Mobile Multimedia Services - Surveying the preferences of young people.

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Abstract. In this paper, a questionnaire study concerning young Swedish peoples use patterns for mobile services is conducted. The study investigates what possible added value mobile multimedia services can provide for the users. Furthermore a workshop with a focus group is conducted that also examines the possible added value with mobile multimedia services. This study also investigates what barriers there is for mobile multimedia services. The identified barriers are analyzed using the Innovation Diffusion Theory (Rogers, 1995). The overall research question in this paper is: can mobile multimedia services be a feasible strategy for service providers to attract young audiences? Two main barriers for mobile multimedia services are identified, cost and technical restraints. Further on, one barrier that was identified in the workshop was the lack of knowledge of what services that were offered by service providers and mobile operators. Even if complexity issues could be identified regarding the configuration of the mobile devices, they were not critical. The results indicate that mobile multimedia services may be a feasible strategy for service providers and mobile operators to reach a younger audience.

Keywords. Mobile Multimedia Services, Adoption

1. Introduction

As the mobile market matures, operators and service providers are expanding and diversifying their services (Srivastava et al., 2006). One driving force is the fact that the average revenue per user from standard voice services are falling, and mobile operators and service providers are looking for new appealing applications and services that will drive up usage and therefore revenue (Harmer, 2003). UMTS-networks as well as the upcoming standards for WIMAX and HSDPA enables a mobile Internet where the combination of mobile functionality, Internet accessibility and multimedia capabilities provides the necessary means to provide mobile multimedia services (Srivastava et al., 2006). Examples of such services are downloads of music, video and text as well as multimedia messages, individualized infotainment, mobile office, shopping and banking services (Westlund, 2006). Another prerequisite for mobile multimedia services is that the mobile devices used are capable of these kinds of services. Today, many mobile phones are limited to handle multimedia, i.e. CPU and memory limitations and limited color displays (Paelke, Reimann & Rosenbach, 2003; Huang & Venkatasubramanian (2003), but recent mobile devices and upcoming devices on the market provide better opportunities for multimedia (Scherp & Boll, 2004).

However, mobile multimedia services are still in its early stages of commercialization, adopted only by early-adopters-type of end users (Verkasalo, 2006). Nevertheless, as countries like Italy and Sweden reached a 110% penetration rate of mobile phones in 2006 [1], and approximately 94% of the Swedish households can access UMTS-networks, making Sweden the best covered country in Europe (PTS, 2006), it is reasonable to believe that multimedia services will have an impact on the mobile industry in countries like Sweden. Even though the use of mobile multimedia has not yet taken of, the amount of mobile data traffic that is sent over the UMTS-network is heavily increasing. The traffic increased 328% from 2004 to 2005 and today the UMTS traffic constitutes 7,4% of the total amount of Swedish traffic sent over the mobile networks (PTS, 2006).

Despite the technical prerequisites mentioned above, the adoption of mobile services in general has not taken off as expected in Europe (Hammond, 2001, Carlsson *et al*., 2006) compared to for example Japan where the mobile channel has been the most common point of access to online services for years (Ratcliff, 2002). This phenomenon has attracted researchers to study the adoption of mobile services (e.g. Pedersen *et al*., 2002; Ioanna *et al.*, 2004; Knutsen, 2005; Fife & Pereira, 2005; Mallat, 2006, Blechar *et al*., 2006).

Early adopters have traditionally been an interesting target group to investigate while planning for new technologies and services (Rogers, 1995). In Sweden, teenagers and young adults are in general more frequent mobile users than elderly (Westlund, 2006), and they also use the Internet to a much higher degree. For

example, 77% of the users between the ages of 16-24 use internet on a daily basis compared to 38% of the users in the ages of 55-74 (SCB, 2006). Together, these facts make them an interesting early-adopters-type of target group for investigating the possibilities with mobile multimedia services.

The study conducted in this paper aims at presenting a profile of young Swedes use patterns of mobile services as well as investigating possible added value and benefits with mobile multimedia services. Furthermore, using the Innovation Diffusion Theory (Rogers, 1995), potential barriers for adoption of mobile multimedia services are investigated. The overall research question is: Can mobile multimedia services be a feasible strategy for service providers to attract young audiences?

