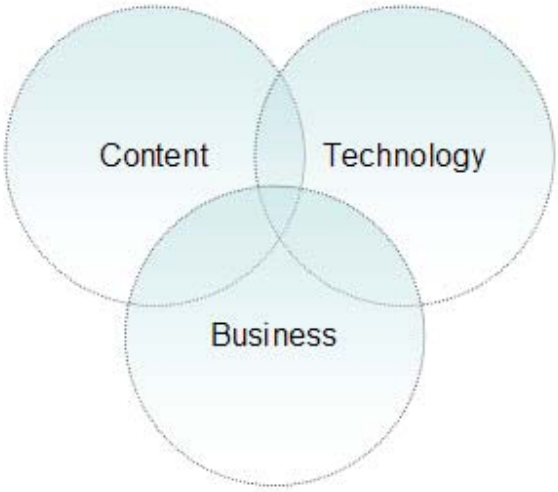
White book on M-services



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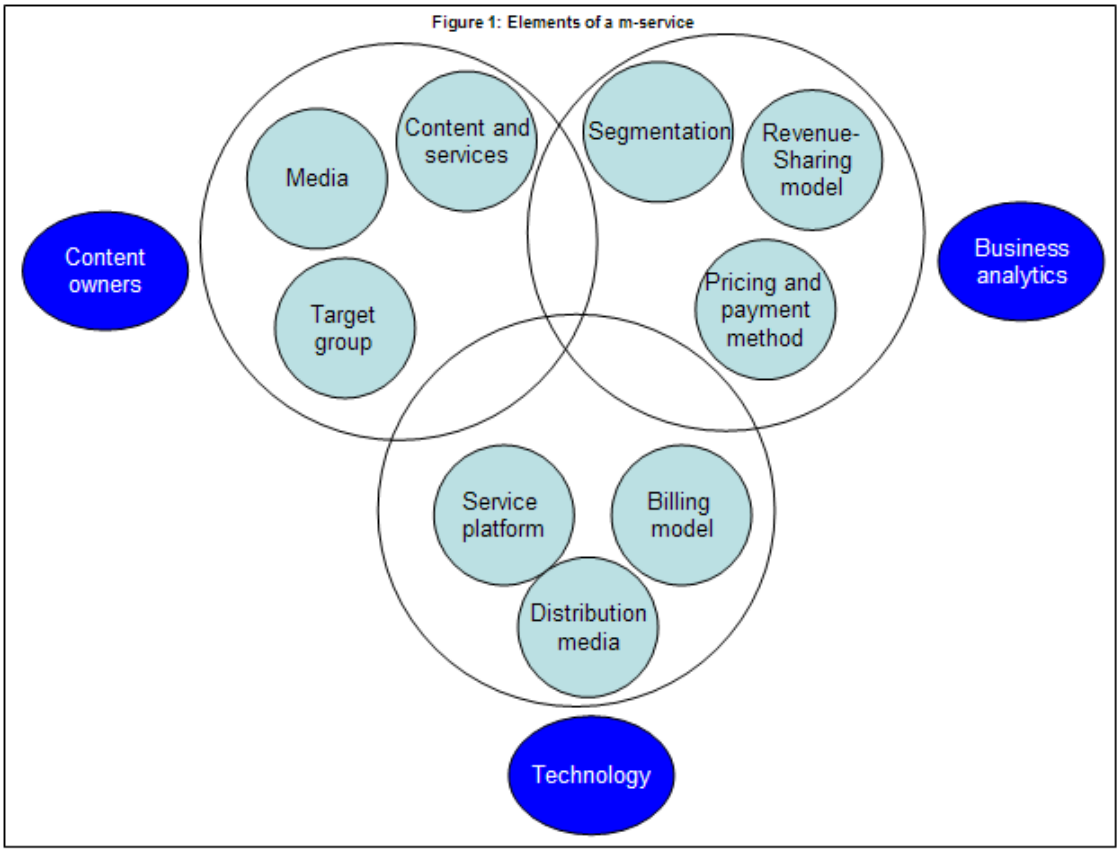
Introduction

The convergence of the two fastest growing communication technologies of all time, mobile phones and the Internet will potentially make possible the introduction of all kinds of new services. A mobile internet connection differs from traditional fixed internet in that 1) a mobile terminal is a far more personal devise to its user than a PC (it is usually only used by one person who carries it most of the day), and 2) network operators can determine what menus and services appear on their users' mobile terminals whereas PC users can easily alter settings. The Mobiconomy project aims at utilizing new and existing technologies and the properties of mobility to launch a variety of new context depended mobile services.

The background for this white book is the development of novel m-services in the Mobiconomy regime. The point of departure is the model for thinking about m-services presented by Hewlett-Packard, which is portrayed below in a modified version.

Figure 1: Elements of a m-service



Here we will shortly attach some remarks to the different elements of the model. Our aim is not to provide a comprehensive guideline for designing m-services. Instead the purpose is to inform and provide inspiration for novel ways for the partners to consider the various elements that together comprise an m-service. The figure above portrays the HP-model. Staying loyal to the model we first discuss the three bubbles of the content owners: content, media and target group. Hereafter, we move on to demographics, revenue-sharing models and purchase methods. Finally, the billing models, distribution media and service platforms are described.

With the purpose and the structure of the white book clarified we now move directly into the individual but mutually interdependent elements of the model. Enjoy!

The Mobiconomy Research Group, Copenhagen Business School, June 13 2003.

Table of Content

1 CONTENT AND SERVICES 6

1.1. CONTENT 6
1.1.1 Information 6
1.1.2 Entertainment 7
1.1.3 Education 8
1.2 SERVICES 8
1.2.1 Communication 8
1.2.2 Transformation 10
1.2.3 Surveillance 10
1.3 MIXED CONTENT AND SERVICES 11
1.4 CONTENT, SERVICES AND NETWORK EFFECTS 12

2 MEDIA 13

2.1 THE DEVISES 13
2.2.1. Mobile phone 13
2.2.2 PDA (Personal Digital Assistant) 13
2.2.3 Other 14
2.2 FORMAT 14
2.2.1 Text 14
2.2.2 Audio 15
2.2.3 Images 15
2.2.4 Multimedia 15
2.2.5 Streaming 16
2.3 FORMAT AND CONTENT 17

3 TARGET GROUP 18

4 SEGMENTATION 19

4.1 DEMOGRAPHIC SEGMENTATION 21
4.2 BEHAVIOURAL SEGMENTATION 22
4.3 PSYCHOGRAPHICS SEGMENTATION 26

5 PRICING AND PAYMENT METHOD 28

5.1 MOBILE PAYMENT SEGMENTS 29
5.2 TRANSACTION MODEL 30
5.3 PRICING 30
5.3.1 Per time unit 30
5.3.2 Per megabyte 31
5.3.3 Per service unit 32
5.3.4 Subscription to service 33
5.3.5 Bundling 34
5.3.6 Free 35
5.3.7 General remarks 35
5.4 CRITICAL ISSUES 36
5.5 EXAMPLES 37

6 REVENUE SHARING MODELS 39

6.1 PRESENT TARIFF STRUCTURES 39
6.2 NEW PAYMENT STREAMS WITHIN THE MOBILE INTERNET 40
6.2.1 Reverse charging 41
6.3 OPERATOR-CENTRALIZATION – DEVELOPMENT AND MARKETING OF M-SERVICES 43

7 BILLING METHOD 48

7.1 CONTENT VALUE 48
7.2 WHO SHOULD HANDLE THE BILLING? 48
8 DISTRIBUTION MEDIA 50
APPENDIX 55

1 Content and Services

In this section we will describe several categories for content and services. The main goal of the section is to enable content providers to identify what category a certain provided service belongs to. The categories are defined primarily from the interaction between the users and the service provider. One promoted service from a content provider may in fact consist of two or more types of services. The main reason for stating the type of service is to make content providers more able to state the optimal media for you service later, and as a fundament when developing the revenue sharing model for the service(s).

1.1. Content

The types of content are divided into three categories, with one or more sub-type with in each category. The three categories are: information, entertainment and education.

1.1.1 Information

In general information services is closely related to news information services, but not necessarily. The critical issue is to provide correct and relevant information on the right time. News fast becomes old news.

- *Simple Information provision*
  Content owners decide the exact content and time it is provided. This is much like TV and radio channel to day – a one-way type of communication. The user only has two options: to receive or not to receive the information.
  Examples: SMS to new users of a mobile network. News Channels broadcast through broadband.
- *Information on demand*
  The user decides when he or she wants to receive the information. Further more, the user demands the type of information that should be provided (every thing from sport news, financial news, to minutes of the last board meeting in the firm). Fundamentally, the user has to be active before the information is provided.

Examples: News services demanded by SMS. News websites accessible through GPRS, WAP.

- *Information on events*

  This kind of information provision is *profile-based*, meaning that the user must have a profile with the content provider, containing information about desired information. Typically, the information desired concerns a concrete *object* – e.g. a particular sports team, a particular stock, a particular firm etc. In general, the user fills out the profile, and hereafter do not have to do anything active before the information is provided to him/her. The service provider will often have an "editor" to review the information before it is provided to the users. In contrast to the "Surveillance service" the content provider decides when the news is to be provided (see below).

  Examples: News letters/SMS about your favourite sports team, traffic information, weather information, etc.

