Studies of the Business Opportunities in Context aware Stories for Mobile Users

by

Thomas Braun

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Supervisor of Research:

Marcus Breathnach (Forfas)

Advisor:

Glorianna Davenport (Media Lab Europe)

Faculty of Commerce

Michael Smurfit Graduate School of Business

University College Dublin

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Dedication

To Máire, Oscar, Emma, Orla and all of my family

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1. Introduction

Companies involved in the mobile technology, infrastructure and devices businesses are increasingly looking for the applications that will drive demand for their products and services within the short to medium future. These companies and the mobile services providers are putting efforts into stimulating the creation of new mobile applications and content for mobile users. Clusters of innovative technology and media companies are encouraged to form in various ways to find the sought after revenue generating experiences, applications and media.

The media industry has evolved hand in hand with technology development providing value to the use of technology systems. New ways of producing and distributing media has gradually been introduced. The artistic side of media production has also developed to provide new rich art forms utilizing new developments in technology.

Stories define how we think, play and understand our lives (Murray 1997). For thousands of years, humans have used the art of storytelling for teaching, enjoyment and information exchange. Stories were told from mouth to mouth in the same location and time, but stories were also told on rock carvings, tools and jewelry, through monuments and on papyrus or paper. Transportation of a story from one place to another (if at all possible) took a lot of time and effort or personal travel. While storytelling from mouth to mouth was very interactive and dynamic (could be improvised depending on circumstances or contexts), later methods for storytelling have due to limitations in technology been more sequential and static in nature. Examples are the telegraph, broadcast television

and radio, cinema and newspapers. The audience watching a film in the cinema does not have any influence on the storyline or sequence of events, all this is predetermined and sequential.

While telephony involves a two way interactive process it has been limited to the use of voice. Later technology enhancements have included multimedia capabilities such as video streaming, picture, video and text messaging. In addition to this the invention of hypertext or point and click on the Internet introduced a certain amount of interactivity. Similar technological developments have now taken place in the area of mobile communications.

Previously most media channels and technology were focused on broadcasting to fixed locations at fixed schedules for example to the home or office. Now people increasingly expect to access and control media and other services when and where needed, both for business and pleasure.

But, people will not use mobile services unless it is convenient to do so. To conveniently be mobile, users would prefer small, light mobile computers (or phones) because they have to be carried around with them. This creates certain limitations to the ease of interaction with the mobile services through the device using relatively small button or visual, touch or pen display interfaces. One aspect of making mobile computers easy to use is the physical design of the device itself. This only goes so far in solving the problem. Another aspect is the design of the mobile application and the content it uses. This puts new requirements on the mobile services and content to increase interactivity while minimizing the amount of physical interaction needed with the service (or device). The new requirements on media content structuring, composition and semantics will change the way media is produced. A new generation of mobile media is developing. It is focused on users being mobile and interactive, thus new tools, techniques, technology and expertise are required for future media production.

The key (Norman 1999) idea behind mobile media is that the user interaction with the computer is minimal, i.e. not much more than with a book or Television. The principle communication occurs in the background, collecting signals about the user location (and other sensory data or context) and translating these into computer requests or commands. In this sense the computer disappears, in favor of a sensory experience. Mobile media enables a visually connected culture to exist even though we are miles apart. When we in real time are able to send and receive live images of ourselves or what we are working on between each other we are suddenly in this visually connected culture similar to being in the same place (Mitchell 2003).

The location is one of the contexts in which we want to access a service and its information. The context act as a filter that together with individual preferences determines what services or information we can access. Context is a trigger of interaction with services or information present in the environment through which we move. In the area of storytelling we can imagine many more contexts for which information changes. An example is a fiction story that tells a different story based on the contexts of location and weather (wind, sun, clouds, temperature, rain) (Wood, A., Davenport, G., Donovan, B., Strohecker, C 2004). The context of the place of being interacts with the story system. This interaction may or may not be known to the user. The users movement and the context in which she moves drive the storyline and sequences dynamically. Each story has to be designed specifically for a particular set of contexts. The richness of this story to the user is dependent on certain features being present in the media and technology as well as the deployment thereof in the environment.

