,02	0,05
Fac. cond. 3	0,12	0,26	0,19	0,13	0,31	0,11	0,73	0,03	0,02

One conclusion that may be drawn from the analysis shown in table 3.3 is that the items retained in factor 2b of table 3.2 lack discriminant validity from interpersonal influence, enjoyment, and self-

efficacy. This is particularly problematic because these items also include many of the original items used in our previous studies of mobile chat, gaming, payment and parking services. However, in these studies, this lack of discriminant validity could not be identified. This may be due to service differences between our previously studied services and the extremely expressiveness of the new multimedia messaging services. It seemed that a more refined measure of identity expressiveness was required for multimedia messaging services. Thus, the items showing lack of discriminant validity in the identity expressiveness scale was removed. The convergence and discriminant validity of the refined measure can be inferred from the new confirmatory factor analysis shown in table 3.4.

Table 3.4. Confirmatory factor analysis of refined measures

Item	Fact. 1	Fact. 2	Fact. 3	Fact. 4	Fact. 5	Fact. 6	Fact. 4	Fact. 8	Fact. 9
Ease o. u. 1	0,01	0,84	0,14	0,09	0,09	0,09	0,26	0,01	0,04
Ease o. u. 2	0,13	0,84	0,08	0,15	0,09	0,21	0,11	-0,02	0,12
Ease o. u. 3	0,10	0,88	0,14	0,16	0,04	0,16	0,14	0,01	0,08
Ease o. u. 4	0,04	0,88	0,15	0,11	0,09	0,16	0,17	0,05	0,05
Usefulness 1	0,11	0,18	0,14	0,85	0,14	0,10	-0,01	0,06	0,04
Usefulness 1	0,12	0,19	0,16	0,88	0,06	0,13	0,04	0,06	0,01
Usefulness 1	0,17	0,08	0,23	0,76	0,15	0,06	0,10	0,05	0,13
Enjoy 1	0,15	0,15	0,85	0,14	0,15	0,18	0,20	0,03	0,03
Enjoy 1	0,23	0,16	0,81	0,17	0,12	0,18	0,15	0,08	0,07
Enjoy 1	0,21	0,12	0,85	0,18	0,14	0,13	0,07	0,12	0,04
Enjoy 1	0,16	0,15	0,85	0,17	0,13	0,18	0,18	0,05	0,04
I. express 3	0,75	0,14	0,24	0,23	0,24	0,06	0,05	0,03	0,12
I. express 5	0,86	0,08	0,14	0,14	0,21	0,02	0,03	0,13	0,07
I. express 6	0,84	0,07	0,09	0,13	0,14	-0,01	0,08	0,14	0,08
I. express 10	0,71	0,04	0,25	0,02	0,18	0,14	0,14	0,29	0,01
I. express 11	0,66	-0,03	0,14	0,01	0,20	0,09	0,10	0,46	-0,01
E. infl. 1	0,08	0,16	0,05	0,06	0,14	0,01	0,00	0,07	0,88
E. infl. 2	0,09	0,05	0,06	0,08	0,10	0,08	-0,02	0,03	0,90
I. infl.1	0,25	0,11	0,18	0,15	0,78	0,12	0,06	0,13	0,08
I. infl. 2	0,37	0,13	0,18	0,12	0,78	0,06	0,12	0,19	0,14
I. infl. 3	0,35	0,10	0,18	0,15	0,72	0,10	0,04	0,14	0,18
S. control 1	0,31	0,02	0,09	0,09	0,13	0,08	0,04	0,88	0,07
S. control 2	0,27	0,02	0,09	0,07	0,19	0,08	0,10	0,87	0,06
Self-eff. 1	0,15	0,19	0,18	0,19	0,29	0,21	0,52	0,13	0,03
Self-eff. 2	0,10	0,27	0,19	0,01	0,01	0,18	0,85	0,02	-0,02
Self-eff. 3	0,09	0,31	0,20	0,01	0,04	0,21	0,82	0,10	-0,01
Fac. cond. 1	0,07	0,28	0,20	0,12	0,15	0,72	0,05	0,16	0,04
Fac. cond. 2	0,04	0,17	0,18	0,08	0,01	0,82	0,20	0,01	0,05
Fac. cond. 3	0,07	0,19	0,24	0,13	0,12	0,74	0,31	0,06	0,02

From table 3.4 we now see that the convergence and discriminant validity of the identity expressiveness concept is satisfactory. Thus, expressiveness is found to be composed of the two dimensions of personal and social identity expressiveness, but in the nomological structure of our independent variables, these dimensions are best reflected by treating identity expressiveness as a one dimensional concept. To confirm this, exploratory factor analysis of the five identity expressiveness items extracts a first factor with eigenvalue 3.641. The next factor extracted has an eigenvalue as low as 0.609 confirming our assumptions. Finally, identity expressiveness in its final version was found highly reliable with  $\beta=0.90$ , whereas the reliability of the original version applied

in previous studies was  $\beta=0.84$ . From table 3.4 we see that the other variables also had acceptable discriminant validity.

Ease of use was measured using four items developed from adapting the original items of Davis et al. (1989) to our setting. Similar operations are found also in Taylor and Todd (1995) and in Battacherjee (2000). Usefulness was measured using three items covering the original dimensions of time saving, improvement, usefulness and quality suggested by Davis (1989). Attitude towards use was measured using four bipolar adjectives indicating different aspects of the subjects' attitude towards use. The items were very similar to those used by Davis (1989), Taylor and Todd (1995) and Battacherjee (2000). The enjoyment concept was defined as incorporating a group of gratifications identified in studies of the Internet as "enjoyment" (Pappacharissi and Rubin, 2000), of ICQ as "entertainment" (Leung, 2001), of mobile phones as "relaxation" (Leung and Wei, 2000), of pagers as "fun-seeking" (Leung and Wei, 1999b), and of text messaging as "nutz-spaz" (Höfflich and Rössler, 2001). To cover these elements of enjoyment, a four item scale was developed collecting items from uses and gratification scales. The first of the item covered the "entertainment" conception, the second the "relaxation" conception, the third item covered the "excitement" conception also found in studies of video-game and TV-gratifications (Sherry et al., 2001). The final item was a general item covering the "fun-seeking" gratification. The wording of each item was adapted from uses and gratifications studies.

The measure of external influence was based on two sources of influence - media and society or profession. Thus, it includes the measures used by Battacherjee (2000) and Taylor and Todd (1995). The measure of interpersonal influence was based on Battacherjee's (2000) extension of the measures used by Taylor and Todd (1995), and adapted to our setting. Our norm-based interpretation of self-control is believed to be a component of or moderator of subjective norm. Self-control was measured by items reflecting indirect indicators of self-control, such as resisting group pressure, superior influence and group conformity. The items were mainly based upon a subsection of the self-control measure suggested by Rosenbaum (1980). The measure does not capture the whole range of the self-control components as defined by Rosenbaum (1980), but includes some of the social norm related items from these more complex self-control scales. Subjective norm was measured using three items almost identical to the items used by Mathieson (1991) and Battacherjee (2000), but adapted to our setting. A somewhat simpler version of the

measure was used by Venkatesh and Davis (2000). The measure of self-efficacy was based on the items used by Battacherjee (2000) and Taylor and Todd (1995), again adapted to our contexts. The measure also corresponded well to the extended *user* resources part of the "resources" scale of Mathieson et al. (2001). The convergence validity of the self-efficacy scale may be questioned because the factor loading of one item was below the suggested 0.7 criteria suggested by e.g. Agarwal and Karahanna (2000) (see Fornell and Larker, 1981). However, the reliability of the scale was considered acceptable and we chose to retain all self-efficacy items. The measure of facilitating conditions was based on the same sources as the self-efficacy measure. It included specific items related to the infrastructure of mobile services and the facilitation of service usage by the user's provider or operator. The measure of behavioral control was almost identical to the measure applied by Battacherjee (2000) and Taylor and Todd (1995).