2. Theoretical Background

In this section we present the Innovation Diffusion Theory by Rogers (1995) and specifically present research related to adoption of mobile services. This section is concluded with a presentation of mobile multimedia services as well as a brief presentation of our selected target group, young Swedish mobile users.

2.1 The Innovation Diffusion Theory

The Innovation Diffusion Theory explains the process of the Innovation-Decision Process, the determinants of the rate of adoption, and various categories of adopters (Rogers, 1995). The innovation decision process consists of five stages, 1) knowledge, 2) persuasion, 3) decision, 4) implementation and 5) confirmation. In the second stage, the persuasion stage, the general perception of the innovation is developed which is explained by the perceived attributes.

Rogers states that potential adopters judge an innovation based on their perceptions in regard to five attributes of the innovation, i.e. a) relative advantage, b) compatibility, c) complexity, d) trialability and e) observability. The relative advantage regards the added values compared to existing artifacts, in value for the money or other advantages. The new artifact compatibility is to what extent it fits in the users existing needs, values and experiences. Complexity is about the perception of effort required to learn to use the new artifact. Experiences of existing similar artifacts can reduce complexity. The extent to which the artifact can be tested and tried out is referred to as trialability and influences the acceptance of the new artifact. Finally, observability is an expression for that the more users you see using the new artifact, the more likely you are to try yourself. So called early adopters play an important role for observability. Innovations that are perceived as having greater relative advantage, compatibility, trialability, and observability and less complexity will have a more rapid adoption rate compared to other innovations.

To explain the diffusion of innovations, Rogers differentiates the rate of adoption among five groups of customers as described in figure 1.

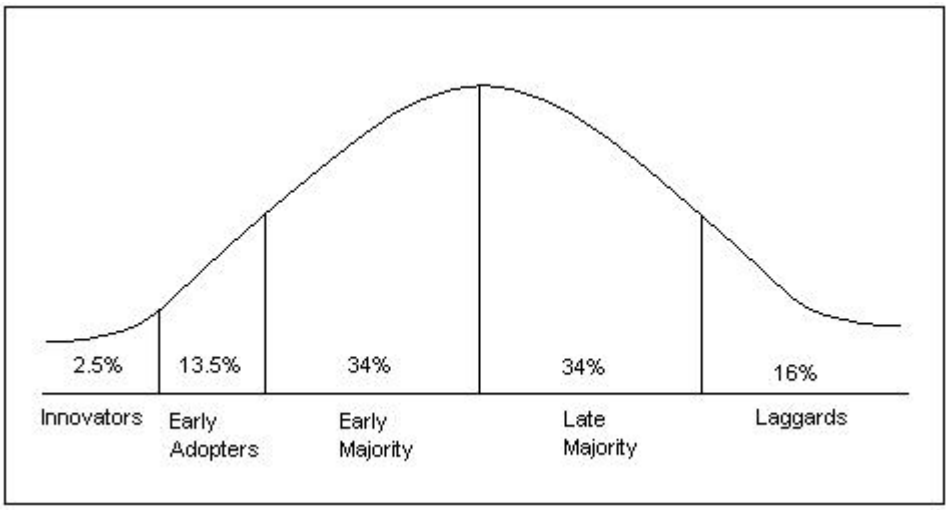

Figure 1. Technology adoption curve (Rogers, 1995)

Rogers central argument is that early adopters have an important role in "marketing" the innovation to a greater mass of people. People that think about adopting the new technology turn to the early adopters for advice. Since early adopters are not too far ahead in the adoption curve, their preferences can serve as a proxy for those of the majority of customers.

2.2 Adoption of Mobile Services

Rogers diffusion theory has been used in several studies within the m-commerce field, regarding for example adoption patterns of mobile services (Carlsson et al., 2005), adoption of mobile payments (Mallat, 2006) and to understand iMode adoption (Barnes and Huff, 2003).

The last generations of telecommunication, such as UMTS, has provided the users with the possibility to always be connected to a mobile Internet. According to Funk (2004), mobile Internet is a disruptive technology that improves some aspects of performance compared with earlier technologies, but also reduces others. This may cause a change in the customer population, meaning that the early adopter group may not be the same for both technologies. Mobile Internet is most appropriate for customers who value portability over limitations such as a small display, keyboard and memory.