There is a new generation of media developing. It will be focused on users being mobile, connected and interactive, thus new tools; techniques and expertise are required for future media production.

There is a need for enhanced technology, focused on greater mobility and interaction. For example small efficient sensors, better human computer interfaces, faster and more reliable networks, more durable batteries (lower energy consumption), more exact positioning technology need to be developed. A level of interoperability between the technologies has to be achieved.

There is a new type of business developing for mobile media. An application of this is context aware stories. New business models need to be invented. The richness to the businesses and their possibility in gaining benefit from context aware story systems and content depend on the profitability (revenue and cost) and wide commercial deployment of such systems and content in the environment. Naturally the development of mobile technology is also an underlying prerequisite.

The introduction of new mobile technology in third generation (3G) and fourth generation (4G) mobile telephone systems, wireless LAN/WAN infrastructure and devices is taking us closer to the point when this type of rich interactive mobile media services is becoming a reality. It is a belief that the winners in this space will have a great and prosperous future to look forward to. Therefore the core *rationale of this study* is to identify the *value chain* and *business opportunities* for each part in that value chain of a mobile context aware story application of mobile media. Suitable *business models* for *startup companies* and *big media companies* respectively, will be identified and critiqued. In understanding this information, an entrepreneur in a start-up company or a business leader in a big media company would be able to build particular business cases with economical forecasts to assess whether or not to enter into a new venture in *2006*, depending on their resources, competences, capabilities and commercial expectations.

Chapter one has introduced you, the reader to the subject area under study. In Chapter two relevant literature is reviewed. In Chapter three the research methodology is described. Here the framework for the study is defined together with the primary and secondary information sources and the method of analysis. The chosen method of investigation is exploratory. The research findings and analysis are described in Chapter three to twelve. Chapter three the research methodology is defined. Chapter four analyses the product or service. Chapter five analyses the market feasibility. Chapter six analyses the area of opportunity recognition. Chapter seven analyses the areas of technical feasibility. Chapter eight analyses the business models. Chapter nine analyses the operations feasibility. Chapter ten analyses the future of mobile media. Chapters eleven and twelve provide background to entrepreneurship, startup companies and the media business. Finally the summary and conclusions of this study are described in Chapter thirteen followed by references and appendixes.

2. Literature Review

2.1 Marketing

Geoff Moore (Moore 2001) draws on marketing theory and high-technology experience to describe the elements of the product life cycle for technology innovations. He examines how communities respond to new products or services that require the end user in the marketplace to dramatically change past behaviour (discontinuous innovations). Companies must position their products differently through the cycle to reach their full sales potential and become an industry standard instead of a novelty. Many new high-technology products start along a classic new product diffusion curve, but fail soon thereafter. Very different strategies for product and service offering and positioning are needed for the various phases of the technology adoption life cycle.

The basis of the technology adoption life cycle is similar to the basis for diffusion models. Different groups of potential customers react differently to innovations, and adoption proceeds from the most enthusiastic to the most conservative. Communities respond to discontinuous innovation, when confronted with the opportunity to switch to a new infrastructure paradigm, customers self-segregate along an axis of risk aversion. Moore separates customers into five categories, along which the cycle of new technology adoption proceeds:

- Innovators - technology enthusiasts who are fundamentally committed to new technology on the grounds that sooner or later it will improve their lives.
- Early Adopters - visionaries and entrepreneurs in business and government who want to use the innovation to make a break with the past and start an entirely new future
- Early Majority - pragmatists who make up the bulk of all technology infrastructure purchases. Their purchasing behavior is based on evolution rather than revolution and they buy only when there is a proven track record of useful productivity improvement.
- Later Majority - conservatives who are very price sensitive and pessimistic about the added value of the product. They buy only when technology has been simplified and a commodity.
- Laggards - skeptics who are not really potential customers. The goal is not to sell to them.