Intention to use was measured with a two item scale adapted from Battacherjee (2000) and Mathieson (1991). Actual use was also measured using a psychometric measure consisting of three items. A summary of the reliability of our final measures is shown in table 3.5. This table shows acceptable reliability for all variables except for behavioral control if using the criteria of  $\beta$  above 0.75 (Nunnally, 1978). Because the measure had shown acceptable reliability in previous studies and because the deviance from the 0.75 criteria was so small, we choose to retain the original measure of behavioral control as well.

Table 3.5 Measure reliabilities (\* indicates refined concepts)

Variable / Study	Average previous studies	MMS original	MMS refined (final)
1. Ease of use	0.95	0.93	0.93
2. Usefulness	0.89	0.85	0.87*
3. Expressiveness	0.85	0.84	0.90*
4. Enjoyment	0.96	0.94	0.94
5. Attitude	0.93	0.86	0.86
6. External influence	0.75	0.80	0.80
7. Interpersonal influence	0.85	0.88	0.88
8. Self-control	0.87	0.92	0.92
9. Subjective norm	0.85	0.85	0.85
10. Self-efficacy	0.84	0.81	0.81
11. Facilitating conditions	0.81	0.80	0.82*
12. Behavioral control	0.78	0.73	0.73
13. Intention to use	0.91	0.86	0.86
14. Use	0.92	0.89	0.89

For descriptive analysis all variables were calculated as additive scales. To help interpretation of the variables, they were scaled to the 7-point scales used in the original items. The means, standard deviations and correlation matrix of the final variables are shown in table 3.6. Statistics of the variables using to the operations applied in previous studies are shown in parentheses.

Table 3.6 Means, standard deviations and correlation matrix

Measure / Study	N	Mean	St. dev
1. Ease of use	519	5.06	1.41
2. Usefulness	526	4.53(4.39)	1.44(1.38)
3. Enjoyment	524	4.94	1.65
4. Expressiveness	527	2.71(3.36)	1.53(1.66)
5. Attitude	516	4.98	1.35
6. External influence	525	4.40	1.69
7. Interpersonal influence	531	3.00	1.67
8. Self-control	531	2.80	1.73
9. Subjective norm	517	2.52	1.55
10. Self-efficacy	527	5.14	1.78
11. Facilitating conditions	525	4.62(4.64)	1.48(1.42)
12. Behavioral control	528	5.19	1.51
13. Intention to use	530	4.27	1.94
14. Use	527	2.99	1.77

Var.	1	2	3	4	5	6	7	8	9	10	11	12	13
1.EoU													
2.Usef.	0.38												
3.Enj.	0.39	0.45											
4.Exp.	0.23	0.37	0.49										
5.Att.	0.40	0.54	0.58	0.45									
6.Ei.	0.24	0.22	0.18	0.21	0.19								
7.I.i.	0.31	0.42	0.49	0.66	0.46	0.33							
8.S.c.	0.12	0.22	0.29	0.59	0.28	0.18	0.48						
9.S.n.	0.14	0.27	0.28	0.57	0.28	0.18	0.58	0.47					
10.S.e.	0.52	0.20	0.45	0.27	0.31	0.07	0.27	0.19	0.19				
11.Fac.	0.48	0.34	0.50	0.28	0.39	0.18	0.35	0.26	0.26	0.50			
12.B.c.	0.40	0.21	0.38	0.22	0.28	0.13	0.31	0.11	0.14	0.55	0.56		
13.Int.	0.31	0.36	0.56	0.49	0.46	0.12	0.51	0.33	0.41	0.48	0.58	0.48	
14.Use	0.29	0.38	0.52	0.66	0.43	0.17	0.62	0.48	0.49	0.39	0.43	0.32	0.63

All coefficient are significant at the  $p < 0.01$  level.

All our traditional measures are based upon previously validated measures (Venkatesh and Morris, 2000), and their reliabilities were considered acceptable. Discriminant and convergence validity were also shown to be acceptable in the analysis of the identity expressiveness items shown in table 3.4.

A final validity element in structural equation models is that the indicators are reflective (Chin, 1998). Reflective items are “viewed as affected by the same underlying concept” whereas formative items are “measures that form or cause the creation or change” in the latent variables (Chin, 1998, p. ix). The traditional way of discriminating reflective from formative items is that they are believed to correlate with variance in the underlying concept. Chin (1998, p. ix) suggests asking the following acid test to ensure reflective items: “*Is it necessarily true that if one of the items (assuming all coded in the same direction) were to suddenly change in a particular direction, the others would change in a similar manner?*”. When applying this acid test to our items, we conclude that all our items are reflective. Furthermore, all our latent variables include measured items. Consequently, all variables may be modeled as first order factors. Thus, based upon our investigation of sample characteristics, reliabilities and internal consistency, construct, discriminant and convergence validity as well as the acid test of reflective items, we conclude that our variables may be used for further model estimation using structural equations modeling (SEM).

## **4. RESULTS**

In this section, we present the results of the multimedia messaging study applying the model introduced in section 2. However, the study also provides detailed descriptive results on the individual concepts of the model. Thus, descriptive results are presented in section 4.1. In section 4.2 we present the results of the model estimations. In section 4.3, we compare the results of the multimedia messaging study with results obtained in five previous studies of regular text messaging, mobile chat, mobile gaming, mobile payment services and mobile parking services.

### **4.1 Descriptive results**

In the survey, 14 model independent, endogenous and dependent variables, innovativeness, and four demographic variables were measured. In table 3.6, means and standard deviations of the 14 model variables are shown. From table 3.6, we see that when comparing the variables in the motivational process, multimedia messaging services are generally perceived as easy to use, somewhat useful, somewhat expressive and enjoyable. These findings are rather consistent with expectations, but it is difficult to interpret these statistics without reference to data on how other mobile services are perceived. A comparison with five other mobile services is found in section 4.3. Attitudes towards use are rather positive. For social variables, people perceive the external influence as strong whereas interpersonal influence and general subjective norms are not perceived as particularly strong. The self-control variable is a reversed variable, so these users self-control is relatively high. However, this may not be interpreted as if social norms are not influential in the adoption process because these statistics only reflect the absolute level of these variables and not how they influence adoption and use. The high means on self-efficacy and behavioral control indicate that subjects feel they have the necessary skills and resources to adopt multimedia messaging services. On the other hand, the mean of facilitating conditions is low suggesting this variable should be investigated further. In table 4.1, we find the means and standard deviations of all the original facilitating conditions items.

Table 4.1 Facilitating conditions

Item	N	Mean	Std. dev.	Mean Texting
I have the necessary financial resources required to use MMS	533	4,64	2,08	5,12**
I have the necessary technological resources required to use MMS	532	4,69	2,25	5,03**
MMS services are reliable and technically well functioning	529	4,16	1,65	4,63**
My provider/operator facilitates the use of MMS	527	4,89	1,76	4,61**
MMS services are well integrated with the other mobile services I use	531	4,81	1,77	4,68

\*\* indicates significance of F-test using ANOVA at  $p < 0.01$

From table 4.1, we see that facilitation is generally perceived as acceptable, but when comparing these means to the means found in our study of regular text messaging, we see that the differences are large and significant for all items except for the degree of integration with currently used services. Thus, because the samples used in the text messaging study and the multimedia messaging services are very similar we may conclude that users perceive regular text messaging as much better facilitated than multimedia messaging services. Consequently, facilitation is a matter that needs to be resolved by operators, service providers and handset suppliers. Finally, we see that the intention to use multimedia messaging services is high but that current use is low. This is as could be expected from new media services like MMS.

Differences between segments in these variables may also be of relevance to understanding the process and requirements of multimedia messaging services adoption. In table 4.2 F-values and t-values, and their corresponding significances are shown for the demographic variables of all 15 variables studied.