1.1.2 Entertainment

Entertainment usually relates to games and jokes. But also interaction with other users in a specific forum can be categorized as entertainment. Many entertainment services will have the same features as some information services. The main difference will be the maintaining of the actual content for the content provider.

- *Simple entertainment provision*

  This is much like "Simple Information provision". The content provider provides the content to the user, who only has the options to receive it, or not to receive it. This is a one-way communication between the content provider and the user.

  Examples: Streaming (film, radio, programs, etc.), web cams.

- *Simple Entertainment (on demand)*

  This kind of service covers simple provision of entertainment, when the user wants to be entertained. The service is very similar to the "Information on demand" service. The user has to be active, before the content is provided to him.

  Examples: Jokes by SMS on demand.

- *Interactive entertainment on demand*

  This service covers entertainment where there is established some sort of interaction between the user and the service provider. A typical example is gaming through a mobile device. The user demands the service/content that he wants provided. The user thus has to be active before the service is provided, and may have to be active continually for the entertainment to continue (typically if the entertainment is a game).

  Examples: Games accessible through a mobile device.

- *Interactive entertainment with other users*

  This type of service covers entertainment on demand, where the interaction comes from other users end the content provider is only supplying the forum for this interaction.

  Examples: SMS flirt.

1.1.3 Education

The same categories as listed under entertainment can be listed under education. Thus,

- Simple education provision,
- Simple education on demand,
- Interactive education on demand, and
- Interactive education with other users

all represent different kinds of education content.

1.2 Services

In this section we focus on three different services: communication, transformation and surveillance services.

1.2.1 Communication

Communication is about making contact from A to B. The traditional services are voice and SMS services. Yet, more complex services, as for example payment services will be more and more common on the mobile marked in the future.

- *Speech service*

  The classic service already provided by telephone companies: the possibility to make voice contact from one mobile device to another.

  Examples: Calling services.

- *Direct data/text/Image communication*

  This service makes it possible for the user to communicate data to other users via SMS, data fax, etc. The main difference to speech services is that the user in the other end (user B) does not have to be online, for User A to be provided with the service.

  Examples: SMS services, data transmission services.

- *Communication between anonymous users*

  In contrast to the above-mentioned services, communication between anonymous users, require a "middleman" – the content provider. Usually communication between anonymous users is a part of a greater service, often involving users who have some kind of *profile*, with an alias name. The service provider basically forwards the message sent to an alias, on to the user owning the alias. What makes this service mere complex is that each user may demand different services, depending on the user's profile. For example, a user may not wish to receive messages from specific users.

  Examples: Dating services.

- *Safe communication*

  The service secures the transport of data, and typically ensures that the data cannot be monitored by external parties. This service both covers encryption and routing services through dedicated secure networks. The need for this service is great when sensitive information or information about payment must be transferred.

  Examples: Payment transaction, secure lines.

- *Payment transaction*

  This is the actual provision of payment services. This service is of cause often combined with the "Safe communication" service, for encryption etc. This service

covers the complete setup that makes the payment transaction possible. This involves transaction between user, services provider, network operator, and for some payment solution also the financial institution. Payment transaction covers both payments through the network operators billing system (typical small payment for premium content) and payment through a financial institution, where the money is redrawn from a bank account (typical remote content). Finally there is mobile-point-op-sale payment transaction, where you pay for a physical thing with your mobile phone, on the point of sale (fast food, parking meters etc.). This setup is usually very similar to the payment transaction for premium content.

Examples: Overpriced SMS; overpriced 900-numbers; payment with credit card for remote content.

1.2.2 Transformation

Transforming is about transforming data and information between media, making more media available to the user.

- *Converting between media*

  This service transforms data into another form and by that enables it to access other media. An example could be transforming an email to fax. The content provider is not actually providing the content, but is converting the content, so that it is readable on another medium, and hereby makes it possible for the user to access this medium.

  Examples: E-mail to fax, making e-mails accessible on websites, accessing your mails from a mobile device, accessing MMS on the Internet; making database content accessible.

1.2.3 Surveillance

Surveillance is about watching information, and notifying the user instantly when you have the information. Time is essential when providing this service.

- *Surveillance services*

  This service covers the surveillance of very exact information. The service provider watches over the *object* of information identified by the user, with the *parameter of notification*. The difference to "Information when happening" is that this type of services needs to be provided instantly and thus automatic. An example of an object could be a specific stock, that the user want to keep an eye on, and the parameter of notification could be "when the price reaches 134" or "when the price changes". A variant of this service is monitoring of other users in a certain forum, or users of a certain program – such as chat programs.

  Examples: Stock price Surveillance, SMS when you have mail, ICQ, MSN Messenger.

1.3 Mixed content and services

Most services promoted by content or service provider are a mixture of two or more of the mentioned types of services. Often a provider will combine "Information on demand" with another type of service. As mentioned, some of the described types of services are not stand alone services, and can only be sold bundled with one or more other services. Often can one service (from the content providers point of view) in fact be a mixture of two or mere services. Some examples of mixed services:

- *Dating services*

  This service is typically a mixture of "Information on demand" (browsing through other profiles), "Surveillance of information" (I receive a SMS if I have mail) and "Communication between anonymous users" (I can send a SMS to another profiles mobile phone).

- *Betting service*

  This kind of service is typically a mixture of "Information on demand" (browsing through bets and matches), "Surveillance of information" (I receive a SMS when they have a bet on a specific player or team that I have specified), and "Safe communication" when I place my bet, using credit card information.

1.4 Content, services and network effects

Some content and services exhibit network effects, i.e. the value of the content and services increase as the number of users increases. The networks effects are often more important when it comes to services compared to content. Examples of such services include dating, chat rooms, and file-sharing. Whether or not content exhibits network effects is central to the business plan behind the services offered.

2 Media

This section will concentrate on mobile terminals and the different content types as these issues are important to take into consideration when designing the m-services.

2.1 The devises

When designing content companies most also consider what kind of terminal it should be designed for. Generally, speaking mobile phones and PDAs are currently the only alternatives. Yet, one should remember that within each of these two categories terminal vary considerably and content designed for a specific phone may not be compatible with other phones due to differences in screen size, processing power, etc.

2.2.1. Mobile phone

Mobile phones are the most popular form of wireless communication with a penetration rate in Scandinavian countries well above 70%. Hence, they will most likely be the leader terminals of mobile commerce initially. Because phones send digital signals, they can serve many useful functions aside from voice communication. Yet, they do have limitations relating to both output and input features. In terms of output related features mobile phones have small screens, limited color display and low resolving power. Of input related features the lack of a keyboard is the most obvious problem. Most newer mobile phones will run on the Symbian operating system.

2.2.2 PDA (Personal Digital Assistant)

PDAs constitute the second major category of terminals in mobile computing. The quality that makes a great mobile phone will not necessarily make a good PDA. Unlike mobile phones PDAs are not originally built to transmit. However, they provide a more suitable environment for surfing the web than do mobile phones. In general they are more functional than mobile phones. They can perform word process, e-mail, fax, access the web, play music, read e-books, and much more. Still they lack the built-in full-size keyboard of laptops and most use touch screens as the alternative. Outside Palm, most handheld PDAs are run by the Windows CE operating system.

2.2.3 Other

There are other mobile terminals on the market but devises such as pagers and laptops are not explicitly considered here. In the near future we should also expect to experience further convergence between mobile terminals and hence a person may be able to accomplish the same tasks with one devise. Another issue to be aware of is the effect of voice recognition. Effective voice recognition will circumvent many of the implications and problems of mobile devises today.

	Mobile phones	**PDAs**
Advantages	High penetration; "always" carried by owner; with GPRS: always online as always turned on.	Larger display screens; more memory.
Disadvantages	Relatively small screen and inferior display quality; numerical keys; limited memory.	Colors are a source of major power drain; most PDAs need external hardware to surf the internet; not very high penetration rate.

2.2 Format

Content can be provided in a variety of formats. In this section we focus on content provided as text, audio, images, streaming and multimedia.

2.2.1 Text

When text is correctly structured and formatted, it can be the most flexible way to present content. Text can be displayed on screens on all electronic communication devises. The advantages of using text-based content include that text is the most mature media - users are familiar with text, text has a relatively small size and is thus cheap to send, text is displayed identical on all terminals irrespective of screen size and color/not color display. The disadvantages are primarily that it places limitations on the content and that users do not want to read much text on their mobile terminals.

2.2.2 Audio

Audio can add to the general appeal of content. Audio can be "consumed" in instances where text is not appropriate for consumption e.g. when driving, when walking. Moreover, it can be presented more appealing and personal - the choice of voice, accent, etc. A complication could be the language as it can be expensive to develop content for a small language as Danish.

2.2.3 Images

Images can provide information on the mobile devise. Moreover, it will be possible to for instance download a map and project it onto a wall or another flat item. Images can be advantageous as users can visualize goods, locations, etc. which can enhance the value of the service. For instance, a traffic report may tell you that there has been an accident a certain place but if you do not know the place it will be helpful to get a picture of a map pointing out the place in question. Another example: Blockbuster advertising for a new movie. The title may not mean anything to you but the movie poster does. The downsides are that not all mobile terminals can receive pictures and that images must be scalable to fit with different screen sizes. Text can be combined with images, to provide a service that has the advantage of both Text and Image. This is often seen on web pages accessible from a mobile device. The disadvantage is as with images that not all mobile terminals can receive pictures and that images must be scalable to fit with different screen sizes. Furthermore you loose the advantage with the small size data volume.

