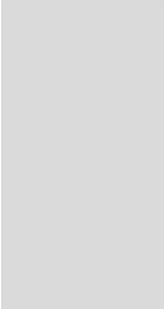




The Demand for Mobile Value- Added Services

Study of Smart Messaging

Market Study



NOKIA

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Executive summary

Mobility and virtualization are two trends that are changing the way people can access information while on the move. People are learning that mobile phones can be used for more than just making phone calls. Already now, mobile phone users can access a variety of useful value-added services (VAS) for data. The future of telecommunications also promises diversified usage of mobile phones. Innovation of future mobile applications is limited more by the imagination than by technology.

There are value-added services that are available already today and enabled by Smart Messaging technology and the Nokia Artus Messaging Platform. Messaging Platform utilizes the Nokia Artus Short Message Service Center (SMSC) to create a link between mobile phones and the Internet via short messaging. The fundamental idea behind this is to see the Internet as a standard resource for information content that can be utilized with mobile phones. The Internet is increasingly making it possible to publish information on a global scale through the World Wide Web and within restricted company networks called intranets. Messaging Platform acts as a medium to provide mobile subscribers with Internet or intranet based value-added services.

As we are just starting to understand the possibilities of VAS we need to investigate the market to find out the true extent and nature of demand of mobile VAS. The more that is known about what end users demand the better operators will be able to meet those demands now and in the future.

This paper discusses the results and implications of a Nokia conducted market study. The driving assumption of the study is that *without lead users the diffusion to mass markets and thus standardization of new technology will not take place*. The lead users are thus extremely important. Even while the technology matures and the initial purpose of the innovation may change, it is still worthwhile to understand the lead users. *Being successful among innovators in the lead markets provides a basis for eventually being successful in the mass markets*. The technology has a good chance of taking root in daily use in mass markets, just as with normal short messaging in Finland today.

Introduction

Mobility and virtualization are two trends that are changing the way people can access information while on the move. People are learning that mobile phones can be used for more than just making phone calls. Already now, value-added services (VAS). The future of telecommunications also promises diversified usage of mobile phones. Innovation of future mobile applications is limited more by the imagination than by technology.

Already today, mobile phone users can access a variety of useful value-added services enabled by the Smart Messaging technology and the Nokia Artus Messaging Platform. Messaging Platform utilizes the Nokia Artus Short Message Service Center (SMSC) to create a link between mobile phones and the Internet via short messaging. The fundamental idea behind this is to see the Internet as a standard resource for information content that can be utilized with mobile phones. The Internet is increasingly making it possible to publish information on a global scale through the World Wide Web and within restricted company networks called intranets. Messaging Platform acts as a medium to provide mobile subscribers with Internet or intranet based value-added services.

Due to the fact that VAS on top of mobile communications poses a relatively new type of business for operators, the focus is put on lead demand for mobile VAS. The arguments presented in this paper derive from a market study conducted by Nokia. The area of the market study concerned the extent and nature of demand for mobile VAS. Answers were sought for the following questions: Who comprises lead-segments of mobile VAS? What are the actual services and service characteristics in demand? What are the specific usage conditions for the demand of these services? The market study was conducted in Finland, which can be seen as one of today's leading geographical areas for mobile adoption of technologies.

Conducting the market study

In the market study concerning demand of mobile VAS, the driving assumption was that *without lead users the diffusion to mass markets and thus standardization of new technology would not take place*. The empirical market study was conducted in three phases. The preliminary study was performed to collect existing market information and experience. That is, all commercially available or potential VAS, including those by Nokia, were identified and characterized according to their nature. Then to identify the early adopter segments for mobile VAS and their source of demand, a quantitative questionnaire was circulated within a sample group of 155 persons that were selected as they purchased a new mobile phone subscription. This sample gave a better chance to study the potential market for VAS. Finally, a qualitative group interview was performed among identified lead users to identify those factors that act as mobile VAS diffusion barriers.

The results of the market study

Following are the results of the questionnaire and group interview.

General overlook of potential users of VAS

We first took a general overlook at the data collected from the end-user questionnaire. As intended with the selected sampling method, merely looking at the sample itself should tell us something about the mobile VAS target group. Namely, we wanted our sample to consist of people, who would already belong to the lead group of potential mobile VAS. For instance those, who do not carry a mobile phone (altogether about 50% of Finnish population), were by default not included in the sample.

Everyone in the sample carried a mobile phone and nearly 90% lived in the urban capital area. The first stunning result from the potential target group shows there to be the *lack of Smart phones in the potential target markets*. To be exact, 77% of the target population carried a legacy phone. If we calculate both the new Nokia 6110 mobile phones and legacy mobile phones, the amount of legacy phones in the target population rises to 89%. None within the sample carried a Communicator and only 11% a Smart phone, the Nokia 8110i. This being the case in the market, the first general finding is thus that *markets today are technically not in a very advanced phase concerning mobile VAS*. The amount of legacy phones is still large and increasing in the market. This merely means that highly *advanced mobile VAS solutions can not yet be offered at least to mass markets*.

Our sample was on average purchasing their second mobile phone. This figure makes sense, since about four years ago, in Finland, mobile phones started to dramatically increase and their product life has been approximately three years. Only 20% of the whole sample were purchasing their third or later mobile phone.

A large figure, 73%, had a PC at home. A total of 45% had Internet at home, where a corresponding 67% had Internet at work. Since 60% stated that they use Internet less than 30 minutes a day, heavy Web surfing was not a hobby of those in our sample. Up to 77% mentioned use of SMS, which means less of a need to educate markets technically for SMS based mobile VAS usage. Especially due to the amount of legacy phones in the market, the existing knowledge of SMS usage may be seen as a positive thing. The amount of SMS sent, at first glance, was not very high. During one week, 60% said that they send 3 or less SMS. This figure is, however, very high when we compare it to Germany, for instance. Mannesman Mobilfunk announced average usage of SMS as being 3 mobile originated SMS/month/subscriber. Our sample's weekly average was 2.46, resulting in 10 mobile originated SMS/month/subscriber, more than three times the average in Germany. The real heavy users of SMS turned out to be the young people. Of the heavy users, that is those sending more than 8 SMS a week, 65% were under 25 years. In fact, 71% of those under 18 sent more than 8 SMS a week. In addition, those of both genders sent an almost equal amount of SMS.