Focus group studies conducted by Järvenpää et al. (2003) reveals that users may lack motivation to adopt mobile services if not these services creates opportunities where mobility matters. According to Kaasinen (2005), there is a risk that the services become a collection of useful features, but as a whole they

may not provide enough value. Furthermore, Kaasinen states that value may be one of the key features of a service which constitutes the main reason why users are interested in a new mobile service.

2.3 Mobile Multimedia Services

According to Ericsson (2004), mobile multimedia enables a richer person to person communication as well as a richer person to content communication. The boundaries between these use cases are vague, and will become more so as new applications and services are introduced. Opportunities with mobile multimedia for service providers and mobile operators arise when they work more closely with content providers and device manufacturers according to Harmer (2003), who exemplifies this with the following examples:

- marketing and product awareness, through fun interactive games and downloads,
- a channel to market as part of an enterprise's multimedia call centre strategy,
- a channel to market for the media industry – building on the success of ringtones to include audio-track streaming and download, video clip download, pop group trivia and "mobile merchandise", sports highlights, and cartoons,
- vertically integrated devices and applications (e.g. cameras/camera phones, surveillance),
- location-based multimedia, travel news, maps and pictures, picture messages sent to subscribers within a location (e.g. university campus).

Today, many new mobile services deal with multimedia which can be seen as solutions which provides added value to the users (Verkasalo, 2006). In providing a service, two parties are needed, a service provider and a service user. If mobile operators and service providers want to enable a fast user adoption of multimedia services, they need to understand what needs these services fulfill (Ericsson, 2004). These new multimedia services can then build on what users already are familiar with, i.e. look at existing use patterns, to be able to add new flavor and stimulate an interest among the users. Karjaluoto (2006) suggests that to be able to get the big picture regarding user acceptance of mobile services, designers needs to understand the different situations in which users use mobile services. Therefore it is essential to understand the use patterns of the mobile users.

2.4 Young Swedish mobile users

Sweden is ranked as the sixth country in the world concerning the teledensity (103 mobile subscribers per 100 inhabitants) (Srivastava et al., 2006).

Approximately 94% of the Swedish households can access UMTS-networks, making Sweden the best covered country in Europe (PTS, 2006). Although there are more similarities than differences regarding the mobile communication culture in Europe (Oksman & Turtiainen, 2004), it is according to Westlund (2006) appealing to study an innovating nation as Sweden concerning the use of mobile services.

In Sweden, teenagers and young adults are in general more frequent mobile users than elderly (Westlund, 2006), and they also use the Internet to a much higher degree. According to Ericsson (2004), young people are showing again and again that they are willing to experiment with new services and that they define new uses for mobile devices and services. Teenagers seem to have formed an own social reality through mobile devices and the Internet. The mobile phone is an important device handling their social contacts enabling them to be accessible 24-7. Therefore, young Swedish people represent an interesting early-adopters-type of target group for investigating the possibilities with mobile services.

3. Research Approach

This study is conducted within the UbiMedia project, which is a Swedish project with partners from 9 Swedish newspapers, the Swedish Newspaper Publishers´ Association and Stampen (a parent company for several newspapers, printing houses and distribution companies). The UbiMedia project is a two-year project that targets the challenge of designing ubiquitous media services for a multitude of devices and contexts to be consumed anytime and anywhere. In this project, young audiences are of interest when exploring future services. In the case of mobile services, this group of young users represents in many cases what Rogers (1995) define as an early adopter type of users (Westlund, 2006; Ericsson, 2004).

Our study is an example of a multi-method approach containing multiple data collection. The study is based on a two step approach and was conducted during the first quarter of 2007. The first step was a questionnaire that examined young adults use patterns for mobile services in general, as well as possible benefits, added value, and preferences regarding mobile multimedia services. The second step was a workshop with a student focus group. The questionnaire was distributed to 63 university students studying the field of informatics, and was handed out and collected by their teachers. The students selected were in the ages 19-31 with an average age of 23.7. The selection of students was somewhat unbalanced concerning gender, 72% were males and 28% were females. All students answered the questionnaire, but three respondents had missing answers concerning age or gender and were therefore excluded from the sample. However, this group was selected to represent an early-adopters-type of end users (Rogers, 1995). Our selection was therefore primarily based on age and the fact that it was

students that studied informatics. The first part of the questionnaire contained backgrounds questions regarding age, gender and ownership of mobile devices. The second part had questions regarding what mobile services that were used and how often. The last part of the questionnaire investigated possible benefits and added value with mobile multimedia services.