2.2.4 Multimedia

Multimedia is the combination of text, graphics, video, animation and sound. Such content can satisfy a new demand for mobile services. It creates a richer connection between the companies and the users, but at the same time is can be expensive to send and requires significant bandwidth. Often multimedia is used with different kinds of games.

The figure below illustrates the advantages and disadvantages associated with the different formats of content.

	Text	**Audio**	**Images**	**Multimedia**
Advantages	Mature media, small size, identical displayed on all terminals	More personal than text and can be consumed in alternative situations	Visualization can significantly enhance value	The richest format
Disadvantages	Limitation of the ”message”	Small language thus, high average cost per service	Different screen sizes requires that images are scaleable	Large files thus expensive to send and receive

2.2.5 Streaming

Traditionally content is downloaded from the Internet involving the copying files. The speed of this depends on available bandwidth and the file cannot be played before it is fully downloaded. *Streaming* skips the downloading process because the bits and pieces are played along with the reception. Thus, streaming a video or audio is essentially as playing a video or CD and the bits are usually not saved on the consumer's hard-disk.[1] Usually streaming will be on demand, but can also be provided as for example “Simple information provision”, where the content provider “broadcasts” the content to all users at the same time, and the user must be idle to enjoy the content. The main disadvantage in streaming is in fact, that in difference to images and text forms, the content *must* be consumed instantly, and cannot be viewed later, or saved on the mobile device. Further more it requires large bandwidth, to be a successful. The advantage compared to audio services is that the same content can often be used in several countries, as changing factors as subtitles, etc. is relatively cheap, compared to translating an entire audio service.

[1] Three main brand standards enable playing of streaming media: RealNetwork's products (RealOne and RealPlayer), Microsoft's Windows Media Player and Apple's Quicktime.

2.3 Format and content

The table below describes the typical format for the services described in the previous chapter. These are only suggestive and **not** definite classifications of forms of content.

Type of content	Typical form
Simple Information provision	Text, Streaming
Information on demand	Streaming,
Information when happening	Text
Simple entertainment provision	Text, streaming
Simple entertainment on demand	Test, images
Interactive entertainment on demand	Multimedia
Interactive entertainment with other users	Text, Multimedia
Speech services	Audio
Direct data/test/image communication	Text
Communication between anonymous users	Text, images
Safe communication	All
Converting between media	Text, images
Surveillance services	Text

General remarks

In general, users benefit when alternative media formats are available for the same content. Imagine a cinema sending out advertising for a film running at 8.00 PM. The cinema could either send out a text-based SMS, an audio clip with the same information, a picture displaying the movie poster with some additional text or a multimedia clip containing the trailer for the film. A parallel can also be drawn to the media and entertainment industry: media conglomerates use a variety of channels including cinemas, VHSs, DVDs, pay-per-view, satellite, broadcast to distribute one product to the consumer. The consumers chooses which type of media that he/she wishes to consume the product through given his preferences, ownership of electronic products, economic status, etc.

3 Target group

The content providers should think of who they would like to offer their services to i.e. they should identify a target group. They must understand the context that their services will be used in and hereby derive ideas for specific customer groups which they will target. The exercise is closely connected to the segmentation models presented in the following section. The target group should be based on knowledge about existing customers. Thus whereas defining the target group requires specific customer knowledge the segmentation models are more generic. However, to add value to the target group identification interplay between this process and the relevant segmentation models should be pursued.

4 Segmentation

Companies offering mobile services must choose the degree to which the content should be customized. The same content can be provided to all customers of a service, i.e. no customization. Alternatively companies can offer different variations of content to different segments or groups. Finally, they can choose to offer fully customized content to customers, i.e. the content one customer receives is different from what all other customers receive.

	All consumers	**Segments**	**Individually**
Advantages	Low cost; potential social effects.	Narrower than all consumers i.e. consumers should in average place more value on the service.	The more customized, the higher value for the consumer.
Disadvantages	Not utilizing the advances in technological development such as the opportunity for time-, situation- and location-based services. Risk of "spamming".	Does not achieve the low cost of broadcasting content and does not achieve the high value of customizing content.	High costs

It should be noted that despite the respective advantages and disadvantages of reaching all consumers, segments or individual consumers each strategy may be advantageous for specific services.

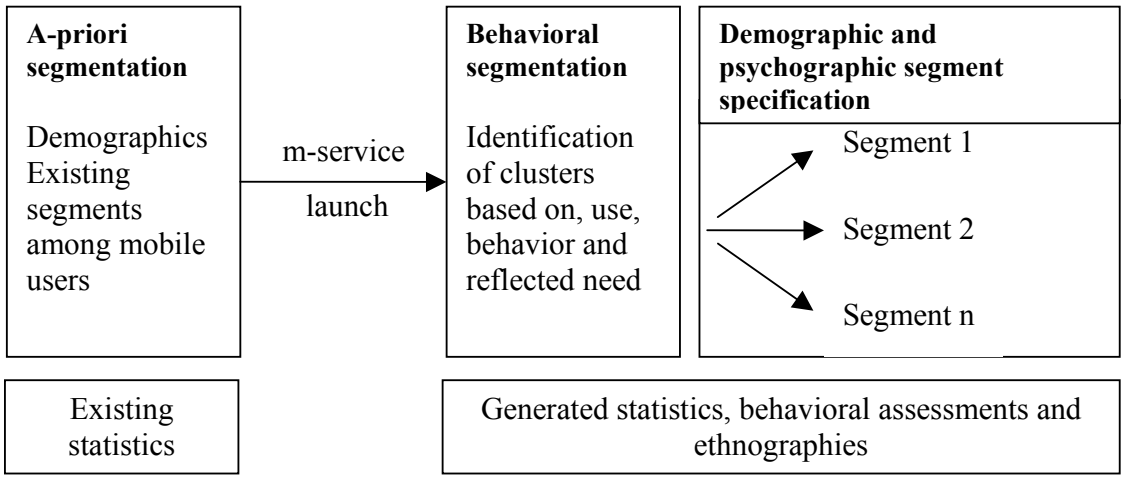
If an m-service cannot satisfy the needs and wants of all consumers and is not appropriate for total customization then identifying a target group is useful. Segmentation is the process of dividing a particular market into sections, which displays similar characteristics. A target market for a service is the specific segment of customers most likely to purchase the particular service. Segmentation and targeting are very important as they affect the 4Ps (product, price, promotion, place) in firms marketing mix.

In marketing theory a segment refers to the definition of a group of consumers/users with relatively homogenous set of defined characteristics. Segmentation, thus, is the process of dividing a particular market into sections of people of similar characteristics. Demographic, psychographic and behavioral segmentation are the most common categories housing variables for defining segments. By defining segments, marketers can specify groups of people to target with communication and marketing initiatives and also to some degree predict the response of individuals belonging to the segment. The latter presumes that the individuals constituting the groups have responded or acted in similar ways in the past and are therefore likely to do so in the future.

When a service is already present in a certain marketplace and the users have formed into recognizable groups, segmentation is, if not easy, rather straight forward. However, for new products and services in development projects, user segments are partly unknown as user groups will form during the test-period subsequent to launch. Thus, the possibility to adequately identify characteristics and divide people into different groups will increase as the project rolls out. For these services and products, the relevant segments will form during the test period and their identification then becomes partly a process of discovery. It is also important to acknowledge the dynamism in this process as the distinctness of segments may also vary and alter as services becomes reconstructed, bundled or re-introduced.

M-services are novel services and the initial users have to explore these. Thus, we can have some initial idea of the demographics of the population relevant for the test scene, e.g. age, income, gender, marital status, education, occupation and household size. We can also know something about the general behaviors and lifestyles of different groups of existing mobile users. However, we cannot know specifically what segments that will emerge and be present in Ørestad N. Clear up-front definitions would, at best, be juxtapositions. Such juxtapositions may lead to biased segmentation that exclude or rule out the discovery of potential segments, and thus service users. To avoid the pit-fall of a-priori biases, we therefore propose an alternative segmentation model that will

incorporate traditional but also constitute a novel approach: volition[2] and usage based segmentation. This is illustrated in the figure beneath.



4.1 Demographic segmentation

A-priori segmentation is central to create an initial understanding of the population of the relevant region. Based upon existing segmentations among Danish consumers as well as the statistics available for the Ørestad region, we will be able to obtain an up-front understanding - an understanding that is subject to change as the project rolls out.

The population can be divided into age, gender, income amongst other variables.

As people age their needs and wants change. Some companies develop specific products aimed at particular age groups. In the South Korean market, one of the countries on the forefront of mobile commerce, three companies (SK Telecom, KT Freetel and LG Telecom) operate and they all deploy segmentation rules based on age:

- *Brands aimed at 13-18 year segments*. Easy comprehensible price schemes
    - SK Telecom's "Ting" (Ting 500 or Ting100 denoting the number of free SMSs per month)

[2] Volition refers here to people's choice based on needs, wills, wishes and desires that relates to usage of a product or service.