In the sample itself, age did not play a big role. All the age groups were nicely represented, with 10% under 18 years, 25% 19-25 years, 23% 26-35 years, 25% 36-50 years, and 16% over 50 years. Of the sample 60% were men, whereas 40% were women. The number of persons per household was also rather divided. The mean was 2,83. Half of the sample stated that their household's annual income exceeded FIM 150,000. The presence of the highly educated was clearly visible, at 62% of the sample. The amount of unemployed and retired were nearly non-existent. The sample also seemed to be quite mobile since 60% of the sample traveled abroad more than once a year and 75% had hobbies that involved mobility, namely sports.

Characteristics of the mobile VAS favorable person

Of the entire sample, 86,8% stated that they are at least a little interested in mobile VAS. This is an important group since it is from this potential target group of people that we will find our lead segment. We can remove the 13,2% of the sample who show no interest, since it is the opinions and backgrounds of the remaining 86,8% that we are interested in. On the whole, the sample was quite positive with 25% being very interested and 34,2% quite interested in

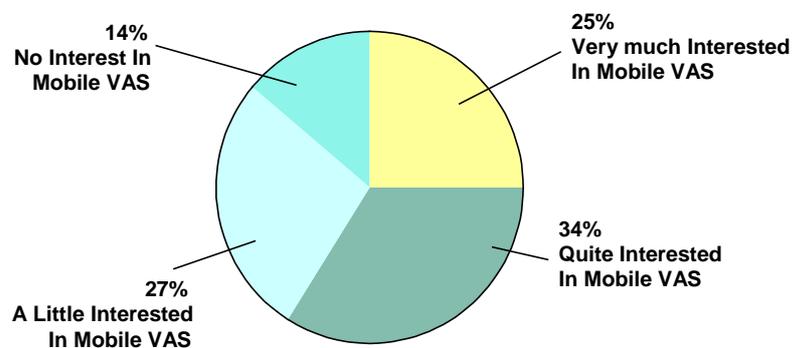


Figure 1: A total of 86% of the whole potential target group shows at least a little interest towards mobile VAS.

mobile VAS. Those that were very interested in mobile VAS are termed as the high interest segment.

The idea was to study the increase in general interest in mobile VAS and spot those characteristics typical of a person in favor of mobile VAS.

Mobile phone experience

Of the whole sample, 77% carried a legacy phone, whereas 12% carried a Nokia 6110 and 11% a Nokia 8110i. However, when we examine those who are very interested in mobile VAS, that is the high interest segment, the figures change quite dramatically to 52% legacies, 16% Nokia 6110, and 32% Nokia 8110i. Quite basically this means that *those people, who are very interested in mobile VAS tend to own more advanced handset*. In fact, the amount of Smart phones tripled within this high interest segment.

Similar results are identifiable among some other background characteristics. In the whole sample, 42% of the people purchased their first mobile phone. While, among the people who were stated to be very interested in mobile VAS only 21% were purchasing their first handset. On the other hand, the relative percentage of people purchasing their third handset rose from 12% for the whole sample to 32% for those very interested. Likewise the relative percentage of people purchasing their third or more handset rose from 25% to 42%. The result implies the underlying reason for buying a new handset. It can be said that *the reason to purchase one's first handset is not to subscribe to mobile VAS*. When purchasing one's first handset, it is more crucial that the device contain more generic level utilities, namely coverage and connectivity. *The demand for the mobile VAS type of augmented product level services tends to rise with the shift to newer handsets*. It is from the new handset that more value is sought.

Technical background

Similarly, the technological background profile tends to be different among high interest segments than with the others. Of the whole sample, 73% had a PC at home, whereas 89% of the high interest segment had a PC at home. Likewise 45% of the whole sample had Internet access at home, compared to 61% of the high interest segment, and 67% of the whole sample had Internet access at work, compared to 83% of the high interest segment. The usage of the Internet tended to increase as one moved toward the high interest segment. Familiarity with information technology and the Internet seems to affect strongly to interest in GSM technologies. The more experience, the more interest there is in combining similar services to GSM. The initial idea of linking GSM to the Internet may thus be even seen as an inevitable and unavoidable outcome.

The usage and experience of SMS seems to correlate with the interest in mobile VAS as well. The whole sample included 77% of SMS-users, whereas the high interest segment included 83%. This rise was not that significant. However, the actual amount of SMS that high interest users send brings more perspective. The non-SMS senders decrease from 26% in the whole sample to 12% in the high interest segment, and in addition, the very heavy users (more than 15 SMS/week) increase from 10% to 30%. In general this means, that prior knowledge and experience of SMS affects one's interest in mobile VAS. The less aware and the less active a person is in the field of technological innovation, the less that person is inclined to be interested in further, more advanced technologies of the same field.

Age, gender, income, and mobility

Among high interest segments the amount of those 18 and under and those between 26-35 years more than doubled. The presence of the 18 and under age group rose from 10% to 22%, and the 26-35 years age group from 23% to a significant 50%. Interestingly, the presence of the 19-25 years age group decreased from 25% to 17%. This brings up the question: "Who pays the bill?" It is likely that those 18 and under do not care about their SMS usage, for instance, because their parents pick up their bills. It may also be that those 26-35 years have company mobile phones that they utilize even in their private life. So they may not worry about their usage of SMS either. On the contrary the 19-25 years are quite likely to be

students and as such, they could be low on money. Value-added services may be seen as extra and unaffordable and are therefore not that interesting. The presence of the 36 and over age group shifted strongly downwards as well. Perhaps their existing ways to accomplish daily tasks have already become routine to a greater extent than with the younger generations. It seems like the younger segments play a bigger role in relation to mobile VAS. These are the same segments that today show heavy use of SMS.

The gender of respondents, as well, indicated some interesting results. The whole sample was almost equally divided into men and women. At first glance it seems that those of both genders purchase mobile phones, and is thus perfect target groups for mobile VAS. However, when we take only the representatives of the high interest segment, 83% of the sample are men and only 17% women. Even though women send SMS, they may not see the value of SMS in connecting to the Internet.

Income seems to also play a role in interest of mobile VAS. Of the whole sample, 76% of households reported earning more than FIM 150.000 annually. In the high interest demand segment the corresponding figure is 83%. The implication may be again the question: "Who pays the bill?" The less monetary issues distract one's lifestyle the more there is interest for value added things such as mobile VAS.

Some more interesting figures are found when we study the mobility of the sample. The sample itself, as intended, consists of rather mobile people. As mentioned earlier, 60% of the sample travels abroad more than once a year. The corresponding figure among the high interest segment is 88%. Further, when we study the hobbies of the high interest segment, the presence of persons interested in outdoor activities rises from the whole sample's 40% to 73%. So mobility itself affects the demand for value-added services independent of time and place.