Table 4.2 Analysis of variance and regression analysis results (original variables in parentheses)

Variables	Sex (F)	Age (t)	Education (t)	Income (t)
Ease of use	1.1	-0.9	-1.0	0.8
Usefulness	0.7 (0.5)	0.0 (-0.3)	-1.9 (-2,2*)	-0.3 (-0.2)
Expressiveness	6.4* (8.6**)	-1.9* (-2.6**)	-2.8**(-3.8**)	-0.3 (1.0)
Enjoyment	1.7	-3.2**	-4.1**	-0.4
Attitude	0.0	-2.2*	-3.4**	-1.0
External influence	3.5	-1.6	-1.3	-3.3**
Interpersonal influence	2.5	-1.2	-4.0**	0.3
Subjective norm	6.6*	2.6**	0.4	3.1**
Self-control	12.5**	-2.3*	-2.4*	-0.5
Self-efficacy	31.0**	-1.8	-0.2	2.0*
Facilitating conditions	5.9* (23.0**)	-0.9 (1.2)	-1.3 (0.5)	1.9 (5.1**)
Behavioral control	7.6**	0.2	-0.2	1.7
Intention to use	14.0**	0.8	-0.6	4.7**
Use	2.7	-1.5	-3.1**	1.7
Innovativeness	21.5**	0.1	-0.4	3.9**

Note: \*\* and \* indicate significance at  $p < 0.01$  and  $p < 0.05$  respectively

The results of table 4.2 should be interpreted with care because our sample appears representative of potential multimedia messaging services users but it is by no means representative of the general mobile services user population. Still, the results are interesting. From table 4.2 we see that there are significant differences in perceptions between male and female users for expressiveness, subjective norm, self-control, self-efficacy, facilitating conditions, behavioral control intention to use and innovativeness. The differences in self control and innovativeness are as in our previous studies with lower perceived self-control and innovativeness by female users. All the other significant differences are in the same direction with female users perceiving MMS as significantly less expressive, feel less influences by subjective norms, perceive lower self-efficacy and behavioral control, perceive MMS as less well facilitated and have a lower intention to use these services. This is very different from our findings in the study of regular text messaging. In this study female users perceived text messaging services as significantly *more* easy to use, useful, enjoyable and expressive than male users. Furthermore, female users both use and intend to use text messaging services more than male users, whereas the opposite is found for multimedia messaging services. There are some differences in the two samples used in the two studies, but still, the results are surprising. It may be interpreted as a general innovativeness and new services difference because text messaging services were mature at

the time of our study whereas multimedia messaging services are still immature and new services. This may indicate that male and female users change their perceptions of messaging services at a different pace. While male users are innovative, positive and feel new messaging services as enjoying and expressive, female users adopt these perceptions slowly whereas male (innovative) users tend to lose their positive perceptions as the services become mature. Despite the sample and maturation differences, these findings are important because they suggest different actions should be taken to market the services to male and female users and that much facilitation and training is required to obtain widespread adoption of multimedia messaging services among female users.

For age we find significant  $t$ -values for expressiveness, enjoyment, attitudes, subjective norm and self-control. The first four of the variables are of relevance here. They indicate that older users find the services less expressive and enjoyable and are less positive towards the services. Particularly surprising is that subjective norm increases with age whereas the direction is the opposite (even though not significant) for the components of subjective norm. This indicates serious problems in the construct validity of the subjective norm concept as it is currently being used in adoption research. Here, it should be interpreted as in older users perceiving that it is expected of them to use this kind of services even though their friends and media do not represent any increasing pressure on them to use it with increasing age. This may best be interpreted as influences on subjective norms changing with age. In particular it seems that the effects of interpersonal influence changes with age. Since subjective norm increases with age even though interpersonal influence is perceived as reduced by age this should mean that the effect of interpersonal influence on subjective norm must increase by age. This may be further investigated in a hierarchical regression analysis of the relationship between interpersonal influence, age and subjective norm. This is sufficient because external influence does not significantly affect subjective norm. The results are illustrated in table 4.3.

Table 4.3 Hierarchical regression analysis of subjective norm

Dependent variable	Independent variables	d.f.	R <sup>2</sup>	? R <sup>2</sup>	B	SE B	β
Subjective norm	Interpersonal influence	513	33.6	-	0.54	0.03	0.58**
Subjective norm	Interpersonal influence Age	504	35.5	1.9	0.54 0.25	0.03 0.06	0.59** 0.14**
Subjective norm	Interpersonal influence Age Interpersonal influence * Age	503	36.6	1.1	0.54 -0.13 0.12	0.08 0.14 0.04	0.56** -0.09 0.32**

From table 4.3 we find that when the interaction of age and interpersonal influence is added, the main effect of age is no longer significant. Thus, rather than a main effect of age, there is a moderating effect of age on the relationship between interpersonal influence and subjective norm. This effect is illustrated in table 4.4.

Table 4.4 Mean subjective norm by interpersonal influence and age

Variables	Values	Interpersonal influence	
		Low	High
Age	Low	1.94	3.25
	High	1.85	3.66

From table 4.4 we see that interpersonal influence affects subjective norm but that this influence is far greater in the high age group. However, this finding should be interpreted with care because most of our subjects are in the 0-29 years old categories.

For the education variable we find that perceived expressiveness, enjoyment and attitudes towards use is reduced with education. We also find that interpersonal influence is reduced with education and that self-control is increasing. Finally, we see that use is decreasing with education. None of these findings is particularly surprising. For the income variable we see that none of the motivational variables are influenced by income. However, the high income subjects feel less influenced by media

and professional sources but generally perceive stronger subjective norms. Thus, the situation is somewhat similar to the situation for interpersonal influence, subjective norm and age. However, when doing hierarchical regression analysis we find that the interaction of external influence and income is the only significant variable. Thus the model is non-compensatory indicating that the combination of high income and external influence is what increases subjective norm. We also see that when including financial elements in facilitating conditions, perceived facilitating conditions increase with income. Finally, intention to use MMS increases with income even though current use does not. As expected the high income subjects perceive themselves as more innovative.

The main conclusion that can be drawn from this analysis is that multimedia messaging services certainly is a segment dependent service. Thus, the likelihood of adoption will vary across segments as well as the successful services and service marketing strategies. Still, these conclusions should be interpreted with care due to the particular demographics of our sample.

#### **4.2 Model results**

Using the data from the parking services study, the adoption model of section 2 was estimated using structural equations modeling. The general requirements for applying structural equations modeling have been discussed in section 3 concluding that our data allows this form of modeling. Amos 4.01 was used for all SEM analyses. The results from estimating the basic model of section 2 are shown in the adoption model for multimedia messaging services illustrated in figure 4.1. Fit indexes are shown in the square on the right hand side of the figure. In each of the ovals, explained variance is indicated by  $R^2$  in percentages for each concept. Along all paths, standardized regression coefficients are shown and the corresponding levels of significance are indicated.