  - KT Freetel's "Bigi". Introduced a measurement unit "R" 1R= 10 Won, one SMS costs 2R to send. "Bigi" includes access to a Internet portal with specific services
  - LG Telecom's "Kahi Holeman"
- *Brands aimed at young people between 18-25 years*. Special price plans and communication strategies, special features such as X free SMSs per month and Y free downloaded ring tones.
  - KT Freetel's Na
  - SK Telecom's "TTL"
- *Brands aimed at the 25-35 year segment*.
  - KT Freetel's "Main". APRU higher than average.
  - SK Telecom's "UTO". APRU higher than average.

Gender segmentation is also used in South Korea:

- *Brands for women*
  - KT Freetel: "Drama" brand for home-going women. Special price plans, special handsets (e.g. with integrated calculator of menstruation periods)
  - LG Telecom's "-lady"

4.2 Behavioural segmentation

Behavioral segmentation refers to why people purchase a product or service. It can be broken down into *benefits* sought by the consumer (ubiquity, speed, ease of use, other)[3],

[3] Benefits of mobile services typically include ubiquity, time sensitivity, personalization, location sensitivity. *Ubiquity:* Mobile devices are always with their owners, both when they are working and at leisure. This means that data services must be "point of need", with information quickly and easily accessible, whenever and wherever users need it. *Time Sensitivity:* Communications and data access take place in real-time, or near real-time. Emails can be delivered instantaneously to workers who are out of the office at meetings, and shoppers can conduct price comparisons using a PDA sync application that was refreshed that morning. *Personalization*: Mobile devices have limited memories and processing power and small screens when compared to PCs. People tend to use them a tool for finding specific information rather than for browsing. As a result, there is less tolerance among users for "noise" – or the delivery of information that is not relevant to them. The value of information therefore increases exponentially as personalization increases. *Location Sensitivity:* While the technology is still not in place to support truly location-specific applications (see section on location-based services), it is still important that a mobile solution address a user's specific geographic context. This can be done in the near term via personalization features. Data is stored locally and only refreshed as needed, limiting network burden. These applications work well in situations where a user requires a relatively large amount of data but not necessarily in real-

occasion or situation i.e. when should the service be purchased (flowers and chocolates on moms days, etc.) or where (physical or social surroundings), *usage rate* (for instance light, medium and heavy users). It is important to understand how different groups differ in adaptation rates and diffusion patterns.

NTT DoCoMo is the company behind the widely cited success model i-mode. i-mode's user base and most popular services are focused on a consumer market, especially urban youth with large amounts of disposable income and a propensity toward checking out new gadgetry. To design a business model that focused on young, affluent consumers, DoCoMo recruited Muri Matsunaga (editor of a magazine on entrepreneurial job opportunities and one of Japan's few leading women executives) and Takeshi Natsuno (an Internet entrepreneur running a successful startup, with an MBA from Wharton School of Business). They championed the idea of targeting urban youth as the ideal early adopters for i-mode. These people were constantly on the go, spending little time in their cramped apartments, meeting on the street and in restaurants. Few of them used automobiles; long train and bus rides were ideal times to access i-mode. While most had little or no PC experience, it was a generation that had grown up addicted to electronic gadgets like Walkman and Gameboy. This led, in turn, to the decision to focus on providing entertainment content, rather than business or education. People under 25 generally spend a much larger amount of their time away from home and the office (if they have one), and make greater use of public transportation (buses and trains) and walking, compared to older people.

In terms of usage rates Fornebu Consulting and Gallup, (2003) have made a survey on mobile usage in Denmark. Usage of mobile technology can also be a way of targeting certain groups. Data from the survey follows:

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time. However, thick applications do require that devices have sufficient memory and processing power to run and store applications.

- **SMS'ers**: In average 14 per week (13-49 years) but 18-19 years old sends 36 SMSs per week and thus are the most active group of SMS senders. Women send 15 SMSs per week whereas men send 12.
- **Advertising**: 18-30 year olds are most positive toward receiving commercials on their mobile terminal. The 18-19 year olds are most positive (35%)
- **Micropayments**: the most positive group is the 20-24 year olds. 32% of these have a positive attitude toward using their mobile terminal for micropayments.
- **MMSs**: 16-24 year olds are the ones most willing to pay for MMSs. 18-19 year olds top. Women are willing to pay more than men.
- **Overprized SMSs**: it is clearly the 13-19 year olds who have been the most active users of overprized SMSs

Beware that end users use what they have at hand. They cannot foretell of future possibilities since they do not know what the supply of mobile services will be in a few years from now. Thus, users assess their future expected usage on the basis of existing services which is evidently a limiting factor.

Vilstrup Interactive (2001) also made a survey on mobile data communication usage in Scandinavia. Selected information from the survey follows.

- WAP: more than 3 of 4 WAP users are men. WAP users are older than SMS users
- PDAs: 1 of 10 mobile phone users has a PDA. PDAs are used for organizational needs (address book, calendar, etc.). Owners are typically men over 40 years old and heavy internet users.

Consumer can be characterized by two attributes

a) *Functionality threshold*: the minimum performance requirements that a product or service technology must satisfy in order for the consumer to be willing to consider purchasing the good, and
b) *Net utility threshold*: the consumer's willingness to pay (highest price) for the product or service performance.

Depending on the initial functionality and cost of the technology, emphasis can be on either product technology to enhance the functionality of the technology in order to meet demand requirements, or on process technology to reduce the price to a level that corresponds to consumers' willingness to pay. Development efforts face a tension between attracting new customers through engaging in product development and loosing satisfied customers who are unwilling to pay the higher price charged for improved products (Adner & Levinthal, 2001).

The behavioral segmentation can take place when we have the ability to obtain data answering why people use a certain service or product. For the m-services, behavior in relation to the technology will only be possible to register after the services are launched. During the initial test-period statistics and behavioral assessment can form basis for a behavioral segmentation. Understanding user behavior connected to the m-services launched can then lead to specification of what value the services offer to the users and what value the users can produce with the services. Therefore, the behavioral segmentation should be focused on the interconnection between service-use, behavior and the human volition the behavior reflect and express. For this we need to register and assess statistics and conduct field studies of user behavior. For even more precise behavioral understanding, the relations between behavior, social systems (hereunder cultures/sub-cultures) and technology can be assessed by conducting in-depth ethnographies[4]. Segmentation based on depth studies of behavior can provide important information in answering questions extending beyond what people do and use – the answers to the important questions of why they do what they do and how they do what they do. This is of principal importance for understanding how clusters develop around

[4] According to Arnould & Wallendorf (1994) ethnography aims to gain in-dept understanding of the ways culture (or microculture) simultaneously constructs and is formulated by people's behaviors and experiences. These authors use the term market-oriented ethnography to refer to an ethnographic focus on the behavior of people constituting a market for a product or service. Ethnography seeks to explicate patterns of action that are cultural and/or social rather than cognitive. It is most commonly used to observe everyday events, settings, interactions, conversations and uses of objects over time and across specific cases. It can provide important understanding of the deeper meanings underlying people's rationale for using a certain service or product. See for example www.ethosresearch.com for companies currently exploring the power of ethnographic based segmentation.

use and human volition so we can target development and communications efforts and influence behavior most efficiently.

4.3 Psychographics segmentation

Psychographics segmentation is an alternative segmentation model which aim to develop more accurate profiles of target segments. It can be broken down into *lifestyle* (interests, opinions and beliefs), *social class* (profession), and *personality characteristics*.

An example of the use of psychographic segmentation is Nokia's segmentation for their 3G mobile phones with focus on lifestyle and personality characteristics. Nokia divide the population into six categories: high flyers, trendsetters, poseurs, reachable, social contact seekers and assured.

The psychographic segmentation and specification of the demographics of the segments can be conducted when clusters pertaining to use and human volition can be identified among the users. Users with similar behavioral characteristics can then be further assessed for similarities pertaining to demographic variables as well as psychographic. The approach above calls for specifications and adjustments to segmentations as the project unfolds. At the end, this will lead to an in-depth and precise identification of the central characteristics defined for the different user clusters.

Problems with traditional targeting

The classic segment-target-position (STP) marketing paradigm (Kotler, 1991) in which firms are told to first segment the market, then examine the characteristics of consumers in these individual segments, and then consider ways of tailoring the product or service to meet segment specific needs is problematic in the context of emerging technologies (Adner & Levinthal, 2001). Such an approach is appropriate when firms can manipulate product attributes at will (e.g. varying sweetness or saltiness in food products). When the manipulation involves performance attributes that cannot be easily or quickly changed, such as reliability, size, and speed the tailoring approach fails. In such situations, an

approach that considers the interaction of consumers' needs with both short-term and long-term technological possibilities is more informative.

5 Pricing and Payment Method

Mobile payment is the use of a wireless handheld device such as a mobile phone to purchase goods or services. It is defined as any electronic payment requiring a customer's wireless device in the transaction process. The emergence of e-commerce has fostered payment processes, whereby payment details are sent over open networks with no physical contact between the buyer and the seller. The recent development of high-speed mobile data networks has created a new channel for commerce, while more sophisticated mobile devices are enabling the virtual exchange of payment information known as proximity payments. Mobile payments are many and varied, and are somewhat determined by regional differences and individual market dynamics. For example:

- In Japan, the success of mobile Internet services can be attributed to the high concentration of populations in urban areas, long commute times, consumer comfort with small electronic devices, and the lack of a ubiquitous fixed-line Internet infrastructure.
- In Europe, mobile top-up for prepaid phone services is popular.
- In individual markets in Asia-Pacific, Europe, and the U.S., there is a drive to implement proximity payments in environments such as road-tolling, fast-food drive-through, and service stations.