Those mobile subscribers consisting of these characteristics pose appealing target groups to mobile VAS operators. Typically, the mobile VAS lead-segments consist of these high interest characteristics and segments just discussed. We are still to specify the detailed niches that form the mobile VAS lead-segments.

Existing long-run demand for mobile VAS

At this stage we start identifying the services in demand. The purpose is to first reveal existing longer run demand. Since answers of the whole potential target group are considered, the results implicate longer run demand that is most likely to occur in mainstream segments. The idea is to study what are the typical services in demand among subscribers.

The following table 1 illustrates the demand for the services of the questionnaire. The services are presented in the favored order of demand. The percentage presented in the table is the cumulative percentage containing "would use" and "would be likely to use" answers for the particular service. The table is divided into three sections depending on the respondents general interest level over mobile VAS. This is, the general interest level 1 includes the opinions of everyone, who is interested in mobile VAS a little or more. The general interest level 2 includes the opinions of everyone that is interested in mobile VAS quite a bit or more. The general interest level 3 includes only the answers of the highest interest level segment.

Table 1: Demand of mobile VAS depending on the level of interest

Level 1	%	Level 2	%	Level 3	%
1. Bank	86,4	Bank	93,3 (+6,9)	Bank	94,7 (+1,4)
2. Phonebook	81,5	Phonebook	88,9 (+7,4)	Remote Control	94,7 (+16,9)
3. E-mail	80,0	E-mail	84,4 (+4,4)	Phonebook	89,5
4. City navigation	73,8	Ringing tones	77,8 (+4)	Weather	89,5 (+13,9)
5. Remote Control	72,7	Dictionary	77,8 (+6,6)	Dictionary	84,2 (+6,4)
6. Ringing tones	72,3	Remote control	77,8 (+5,1)	Ringing tones	84,2
7. Dictionary	71,2	City navigation	75,6	E-mail	84,2 (-0,2)
8. Weather	67,7	Weather	75,6 (+7,9)	Travelling	78,9 (+16,7)
9. Pizza Order	59,1	Pizza order	66,7	Businessman	
10 News Items	55,4	Travelling	62,2	City navigation	68,4 (-7,2)
		Businessman		Pizza Order	68,4
11 Travelling Businessman	52,3	News Items	55,6	Stock info	68,4 (+28,4)
12 Big event	37,9	Big event	44,4	Stock portfolio	63,2 (+27,6)
13 Gambling	33,8	Gambling	42,2 (+8,4)	News Items	63,2
14 Sports	33,3	Stock info	40	Gambling	57,9 (+15,7)
15 Stock info	32,3	Sports	37,8	Big event	52,6
16 Grocery store	31,8	Stock Portfolio	35,6	Sports	42,1
17 Stock portfolio	30,8	Grocery store	35,6	Leisure time	36,8
18 Leisure time	27,3	Jokes	26,7	Jokes	31,6
19 Jokes	24,2	Leisure time	24,4	Grocery store	31,6
20 Sunrise	19,7	Sunrise	20,0	Sunrise	26,3
21 Daily biorhythm	10,6	Daily biorhythm	11,1	Daily biorhythm	15,8

No matter how one looks at the results, *the banking services always score the most points*. Even by comparing the means of demands with different interest levels, the banking services always score best. That is, at the highest interest levels almost everyone would demand banking services. From the whole potential target group 86,4% would demand banking services, and from the target group containing lead characteristics, a stunning 94,7% would demand banking services.

From the table it is quite obvious what kinds of services are desired and in demand. As the demand for mobile VAS generally rises, the demand for particular services usually also rises. Some services, for example, stock related services, face significant growth in demand in the high interest segment.

In addition to banking services, phonebook access and e-mail types of services seem to be very successful. The demand for these seems to be on a very high level throughout the whole potential target group. Also, ringing tones and futuristic services such as remote control seem to appeal to the potential markets. Such services as dictionary queries and weather updates seem to appeal on a rather good level, and city navigation services on a moderate level.

Some services generally face poor demand. For instance, only 24,2% of the whole potential target group say they want joke services. Sunrise information is feasible for only 19,7% of the potential target group and daily biorhythms would appeal to only 10,6% of the target population.

How are different services seen by end users?

By further studying the characteristics of the services in demand, we can see in the broader meaning what characteristics and attributes the exact services represent. This is crucial for making marketing implications. Beneath in table 2 are attributes of three very different in demand services: the banking services that belong to the most in demand services, the news items that belongs to the rate level demand service category, and jokes that belong to the level demand service category. The percentage figure presented in the table refers to how strongly that attribute contributes to the image of the service. For instance, 89% of the allowed sample (that is everyone who shows a little or more interest towards mobile VAS) says that banking services are personal, whereas 89% reports joke services as belonging merely to leisure time.

Table 2: The service attributes

Bank services

Personal	89%
Useful	86%
Both work and leisure time	56%
Pragmatic	83%

Joke Service

Mass service	58%
Useless	69%
Leisure time	89%
Entertaining	99%

News

Customizable	41%
Useful	73%
Both work and leisure time	55%
Pragmatic	77%

Basic service categories

Services can commonly be categorized as *entertainment* (for example a random joke service), *infotainment* (for example a news service), or *transactions* (for example banking, e-mail, phonebook, and remote control services). The first two can be held as pure content provision services. Transactional services are typically services that involve a functionality, that is, an event that occurs as a result of service execution.

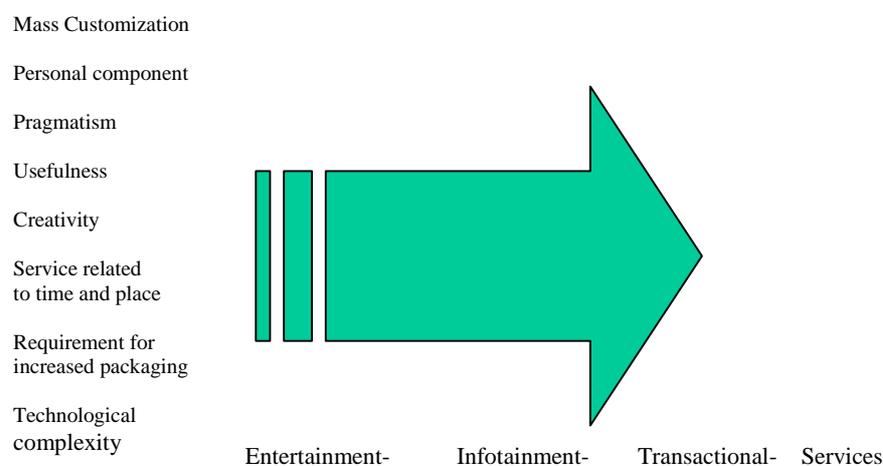
Typically *entertainment services* facing lowest overall demand are the services that are interpreted as being mass services. Most importantly, these are the services that are reported as being the most useless. Their function is merely to provide entertainment for leisure time usage.