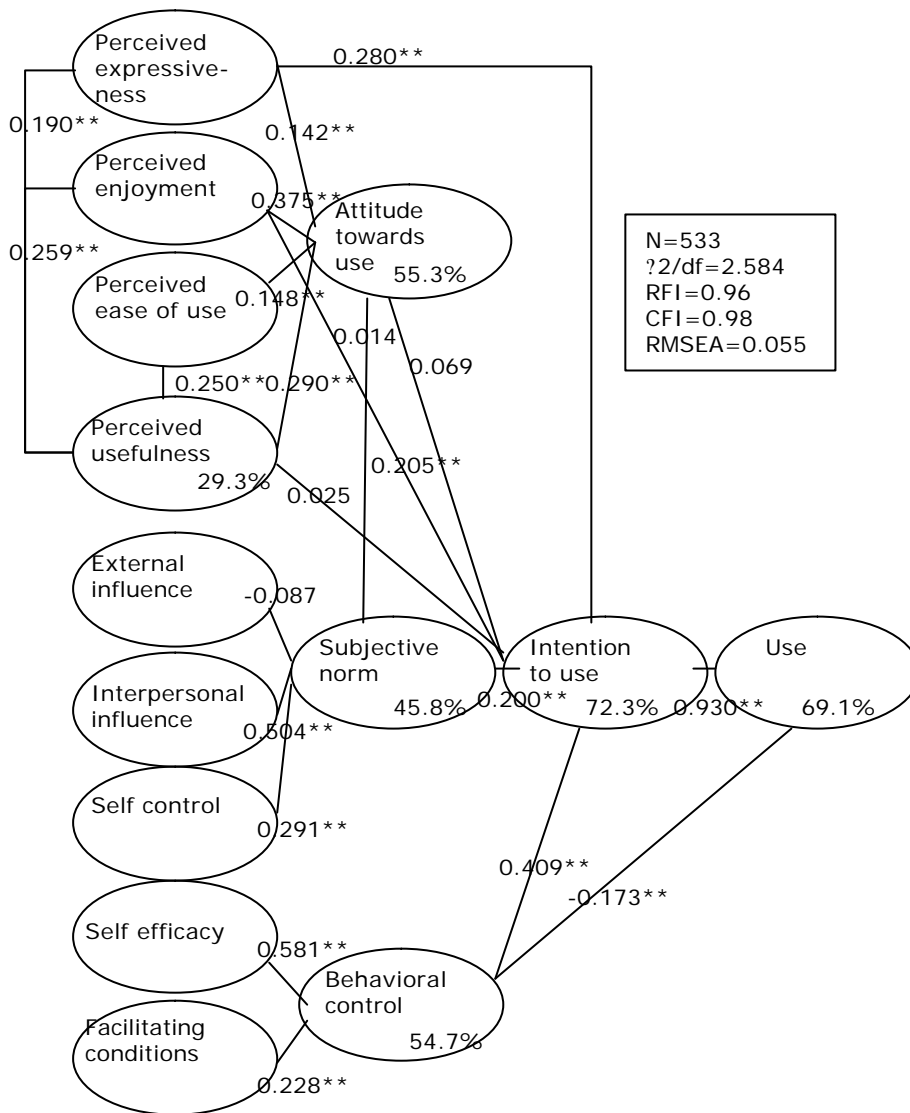


Figure 4.1 Adoption model of multimedia messaging services [(\*) and (\*\*) indicate significance at  $p < 0.05$  and  $p < 0.01$ ]

From figure 4.1, we see that model fit is very good when evaluated by all fit indexes<sup>2</sup>. The model explains 72.3% of the variance in intention to use multimedia messaging services and 69.1% in self reported perceived actual use. This is generally considered a large proportion of the variance, so the explanatory power of the model is very good.

<sup>2</sup> We generally employ parsimony adjusted measures of fit only. According to Browne and Cudeck, cited in Arbuckle and Wothke (1999), a RMSEA less than 0.08 is acceptable. According to Bentler, cited in Battacherjee (2000),  $\chi^2/df$  should be less than 5, preferably less than 2, and all other indexes should be close to 1 (Taylor and Todd, 1995). In general, we apply the rules of  $\chi^2/df \leq 2$  or better,  $RMSEA < 0.08$  and all other indexes  $\sim 1$ .

When investigating model relationships, we first see that intention to use multimedia messaging services is explained by two direct effects of enjoyment and expressiveness and not by the direct motivational and attitudinal effects of usefulness and attitudes towards use. Thus, we conclude that the motivational concepts traditionally included in the technology acceptance model explaining the adoption of traditional ICT services are insufficient when explaining the intention to adopt mobile services of this kind. When removing identity expressiveness from the model, explained variance in intention to use is reduced by 6.3%, attitudes towards use by 0.7% and usefulness by 2.5%. Thus, expressiveness is an important concept significantly contributing to the explanatory power of our model, but it is the direct effects of expressiveness on intentions that are most significantly contributing to the explanatory power. When further removing the intrinsic motivations of enjoyment, the explained variance in intention to use is further reduced by 5.9%, attitudes towards use by 13.2% and usefulness by 9.9%. Thus, we also conclude that enjoyment is an important explanatory factor in our model. Enjoyment contributes significantly to the explained variance in intention to use, attitudes and usefulness. These findings are consistent with our propositions in section 2, except for attitudes towards use. Even though subjects had little direct experience with multimedia messaging services at the time of the study, attitudes towards use did not significantly influence intention to adopt the services.

The model explains 55.3% of the variance in attitudes towards use. Attitudes are significantly affected by expressiveness and enjoyment as well as by the traditional variables of the technology acceptance model – usefulness and ease of use. The model only explains 29.3% of the variance in usefulness. Usefulness is affected by expressiveness, enjoyment and ease of use. The low explained variance indicates that even though the items were adapted to our context and services, there are components of perceived usefulness of multimedia messaging services that are not captured by the traditional usefulness items. This calls for further exploration of the usefulness concept when studying mobile services.

Subjective norm also contributes significantly to the explained variance of the model. When removing subjective norm from the model, explained variance in intention to use multimedia messaging services is reduced by 5.0%. Subjective norm is affected by interpersonal influence and self control only. These findings indicate that interpersonal influence is important in forming the

subjective norms perceived by MMS adopters. Consistent with our propositions of section 2, norms are an important element in the adoption of new services like multimedia messaging services.

Finally, behavioral control also contributed to the explained variance in intention to use multimedia messaging services. When removing behavioral control from the model, explained variance in intentions are reduced by 17.2%. Thus, behavioral control is one of the most influential variables in our model. Behavioral control is affected by both self-efficacy and facilitating conditions, but the difference in level of significance and relative values of the standardized coefficients indicate that self-efficacy is most influential. As in previous studies of mobile services a remarkable relationship is identified between intentions to use, self reported actual use and behavioral control. While behavioral control affects intentions of future use positively it affects self reported current use negatively. However, when removing the relationship between behavioral control and intentions, the path coefficient between behavioral control and actual use becomes positive, but not significant. Thus, there are interactions of intentions, actual use and behavioral control suggesting a moderating relationship rather than a direct effect on actual use. This is revealed in a hierarchical regression analysis showing that behavioral control significantly affects actual use alone, but when adding intentions to the model, the main effect of behavioral control on actual use is lost. However, when including an interaction term of behavioral control and intentions, all coefficients are significant. This is shown in table 4.5.

Table 4.5 Regression analysis of behavioral control, intentions and actual use

Dependent variable	Independent variables	d.f.	R <sup>2</sup>	? R <sup>2</sup>	B	SE B	β
Actual use	Intentions	515	40.8		0.23	0.43	0.1.97*
	Behavioral Control			0.0	-0.18	0.09	-0.16*
	Intentions * Behavioral Control			1.0	0.06	0.02	0.43**

\* and \*\* indicate significant at  $p < 0.05$  and  $p < 0.01$  respectively. ? R<sup>2</sup> indicates additional explained variance from including variables hierarchically.

From table 4.5 we see that the effect of the interaction between behavioral control and intentions on actual use is positive. Thus, the relationship between intentions and actual use is stronger for those with high behavioral control than the other users. This also means that for people with high

behavioral control intention is a better predictor of actual use than for users with low behavioral control. The other element is that the main effect of behavioral control is negative indicating that controlled for the interaction, high behavioral control also reduces the expected actual use given a specific level of intentions. This is not so surprising given that these subjects exert high behavioral control.

From the analyses of section 4.1, we found indications that interesting sub-sample model differences were to be expected. For example, for many of the variables there were differences between male and female users and users of different age, education and income. These differences may also lead to adoption model segment differences. To simplify the analysis of segment differences, a table of the motivational, attitudinal, social and situational control processes may be set up. In table 4.4 and 4.5, these processes are illustrated for all the four relevant segment categorizations.