There is also a section that Moore calls the chasm, separating adoption by the early market customers (innovators and early adopters) from adoption by the early majority. Moore describes the chasm as follows:

Whenever truly innovative high-tech products are first brought to market, they will initially enjoy a warm welcome in an early market made up of technology enthusiasts and visionaries but then will fall into a chasm, during which sales will falter and often plummet. If the products can successfully cross this chasm, they will gain acceptance within a mainstream market dominated by pragmatists and

conservatives. Since for product-oriented enterprises virtually all high-technology wealth comes from this third phase of market development, crossing the chasm becomes an organizational imperative.

The strategy for crossing the chasm, as well as the strategy for each of the other categories is very particular to where the product is in the life cycle. The source of competitive advantage changes through the cycle. It draws on various combinations of competing on cost, differentiation, and focus.

The sections are categorized as follows:

- The Early Market - a time of excitement when customers are technology enthusiasts and visionaries looking to be first to get on board with the new paradigm. Visionaries are willing to work through bugs and put in effort themselves to make the solution work. The product sells itself.
- The Chasm - a time of despair, when the early market's interest wanes but the mainstream market is still not comfortable with the immaturity of the solutions available. The only safe way to cross the chasm is to put all your eggs in one basket, target a single beachhead of pragmatist customers in a mainstream market segment and accelerate the formation of 100 percent of their whole product.
- The Bowling Alley - a period of niche-based adoption in advance of the general marketplace, driven by compelling customer needs and the willingness of vendors to craft niche-specific whole products. A whole product is the minimum set of products and services necessary to ensure that the target customer will achieve his or her compelling reason to buy. Pragmatists want a whole product, with the necessary user infrastructure and customer support. At this stage companies should resist the temptation to try to provide a general-purpose whole product and simplify the whole product challenge. To get customers on board, service content is high, Return on investment to end-user must be high, and partnerships with other companies may be called for. Success in the niche can then be leveraged elsewhere. The two keys to

targeting the right niche customers here are a) the segment has a compelling reason to buy and b) the segment is not currently well served by any competitor.

- The Tornado - an ugly and frenzied period of mass-market adoption, when the general marketplace (early majority customers) switches over to the new infrastructure paradigm. It is a herd mentality. Keys to success in this period are to ignore customer needs and product modifications and just ship, riding the wave. Market share is critical at this stage to lock out competitors, and partners should be eliminated. Companies entering the tornado should expand distribution channels, attack the competition, and price to maximize market share.
- Main Street - a period of aftermarket development, when the base infrastructure has been deployed and the goal is now to flesh out the potential. Another reversal of strategy is needed back to niche-based marketing. Before the product becomes obsolete, there is an opportunity to settle into a profitable period of differentiating the commoditised whole product with extensions focusing on the end user.
- End of Life - which comes too soon in high technology. Companies should find caretakers that can take over a fully commoditised product with low profit margin.

2.2 Strategy

Value Chain:

The value chain (Porter 1985) is a systematic way of examining all the activities a firm performs and how they interact. It scrutinizes each of the activities of the firm as a potential source of advantage. The value chain maps a firm into its strategically relevant activities in order to understand the behavior of costs and the existing and potential sources of differentiation. Differentiation results, fundamentally, from the way a firm's product, associated services, and other activities affect its buyer's activities. All the activities in the value chain

contribute to buyer value, and the cumulative costs in the chain will determine the difference between the buyer value and producer cost.

A firm gains competitive advantage by performing these strategically important activities better or cheaper than its competitors. One of the reasons the value chain framework is helpful is because it emphasizes that competitive advantage can come not just from great products or services, but from anywhere along the value chain. It is also important to understand how a firm fits into the overall value system, which includes the value chains of its suppliers, channels, and buyers.

Activity Mapping:
Porter (Porter 1996) builds on his ideas of generic strategy and the value chain to describe strategy implementation in more detail. Competitive advantage requires that the firm's value chain be managed as a system rather than a collection of separate parts. Positioning choices determine not only which activities a company will perform and how it will configure individual activities, but also how they relate to one another. This is crucial, since the essence of implementing strategy is in the activities either by choosing to perform activities differently or to perform different activities than rivals. A firm is more than the sum of its activities. A firm's value chain is an interdependent system or network of activities, connected by linkages. Linkages occur when the way in which one activity is performed affects the cost or effectiveness of other activities. Linkages create tradeoffs requiring optimization and coordination.