In this paper we focus on presenting a user profile of the users, therefore descriptive statistics is used to present the use patterns. The answers from the last part of the questionnaire, containing open questions regarding possible benefits and added value, were analyzed using a qualitative clustering technique (Miles & Huberman, 1994). The answers were sorted into different categories representing the user's view of added value and benefits of mobile multimedia services.

To be able to get a deeper understanding on possible benefits and added value as well as investigating what possible barriers there could be for adopting mobile multimedia services, a workshop and a group interview with a focus group of 10 individuals were conducted. The validity of using focus groups seems high according to Marshall & Rossman (1999), primarily because the results are readily understood and findings appear believable. If the discussion is recorded, it provides the opportunity for later analysis and there is also the opportunity to invite the participants later on to explain their comments.

Three women and seven men in the ages of 17-34 were selected from a student focus group that is involved in the UbiMedia project. These individuals matched the same profile as the respondents from the questionnaire study, i.e. young users that studied informatics. Most of the members in the focus group were in their early twenties. The workshop took 2 hours and started with a short presentation of interactive video scenarios provided by Vodafone presenting a future vision of mobile multimedia services. The video scenarios were used as triggers, aiming to fuel the forthcoming discussions. The concept of added value as a notion was also introduced before a group discussion started. The first part of the group discussion dealt with pros and cons with mobile services in general and mobile multimedia services. The group also discussed if there were any added value with mobile multimedia services and if so, what benefits and added value did these services provide. The discussion was facilitated and moderated by one of the authors to ensure input from the whole group. Using a facilitator in group discussions is recommended by Nielsen (1997) who argues that the facilitator's role is to encourage quiet people to talk and try to handle participants that are too dominant in the discussion. This discussion was followed by questions regarding what demands and desires the group had on mobile multimedia services and the group democratically ranked their demands and desires and presented them on a white board.

The workshop was ended with the same questionnaire as the one distributed in the first step of the study. The discussions in the workshop were recorded with the

help of mp3 recorders and transcribed to enable the extract of representative quotations.

4. Empirical Findings

4.1 Background questions

The first part of this sections reports from the background questions from the questioner. 60 respondents answered all three questions, 3 did not answer the age question and are therefore not included in table 1. The average age was 23.7, with most respondents in the groups 19-22 and 23-26. 75% owned a mobile phone that could handle multimedia content. 67% of the group owned a GSM phone and 30% owned a 3G phone.

	Gender		Own a mobile phone that can handle multimedia			Type of phone	
	Man	Woman	N	Yes	No	GSM	3G	Edge
Total %	72%	28%	100%	75%	25%	67%	30%	3%
19 - 22	54%	70%	35	58%	60%	54%	72%	0
23 - 26	30%	30%	18	29%	33%	33%	22%	50%
27 - 31	16%	0	7	13%	6%	13%	6%	50%
N	43	17	(60)	45	15	40	18	2
Total N	60			60		60		

Table 1

4.2 Use patterns regarding mobile services

We wanted to explore what type of service our respondents used and how often. The results are presented in table 2. Most of the respondents, 78%, had tested some kind of mobile service. To be able to investigate the frequency of use regarding mobile services, the individuals that answered yes on this question, also answered a question regarding how often they did use different kind of mobile services. A selection of mobile services were presented and the respondents marked which services they used and how often. 50 respondents answered this question and each individual could give multiple answers. Text news was the service that was most used, regardless of how often. Noticeably is that text news were not highly used on a daily basis compared to for example MSN which were the mobile service that were most regularly used, i.e. once per day or more. It is also interesting to see that many of the services are used once a week or more, showing that the selected target group often uses mobile services.

	Text news	Video News	Downl. music	Ringtones	MSN	Games	Movieclip	Internet*	Mail	Radio*
Once per day or more	8%		0%	0%	27%	10%	0%	0%	0%	21%
Once a week or more	35%	40%	20%	23%	37%	33%	100%	75%	33%	32%
Sometimes in a month	27%	60%	40%	7%	18%	24%	0%	25%	67%	26%
More seldom used	30%		40%	70%	18%	33%	0%	0%	0%	21%
total%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
N	26	5	5	13	11	21	4	4	2	19
N% of total N	52%	10%	10%	26%	22%	42%	8%	8%	4%	20%

Table 2
**general use*

When asked in what format the respondents preferred mobile content, for example mobile news, 60% answered that they preferred new content as text and pictures. 43 % preferred only text and 24% preferred mobile content delivered in the form of either sound or/and video. In this question multiple answers were allowed, therefore the uneven percentage of the answers.