Table 4.6 Influences on intention to use across segments

Influence	Motivational			Attitudinal	Social	Control
	Express-iveness	Enjoyment	Usefulness	Attitudes	Norm	Behavioral control
Male	++	++	0	0	++	++
Female	++	+	0	0	+	++
High age	++	++	0	0	++	++
Low age	++	0	0	0	+	++
High ed.	++	++	0	0	++	++
Low ed.	++	++	0	0	++	++
High inc.	++	++	0	0	++	++
Low inc.	++	+	0	0	++	++

(+) and (++) indicate significance at  $p < 0.05$  and  $p < 0.01$

Table 4.7. Adoption model sub-processes of segments

Process	Usefulness determination			Attitudinal process			
	Express-iveness	Enjoy-ment	Ease of use	Express-iveness	Enjoy-ment	Ease of use	Useful-ness
Male	++	++	++	++	++	++	++
Female	0	++	++	0	++	0	++
High age	+	++	++	++	++	+	++
Low age	++	++	++	0	++	+	+
High ed.	0	++	+	++	++	0	++
Low ed.	++	++	++	0	++	++	++
High inc.	0	++	+	++	++	0	++
Low inc.	++	++	++	0	++	++	++
	Norm process			Control process			
	External influence	Interpers. influence	Self-control	Self-efficacy		Facilitating conditions	
Male	0	++	++	++		++	
Female	0	++	++	++		++	
High age	0	++	+	++		++	
Low age	0	++	++	++		++	
High ed.	+	++	0	++		0	
Low ed.	0	++	++	++		++	
High inc.	0	++	0	++		++	
Low inc.	0	++	++	++		++	

(+) and (++) indicate significance at  $p < 0.05$  and  $p < 0.01$

All the models illustrated in tables 4.6 and 4.7 showed acceptable fit and high explanatory power. The analyses of age, education and income are based on a median sample split. From table 4.6 and 4.7 we see that there are few differences in the part of the model explaining intentions to use MMS between male and female users. Thus, even though male and female users perceive multimedia messaging services differently, the intentions to use them are explained by the same mechanisms. Thus, the difference in intention to use MMS between male and female users is a matter of perceived levels rather than differences in motivational mechanisms. For the other processes we find no differences in formations of subjective norms and behavioral control. There are some differences in the formation of usefulness and attitudes towards use but these differences are of less relevance because none of these variables significantly influences intention to use these services.

For the two age categories we identify a difference in the influence of enjoyment that is not significant in the young user category. The rest of the influences on intentions are similar for old and young

users. For usefulness determination we find no differences, but for attitude formation we find a difference in the influence of expressiveness. No differences are found for the norm and control processes. For the high and low education categories we find no differences in the processes affecting intention to use multimedia messaging services. For usefulness determination and attitude formation there are some differences but it is not easy to interpret these differences. For example, expressiveness is not significant in the usefulness determination of users with high education but expressiveness is influential in the attitude process of these subjects and vice versa for low education users. The recursive nature of the model makes this difficult to interpret particularly because these variables have no further relevance in the explanation of intentions. More important is the lower influence of self control and facilitating conditions for the high education group. Particularly the finding of facilitation is unique, but it may be explained by these users' perceived resources. Finally, we find no differences in the influences on intention to use these services between high and low income users. For these users there are some differences in the usefulness and attitudinal processes. More important though, is the difference in the influence of self-control. However, this finding is similar for high educated and high income users and may be explained by these users generally high perceived self-control.

From the analyses of segment differences in the adoption model, we conclude that there are very few segment differences in the process explaining the intention to use multimedia messaging services. There are some differences in the usefulness and attitude formation processes, but these differences are of less relevance because both usefulness and attitudes towards use are not significantly affecting intentions. The few differences in the norm and control processes are as expected because the users with more resources perceive more self-control and are less affected by facilitation. Comparing the model estimations with the significant segment differences in perceived levels of variables is somewhat surprising. For example, it seems that the process of forming intentions is similar for male and female users, but the perceived levels of expressiveness, subjective norm and behavioral control are different. This identifies a problem with obtaining high intentions to use multimedia messaging services among female users. Because the adoption intention process includes expressiveness, subjective norm and behavioral control but the perceived levels of these variables are significantly lower, services must be created that appeal to female expressiveness, network effects must be stimulated, female users must be educated and services must be facilitated to obtain a satisfactory

penetration level of multimedia messaging services among female. This is a considerable challenge. Similar conclusions may be drawn with respect to the other three segment variables of table 4.2 – age education and income.

### 4.3 Cross service comparisons

We have previously studied traditional text messaging, contact services, mobile payment services, mobile parking and mobile gaming applying the adoption model of section 2. A comparison of the means of the perceived variables across these studies is illustrated in table 4.8.

Table 4.8 Means of the perceived variables of six mobile data services

Variable	Texting	Contact	Payment	Gaming	Parking*	MMS*
Expressive-ness	2.4	1.4	2.4	3.0	2.6	3.4
Enjoyment	4.0	2.1	3.5	5.0	2.6	4.9
Ease of use	5.8	3.7	4.1	5.3	5.2	5.1
Usefulness	4.6	2.4	4.0	4.0	4.4	4.4
External influence	3.8	3.9	4.0	3.5	2.9	4.4
Interpersonal influence	3.1	1.7	2.5	3.1	2.4	3.0
Self-control	2.7	1.9	2.5	2.5	2.2	2.8
Self-efficacy	5.7	3.7	4.0	5.2	5.3	5.1
Facilitating conditions	4.6	3.5	4.0	3.9	5.1	4.6
Attitudes	4.9	2.6	4.5	4.7	5.3	5.0
Subjective norm	3.4	1.6	2.4	2.2	2.3	2.5
Behavioral control	5.8	4.9	4.5	5.3	5.8	5.2
Intention to use	4.9	1.8	3.5	4.7	4.2	4.3
Use	3.1	1.5	2.4	3.6	2.4	3.0

(\*) Comparable variable operations used across all services are used

The figures should be interpreted with care due to sample and context differences. The mean values should be interpreted as absolute level values, but they are comparable across service categories. Comparisons across variables should be done with even more care. For multimedia messaging services, we see that they are generally perceived as expressive and enjoyable. In fact, they are perceived as the most expressive and almost as enjoyable as mobile gaming services. Perceived usefulness and ease of use is relatively low, at least when compared to traditional text messaging.

Furthermore, external influence is high, but this is of less relevance because it is not influential in the adoption model. Interpersonal influence is high but not above the level of other services studied, and self-control is also high. Perceived facilitation is not as low as we expected when compared to other services, and the same may be observed for self-efficacy. Of the aggregated variables we see that expectations of use in the form of norms is far from as high as for text messaging, but still rather high. Behavioral control is very similar and attitudes are surprisingly positive. The gap between attitudes and intentions is not very different from other new services but very different from text messaging and the gap between intentions and actual use is very similar to that found for other new services. Thus, the main differences between the perceived levels for multimedia messaging services are in the high levels of perceived expressiveness and enjoyment. However, this is as one would expect from expressive services like MMS.

When comparing the adoption models across mobile data services we apply the notations of tables 4.6 and 4.7. In table 4.9, the influences on intention to use each of the six mobile data services are shown.

Table 4.9 Adoption model influences of six mobile data services

Influence	Motivational			Attitudinal	Social	Control
	Express-iveness	Enjoyment	Usefulness	Attitudes	Norm	Behavioral control
Texting	++	++	++	++	0	++
Contact	++	++	0	+	++	0
Payment	++	++	0	0	0	++
Gaming	++	++	+	0	0	++
Parking	++	0	++	0	0	0
MMS	++	++	0	0	++	++

(+) and (++) indicate significance at  $p < 0.05$  and  $p < 0.01$

From table 4.9 we see that the influences of intention to use are different across mobile data services. It is also generally difficult to identify any patterns of influences common to services of a specific category (e.g. information versus communication services, entertainment versus instrumental services). However, we see that for all services investigated, expressiveness is found to be the most consistent influence on intentions to use the services. We also note that enjoyment is surprisingly important across services and that usefulness, as it has been defined in adoption literature is of less consistent relevance to the adoption of mobile services. A surprising lack of influence from attitudes

towards use is found as well as a surprising lack of influence from subjective norms. However, the lack of influence from subjective norm may partly be caused by our operations used in the first five studies for expressiveness. There appears to be elements of norms reflected in expressiveness in the way we originally measured the concept. Still, the lack of influence from norms is surprising. It is also difficult to interpret why behavioral control seems influential for some services and not for all new or complex services. For multimedia messaging services we have now developed reliable and valid measures through five previous studies. Thus, our measures and concepts are highly valid and many of our findings are consistent with our expectations. Still, comparisons of these results across services should be done with care and most of the conclusions in this study should focus the findings that are internally valid, such as segment comparisons within our limited sample.