Porter describes three choices of *strategic position* that influence the configuration of a firm's activities:

- Variety-based - based on producing a subset of an industry's products or services. This involves the choice of product or service varieties rather than customer segments. It makes economic sense when a company can produce particular products or services using distinctive sets of activities.

- Access-based - segmenting by customers who have the same needs, but the best configuration of activities to reach or access them is different.
- Needs-based - similar to traditional targeting of customer segments. Arises when there are groups of customers with differing needs, and when a tailored set of activities can serve those needs best.

The concept of activity mapping helps to explain how different strategies, or positions, can be implemented in practice. According to Porter, the key to successful implementation of strategy is in combining activities into a consistent fit with each other. A company's strategic position, then, is contained within a set of tailored activities designed to deliver it. The activities are tightly linked to each other. Fit locks out competitors by creating a chain that is as strong as its strongest link. If competitive advantage grows out of the entire system of activities, then competitors must match each activity to get the benefit of the whole system.

Porter defines three types of fit:

- Simple consistency - first order fit between each activity and the overall strategy.
- Reinforcing - second order fit in which distinct activities reinforce each other.
- Optimization of effort - coordination and information exchange across activities to eliminate duplication and wasted efforts.

Sustained Competitive Advantage:

Porter (Porter 1990) outlines three conditions for the sustainability of competitive advantage:

- Hierarchy of sources (with regard to durability and imitability) - lower order advantages such as low labor cost may be easily imitated. Higher order advantages like proprietary technology, brand reputation and customer relationships require sustained and cumulative investment and are more difficult to imitate.

- Number of distinct sources - many sources of competitive advantage is harder to imitate than few sources.
- Constant improvement - a firm must be creating new advantages at least as fast as competitors replicate old ones.

3. Research Methodology

3.1 Framework

The framework used for studying these business opportunities is based on material from the course New Venture Planning (BMGTP 770/776), taught by Professor Frank W. Roche at Michael Smurfit Graduate School of Business July 12-16, 2004 and the business plan model presented in the book, New Venture Creation: Entrepreneurship for the 21st Century (Timmons, Spinelli 2003, p.403). However the study is not intended as a complete business plan and only includes the relevant areas of focus. The study focuses on:

- The product/service
- Market feasibility
- Mobile technology
- Business models
- Operations and
- Future of mobile media

How can a small startup and a large resource rich media company respectively potentially enter the business of context aware stories for mobile users as applied to a city exploration tour guide?

3.2 Primary data sources

Because of the nature and uncertainty of the problem an unstructured or exploratory approach was used. The approach involved:

- *In depth interviews with key experts (Table 1)*
- *Brainstorming (Table 2)*

Organization	Titles	Questions	Main Role
Changingworlds	Chief Technology Officer	Network Service Provider	Technology Enabler
BT Mobile	General Manager, Business Service Provider	Network Service Provider	Mobile Virtual Network Operator
Eircom	Manager Technology, Manager Content	Network Service Provider	Fixed/Broadband Network Operator
Meteor	Product Development Manager	Network Service Provider	Mobile Network Operator
Vodafone	Billing Process Manager	Network Service Provider	Mobile Network Operator
RTE	Technology Development Manager	Content Provider	Media Company/ Broadcaster

Table 1. The complete set of interviews with primary data sources. No reference numbers are given for interviews due to confidentiality required by some companies. A specific interview will not be referenced throughout the thesis.

The complete set of brainstorming sessions conducted with primary resources is listed in Table 2 below.

Reference Number	Organization	Titles	Questions	Main Role
1	Ericsson	Project Manager	Mobility World	Network Equipment Developer
2	Ericsson	Business Development Manager	Mobility World	Network Equipment Developer
3	Ericsson	Project Manager	Value chain	Network Equipment Developer
4	Ericsson	Designer, Designer	Technology Trend	Network Equipment Developer
5	MLE	Senior Investigator, Patent Engineer	Context Aware Stories Project	Media and Technology Research
6	MLE	Senior Investigator, Programmer	Context Aware Stories Project	Media and Technology Research
7	MLE	Researcher, Researcher	Context Aware Stories Project	Media and Technology Research
8	MLE	Senior Investigator, Researcher, Researcher	Context Aware Stories Project	Media and Technology Research

Table 2. The complete set of brainstorming sessions with primary resources.