In turn, *infotainment services* facing moderate level demand are reported as being quite the opposite of entertainment services. They are seen as pragmatic and quite useful services. The distinction between mass and personal service is no longer so clear. The source for the interest is the personal component of content. For instance, one may request for the stock quote of one's personal portfolio, a weather forecast of the city where one's summer cottage is located, or the translation for a Finnish word in the language of the country where one happens to be. The distinction between user role is not that clear either since these services can be used for both work and leisure time.

Transactional services face the highest level of overall demand. These services are used to perform a routine daily task. For instance, a banking service may be used for personal money transfer, a remote control service may allow one to control personal devices of interest, and a phonebook service may be utilized for initiating a call. Transactional services are mostly seen as very useful, personal services. The utilization of these services does not know the limits between work and leisure time. Further, different types of people use these services for customized purposes. *The transactional services are thus very feasible for mass customization.* The entertainment here may be seen as creativity. Downloading a personal ringing tone to a mobile phone is but useful also creative and thus entertaining. Transactional services are the kind of services where mobility adds most value. The daily tasks need to be performed somehow, and sometimes the mobile phone provides the most feasible means.

The following figure 2 summarizes characteristic differences between entertainment, infotainment and transactional services.

Figure 2: Characteristical differences between service categories



Towards transactional services the weight and importance of those characteristics illustrated on the left hand side of the figure grows. These are overall the most valued characteristics of the value-added services.

There exist naturally services that do not quite fit any of these three categories above in terms of demand. For instance, the grocery store service faces very poor demand, but could still be categorized as a transactional service.

Table 3 represents the services of the questionnaire in the three different service categories. When comparing table 3 with table 1, the correlation between service nature and overall service demand is quite well visualized.

Table 3. Service categories by service nature

Entertainment	Infotainment	Transactional	Outcasts
Big event	Dictionary	Bank	Gambling
Sports	Weather	Phonebook	Grocery store
Leisure time	Travel	Remote Control	
Jokes	City navigation	Ringing tones	
Sunrise	News	E-mail	
Biorhythm	Stock	Pizza Order	
	Stock portfolio		

The services in the Outcasts category of the table actually belong to transactional services. These services are presented, however, separately since they face a different type of overall demand than the other transactional services. In fact, in terms of overall demand they are similar to entertainment services. The biggest reason for these services not facing such large overall demand is their inability for efficient mass customization. Instead, their usage occurs more or less on a narrow niche level.

Important service characteristics

From the results discussed above we can draw several marketing implications.

The personal component of the services seems to be a very important one. Those services in demand the most are those that are personal; a banking service to control one's personal accounts and money matters, an e-mail service to control one's personal messages, and a remote control service to control one's personal devices. The ringing tone service, on the other hand, turns one's mobile phone into a personal device that can be recognized from the masses.

Mass customization can't be separated from personal services. *The most in demand services enable a wide range of mass customization.* Different people, for instance, may utilize E-mail, quite divergently and for different purposes. There may thus be identified several subscriber groups that utilize the same technical solution for rather different purposes. The usage of services is not limited to the "one person, one role". The same service may be accessible in one's private life as well as at work.

It seems to be very important that common, every day services are accessible independent of time and place. This means that the really in demand services are such, *where mobility actually adds value.* For instance, it may be very important to have access to e-mail all the time without having to carry a laptop. On the sea or at a leisure home it may be important to find out the weather forecast. In a restaurant it may be important to check the translation of a word. While on the move if you do not remember your friend's or business colleague's phone number, the best way to get it might be with your mobile phone.

Closely related to the importance of mobility is the importance of *information tied to time.* People do not see it crucial to have a piece of information, when it is not crucially important. Results show that certain services may not seem as appealing, for instance news items, sports results, stock updates, and the purchasing of groceries. Such things one may as well handle at a later time. The information that is most in demand is that information that is personal and that one needs at a certain moment regardless of where one is. This is especially important when there is a lack of a better way to get information or handle a matter.

Importance of communications related services is clearly visible. E-mail and phonebook services relate directly to communications, whereas banking in the form of transactions may also be seen as communications. The concept of unified messaging is thus extremely interesting especially in meeting long run demand. The concept and underlying idea of unified messaging is to integrate e-mail, fax, voice mail, and SMS services. Our results on the popularity of communication related services encourage this direction.

The technological complexity of these services in demand varies a lot. Those services most desired would seem to require quite advanced technologies. Although a variety of services in demand can already be implemented with existing technologies. Nokia Artus Messaging Platform and Smart Messaging, namely TTML, may be utilized already today for advanced services such as ringing tones, phone catalogue service, as well as versatile travel-, weather- and dictionary services. The menu structures and understanding of various message formats enable reasonable usage convenience. Unfortunately, in terms of technical background, most of the subscribers of the sample may not quite yet utilize these services. The amount of Smart phones is so small that in terms of technological complexity services, concentrating on the legacy phones while preparing for the future is the only recommendable option. This sets the marketer of the VAS into a quite awkward position. On the other hand, there would seem to exist long-

run demand for several services that could be implemented right now, but the markets lack the technology to efficiently utilize the services.

There are, however, some services, even among those most in demand, which may well be applicable to legacy phones. For instance, dictionary and weather services may be implemented with legacy phones as well. This requires, however, reducing the menu hierarchies and thus compromising on service functionality.

Those services that offer real value are most in demand. Merely entertainment is not seen as that appealing. Merely entertaining services scored the lowest scores in the whole study. Low scorers were joke services, leisure time service packages, sport results, and lottery numbers, all of which to some extent serve almost no other purpose than entertainment. On a mobile phone, entertainment is more or less seen as time consuming instead of as a convenience. So, using mobile phones for services needs to offer some degree of real personal value.