## **5. CONCLUSIONS AND DISCUSSION**

This report extends previous research on mobile service adoption from SNF (Pedersen, 2001, 2002, Pedersen et al., 2002). It is based on a modification and re-specification of the theory of planned behavior and includes analysis of the motivational, attitudinal, social and behavioral control influence on adopters' intention to use mobile services. In this paper, we particularly focused the motives of expressiveness, the concept of identity expressiveness and the importance of identity expressiveness in using media rich services like MMS. In this section we summarize our conclusions, discuss the validity of the study and suggest some implications for providers of mobile data services.

### **5.1 Conclusions**

In section 2.1 a model of mobile data services adoption was suggested based upon the theory of planned behavior, but modified and re-specified using findings of mobile services end-user behavior in uses and gratifications and domestication research. The model included four primary influences on adopters' intention to use mobile services. The motivational influence included intrinsic, extrinsic and derived motivations for using mobile services. The attitudinal influence stemmed from motivational determinants and social norms. The social influence was determined by external and interpersonal influence, and was moderated by self-control - the individual user's tendency to resist external and interpersonal influence. Finally, resource-related influence was determined by users' self-efficacy and perceptions of service facilitation.

This model was tested with empirical data on users' adoption and intention to adopt multimedia messaging services. Focusing these services made us elaborate and refine the concept of identity expressiveness in the model. A total of 533 users recruited from web sites delivering multimedia messaging services responded to our questionnaire, and these data were used to estimate the model presented in section 2. The general results of the analyses of these data and the model estimations may be summarized as follows:

? General findings:

- The measures of the adoption model proved to be reliable and valid.
- Multimedia messaging services were perceived as expressive, enjoying and surprisingly useful services.
- Attitudes towards multimedia messaging services were positive.
- Intention to use multimedia messaging services was relatively high when compared to other mobile data services.
- External influence was perceived as high whereas interpersonal influence was perceived as moderate.
- Multimedia messaging services were perceived as less well facilitated than SMS services. This was particularly obvious for reliability and technical facilitation. Still, users feel they have the necessary skills and resources to use them.

? Segment differences:

- Perceptions of model concepts differed considerably across potential users.
- There were gender differences in the perceptions of expressiveness, subjective norm, self-efficacy, facilitating conditions, behavioral control and intention to use. In general, male users perceived the services as more expressive, felt stronger norms of use and felt they controlled the services more than female users.
- There were age differences in perceived expressiveness, enjoyment, attitudes and subjective norm. Generally, older users perceived the services as less expressive and enjoying, and had less positive attitudes but at the same time felt stronger norms of use.
- There were education differences in perceived expressiveness, enjoyment, attitudes, interpersonal influence and use. More educated users found the services less expressive and enjoying, and had a less positive attitude towards use. They also used less and felt less interpersonal influence in using.
- There were income differences in external influence, self-efficacy and intention to use. High income users felt less external influence and more self-efficacy but also reported higher intentions to use MMS.

? Adoption model findings:

- The adoption model showed good fit and explanatory power.
- Intention to use multimedia messaging services was influenced by perceived expressiveness, enjoyment, subjective norm and behavioral control.
- There were no effects of attitudes towards use and usefulness on the intention to adopt MMS.
- Usefulness was influenced by ease of use, enjoyment and expressiveness, and attitudes towards use were influenced by usefulness, ease of use, enjoyment and expressiveness.
- Norms were determined primarily by interpersonal influence and self control.
- As for all mobile services studied, behavioral control was determined by both facilitating conditions and self-efficacy.
- There were very few differences in the adoption models by gender, age, education and income. This was rather surprising given the amount of significant differences in perceived variables by gender, age, education and income. Thus, the influences on intention to adopt are similar across segments but the perceptions of the characteristics of multimedia messaging services differ considerably across segments.

The findings were generally as expected in the propositions of section 2 except for attitudes towards use. Among the other surprising findings was that despite significant differences in perceived characteristics of MMS across segments, few differences were found in adoption models across segments. Besides these findings, the most important contribution of our study was the theoretical and methodological investigations of the identity expressiveness concept. From these investigations, a measurement scale was developed that showed good reliability and convergence and discriminant validity. This scale may be applied in further investigations of the influence of identity expressiveness in the use of consumer products and services.

## 5.2 Discussion

This study is based on the developed procedures, measures and results of six previous studies of mobile service adoption. For a discussion of the validity issues of these studies, we refer to Pedersen

(2001, 2002) and Pedersen et al. (2002). Thus, we propose that the theoretical and methodological foundations for acceptable internal and external validity are sufficient. In section 3, we presented the procedures and measures applied. In general, all theoretical concepts have been discussed in section 2 or in previous work (Pedersen, 2001, 2002, Pedersen et al., 2002), and are well founded in previous information systems and communication studies research. Thus, the construct validity is considered acceptable. Furthermore, the analyses of section 3 showed that measures were reliable and that constructs had acceptable convergence and discriminant validity. However, there are still issues of relevance to the internal and external validity of this particular study that requires further discussion.

With respect to internal validity, the procedure used to recruit subjects in this study may have resulted in subjects with a more positive attitude towards the service than the population of potential users. To obtain respondents with experience or who had considered using multimedia messaging services, we only recruited subjects visiting web sites offering such services. Thus, our first validity issue is if the results generalize to subjects with a general interest in using multimedia messaging services. Multimedia messaging services are used for both person to person communication and for providing content services. All our subjects were recruited at web sites offering content services. However, it is likely that subjects browsing for content services also have experience from other uses of MMS. Our questionnaire also covered both service categories. Some of our recent studies of content services also indicate that content services are some of the first services tested when buying a camera phone if you don't know other users having it. Thus, we assume the recruitment and experimental procedures have not made the sample systematically different from the sampling frame representing the population of users with a general interest in MMS. Another element of internal validity given particular attention in this study was the validity of the expressiveness concept. By providing a more firm basis for the concept in identity literature we suggested using the concept identity expressiveness composed of two components – social identity expressiveness and personal identity expressiveness. We also developed a reliable and valid scale for the concept and showed that it could be treated as a one dimensional construct of identity expressiveness in this kind of study.

The issue of external validity may be discussed with reference to subject-, setting- and time-specific threats. Even though we argue that internal validity is not threatened by the self-selection procedure applied to recruit subjects, external validity may be. Thus, one should be careful in generalizing our

findings to users not so far showed an interest in multimedia messaging or tried these services. It is, for example, not unlikely that these subjects will be more influenced by attitudes and less by social pressure. Still, users are not likely to adopt these kinds of services without some initial consideration and reflection, making our findings externally valid anyway. Another issue with respect to the subjects recruited is the skewed distributions of demographic variables such as age, gender and income. However, we found very few model differences by gender, age, education and income even though the mean perceptions of most of our variables varied by gender, age, education and income. Thus, it seems that the adoption model to some degree may be generalized across gender, age, education and income, but the mean levels of perceptions may not.

Another issue threatening external validity is the stimulus context used in this study. One may argue that the services offered by our recruitment web sites affect the responses of subjects in systematic ways. The providers offer a variety of services not only in the entertainment category, but still, this is a relevant validity threat. MMS was also studied during a period of free trial use of some services. This may have affected the attitudes and intentions to use in a positive direction. However, other advertising campaigns or MMS-related events were not observed during the period of the survey. Thus, our findings should be interpreted with care because more attention was given to internal than to external validity in the design of the study.