Despite the regional variations, there is a shared requirement for payment to be secure, interoperable, and easy to use.

There are four main parties involved in a mobile payment transaction: the user; the network operator; financial institutions; and content providers. These parties share many of the same concerns that need to be addressed by a mobile payment standards body. However, not all of these concerns are given equal weight by each party. For example:

- **Consumers** are mostly concerned with security, flexibility, ease of use, and privacy. They also require any payment scheme to work across multiple devices, including mobile phones, PDAs, wireless tablets, and handheld computers.

- **Mobile operators'** principal concerns revolve around standardization and interoperability. Operators want payment to be seamless, allowing them to compete on services and applications.
- **Financial institutions** are primarily concerned with ensuring the integrity of the payment system and reducing the risk of fraud. The payment systems integration with financial institutions may also be important for the user.
- **Content providers** want the payment process to be transparent to the user, as this encourages greater usage and/or propensity to complete a purchase. They also want any payment scheme to facilitate swift and easy completion to ensure they get paid on time.

5.1 Mobile Payment Segments

According to Strategy Analytics[5] there are three distinct mobile payment segments:

- **Content Payment:** The purchase of content or other data services delivered to a wireless handheld device for which a premium is paid over and above the cost of access and transport.
- **Remote Payment:** The purchase of goods or services, where the buyer and seller are physically separated. Goods are sent to a delivery address (e.g. books, CDs) or collected at the merchant's premises at a later date (e.g. theatre, cinema, airline tickets). As previously mentioned, browsing for goods may take place on the fixed Internet with only payment authorization being done from the mobile device.
- **Proximity Payment:** The purchase of physical goods or services at a merchant's real point of sale such as at a supermarket checkout, vending machine, ticket machine or parking

[5] Strategy Analytics (2002). Mobile payment: Strategic outlook for mobile operators and solutions vendors.

5.2 Transaction Model

In general user can be charged for m-services by deducting the charge from a source of funds (i.e. debited from prepaid balance or bank current account) or adding it to a credit account (i.e. a monthly phone bill or credit card bill). These two options are generally known as prepaid and postpaid payment methods. There is a generation of mobile prepaid consumers who have no formal account relationship with either the banking or telecommunication communities. Now, network operators have an opportunity to capitalize on these consumer relationships by offering electronic payment services using managed prepaid accounts. Prepaid means that consumers pay in advance to obtain the content they desire. Voice pre-paid cards and electronic "wallets" (stored value wallet) are examples of these kinds of payment methods. Yet, in general terms the prepaid accounts should be regarded not as relationship-based but as transaction-based. In contrast there is a much better opportunity for relationship building with postpaid accounts. When choosing a post-paid method, consumers receive the content and consume it before paying. Examples include, a consumer gets a ring-tone and pays it through a bill. Vodafone offers its customers the "Vodafone m-pay card" where customers can register details of credit or debit-cards once, and then use there mobile phone for shopping.

5.3 Pricing

Pricing models are very important as they are variables that can greatly affect demand in a variety of ways. Thus they are essential tool in the implementation of a consortiums m-service strategy. Especially in the early days of the product life cycle an important goal is to create new users. Here we only consider the purchase of digital goods and services. The ordering of physical goods and services and the payment by the use of a mobile terminal is thus not included in the study.

5.3.1 Per time unit

The GSM-networks (circuit-switched networks) have based the payment of mobile services on the time the users has used the service. Thus, the user is charged for the total time of connecting to the mobile internet irrespectively the actual use of services. For

WAP services this led to many users regarding the services as expensive or inappropriate to use. For content providers this method would only be interesting if they shared the traffic revenue with the operator but operators have not allowed this. With the availability of the new technologies (GPRS, EDGE and UMTS) there will be few advantages associated with charging per time unit. However, the disadvantages include the fact that users become unsatisfied as they pay for waiting time and that content providers do not have incentive to develop and provide content. The i-mode service represents an example of a service that initially was charged base on time units. Because DoCoMo billed per minute it was very important for them to control the content and ensure quality. WAP services as we know them in Europe are also charged on a per minute basis.

5.3.2 Per megabyte

The emergence of packet-switched networks such as GPRS, EDGE and UMTS allows for charging the customer for the actual downloaded megabytes. Charging per megabyte has the following advantages and disadvantages. The main advantages of charging per megabyte is that users pay for the amount of traffic the actually cause and that no matter I f a user looks at a downloaded file for 2 seconds or 2 hours the cost is the same. The disadvantages are that users may value “small megabyte” services relatively high. For instance, e-mail services are typically valued highly by users but if they are charged per megabyte the service will be very cheap. Moreover, many new multimedia services will be extremely expensive to use as they contain many megabytes. This does not necessarily imply that the user values these services higher than the “lighter” services. In addition, the vast majority of wireless consumers do not know what a bit or byte is, so they are probably not going to be excited about paying for them. A final complication of charging per megabyte is that consumers often cannot determine the true cost of data services when pricing plans are phrased in terms of kilobytes or megabytes.

5.3.3 Per data bundle

The bundling of a fixed volume of data (typically 1MB which is sufficient for most monthly usage patterns) was seen as a solution separate to voice to add simplicity to mobile data tariffs. However, the opt-in to such monthly bundles requires a user to be

satisfied that they will get value for money and that they will often use the service. With usage of WAP services remaining at low levels and content far from compelling, few people appear willing to commit to an additional monthly charge.

5.3.4 Per service unit

It is also possible to charge users per service the use. Ringtones, logos, and screensavers are typically charged in this way. In terms of overprized SMSs, companies can construct different types or classes of services and assign prices to each of these. This is a used practice in a variety of countries. The number of classes and their price levels differs from country to country but in most countries there are 4-8 classes and the price range goes up to 1 EURO (Strand, p. 24). Categories can be made in terms of content. For entertainment games, ring tones, horoscopes, etc. and for information news, financials, sport, culture, etc. A simpler categorization scheme is to only differ between text and multimedia content (used in South Korea: price per megabyte text: $9.8 and price per megabyte multimedia $3.8). The main advantage of having many classes is obviously a more fine-grained price setting, whereas the main advantage of having few classes is the simplicity.

A variant of the "per service" billing is to make the price depend on volume of services. I.e. if customers buy the service a certain number of times the price for the service will change (typically it will become cheaper). The advantage of such a scheme is to create incentives for users to use the service so much that they end up in the cheaper category.

What if the same service can be used over and over again such as the case is with games? Transparency and simplicity are clear advantages of per transaction billing. Compared to the "per megabyte" method users will be able to asses the cost of the purchase easier. On the other hand users will think of the added cost of every service which compared to subscriptions is a disadvantage. Moreover, the user's marginal utility will typically fall as the same service is purchased a number of times. Unless the pricing scheme is sensitive to this, user may find that the marginal cost exceed marginal utility after a few purchases.

An example of an operator charging per service is j-Phone: 2 yen per request (no monthly fee as opposed to DoCoMo and KDDI).

5.3.5 Subscription to service

Companies can offer subscription models to their customers. This can be done either for all the company's m-service, groups of the company's m-service or just a single m-service. In all cases the companies have two charging methods available:

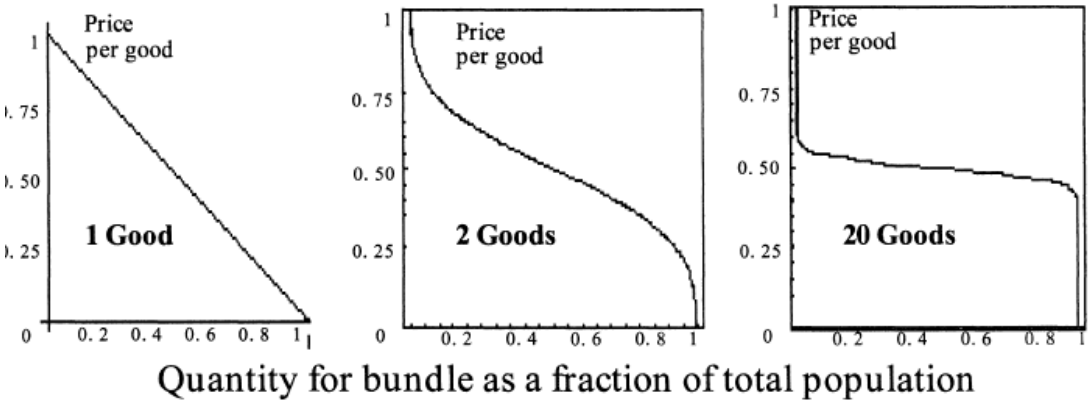
1) Pure subscription fee, or
2) Subscription fee plus a per service fee
   - High subscription and relatively low use prices, or
   - Low subscription and relatively high use prices

The scheme can also be varied according to the use of the service. For instance, the subscription fee can cover a certain amount of services and the services used on top of this costs extra. In this way companies can offer different subscription packages with for instance 10, 20 or 50 m-services per month. Using subscriptions makes billing very simple for the consumer simple and it does not put any economic incentive constrains on usage, which is appropriate at least when building a market. The disadvantages are that it can result in "over-use" (as AOL experienced), it can cause customer frustration if they pay and do not receive the m-service (e.g. if no traffic accident or the like has occurred), and users may not find it appealing to take on a fixed cost. Examples of subscription based billing model include:

- i-mode: Each consumer pays a flat monthly charge to sign up for the service. Then, the individual is charged on the basis of the number of packets transferred by him or her. DoCoMo princing: 300 yen per month plus 0.3 yen per package
- KDDI: 200 yen per month plus 0.27 yen per package.
- AOL: AOL pioneered the method of flat pricing with unlimited usage.