4.3 Added value with mobile multimedia services

In the last part of our questionnaire we had an open question regarding what added value (if any) mobile multimedia services provided the respondents. The answers are clustered into 3 categories (see table 3), and only 27 respondents answered this question. The category labeled "Easy to access" includes answers such as: "*It's nice to be able to get access to services that you normally only get access to with a computer connected to internet*", "*mobile information at the right time"*. The category labeled "Entertainment value" includes answers concerning general benefits e.g.: *"Fun, effective, smooth and factotum"*. The category labeled "None" includes answers where the respondents did not see any added value: "*I do not see any advantage with TV or similar when the screen is so small. On the other hand, I appreciate the ability to listen to news and similar through the mobile phone"*.

Added value with mobile multimedia services		
Esay to access	Entertainment value	None
15	8	4

Table 3

In the workshop the focus group stated that the biggest added value with mobile multimedia services was the fact that it could be accessed anytime and anywhere. For example the possibility to be able to look at television in a mobile phone when staying at places where televisions can't be used. Another example was more general mobile services, for example news content that could be accessed at places where you could not get a regular newspaper or have access to a computer. One respondent talked about how much better it is to consume for example news with sound and video and how that added more experience than

just reading the same news in text format in the phone. Sharing pictures was another comment that was mentioned and how for example a company could share information and how that could help them in different situations for making fast decisions.

4.4 Barriers

One barrier that we wanted to investigate in the questioner was the level of difficulty configuring the mobile phone for multimedia services and if that could affect the use of mobile multimedia content. The question was based on a 7 point likert scale where 1 is very easy and 7 very hard. The average of the answers was 3.15. Overall, rather few respondents found it hard and none answered that it was very hard. In total, 52 respondents answered this question.

[redacted]	Level of difficulty to configure the phone for mobile services						
	Very easy 1	2	3	4	5	6	Very hard 7
	17%	29%	11%	27%	8%	8%	0%
N	9	15	6	14	4	4	0
Average			3,15				

Table 4

In table 5 we summarize the reasons why a number of respondents didn't use some of the mobile services. 48 individuals answered the question and the most mentioned reason was cost and technical restrictions of the mobile phones.

Reasons for not using mobile services	N	N%
The device can't handle the technology	15	31%
Not interested in that kind of technology	3	6%
To expensive	18	38%
To troublesome	9	19%
Not interested in that kind of services	8	16%
Hard to use that kind of service on a mobile phone	6	12%
Existing services are uninteresting	6	12%
Takes too long to load a service	6	12%
Not familiar with mobile services	1	2%

Table 5

In the workshop 5 items were identified by the group regarding barriers and constraints of using mobile services. The points were; (i) cost, (ii) Technical restraints, (iii) Navigational issues, (iv) Selection of content and (v), Knowledge of services.

Cost concerned the total cost of using a service. The group thought it was too expensive using mobile services. This was the biggest barrier according to the focus group. Some argued that many does not have access to broadband/internet through their mobile phones and if they are going to start using mobile services they have to pay for each kilobyte they download. The group suggested that a flat rate subscription was much better then pay per kilobyte.

Technical restraints concerned both the bandwidth of the networks as well as hardware restraints of the mobile device, for example CPU speed, RAM speed. Another issue that was identified by the group was the problem with the standby time. The respondents' hade comments about the battery consumption when using some mobile services.

Navigational issues concerned the interface design and interaction design e.g. how menus are ordered, the support and feedback regarding the spatial position in the digital environment. The respondents also listed limited screen size as one of the top problems for using mobile services.

Selection of content concerned how much information that is available through the mobile services, e.g. news services. Most of the respondents thought that news content in a mobile service should contain almost the same amount of information as an online edition of a newspaper. Knowledge concerned information about the different services the respondents / users could choose from. As one of the respondents said: "*The problem is not the configuration to get a service, it's the problem of knowing what type of services that exists, and the cost of each and every service*".