The need for mobile entertainment services should not be completely underestimated though, since certain niche markets may well find their hobbies via mobile phones. Young people actually enjoy playing with their mobile phones and amusing themselves with its services. Even though general statistics do not report massive enthusiasm for mobile entertainment, there may well be an important niche of, for example, adolescents. This is because of their massive usage of services. Further, their seeking of entertainment is almost as if transactional. In other words, when they use entertainment via a mobile phone, they are actually accomplishing something.

The need for operators to offer services or service packages is obvious at least in the long run. Markets see operators as service providers. Many of the services most in demand are by nature subscribed to separately, for example, banking, e-mail, and intranet services. Also, all services that offer reliable, branded content (for example weather and travel info) are operator specific services. Operators offer these services to differentiate from their competition. The subscriber utilizing these services will often become to some extent tied to a particular operator who happens to offer an interesting service package or range of services.

The service characteristics discussed above are *typical of long-run mobile VAS demand*. These services become profitable to the operator because they allow *personal, mass customized usage*. Different types of people, for example, people of different ages, use the same services for personal, customized purposes. Further, the same people use the same services while having different roles.

Lead demand segments and services

The target groups most in favor of mobile VAS are typically *young, male, technically very advanced, heavy users of SMS, and rather mobile people*. In addition to this they are not likely to pay their own phone bills or are otherwise not overly restrained by monetary matters.

In addition, we have identified those characteristics of services that ideally appeal to markets. For example, the markets state that they require and demand transactional services. Typical elements for transactional services are personality, independence of usage role, pragmatism, to some extent creativity, as well as usefulness and real added value of accessibility independent of time and place.

Unfortunately, technical complexity is also typical of transactional services. The forced, awkward position at this point is to state that markets are not yet technically ready for their desired and announced demand.

The lead-segments compose of technically advanced people who are aware of SMS technology. In addition to simple SMS usage the lead-segments are already aware of mobile VAS and have already used the services. The really heavy users of SMS within the potential market are the young people, that is,

people 35 and under. These people are also likely to carry a more advanced handset. Young people may be divided into age groups of 18 and under, 19-25, and 26-35. Definite differences concerning the characteristics of these age groups appear. Table 4 presents lead-segment categorization and describes typical background characteristics for each age group and the corresponding segment.

Table 4: Lead-segment categorization according to typical background characteristics

18 years and under – The adolescent segment

- Heavy SMS users (more than 8 mobile originated SMS/week)
- Aware of and have used mobile VAS
- Of both genders
- Unlikely to be restrained by monetary issues as their parents pay the bills
- Living with their parents
- Quite familiar with Internet technology
- Very mobile people, participating actively in sports and outdoor activities.

19-25 years – The student segment

- Heavy SMS users (more than 8 mobile originated SMS/week)
- Aware of and have used mobile VAS
- Male
- Possibly restrained by monetary issues
- Students
- Internet and information technology literate
- Very mobile people, participating actively in sports and outdoor activities.

25-36 years – The business segment

- Moderate SMS-users (1-7 mobile originated SMS/week)
- Aware and have used mobile VAS
- Male
- Not restrained by monetary issues
- Highly educated, working on the managerial level or as an expert
- Internet and information technology littermates
- Very mobile people, participating actively in sports and outdoor activities.

Those 18 and under and 19-25 are the really heavy users of SMS. The amount of SMS sent by these age groups exceed 8 SMS/week. The 26-35 age group does not use SMS so heavily, in fact only about half of the amount of those 25 and under, but still they form about 50% of the lead-segment. In terms of size the 26-35 age group forms a very appealing target group for mobile VAS. Monetary restraints are less visible for those 26-35 than those 19-25, who as students tend to often face monetary restraints.

The 19-25 and 26-35 age groups are most likely to be male. With the 18 and under age group one's gender does not make a difference in interest of mobile VAS. All these segments are quite technically conscious, and thus utilizing the Internet, for instance, has become a daily routine. Comparing the general interest level in VAS and the type of the handset one carries shows that these segments are more likely to carry a newer handset than the rest of the market. The segments are rather mobile and the need for mobile VAS is thus increased.

The background characteristics of these three segments appear somewhat similar. The major difference is the existence of females in the 18 and under age segment, whereas females are not present in the other lead-segments. Also, money has a significant effect. The most appealing lead-segments are the ones not paying their own phone bills. Whereas background characteristics to lead-segments are somewhat similar, the nature of service usage and the source of demand within lead-segments varies a lot.

Adolescent segment: Heavy users of entertainment services

The relative importance of transactional services decreases dramatically for the 18 and under age segment, the adolescent segment. Whereas, in general, transactional services were the most appealing ones, the adolescent lead-segment does not see their value. Whereas 63% of the potential target group stated that they would certainly use an e-mail service, only 25% of the adolescents felt similarly. Also, 25% of adolescents felt that they would not need banking services at all. The corresponding figure with the potential target group was only 7%. Similar findings were found with almost all of the services that we categorize as transactional services. The phone book service loses its significance, 50% sees pizza and gambling services totally unnecessary, and no one would use a grocery store service. The transactional services that remain appealing are the ones with personal status indicators or entertaining functionalities. Services such as a remote control service and a ringing tones downloading service remain heavily in demand.

Pure infotainment services do not appeal to the adolescent segment. In fact, 75% state that they have no need for news or stock information nor services such as city navigation services. Also, 50% feel that travel and weather services are unnecessary. The figure is high since from the whole potential target group only 11% report weather services and 16% travel services as being totally unnecessary. One infotainment service that actually remains in demand is the dictionary service.

There are striking results when we look at the adolescent demand for entertainment services. Typically entertainment services face the lowest demand, but the adolescent segment reports otherwise. For instance, 58% of the whole potential target group state that they would not use a joke service. The corresponding figure for adolescents is 25%. In addition, about 50% of the adolescents would consider using services related to, for example, sport results, sunrise information, and daily biorhythms.

Keeping in mind that the adolescent segment composes of heavy users of SMS and mobile VAS conscious people, the segment poses a very appealing target group for mobile VAS operators. This segment demands services with the entertainment component. Simple, merely entertaining services are seen as worth trying out and spending time with. The personal component is also held important. The entertainment services with personal status indicators are of the most in demand. So a remote control service and a ringing tone downloading service would to a great extent appeal to this segment. Pure pragmatic infotainment services are not seen to add value and are instead seen as uninteresting.

The demand for the adolescent segment can technically be easily met today. Adolescents already carry phones capable of, for example, ringing tones downloading services. Only the remote control service is technically out of range. The importance of personal entertainment may even further encourage the purchasing of newer phone models. The adolescent segment may be seen as a "Would buy TTML" segment. The segment reports to being technically quite advanced and using simple services with current technologies does not pose a problem.