5.3.6 Bundling[6]

M-services can also be billed in bundles. Bundling involves the development of a specific combination of services sold together often at a price cheaper than if the services were sold individually. The bundling can connect m-services with other m-services, with traditional products, with the purchase of the mobile terminal, with the subscription model purchased from the operator, etc. the key intuition behind bundling is that consumer's valuation for a collection of goods typically has a probability distribution with a lower variance per good compared to the valuations for the individual goods. This is illustrated on the figure below.



Basically, two ways of bundling exist:

1) bundling with a leader product or service, where the price of the leader is discounted on the condition that a second product be purchased, and
2) bundling with equal products or services, where the items are sold in a package for a special price.

Bundling is attractive if some products or services in the bundle are more attractive than others. In such cases some buyers will purchase the full bundle in order to receive the savings. When complementary relationships are strong, the effects of the special price will be even greater. This can be particular attractive when products or services need to

[6] For a good article on bundling of information goods see, Bakos & Brynjolfsson (1999), Bundling Information Goods: Pricing, Profits, and Efficiency, *Management Science*, 45, 12, pp. 1613-1630.

achieve critical mass. One potential complication of bundling digital services can be legal constraints. Other disadvantages include higher cost than the individual service - this is only the case if customer can only buy the bundled package and not the products or services individually – and unclear positioning of the service.

5.3.7 Free

The users can be offered services for free and only the operator will make money on the traffic. For instance, the operator and content provider make an agreement that when 100.000 hits the content provider will receive X, when 200.000 Y, etc. Free content is often very attractive for the user as he/she incurs no costs. Yet, as the money must come from somewhere free content will typically squeeze the margins of the value web players.

5.3.8 General remarks

The appropriate purchase method and pricing depends very much on the service in question, the media you receive it on, the distribution channel, the type of content (text, audio or multimedia if substitutable), and additional factors. Still, with the opportunities for deploying a variety of purchasing methods and pricing principles it should be remembered that the billing of mobile services must be simple and enable the users to place orders immediately. In addition, the appropriate billing model and pricing scheme will not fit all users as they have differences in preferences and tastes. Thus, the purchasing method must be developed with a close link to the identified expected target group.

It is of course also a possibility to deploy a dynamic pricing strategy that considers the service product life cycle or other relevant factors. MMSs for instance are so far free for users to send given it is in the introduction phase and it is important that users get familiar with the services. As the MMS life cycle moves forward the users will be charged for the service.

Pricing systems can also be constructed with non-monetary usage limits such as X megabyte per month, Y SMS per day, Z transactions per hour, etc. moreover, loyalty programs, volume discounting schemes and other models can be implemented.

In sum, the main advantages and disadvantages of the different billing models are portrayed in the following table.

	Time	**Megabyte**	**Service**	**Subscription**	**Bundled**	**Free**
Main advantage	Few	Pay for actual use	Transparency and simplicity	No economic incentive constrains on usage	Increase sales	No user costs
Main disadvantage	Pay for waiting time	Pay does not represent the user value of content	Added costs and decreasing marginal utility	Fixed cost	Unclear positioning	Squeezing the margins of value web players

5.4 Critical Issues

- **Security:** Security is consumers' primary concern and they will have little confidence in a payment method that cannot provide ways to guarantee authenticity, confidentiality, and integrity. Reaching an adequate security level is not enough more important is to convince the customers that it is actually secure.
- **Convenience:** To what extent can the payment method be used to pay for any type of content, from any location in the world, using any device? Some payment methods might require consumers to upgrade their existing handsets, or be pre-registered with a company. Payment applications have to be compatible with every mobile phone and every mobile network. Payment applications that are limited to one type of mobile phone or to one type of network are not in the interest of retailers, who are not willing to accept payment applications from four providers.

- **Speed:** Is the amount of time spent using the payment method acceptable to consumers? This is especially true when customers have to pay for the access.
- **Ease of use:** Is the payment method easy to learn and use from the viewpoint of a consumer and a retailer? Ease of use and speed are especially important for micro-payments.
- **Price:** Payment applications must be inexpensive. A transparent and simple cost structure helps a payment system to become accepted. Thus, it is also important how much must it costs content providers to integrate a particular payment method into its existing m-commerce applications.

5.5 Examples

- As far as interface goes, Paybox, uses an Integrated Voice Recognition (IVR) based system. A user making a transaction is providing her mobile number to the merchant, who then calls the IVR with the transaction data. The user receives an IVR call (in her own language), asking for a PIN code. Established in 1999 Paybox already has 750,000 users signed up for its service and about 10,000 available acceptance points.
- Network365, a leading provider of secure mobile payments, personalization and identification platforms, announced in October 2002 that Celltel Lanka, Sri Lanka's leading mobile operator, has chosen them to enable its users to make payments for goods and services with a simple SMS. The CellWallet™ provides encrypted electronic storage for information pertaining to a user's credit card(s), debit card(s), bank account(s) and other personal data, allowing the user to issue payment instructions from his or her mobile phone, without having to transmit such sensitive data 'over the air' for each transaction. The service enables secure macro and micro payments.
- The Norwegian mobile operator NetCom has completed an innovative pilot project called MIDAS. MIDAS enables NetCom clients to order products and services on their mobile phones – and lets them pay for those services over the phone as well. Payments can be charged to phone bills, credit cards or any other

payment method that the client chooses. Behind the system is the MBroker platform from MoreMagic Software.

- The Magex Managed Payments Platform adds Interactive Voice Response (IVR), SMS and WAP access to its person-to-person and person-to-merchant products for the banking community, in addition to Web-based access. The SMS service allows users to initiate a payment by sending a text message with their password, the amount they want to send, and the recipient's mobile phone number. They can also include a short message. As long as the person is on the GSM network, the service will transfer the funds and the recipient is notified via SMS.
- Mint is an integrated mobile payment and loyalty service enabling consumers to conveniently order and pay for goods and services through the use of a mobile device. The consumer can connect any mobile phone to the service and choose to pay on a prepaid or credit basis. In addition, the mobile payment service can be used in security applications and has an easy-to-use Internet payment application.

6 Revenue sharing models

The existing tariff structures contain critical issues for both operators and content providers. One problem is that the existing revenue models are not differentiated enough to take the content providers and their ability and will to develop the market into consideration. The lack of flexibility causes problems for both content providers and operators. WAP can be seen as an example of this problem. Due to poor revenue models operators were not able to offer attractive business cases to WAP content providers resulting in a very limited offer of WAP services.

6.1 Present tariff structures

The present content allocated SMS/MMS payment structure allows the content providers to distribute and collect payment for their content through the operators' network. The payment is then divided between the content providers and operators through different tariff structures.

Class	Price	- to operator	- to content provider	Revenue share content provider
1	0,102	0,056	0,046	45%
2	0,152	0,070	0,082	54%
3	0,304	0,115	0,189	62%
4	0,506	0,172	0,334	66%
5	0,657	0,215	0,442	67%
6	0,809	0,261	0,548	68%
7	1,011	0,318	0,693	69%

Figure 1: Tariff structure from Telenor, Strand Consult

The example of tariff structures from Telenor illustrated above shows larger revenue to the content provider if a higher tariff class is selected. This strategy provides incentives for the content providers to produce content of high quality and value. An opposite strategy used by Telia offers the content provider a larger revenue share if a lower tariff class is used. This strategy focuses on development of services to the lower tariff classes and targets quantity rather than quality.

Strategy:	Higher class = larger revenue share	Lower class = larger revenue share
Key findings	• Targets higher tariff classes • Quality services • Expensive services	• Targets lower tariff classes • Quantity of services • Cheap services

Besides the tariff classes operators also have other variables regarding their pricing strategy. These variables include volume; start-up costs; operating costs; and type of user subscription (postpaid or prepaid)

The use of different pricing strategies by different operators in the same market can cloud the signals to the content providers whose revenue share from a given service changes dramatically from operator to operator. The present tariff structures are only differentiated in regards to the different tariffs. The services are not differentiated in regards to its value which they provide to the operator, and do not consider the different types of content and services which in different ways gives value to the operator. Only in a very limited extent revenue share between operator and content provider are differentiated regarding which tariff is used and how much traffic the content provider creates.

6.2 New payment streams within the mobile Internet

There has been some debate about whether the traditional revenue models are insufficient to quickly and effectively drive and develop the market in an advantageous direction. In the next section we focus on cross combination revenue models.

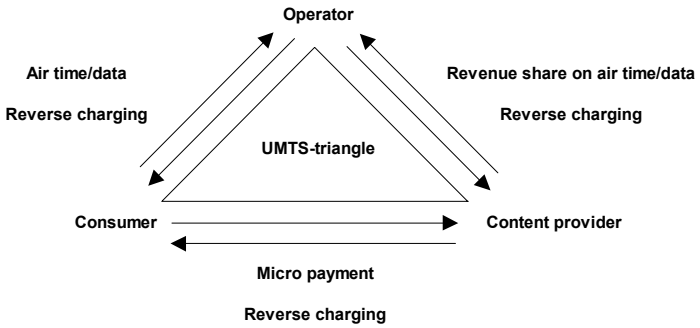


Figure 2: UMTS Triangle

We must expect to see payment streams which move differently than present revenue models. This can be

illustrated with a model for the possible future payment streams called an "UMTS-triangle".