5. Discussion and conclusion

In this study we are presenting a profile of young peoples use patterns of mobile services. Young users represent an early adopter type of group concerning mobile services (Westlund, 2003; Ericsson, 2004) that can serve as a proxy for the majority of users (Rogers, 1995), when examining technology adoption. Our selection of users, even though it is somewhat limited regarding background and gender, provides an interesting picture of early adopters use patterns of mobile services. According to Karjaluoto (2006) it is important to investigate the user acceptance of mobile services as well as study mobile users use patterns to be able to understand what stimulates an interest regarding new mobile services.

The results of the study shows a relatively high usage of mobile services as well as a quite high percentage of 3G phones (30%) compared to the overall Swedish penetration of 3G phones. The UMTS network provides the necessary means to deliver mobile multimedia services and today 94% of the households in Sweden can access UMTS (PTS, 2006). Worth to notice is that of the 30% that had 3G phones, 72% were in the ages 19-22 which shows that the penetration of UMTS is higher within this age group. Even though multimedia content is dependent of a higher bandwidth and is somewhat restricted by GSM phones, 75% of our respondents owned a mobile phone that could handle multimedia.

The use pattern for our selected profile group shows that young people are using mobile services quit often, for example 80% are using a mobile service once a week or more. The most frequent service used was MSN, where 27% used it once a day or more, text news was consumed by 52% of our respondents and

35% used the service once a week or more. We had also high number of users who used games (42%) and downloaded ring tones (26%).

Even if the usage of mobile services is high within the group, there are barriers for mobile services. We identified two main barriers for mobile services in both parts of the study which were cost of the services and technical restraints with the mobile devices and/or the telecommunication networks. 38% percent of the respondents in the questionnaire stated that they didn't use mobile services because of cost and this issue was the main identified barrier in the focus group. One way to mitigate the cost issues was according to our respondents the incorporation of a flat rate solution. This would make it easier for the users to know exactly what their monthly cost would be for mobile multimedia services.

One interesting finding is that the users did not find it particular hard to configure the devices for mobile services nor to use the services. This indicates that the perceived attribute of complexity (Rogers, 1995) is rather low, even if there are still users that perceive it troublesome to handle the technology. In the questionnaire 19% stated that they didn't use mobile services because it was too troublesome. According to Harmer (2003) it is important that service providers and mobile operators starts to work more closely together with content providers and device manufacturers to enable opportunities with mobile multimedia. A closer cooperation between service providers, phone manufacturers and operators can for example lead to preconfigured phones that can handle advanced mobile multimedia services out of the box instead of letting the user configure the phones and the services which can lead to complexity issues.

One interesting barrier that was found in the workshop was that there was a lack of knowledge of what services that was offered by service providers and mobile operators. There was also a lack of knowledge regarding the cost of these services. Knowledge of an innovation is the first step of the innovation decision process (Rogers, 1995) and without the knowledge of what services that exists, the adoption process will not even start. Marketing and product awareness of mobile multimedia services is also one of the benefits that Harmer (2003) exemplifies when the author suggests a closer cooperation between the different actors on the mobile scene.

According to Kaasinen (2005) value may be one of the key features that constitutes the main reasons why a user is interested in a new mobile service. Our results show that there was a limited added value identified by our target group. The added value concerning the ability to access the services anywhere anytime is generic for all kind of mobile services and not specifically multimedia services. However, as Funk (2004) points out, mobile Internet (e.g. UMTS) is a disruptive technology that enables other kind of mobile services compared to what the traditional GSM network provides. Funk also points out that mobile internet is primarily for users that value portability over limitations such as for example small displays. Järvenpää et al. (2004) argues that users may lack motivation to

adopt mobile services if not these services creates opportunities where mobility matters.

The specific added value identified regarding mobile multimedia services, were the entertainment value. However, looking at Rogers (1995) perceived attributes of an innovation, these two categories together, may provide enough added value and relative advantage compared to other more traditional mobile services. This indicates that mobile multimedia services may be a feasible strategy for service providers and mobile operators to reach a younger audience.

For further research it would be interesting to follow up the issue about the lack of knowledge of mobile services that was identified in the focus group. Maybe content providers and mobile operators need to rethink the way that they promote and price new mobile services, so that they in a better way can reach the consumers. If the problem concerning lack of knowledge exists among young users, it seems reasonable that this problem also exists among other target groups.

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