### **5.3 Implications**

Our results have implications for both service providers and mobile operators as well as for further research. For service providers and mobile operators the adoption model results are as one would expect. Expressiveness and enjoyment are the main motivations for using, whereas usefulness and attitudes are not. This means developers should focus on providing services fulfilling the expectations of expressiveness and entertainment and that marketing should focus on communicating what may be expected. Marketing focus should not be on influencing attitudes but rather communicate realistic expectations. Norms are important but norms are mainly determined by interpersonal influence. Using media actively to form norms is not recommended and instead opinion leaders and innovators in social groups should be encouraged to use services and show their use to others. Norms may be influential for a short period of time because once camera phones are owned by everyone, norms will lose its influence. Thus, to obtain network effects there is a short time window that providers

must utilize in their service provisioning and marketing communication. Behavioral control is important to end users adoption of MMS. Because behavioral control is determined by individual user characteristics such as self-efficacy, skills and knowledge and operator or service provider specific characteristics such as facilitation, developers and providers must focus both elements. Self-efficacy must be increased by giving assistance to early adopters, for example by manuals, guides and even street-corner courses in MMS use. However, this assistance in increasing user competence should not only focus technical competence. It is important that MMS develops into a communication genre managed and embraced by new users. Thus, ways to create these communication genres should be communicated both in marketing communication and in support service communication. Finally, interoperability issues need to be resolved on the technical side to ensure that MMS is perceived as well facilitated services.

Even though we identified few differences in the adoption model by gender, age, education and income, subjects in different segments considered the characteristics of multimedia messaging services very differently with respect to expressiveness, enjoyment, interpersonal influence, subjective norm, self-efficacy and behavioral control. Users also showed differences in intention to use MMS by gender and income. Thus, what constitutes an expressive or enjoying service is perceived differently in different user segments. The same may be said of what it means to perceive strong norms and to perceive full behavioral control of service use. The implication is that service providers and carriers will have to focus the segments identified in this study with low perceived expressiveness and enjoyment (female, older and higher educated segments) to identify what is required for a multimedia service to be perceived positively. Furthermore, they will have to focus segments with low subjective norm (female, young and lower income) to identify the mechanisms of network effects in these segments. Finally, they will have to focus what creates the low perceived self-efficacy and behavioral control of female and lower income subjects. One may suggest that this has to do with skills and perceived self-efficacy among female users and pricing and service facilitation among low income users. These problems may be approached through service development, service facilitation, consumer education, and marketing communication.

The most consistent effect on intention to use mobile data services across all our studies has been identity expressiveness. Identity expressiveness includes elements of social identity and personal identity. For multimedia messaging services both elements were found influential. Identity

expressiveness is often unanticipated by service designers and adopters, and is thus not something that was planned or designed by intent. Instead it is often created by end-users' own sophistication of service use and by the creation of service content in the form of specific communication genres suited for the different media services provided on the mobile terminal. For example, SMS users have created communication genres of abbreviations, grooming, gift giving and shared content creation that are used to express both social and personal identity in communication. A similar development is required for multimedia messaging services to gain critical mass. Currently, it is not obvious how the communication genres of multimedia services will be, but developers, service providers and operators may study the communication genres of early adopter to try to teach and facilitate these forms to wider user groups.

For researchers, the results further confirm the influence of expressiveness on the adoption of mobile services. This suggests adoption models of mobile services should include elements reflecting intrinsic motives for use as well as derived motives like expressiveness. This corresponds well with recent approaches including emotional elements into ICT adoption models (Venkatesh, 2000) as well as recent approaches to identity, self-identity and identity expressiveness in social psychology. In applied social psychology and consumer psychology, the element of self-identity in consumption has been investigated within the framework of the theory of planned behavior (Mannetti et al., 2002, Sparks and Guthrie, 1998). Self-identity in many of these contributions is seen somewhat different from the socially constructed self-identity of Mead and Goffman (Mead, 1934, Goffman, 1959) and in the structuration theory of Giddens (1991). In consumer psychology, identity expressiveness has mainly been applied to the consumption of value expressive products (Mittal, 1994) such as objects of display or style and products related to personal life-styles such as environmentally relevant products (Cook et al., 2002). In IS-research, these concepts have so far been given little attention. Instead, symbolic elements of media choice and use have been investigated in this tradition, focusing more on the symbolic effects of using specific technologies and services rather than their role in the formation of users' identity expression, confirmation and reflection. As mobile services are introduced in work contexts, the influences of social identity and personal identity in the process of adopting these services should be given more attention. The development of the identity expressiveness concept in this and previous reports, the development of measurement scales and the evaluation of their validity and reliability support the inclusion of these elements in further adoption

research. The demonstration of the relevance of identity expressiveness in six different empirical studies on mobile service adoption across user segments represents significant contributions to this research.

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## APPENDIX A

<b>Undersøkelse om bruk av MMS (Multimedia meldinger)</b>	
<p>I denne undersøkelsen er vi interessert i dine synspunkter på nye <b>MMS-tjenester</b> (Multimedia-meldinger). MMS er en meldingstjeneste som gjør at du kan sende bilder, lyd og tekst fra en mobil til en annen eller du kan få meldingene levert fra en innholdsleverandør som f. eks. TV2, NRK, Rabbit eller djuice for visning på din mobil.</p> <p>Selv om du <b>ikke</b> bruker denne tjenesten i dag er vi likevel interessert i dine synspunkter. Undersøkelsen gjennomføres av <b>Samfunns- og næringslivsforskning</b> uavhengig av teleselskaper eller andre kommersielle interesser, og resultatene brukes kun til forskningsformål.</p> <p>Hele undersøkelsen er ikke ment å ta deg mer enn ca. <b>10 minutter</b>. Du trenger ikke å bruke lang tid på å tenke deg om ved hvert spørsmål, men prøv å besvare så <b>mange av spørsmålene som mulig</b>.</p> <p>Ved å gjennomføre undersøkelsen deltar du også i <b>trekningen</b> av:</p> <ul style="list-style-type: none"> <li>• <b>5 gavekort a kr. 1000,- i valgfri lokal butikk</b></li> <li>• <b>20 gavekort på CD hos AkersMic Online</b></li> </ul> <p>Alle svar er konfidensielle for andre enn de som skal analysere resultatene. Svarene er anonyme og knyttes ikke til noe som kan identifisere den som har avgitt dem.</p> <p style="text-align: right;"><b>Per E. Pedersen</b> Professor (faglig ansvarlig)</p>	
<p><b>Start undersøkelsen ved å klikke på den aktuelle linken under:</b></p> <ol style="list-style-type: none"> <li><b><u><a href="#">1. Start undersøkelsen</a></u></b></li> <li><b><u><a href="#">2. Jeg ønsker ikke å delta i undersøkelsen</a></u></b></li> </ol>	
<p><i>Hvis du har problemer med å komme videre fra denne siden eller får andre problemer, legg merke til følgende:</i></p> <ul style="list-style-type: none"> <li>• <i>Undersøkelsen består av 3 sider med spørsmål. Svar på så mange av spørsmålene som mulig. For å lede deg gjennom undersøkelsen bruker vi "cookies", men disse brukes bare til dette formålet og lagres ikke. Nettleseren din må imidlertid tillate bruk av "cookies". Nettleseren din må også akseptere "redigering".</i></li> <li>• <i>Hvis du stadig blir brakt tilbake til denne siden er det sannsynligvis fordi nettleseren din ikke aksepterer "cookies". Endre dine innstillinger i nettleseren og prøv igjen.</i></li> <li>• <i>Hvis du tidligere har deltatt i hele eller deler av undersøkelsen blir du automatisk brakt til den siden du eventuelt avsluttet på. Imidlertid kan svarene bare avgis en gang.</i></li> </ul> <p style="text-align: center;">Sidene vedlikeholdes av <a href="mailto:per.pedersen@nhh.no">per.pedersen@nhh.no</a></p>	



Side 1 av 3

Vi vil at du nå konsentrerer deg om **MMS-meldinger (multimedia meldinger)**. Det betyr MMS-meldinger du sender til eller mottar fra andre, eller MMS brukt for å motta bilder, lyd og tekst som en MMS fra en innholdsleverandør (f. eks. TV2, djuice, FINN, Rabbit).