The *sample design* was based on a non-random sample. This means that the selection of elements for inclusion in sample is left up to the discretion of the interviewer. The disadvantages of a non-random sample are that there is a great potential for selection bias, which means the sample, may not be representative of the population, there is no population list from which to select the sample and one cannot make statistical inference about interval or range of accuracy of the sample. The sample design involved a combination of judgment and convenience sampling. Judgment sampling is a form of quota sampling, which gives rapid turnaround and lower cost per completed interview (often used in market research). Judgment sampling relies on the knowledge and differing views of experts. Convenience sampling is based on the ease of accessibility of people to

be interviewed. The accessibility was determined by the geographic location and the time of availability.

The population where selected based on both relevance to the study and accessibility of people. The initial contact was made by E-mail and followed up by E-mail and telephone call where possible. Out of 18 intended interviews or brainstorming sessions, only 14 were completed. Out of those 14, six was interviews based on comparable mostly qualitative questions and eight where brainstorming sessions with questions suited to the area of expertise. The people involved in the six interviews were presented with a thesis introduction and a set of questions that were going to be asked. The questions, the introduction and the scope of the interviews are defined in Appendix A. Note that the questionnaire was initially designed for traditional mobile network operators. In order to be able to compare the research results the same set of questions where maintained for all interviews, which means the relevance of questions to a particular organization, may vary. A small number of additional questions were designed and asked. The additional information is brought into the thesis where relevant. Thesis introduction.doc included the thesis structure and the complete introduction chapter of this thesis. Practical time limitations steered how many questions could be asked during each interview. That is the reason why certain questions are asked in one interview, but not the other. A sample size of six is too small to draw any valid conclusions from. It can however give an idea of what people think.

By studying table 1 it can be seen that 50% of the sample for *interviews* was made with people from a company operating mobile networks, 16% of the sample for interviews was made with people from a company operating fixed/broadband networks, 16% of the sample for interviews was made with people from a Media Company/ Broadcaster. 16% of the sample for interviews was made with people from a technology Enabler. We can see a bias toward the views of Mobile Network Operators in the sample for interviews.

50% of the sample for *brainstorming* sessions was from a Media/Technology Research company and 50% from a Network Equipment Developer. These two

roles was non-existing in the interviews while they where dominating the brainstorming sessions. By combining the results from interviews and brainstorming sessions a more representative population has been created. However, the views of Mobile Device Developers have not been sufficiently covered.

Main Role	**Number of Interviews**	**Number of Brainstorming sessions**
Mobile Virtual Network Operator	1	-
Mobile Network Operator	2	-
Fixed/Broadband Network Operator	1	-
Media Company/ Broadcaster	1	-
Technology Enabler	1	-
Media and Technology Research	-	4
Network Equipment Developer	-	4

Table 3. Main roles of and the number of interviews/brainstorming sessions per role for the research sample.

All seven people involved in the six interviews where male. Out of the ten people involved in the eight brainstorming sessions, five are female and five are male. Results of the *interviews* are summarized in Chapters three to nine. The numbering of the interview questions throughout the document comes from the questionnaire (see Appendix A). See Appendix D for detailed analysis of research questions. Results from the *brainstorming* sessions are presented throughout the document where suitable.

3.3 Secondary data sources

Firstly, the secondary data is collected from industry reports, books, articles, databases, web sites and trade journals.

Secondly, in order to obtain further understanding of practice, the research also involves an analysis of relevant case studies. The cases studies includes:

- Nokia and MIT's Project Oxygen (Abridged), HBS
- NTT DoCoMo I-mode: Value innovation at DoCoMo, INSEAD
- iPod, iTunes, and Steve Jobs: Apple Driving Market Growth Through Technology, Imperial College London

3.4 Research process

The research process involves four steps. All four steps can be done in parallel.