The known concept with revenue sharing between content provider and operator on basis of content allocated services will also in the future have a central role, but will be supplemented by new payment streams.

6.2.1 Reverse charging

The characteristics for the market in the future is business models which uses the opportunity for payment streams to go in the opposite direction in regards to the known revenue models today. These opposite payment streams are also called "reverse charging". Payment is seen as discounts, "points", prices and money etc. Reverse charging acts as:

- Payment from operator to customer
- Payment from content provider to customer
- Payment from content provider to operator
- Payment from operator to content provider

Reverse charging – from operator to customer

By reverse charging between customer and operator the customer receives payment as an output for using a specific m-service. This is possible, if the operator himself receives a payment from a 3-party provider, or if the service can contribute to increasing traffic. An example of reverse charging between operator and customer can be illustrated by the virtual operator Tele2 in Sweden, whose customers receive a payment on ingoing calls. Reverse charging between customer and operator will seriously gain a foothold with the arrival of UMTS-network. Furthermore, it will be m-services, which will create a basis for payment from operator to customer, when the operator for instance offer his subscribers payment for each received MMS-message.

Reverse charging – from content provider to customer

The traditional payment streams are also turned around in the case, where the customer receives a payment from the content provider. The customer can expect to receive payment in relation with m-services being used as "mobile marketing". There are two essential things with the future "mobile marketing". At first the customer's interest must be awakened and secondly there must be no charging of the customers when using the service. The content provider has to pay the subscribers traffic expenses to the operator, so that the customer does not have any economic load.

Reverse charging – from content provider to operator

It is expected, that reverse charging will increase in reverse charging from content provider to operator. This particular payment stream will increase, when the content providers themselves are beginning to have larger economic advantages by supplying valuated services. In those cases, where several content providers can have advantages by getting their logo/service placed on a specific and central place on the operators mobile portals, they have to pay the operator for this specific service. Furthermore it can be topical, that a content provider pays the operator to get exclusivity to the operator's customer base regarding a certain type of service. This could be illustrated by a given stock-service, which wants to be exclusive on the operator's portal.

Reverse charging – from operator to content provider

In the future the operator can order developed services which the operator gives free to certain segments. The payment to the content providers from the end-users use of the service will not come from the subscribers which get the service for free. In stead the content providers receive payment from the operator with these kinds of services. The operator can be willing to begin this opposite payment stream to make sure, that services are especially goal-directed against attractive but smaller segments with a high average return per user (ARPU). Without reverse charging these segments can be to narrow for the content providers with the traditional revenue models to be willing to develop services for this purpose. The operator must therefore invest their own money in the services, to be able to present the attractive segments for a unique sales argument and thereby ensure customer loyalty. The operator's payment for development of these

services can be seen as a new form of operator-subsidy, which together with differentiated revenue models will make it attractive to develop services for small segments. The operators willingness to pay for content on the mobile Internet in form of this reverse charging is a very important premise for a quick, large and diversified supply of m-services and thereby a premise for the future success of the mobile Internet.

Reverse charging classification	**Key findings**
Operator to customer	• Customer receives payment for using service • Operator receives payment from 3. party
Content provider to customer	• Mobile marketing • The customer has no economic expense
Content provider to operator	• Buys exclusivity and visibility
Operator to content provider	• Free content • Attracting critical mass • Targeting narrow segments

6.3 Operator-centralization – development and marketing of m-services

The section below provides a different point of view of an alternative revenue sharing model. Previously the operator have both developed and market the m-services themselves. This is done by the operators own websites and SMS/WAP-portals, where the operator has tried to market these m-services to the end-user. By this strategy the operators tries on a superior level to strengthen the entire value chain. This strategy implies that the operators both have to be experts in development, distribution and marketing regarding m-services instead of entering collaborations with different partners which have specific competencies.

Disadvantage:

- This strategy has certain problems regarding the operators' wishes about a wide supply of m-services. The problem occurs while the operators act as a limitation of initiatives from other actors which on their own could develop and market new services more innovative and effective than the operators.

What we have seen until now, are the operators increasingly beginning to outsource development, marketing and distribution of m-services to 3-party industries. This is for instance seen executed within content valuation SMS and i-mode, where the operator in both cases makes it possible for external content providers to offer m-services, and at the same time use the operator's invoice system. This strategy gives the content providers a much bigger incitement to develop m-services and thereby market the m-services in a much bigger extent than the operators have resources to.

Disadvantages:

- The direct collaboration between the operator and content provider gives the content provider a number of problems regarding resources. It becomes necessary, that the individual content provider negotiate contracts with each individual operator and each individual mobile virtual network operator on each market. This can be a comprehensive task and raises a number of operating start costs for the content provider.
- From the operator's perspective this model means large resource consumption to negotiations with many content providers.

The entry barriers for development of new m-services are high which for small content providers can seem impossible. Add to this that the market for m-services is still relative immature and the level for expenses and the potential for earnings by operating m-services is emphasized with a lot of uncertainty for both content provider and operator.

6.3.1 Wireless Application Service Providers as connection link

The above problems are among the reasons that we recently have seen a larger use of Wireless application Service Providers (WASP) regarding distribution of m-services.

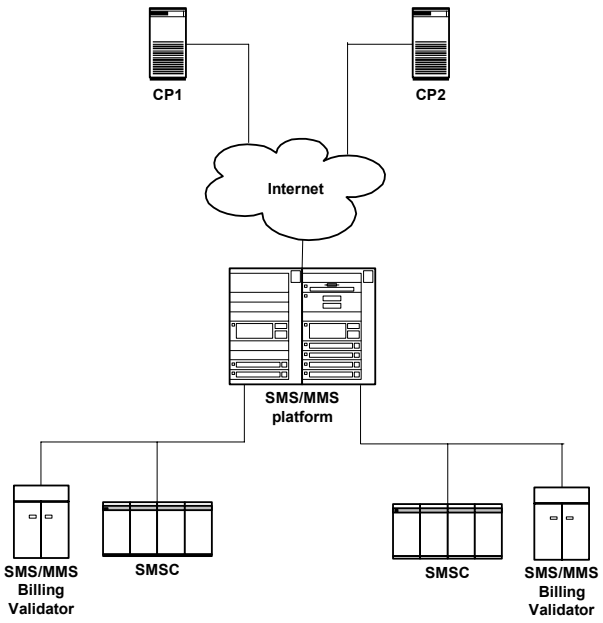


Figure 3: Wireless Application Service Providers

The left side illustration shows WASP's role on a market for content allocation m-services as a connection link between several operators and several content providers named as "CP" in the figure.

The top of the figure shows two different content providers, which is connected to a given WASP over the Internet. This WASP has an agreement and collaboration with multiple operators. This constellation makes it possible for each individual content provider through one WASP to access both operators' customer bases, and at the same time use their billing system. A WASP's role consists as a connection link and mediator between operator and content provider. The WASP possesses a number of competencies inside technical solutions and negotiation, which the operators and content providers takes advantage of by using the WASP as a mediator.

The operator's advantages:

- Contact arrangement to the market's content providers which becomes more flexible and far less resource demanding. On a given market there can be 5-10 different WASP's, who together take care of 500-1000 different content providers. With the use of a WASP the operators avoid the direct contact to each individual content provider, which reduces resources regarding services analysis and contract negotiation. The WASP carries out an initial analysis of services and takes the best to the operator. Thereafter a contract can be made between operator and WASP for a whole group of services.

- Reduces the operator's sale- and marketing costs as the WASP also manages this.

The operator's disadvantages:

- The operator reduces its market power and the direct contact to the content providers. This gives the WASP substantial bargaining power towards the content providers and the operators as the WASP functions as a gatekeeper. It is necessary to create an open market with multiple WASP to avoid a situation with few powerful WASPs controlling the entire market.

The content provider's advantages:

- Outsourcing a number of technical and administrative aspects to the WASP.
- By content allocation SMS/MMS it can seem impossible for small content providers by themselves to launch an m-service due to the high establishment costs. A WASP, which buys SMS-numbers and manage operator contracts plus connection to all the operators' technical systems, will widen up the market, making it possible for smaller content providers to operate. Furthermore this aggregation of operator bases leads to simpler access to large customer segments.
- Startup costs are reduced significantly and the provider avoids building up the necessary IT-competencies, which is a premise when services for instance have to be integrated with the operators billing systems.
- Quicker time-to-market of the provider's m-services. This is because of quicker contact to one individual WASP rather than negotiating the necessary revenue sharing contracts with the different operators.
- Essentially lower entry barriers, which makes it possible for more potential content providers to start their m-services. This result in a larger supply of m-services and the lower entry barriers will at the same time make it possible to supply more m-services to narrow segments, which are one of the operator's challenges.

The utility value which occurs by getting a connection link between operator and content provider is the main reason that WASPs have a central role on the market for content allocation SMS/MMS.

7 Billing method

7.1 Content Value

The type of mobile payment is important for the billing system. Mobile payments can be divided into macro and micro payments with distinct implications for the billing system:

- A *micro-payment* refers to a payment of approximately $10 or less, and in the mobile environment this will often be for mobile content, such as video downloads or gaming.
- *Macro-payments* refer to larger value payments such as online shopping or proximity-based payments (micro could also be proximity, e.g. car parking).