Svar på spørsmålene ut fra dine **erfaringer**. Hvis du ikke har erfaringer vil vi likevel at du svarer på spørsmålene ut fra det du **vet** eller **tror** om **MMS**.

Ta stilling til følgende utsagn, der du angir grad av enighet på en skala fra 1 til 7 der <b>1 er svært uenig</b> og <b>7 er svært enig</b> :	Svært uenig						Svært enig
	1	2	3	4	5	6	7
MMS gjør at jeg raskt kan få tak i eller formidle det jeg ønsker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MMS gjør det enklere å få tak i eller formidle det jeg ønsker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MMS gjør meg til en bedre bruker av mobilen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MMS er nyttige når man skal få tak i eller formidle noe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Det forventes at folk som jeg bruker MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De som betyr noe for meg forventer at jeg bruker MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Folk jeg ser opp til forventer at jeg bruker MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Angi langs en skala fra **1 til 7** hvordan du, sett under ett, ser på **MMS**:

Dårlig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bra
Ufornuftig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Fornuftig
Ugunstig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Gunstig
Negativt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Positivt

Ta stilling til følgende utsagn, der du angir grad av enighet på en skala fra 1 til 7 der <b>1 er svært uenig</b> og <b>7 er svært enig</b> :	Svært uenig						Svært enig
	1	2	3	4	5	6	7
Det er lett å lære å bruke MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Det er lett å få MMS til å fungere slik jeg vil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bruken av MMS er enkel og forståelig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Det er lett å bruke MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Massemediene er fulle av artikler og nyheter som hevder at bruk av MMS er smart	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I medier og reklame finner jeg til stadighet anbefalinger om å bruke MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Å bruke mobiltjenester som MMS er en del av den måten jeg uttrykker min personlighet på	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg bruker MMS for å vise hvilke verdier jeg står for	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ved å bruke MMS kan jeg vise hvem jeg ønsker å være	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg er stolt av at jeg behersker MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg bruker MMS på en måte som skiller meg ut i mengden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mobiltjenester som MMS har lenge vært en del av meg	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg er stolt av at jeg har lært meg å bruke tjenester som MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Klikk på "Send" når skjemaet er utfylt og du er klar til å gå til side 2



Sidene vedlikeholdes av [per.pedersen@nhh.no](mailto:per.pedersen@nhh.no)



Side 2 av 3

Fortsett å ta utgangspunkt i **MMS**, og besvar følgende spørsmål:

Ta stilling til følgende utsagn, der du angir grad av enighet på en skala fra 1 til 7 der <b>1 er svært uenig</b> og <b>7 er svært enig</b> :	Svært uenig							Svært enig
	1	2	3	4	5	6	7	
På jobben/skolen synes alle at mobiltjenester som MMS er noe man bør bruke	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Vennene mine synes at man bør bruke mobiltjenester som MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Jeg får stadig anbefalinger fra venner om å bruke mobiltjenester som MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Jeg føler meg fri til å bruke MMS hvis jeg selv ønsker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Jeg har fullstendig kontroll over bruken av mobiltjenester som MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Generelt sett har jeg de midler og ressurser jeg trenger for å bruke MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	Svært uenig							Svært enig
	1	2	3	4	5	6	7	
Jeg har tenkt å bruke MMS de neste seks månedene	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
De neste seks månedene har jeg tenkt å bruke MMS mye	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Jeg har tilstrekkelig tid til å bruke MMS på en smart måte	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Jeg har de kunnskaper og ferdigheter som er nødvendig for å bruke MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Jeg føler at jeg behersker bruken av MMS fint på egenhånd	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Generelt sett ønsker jeg å gjøre det mine venner synes jeg burde gjøre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Generelt sett ønsker jeg å gjøre det familie eller kollegaer synes jeg burde gjøre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	Svært uenig							Svært enig
	1	2	3	4	5	6	7	
MMS er noe jeg ofte snakker med andre om (f. eks. diskuterer)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Jeg viser gjerne MMS-meldinger eller tjenester til andre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Andre blir ofte imponert over måten jeg bruker MMS på	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
MMS gjør at jeg kan vise andre hvem jeg er	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Jeg bruker MMS for å vise andre hvilken gruppe jeg hører til	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
	Svært uenig							Svært enig
	1	2	3	4	5	6	7	
Jeg har de økonomiske ressursene som er nødvendig for å bruke MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Jeg har det som trengs av teknisk utstyr for å bruke MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
MMS tjenester er stabile og teknisk velfungerende	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Det teleselskapet jeg bruker tilrettelegger godt for bruk av MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
MMS fungerer fint sammen med de andre mobiltjenestene jeg bruker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

Klikk på "Send" når skjemaet er utfyllt og du er klar til å gå til side 3

Send

Nullstill

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Side 3 av 3

Fortsett å ta utgangspunkt i **MMS**, og besvar følgende spørsmål:

Ta stilling til følgende utsagn, der du angir grad av enighet på en skala fra 1 til 7 der <b>1 er svært uenig</b> og <b>7 er svært enig</b> :	Svært uenig							Svært enig						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Jeg synes det er underholdende å bruke MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg synes det å bruke MMS er hyggelig i seg selv	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Å bruke MMS er spennende	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Det er morsomt å bruke MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sammenliknet med andre bruker jeg MMS mye	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg bruker ofte MMS for å få tak i eller formidle det jeg ønsker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg ser på meg selv som en storbruker av MMS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vennligst ta stilling til følgende utsagn om <b>mobiltjenester mer generelt</b> (ikke bare MMS).	Svært uenig							Svært enig						
Hvis jeg hører om en ny mobiltjeneste som er kommet er jeg svært interessert i å prøve den ut	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sammenliknet med mine venner bruker jeg mange nye mobiltjenester	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg er generelt blant de første i min vennekrets som har hørt om nye mobiltjenester når de kommer på markedet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg prøver ut nye mobiltjenester selv om jeg ikke har hørt om andre som har prøvd dem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vennligst <b>besvar følgende spørsmål:</b>														
Omtrent hvor mange ganger sender du en MMS til andre i løpet av en uke?	<input type="text"/> ganger													
Omtrent hvor mange ganger bruker du MMS-tjenester for å få tak i informasjon, logoer, bilder o.l. i løpet av en uke?	<input type="text"/> ganger													
Er du kvinne eller mann?	<input type="radio"/> Kvinne <input type="radio"/> Mann													
Hva er din alder?	<input type="radio"/> 0-19 <input type="radio"/> 20-29 <input type="radio"/> 30-39 <input type="radio"/> 40-49 <input type="radio"/> 50-59 <input type="radio"/> 60 og over													
Hva er din høyeste utdanning?	<input type="radio"/> Grunnskole <input type="radio"/> Videregående skole <input type="radio"/> Universitet/høyskole 1-3 år <input type="radio"/> Universitet/høyskole 4 år eller mer													
Hva er din sivilstand?	<input type="radio"/> Gift/samboer <input type="radio"/> Enslig/separert/skilt <input type="radio"/> Annen													
Omtrent hva er din personlige bruttoinntekt (kroner)?	<input type="radio"/> Under 200 000 <input type="radio"/> 200 000 - 399 000 <input type="radio"/> 400 000 - 600 000 <input type="radio"/> Over 600 000													
Klikk på "Send" når skjemaet er utfyllt	<input type="button" value="Send"/> <input type="button" value="Nullstill"/>													

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