The *first* step is to perform desk research using secondary data to thoroughly understand the different elements in the area of research. The analysis will be provided in Chapter four to nine.

The *second* step is to analyse cases covering areas where parallels can be drawn to the area of research. The analysis will be provided in Chapter four to nine.

The *third* step is to design research questions for in depth interview with the key experts and performing the interviews. The experts interviewed will be based in national or multinational organisations in Ireland and the UK in the areas of:

- Mobile devices
- Mobile services
- Content providers
- Social science and Media research

The analysis will be provided in Chapter four to nine.

The *fourth* step involves brainstorming with experts. The analysis will be provided in Chapter four to nine.

The process is close to action research. The researcher will act as an entrepreneur exploring the feasibility of the business opportunities for mobile context aware stories. Analysis of primary and secondary data is based on manual pattern recognition methods.

3.5 Mobile user profile

A limited user profile among the interviewed was established in order to understand how aware they where of using mobile services. Only one question was asked to five out of six interviewed.

2.8 Have you used Location Based services (what type?)?

All interviewed persons that were asked the question had used some form of location based service. A range of different services had been used including find nearest, get direction, museum tour guide, call a cab, vehicle tracking system and GPS hiking map. This indicates that the people interviewed has a higher than average level of exposure to real mobile services. This has to be taken into account when analysing the research results.

The fact that four out of six people (66%) where not happy with the services possibly indicate an immaturity of location-based services.

4. The Product or Service

This Chapter is intended to provide a very small market research in order to understand the interests in a mobile application and distributed stories creating a location based City Tour or City Exploration experience. Six interviews were held. The questions asked where:

- 1.2 Would you like to have it (personally/company)?
- 1.5 How much would you pay for stories (personally/company)?
- 1.7 What would you like to explore? In what types of stories would you be most interested?

The numbering of the questions comes from the questionnaire (see Appendix A). See Appendix D for detailed analysis of research questions.

4.1 Summary of research

67% of the people asked where personally interested in having the service while 34% where not interested based on the introduction they had been given (Appendix A). The high technology awareness and familiarity with location-based services (Ch 3.5) in the sample has to be considered when interpreting these results.

Three companies (60%) where interested in producing this kind of content or offering this kind of service pending some form of investigation with regards to the market, sales potential or profitability.

This indicates that there is some potential for this kind of product/service. There is however a long way from being interested to actually buying/using or providing the service or content. There is a large need for marketing of the service.

On average, people would be prepared to pay *€7.70* for a guided tour (assuming a total data volume of 1MByte (paid at 2 cents per KByte) on a pay per use basis. See price distribution in table 4. It can be used to determine the pricing model.

Price(€)	1.50	3-4	10	20
Customers(%)	20	40	20	20

Table 4. Distribution of prices that customers are willing to pay. Note that sample size does not provide statistical significance.

The price elasticity can be estimated to be in the order of –0.4 to –0.6, which is relatively high. It is assumed that the quantity demanded increases with a decrease in price.

Using the service on a subscription basis may suit a smaller number of users. The subscription price was indicated to be somewhere between *€5 and €25* per month by one person.

The price companies would be prepared to pay for stories depend on, the volume of traffic (MByte) the story would create, how many minutes of time online the story adds and the required payback period and return on investment. It was indicated that a company would pay between *€50 and €200* to the creator of a story depending on the subject (for example a news story).

The types of stories users are interested in depend to a large degree on what situation they are in. Different profiles were suggested, that describe what type of content a user wants based on the trip the user is on, who the user is with, if the user is still or moving, what day in the week or what time of the day it is and what kind of environment the user is in. The most popular types (Table 10) of content (top 6) was (based on six interviews):

- History (50% of interviews)
- Leisure, travel guide and holiday reading (50% of interviews)
- Culture, local foods and tradition (33% of interviews)
- Business (33% of interviews)
- Sport (33% of interviews)
- Video or movie (33% of interviews)

The business opportunity for companies in this sector lies in finding and providing the content that the largest amount of people are interested in and will pay the most for.