The distinction between the two types of payment is important since the security required for each will be different. For macro-payment, security is much more important than for micro-payments since the non-payment risk has a higher consequence. For example, authentication for every macro-payment transaction through a trusted financial entity is extremely important, whereas network authentication, such as SIM, may be sufficient for micro-payments that only use the operator's infrastructure. For micro-payment, the purchase experience should really be easy and quick for the end-user. The operational cost of the purchase should not be too high for PSP and TTP since the margin per purchase will be low.

7.2 Who should handle the billing?

One important issue when setting up a payment model is who is to handle the payment. There are several possibilities but four seems to be most appealing: banks, credit card companies, operators or payment start-ups. Here we assume that content providers do not consider establishing a billing system as a viable solution. A relevant question is whether operators should collaborate with banks to address the m-commerce business opportunity? On the one hand telcos already have direct and privileged access to customers through handsets. Experiences such as minitel's in France show that they are able to collaborate with numerous content and service providers— there are about 8,000 content providers linked to minitel's network. Plus, since telcos already have highly sophisticated billing and accounting systems, they could offer payment services by

themselves. On the other hand, in most countries telcos would need to consider the legal issues before entering this market alone. At the same time, customers are used to paying through banks, and until recently banks have tended to monopolize the payment systems. Plus, studies from Forrester Research show that a most retailers would favor a joint venture including a financial company as a payment provider. It is important to acknowledge that the payment service provider also obtains "ownership" over customer information. The figure below describes some strengths and weaknesses of different actors to act as payment service provider (PSP).

Criteria	Banks	Credit cards	Operators	Payment start-ups
Motivation	Fear of staying behind	Add new channel	New revenue and service	Business opportunity
Mobile service skills	0	0	4	1
Financial service skills	4	4	0	1
Micro billing skills	1	1	4	4
Macro billing skills	4	4	0	0
Large end-user base	4	4	4	1
Large content provider base	3	4	1	1
Move quickly	1	0	2	4
Able to expand quickly	3	4	3	1
Example firm	Danske Bank	Visa	TDC	Paybox

1: minimal capability, 4: robust capability, Source: Forester Research

8 Distribution media

There are two broad categories of distribution media: network and service technology.

- Network: wireless network (GSM, HSCSD, GRPS, EDGES, UMTS, W-CDMA, CDMA2000, UWB), WIFI/WLAN (802.x series), and access network (Bluetooth and Infrared access technologies).

- Service technology: SMS, WAP, MMS, SIM Application Kit

There are performance tradeoffs and cost differences among the different technologies on a number of dimensions. However, we will not deal with these here but data is available on request.

9 Service Platforms

Service platforms determine what kind of services can be provided. The distribution media provides the basis of service platform. As open system and middleware infrastructure have been generally used, application developers may provide varied platform component to network operators and service providers. A platform requires compatible network standards. Some platforms are for a specific network standard like GSM. Some claim multiple compatibility. Some dedicates to adding mobile function to fixed services.

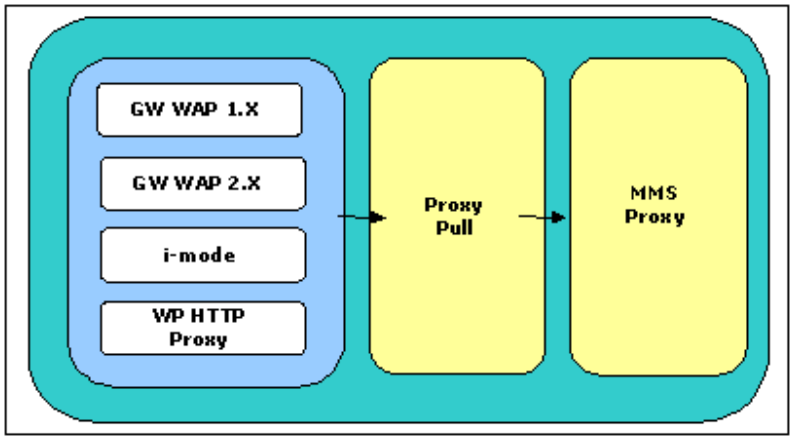
A platform supports services to certain kinds of terminals.

There are different service platforms. The mobile commerce service platform is comprehensive one in that they enable the complete provision of a series of services. There are instances of classifying platforms into enterprise service platform, banking service platform, portal service platform etc. In contrast to comprehensive platform, some platforms may only provide some new functions to services, for example to enable authentication, authorization hence to improve security level of services. In addition to the service platform, there are payment platform, billing system and CRM module etc. These platforms usually consist of a part of mobile commerce or service platforms, or serve as bases of them. Open-service platform is the current trend that allows for compatibility to others, and is open for the users (operators or service providers) to add in new modules and select functions, and lets them launch their own m-commerce service.

Following are some examples of mobile commerce platforms. It should be noted that these are platforms for content delivery and not for other types of services.

- Recently NEC demonstrated its 'NEMIP' platform. It is a highly flexible and modular integrated platform multi-service platform. NEMIP combines the service development of WAP 2.0, Push/Pull Proxy Gateway, MMS, mobile Internet and i-mode into one simple integrated platform. The mobile operator can offer subscribers e-mail, Internet browsing and MMS based services from a single

service architecture - at the same time expanding its roaming capabilities to other mobile service providers. Individual components of the service platform can add significant value to many existing mobile communications service networks deployed today. Further modular components can be added to provide further advanced services such as Java games distribution, Digital Rights Management, location based services including A-GPS, pre-paid billing, MMS based services including online-photo-sharing, and advanced mobile video streaming services. This platform has the added benefits of providing service flexibility to meet the business challenges faced today by the mobile operator.



- HP announced it Mobile Service Delivery Platform (MSDP). It is composed by a powerful set of telecommunications software and tools, partner solutions, carrier-grade hardware and integration services. Combined, these elements constitute an integrated environment to incorporate all of an operator's different mobile services, such as messaging, location and entertainment. Typically, operators have created and deployed new mobile services one at a time, each with its own network and management resources. With HP MSDP, mobile operators can integrate their mobile services into a single platform in which network and management resources are shared, thus minimizing duplication, simplifying management and reducing costs.
- Ericssion claims its mobile commerce platform is flexible and truly customizable for the creation of unique and differentiated offerings to fit customer needs. It

includes a scalable solution that includes modules for access, payment and security. The platform also supplies an end-user on-line customer service function, mCare, which provides immediate context-sensitive help. Services such as banking, trading, ticketing, shopping, gaming and betting will be accessible from any type of fixed or mobile Internet-enabled device. It provides an end-to-end solution for delivering mobile Internet services to a mass market. This platform solution is ready for GPRS, the packet-based data bearer service for GSM and TDMA networks.

- Lucent launched its own m-commerce platform, the Lucent Mobile Experience that, as it described this product, features wireless network equipment, middleware, open APIs, Internet content, mobile Internet developers kits and transaction-based micro-billing applications.
- With Palm and Delphi as the main investors, MobileAria sets an example in providing open-service platform that enables telematics services for the automotive and fleet industries. For fleet telematics, MobileAria's open, scalable, common-access service delivery platform allows fleet operators to manage their entire operations in real-time to reduce operations costs, shorten the dispatch-to-cash cycle, improve customer service and provide a greater return on their mobile assets. For automotive telematics, MobileAria's patent-pending voice-enabled productivity service frees drivers to access their world responsibly in any vehicle using leading voice, GPS and other wireless technologies.
- Finnish firm Popsystems is developing BePop service platform that can be used to create mobile, internet and digiTV services such as portals and communication environments for individuals and workgroups. BePop provides a toolset to implement services such as email, discussion forums, shared calendars, file storage and forward group membership and user administration. BePop is especially designed to support and enhance communication between group members. Various means of communication are available, such as email, SMS and WAP. With the use of templates and BePop database services the application developer can quickly implement a specifically tailored portal service for their customers.

White book on m-services – Copenhagen Business School 2003

Appendix

Group/Category	Service	Remarks
Content		
Information	Simple provision	
	On demand	
	On events	
Entertainment	Simple provision	
	On demand	
	Ínteractive on demand	
	Interactive with others	
Communication	Voice	
	Direct data	
	Between anonymous	
	Safe	
	Payment transaction	
Other	Converting	
	Surveillances	
	Dating	
	Betting	
	Others	
Media		
Reach	All	
	Segments	
	Individual	
Terminal	Mobile phone	
	PDA	
	Other	
Format	Text	
	Audio	
	Images	
	Multimedia	
	Streaming	
Target group		
Demographic		
Psychographic		
Behavioral		
Payment method		
Payment segments	Content payment	
	Remote payment	
	Proximity payment	
Time of payment	Prepaid	
	Postpaid	
Content value	Micro payment	
	Macro payment	
Revenue sharing		
Class and share	High class, large share	
	Low class, large share	
Reverse charging	Operator2custommer	
	Content2customer	
	Content2operator	
	Operator2content	
Billing method		

Billing basis	Per time unit	
	Per megabyte	
	Per service unit	
	Subscription	
	Bundling	
	Free	
PSP	Banks	
	Credit cards	
	Operators	
	Payment start-ups	
	Content providers	
Distrib. media		
Network		
Service technology		