Those services in demand relate strongly to leisure time. By nature, the services are used separately, instead of as part of specific "service packages". They do not offer any pragmatic solution to subscriber needs, but merely entertainment. The services are easily customizable, and the more there is the possibility of customization (for example, with ringing tones), the more there is a demand for the service.

The operator revenue potential from this segment is enormous. The usage of SMS is high and those belonging to this segment are unlikely to pay their own phone bills. In addition, the status element of those services in demand causes an interesting effect within the adolescent segment. There is a "jungle drum" effect that often appears, for instance, after one person receives a funny joke. The joke is then forwarded to a number of friends, who react in the same fashion. The amount of mobile originated SMS sent multiply in the process.

As a lead-segment, adolescents open up the way for other segments to use mobile VAS. Adolescents show how easily technology can be used and in the best case they even educate other segments in using mobile VAS. Today it is quite common for children to teach their parents how to use a mobile phone or

related technology, or to even recommend which mobile phone to purchase. The diffusion of technology is likely to occur via this segment.

Further, adolescents are the students and businesspeople of tomorrow, thus making use of the learned, rooted technologies then. Tomorrow, they will continue utilizing the technology but most likely in a different manner. In the long run, entertainment services may not be that appealing, and the shift through infotainment services ultimately to transactional services is likely to take place.

Student segment: Actively searching for services that add value

The 19-25 year old lead-segment, the student segment, has different kinds of VAS preferences. In general, they have a very positive attitude to those services that add direct value. In fact, their attitude compared to the other segments seems overly positive. The results are in some cases so positive that one has to read them cautiously. It may be that what this segment says could be a bit misleading. However this segment is not afraid of using the technology at hand, if by doing so they are able to complete a particular task. Transactional services face very high demand. E-mail, remote control, banking, phone book access, ringing tones, pizza delivery and even gambling services all face very high demand. All of the services above are meant for performing specific tasks. The tasks relate to everyday student life, no matter if it is private, school, or work. Students are mobile people and they seek alternative ways to perform their daily tasks. Their lifestyle seems to fit rather nicely with mobile VAS usage.

Most transactional services, as stated earlier, require a level of technology too advanced for today's markets. For today's students, however, there are plenty of services already available. The student segment reports demand of pragmatic infotainment services. Dictionary, weather and travelling types of pragmatic services are of very high demand. These services relate to the high mobility of students.

Also, those entertainment services that offer something personal and something practical are of demand. Examples of such services are sports services for following big events and services for new ringing tones. Even jokes seem to appeal. For example, the sports services that we have earlier categorized as pure entertainment services are actually quite pragmatic and personal for student segments. This relates to their hobbies. Students are active in sports and following sports via one's mobile phone actually relates to following their personal source of interest. Also, the student segment seems to be the *gambler segment*, thus most likely interested in, for example, mobile gambling. It might also be a very useful service to follow sports reports in terms of gambling. So services are not used for merely consuming time and entertaining oneself, but there is a logical and pragmatic reason.

The services that students do not request for are those services of no real value. In fact, the fact that this segment is price sensitive adds to the requirement for real value. The services offering no real value are typically pure entertainment services such as daily biorhythms and sunrise information. Also, 67% report city navigation services and grocery store services as totally unnecessary for them. Actually, these services do not add any real value for students. They most likely know their way around the city, and grocery shopping is seldom required at a certain time. Instead, students seek value while on the move. They seek for the easiest and most effective way to fetch a certain piece of needed information or a certain needed service at a certain moment or place. Mobile phones make excellent means for such. Since this segment is very mobile and not afraid to utilize technology, it offers operators a nice platform for VAS growth. Technically, the student segment may also be termed as a "Would buy TTML" segment.

Business segment: Practical, transactional services

For our third lead-segment, the age group of those 26-35, different norms must be applied. This segment may be called the business segment. The business lead-segment is about half the size of the whole potential target group; that is, it is the largest lead-segment in terms of size. The adolescents and students, in turn, were stated to be the volume users. For the business segment, pure entertainment does not seem to add any value. So, 80% state joke services as being totally unnecessary and no one would use a daily

biorythm service. From our lead segments, the business segment may be seen as the most "reserved" and skeptical segment where general attitudes towards mobile VAS are concerned.

Like the student segment the business segment seems to be willing to accomplish their daily tasks via the mobile phone. Transactional services such as banking, e-mail, and remote control are listed as high demand. However, the same technical limitations for these services to become real lead-services apply. The business segment places a significant amount of weight on pragmatic infotainment services. About 80-90% of the business lead-segment reports a need for city navigation services, travel services, dictionary services, and weather services. These are the kinds of services that one requires while mobile. Also, 80% would have a need for news items and would have use for stock services.

Like the student segment, the business segment also consists of very mobile people. The difference compared to the student segment is that they put more weight on business-like information. Information on leisure time related topics are of less value and pure entertainment provides the least amount of value for this segment. Categorizing young, highly educated business people as the mobile VAS lead-segment also implies that these persons technically meet the requirements of the "Would buy TTML" segment.

The three lead-segments defined above all have something in common. Even though most of the transactional services are today not applicable for these markets, there are plenty of services that can very well be provided. *It seems to be a good idea to start with simple entertainment and infotainment services and prepare for transactional services once the markets are technically aware enough.* Simple services act as educative tools to boost the later more complex and diversified utilization of mobile devices. The lead-segments today are all young and definitely the future users of mobile VAS. Today, these segments can already be offered something that they receive value from.

The usage conditions for mobile VAS

For new technology to be adopted by lead-segments, and eventually diffuse to mainstream pragmatist markets, the diffusion barriers, that is, service usage conditions, need to be well addressed.

Possible psychological and technological barriers

The first diffusion barrier that is encountered is the technological diffusion barrier. Those services that are in demand and require advanced technologies may not yet be adopted by lead-segments. Eventually, when the technology diffuses from lead-segments towards lag-segments, it may be that the technology no longer poses a diffusion barrier for identified demand. At the moment, however, this diffusion barrier may be the most visible.

Typically our lead-segments composed of technologically conscious young people. They were in favor of technology and were thus more or less willing and capable of utilizing new technological innovations. Sometimes, it may however, appear that diffusion is hindered because markets are *unwilling to utilize a new technology*. This type of diffusion barrier does not have to do with user experience or the technological complexity of the service, but is merely psychological or social. Some people simply resist performing old tasks in a new way.