In *summary*, the location based City Tour or City Exploration experience should from a user point of view:

- Offer content relevant to the situation or context the user is in. This could be achieved with the use of user profiles.
- Offer stories of the most popular type including History, Leisure, Culture, Business, Sport, Movie or video
- Be charged on a pay per use basis
- Be priced at around €7.70

And from a company point of view:

- Provide the content that *pays the best* and attracts the *largest user base or market*.
- Increase the volume of traffic (MByte) over the network
- Increase the amount of minutes users spend online
- Have potential to achieve the required payback period and return on investment criteria
- Be heavily marketed

At the price paid for stories it is envisaged that a story creator must sell a story to a lot of customers (story aggregators or service providers) in order to cover the costs and achieve a margin.

5. Market Feasibility

This Chapter is intended to provide information about the customers, industry structure and market channels for a mobile application and distributed stories that create a location based City Tour or City Exploration experience. Six interviews were held. The questions asked where:

- 3.2 Who do you think are the customers for Mobile Context based Stories?
- 3.8 Who do you think are the participants in the value chain for mobile context based stories?
- 3.9 Who are in the best position to capture value?
- 3.11 Do you see an opportunity for startups here or would it be occupied by large resource rich organisations?
- 3.15 What market channels could you see being used?
- 3.16 How do you see wireless portals developing?
- 3.17 What is your outlook for the mobile advertisement market 2006-2008?

The numbering of questions comes from the questionnaire (see Appendix A). See Appendix D for detailed analysis of research questions.

5.1 Summary of research

Who do you think are the customers for Mobile Context based Stories?

In general, the customers would be, the more sophisticated mobile users. The main business-to-consumer segments are:

- Tourists
- Family (sub-segment to tourists)
- Under 25 (entertainment)

And the main business-to-business segments are:

- Business travelers
- Advertisers
- Service providers (big companies)

There may be possibilities to attract consumers with limited mobility (physical mobility). Businesses may become customers from using ERM (enterprise relationship management) or logistics systems with commercial stories.

Who do you think are the participants in the value chain for mobile context based stories?

The interpretation of the value chain configuration for mobile context aware stories can be seen in figure 1. It is an abstract view of the value chain, which consists of the following players with associated responsibilities or activities:

- Content creator – makes or authors the content (context aware stories)
- Content aggregator – aggregates, packages, markets and publishes content
- Application provider – core technology, application, integration
- GPS (Global Positioning System) provider – location information
- Network provider – transport, mobile radio and WLAN network
- Service provider – mobile city exploration tour guide
- Retailer – selling application and or content
- Consumer segment – a group of targeted consumers

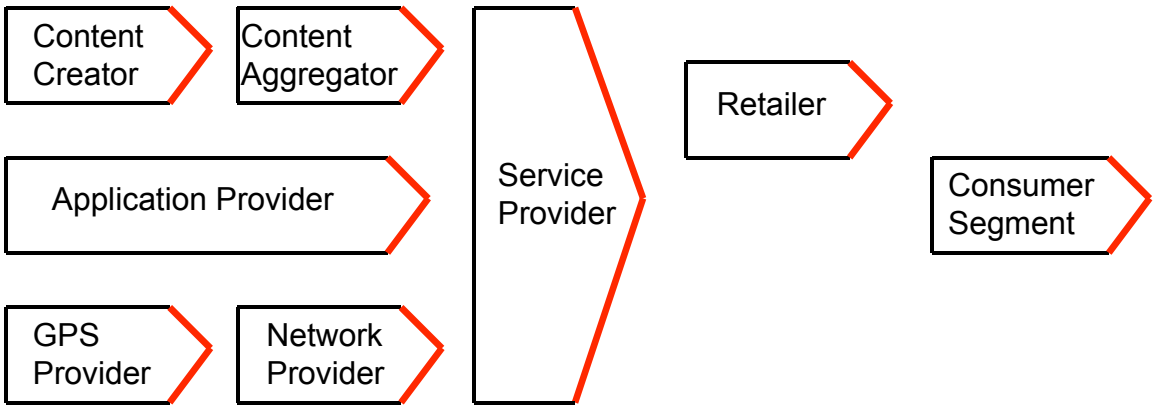

Figure 1. Interpretation of value chain configuration for mobile context aware stories. A red line in front of each role represents an expected margin to be earned from performing activities in that role.