This type of diffusion barrier seems to increase along with an increase in age. Younger people seem to even desire new technologies and enjoy mastering them, whereas for elder segments new technologies tend to pose some fears. In our group interviews this type of fear did not exist. Our lead-segments were not technology reluctant. However, it was obvious that the business segment questioned the new technology more than other lead-segments, and the student segment questioned the new technology more than adolescents did. Older segments required more rationale and real value, and new technology was only accepted if it proved to solve problems.

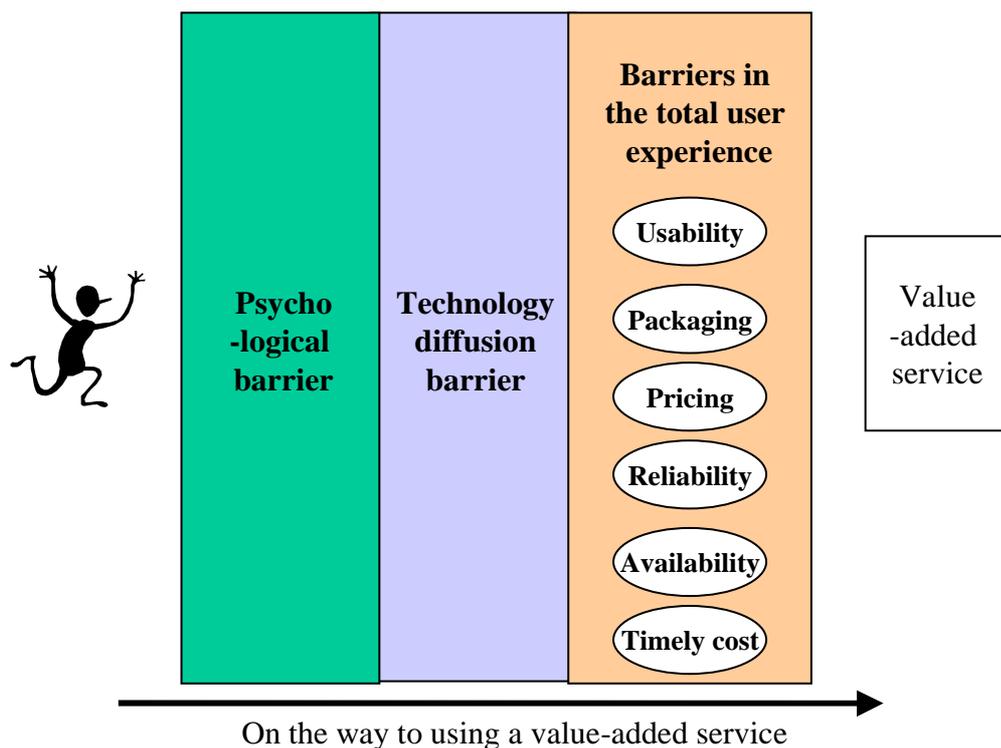
Psychological or social resistance can exist in a person, but it can also "be produced". For instance, a push service that was activated without subscriber permission was seen extremely negatively. The strongest opinions came from the representatives of the business segment. One comment was, "I was in a meeting and received an SMS. I was expecting one so I went out of the room to see what it was all about. It turned out to be a direct marketing message, which made me furious. I turned off my phone." Further, the idea of utilizing the knowledge of a subscriber's location for direct marketing was not received well. Becoming a victim of location based direct marketing via SMS was said to result in the turning off of one's mobile phone and the changing of one's operator. Creating technological reluctance is perhaps one of the most efficient ways to prevent mobile VAS diffusion. In the worst case the operators themselves turn the markets against mobile VAS by overly pushing the technology.

The total user experience

According to the results of the group interview, the total user experience is seen as highly important. Without a doubt it was agreed in the group interview that the services with poor user experience will not be subscribed to. The user experience was commonly seen as improving after changing from a legacy phone to a Smart phone. The shift in technological advances thus directly affects the user experience. The newer and more advanced the technology - SMS, TTML, or WAP - and technical device - legacy phone, Smart phone, or WAP phone - the better the user experience is expected to be. All the technologies required for the service affect the user experience. This means that not only the mobile handset or technology used but also the developments of the whole GSM and Internet infrastructure have direct effect on user experience. So the technology diffusion barrier affects almost all other diffusion barriers. The identified layers of diffusion barriers are illustrated in figure 3, and the causes for these barriers are discussed next.

Firstly, the degree of service tangibilization affects greatly the user experience. The lack of high-tech service tangibilization may act as a perceptible diffusion barrier. Service tangibilization may be seen as a combination of service usability, packaging, pricing, reliability, and availability.

Figure 3: Possible diffusion barrier layers



Usability

It seems to be more or less a necessity that the services enable feasible usage convenience and ease-of-use. Service usability acts thus as a possible diffusion barrier. Plenty of downsides were seen in mobile VAS usability, mainly concerning legacy phones but also Smart phones. The parameters required by services were stated as being very hard to know or recall. The Smart phone menu structure partly solved this problem with usage instructions, storable menus, pre-defined selection lists, and form options. English, as a service language did not bother the lead-segments. However, the Smart phones faced criticism in their fixed menu names and soft key names. The concept of form was not clear to users, and the whole logic of service usage was seen as somewhat confusing. The usage of the services also required too much technical expertise and experience from the end user. However, after using the services a couple of times, our lead-segments reported the services as being rather easy to use. One comment was, "Simple mobile VAS usage with a legacy phone is easy, if one already knows how to use original SMS".

Packaging

The packaging of services was seen important to make services tangible entities. Even simple services were better off if they were grouped into entities. Especially the Smart phones were seen well in packaging the services into rational entities. The need for packaging increased for transactional services that by nature are subscribed to separately. Also, those services that are available only during a pre-defined period of time, such as sports events, were seen as services that would be nice to order separately. For example, the on-going soccer World Cup was the kind of service that the lead-segments wanted to order separately as a whole tournament long package. Requesting for individual bits of information was seen not that appealing for such applications. Push functionality was typically seen to fit nicely into service packages ordered separately. Lack of efficient packaging was seen to decrease the probability of subscription and thus act as a possible diffusion barrier.

Price

The price of the services posed an interesting question. Too high a service price definitely acts as a diffusion barrier. With pricing it became obvious that subscribers made a difference on whether they were paying for service access or for service content. This derives from subscribers having been used to Internet usage, and seeing mobile VAS as a similar solution. Internet offers mostly free content, but access to the Internet costs. For the mobile service access they were willing to pay the price of one SMS, thus USD 0.20. Most of the services were seen to be the kind that would only justify the spending of the cost of access. Typically these were the services that offered no real value.

Interestingly, the mobility itself as a parameter showed to affect the service price justification. The extra cost for content was allowed, if the service offered a relative advantage. The more important it became for the service to be available at a certain time or place, the more there was justified an additional cost to the service. For instance, if dialing 118 (the Finnish phone number for inquiring about phone numbers) costs USD 1.20, our participants would be willing to pay USD 1.00 for an SMS based phone inquiry service.

Also, those services that decreased other costs (for example, time or psychological costs) were allowed an increase in monetary cost. For instance, if the SMS-based bus schedule would prevent unnecessary waiting time at the bus stop, there could be an increase in the cost in the service price. An interesting finding is that services were stated to be of the same monetary value independent of the phone used. The usage that takes place with a more advanced handset and more convenient technology does not justify a higher price. The subscribers are thus not willing to pay for the convenience of use. Typically users would want to pay for the services based on usage. The push services, however, could be purchased and paid for as a whole.

Reliability

Reliability was commonly expected from the services. Without reliability the service subscription was seen as impossible. Reliability may be divided into security issues, service downtimes as well as the reliability of the content itself.

The importance of security issues was relative to the type of the service. The more the service in question required and revealed personal information, the more was expected from security. Typically our lead-segments believed in the capabilities of technology. Therefore, what they expected was a reassuring statement of security. They stated that they would believe that, for example, banking services were secure if they were assured so. Without a reassuring statement of security and an emphasis on security issues, however, they would not enter, for example, their bank account password into a mobile query. The existence of goodwill towards technology among lead-segments helps the marketer overcome diffusion barriers concerning service security.

The reliability in service functionality, that is, service downtimes, was of great importance. Firstly, the lead-segments did not care where the bottleneck was located. The network operator (or the party, from whom the service was purchased) was to be blamed in case of service malfunction. In the long run, an average of 95% successful queries was expected. Malfunction every now and then was acceptable, especially if the reason is explained and understandable. Therefore, error messages such as "Data not found for query, sorry" were seen as not understandable or helpful and thus irritating. Instead, error messages promoting usage instructions or explaining the real reason for query failure were seen as acceptable.

The strongest type of a reliability related diffusion barrier was the reliability of the content itself. By default it was expected that the information given by services is correct and true. The usage of services was not seen exactly the same way as browsing the Internet. For the information that was fetched by browsing the Internet, nearly everyone reported that there is a known chance that the information may be out of date or even totally incorrect. Mobile VAS, on the other hand, were seen as operator specific services. The operator in turn was seen as a reliable party offering only reliable services. If it turned out that the services provided by the operator contained false information, it could be a sufficient enough reason for the changing of one's operator. Especially the business and student segments, which tended to request information services of real value, felt strongly this way. The knowledge of the actual content provider was not significantly important. However, when asked, nearly everyone stated that they would find CNN news more reliable than news by the operator or an unknown party. In addition they stated that "it would be nice to know who provides the content, but it is not a necessity". It is thus preferable, but not absolutely necessary for operators to provide branded content.

Availability

The awareness of service and technology availability may as well act as a diffusion barrier. Availability has to do not only with the marketing efforts but also the start-up process of service usage.

It is fair to say that without reasonable marketing effort no diffusion will emerge. If one does not know that a service exists, one does not use the service. If one does not know how to use the service, one does not use the service. No one seems to be willing to read manuals to learn more about service usage. The education on service existence and usage is thus required. Tangibilization needs to take place also in tying the services to specific handsets. One may have heard that a new kind of VAS exists, but does not know that they are available with one's particular mobile phone as well. In the group interviews participants were typically surprised to find out that the services already functioned with their existing handsets.

Once one is aware of service existence and willing to utilize the service, one has to take the service into use. Significant problems were faced especially in the start-up adoption of the service. All kinds of configuration were deemed unnecessary and irritating. The end-user should be shielded from all kinds of configurative actions and should be provided with a ready-to-go solution. Interestingly, everyone still

reported being willing to set up time- or event-based triggering via a Web interface in order to subscribe to a specific push service. On the other hand, everyone hated the idea of self-configuration. The question is thus, what is it that they are actually configuring? Configuring access was seen negatively whereas configuring a personal service was seen positively. There is thus a definite difference between self-configuration and self-provisioning.

Timely cost

In addition to degree of tangibilization, other factors may also affect the user experience and thus act as diffusion barriers. Timely manners for instance relate heavily to user experience. Very different views concerning the appropriate waiting time for the service were reported. The answers varied from immediate replies to a ten-minute reply delay. It was commonly agreed that as long as one is not kept waiting it is acceptable. This would generally require a reply time of less than ten seconds. This is relatively good news, since it usually takes from five to seven seconds to complete a query. For push services, timely manners did not play that big a role except for those push services that were subscribed based on a time trigger.

Conclusions

Without lead users the diffusion of mobile value-added services to mass markets and thus standardization of new technology will not take place. Although markets today are technically not in a very advanced phase concerning mobile VAS, this merely means that highly advanced mobile VAS solutions can not yet be offered at least to mass markets.

Of the entire sample in this study, 86,8% stated that they are at least a little interested in mobile VAS. On the whole, the sample was quite positive with 25% being very interested and 34,2% quite interested in mobile VAS. Those that were very interested in mobile VAS are termed as the high interest segment. The target groups most in favor of mobile VAS are typically young, male, technically very advanced, heavy users of SMS and rather mobile people. In addition to this they are likely not to pay their own bill or are otherwise not overly restrained by monetary matters.

Services can be categorized as entertainment, infotainment, and transactions. The personal component of the services seems to be a very important one and the services most in demand enable a wide range of mass customization. They are also those services where mobility actually adds value. Users demand services where information is tied to time and real value is offered. Merely entertainment is not seen that appealing. The markets state that they require and demand transactional services. Typical elements for transactional services are personality, independence of usage role, pragmatism and to some extent creativity, as well as the usefulness and real added value of accessibility independent of time and place.

Unfortunately, technical complexity is also typical of transactional services. The forced, awkward position at this point is to state that markets are not yet technically ready for their desired and announced demand. It seems to be a good idea to start with simple entertainment and infotainment services and prepare for transactional services once the markets are more technically aware.

For the new technology firstly to be adapted by lead-segments, and eventually to diffuse to mainstream pragmatist markets, the diffusion barriers, that is, service usage conditions, need to be well clarified and managed.

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