For a more detailed view of the wider industry value system see Appendix B.

Who are in the best position to capture value?

The power distribution in the value chain, which to a large degree determines how much value a particular player will be able to capture, is interpreted as follows:

- Distributor (example mobile network operator) – *high power*
- Publisher (application provider, service provider, concept owner or media company) - *medium power*
- Enabler (niche player, small activity, complementary competence) – *low power*
- Content Creator (author, researcher etc.) – *least power*

A mobile network operator has the advantage of owning a marketing channel. It is an issue to find the market channels when not being a network operator.

Do you see an opportunity for startups here or would it be occupied by large resource rich organisations?

There are more opportunities for big resource rich companies than for small startups. It is indicated that the reasons are:

- The cost of marketing activities and creating the market.

- The need for brand awareness and customer contacts
- The cost and complexity in billing relationship and customer service
- Access to market channels

However there are also opportunities for startups as concept owners, technology enablers or content providers. This requires that startups partner with companies who own well-known brands, have established customer relationships and sufficient resources for marketing.

What market channels could you see being used?

The most preferred market channels include:

- Retail and customer service (travel industry (travel agents, travel companies, tourist office), mobile agency, big retailer heavily branded mobile network operator retail outlet for telephones, accessories or services etc.)
- Viral marketing (mouth to mouth recommendations)

Other marketing channels include:

- Direct channel (email, mobile advertisement)
- Web sites
- WAP sites
- Conferences
- Articles
- Marketing journals
- Case studies

When trying to cross the chasm (Moore 2001) a number of those market channels are required.

Product placement for OEM's would be very small and also complex/costly.

How do you see wireless portals developing?

The research indicates that the wireless web will not develop in the same direction as the Internet because people don't explore it in the same way. The poor usability

and low focus on the user experience have commanded very low levels of usage of current portal based services. New personalization techniques are however being developed to increase the usability of portals. It also indicates that a lot of new portals in the form of wireless short-range radio hotspots will be introduced going forward. In the future we will see more video services as well as location based advertisement and video commercials on wireless portals. Portals are also becoming controlled walled gardens with selected content and user interfaces.

What is your outlook for the mobile advertisement market 2006-2008?
The research indicates that it is likely that mobile advertisement and location sensitive advertisement have a future. The high costs of buying advertisement space are creating a need for other methods of advertising of which mobile advertisement is one. It would be important to do cross promotion between mobile and non-mobile channels to enforce the marketing message. For users to accept mobile advertising, the price of the services used for carrying advertisement has to be very cheap or free. It is however difficult to say when or if it will become a mainstream or key method for marketing. In one sense it is just another marketing channel competing for a limited set of marketing resources. There is a need to provide more stable platforms for mobile marketing and to develop technology systems for automating the management of many small sponsors.

5.2 Irish mobile market trends

According to the ComReg trend report Q4 2004 presentation (Amárach Consulting), 80% of adults have a mobile phone. The mobile phone penetration is now higher than the fixed line penetration. Only 18% of the people asked have purchased any of the more popular mobile services. These services include ring tones (16%), picture messaging (4%), games (4%), music (3%), wallpapers/icons (2%), and subscription services (1%) (One person may have bought many services). Ring tones where purchased mainly by the 15-24 year age group. It is

also interesting to note that 17% of the Irish people (37% of internet users) have made online purchases on the Internet. Online shopping is most prevalent in the 25 to 34 year olds in the ABC1 social class (more disposable income). This may be used as input when estimating the possible market for M-Commerce usage in the future?

6. Opportunity Recognition

This Chapter is intended to identify trapped value or opportunity for new value creation in the vertical business of a mobile city exploration tour guide service based on context based stories. The results are based on the analysis of two in a series of questions defined by Rayport and Jaworski (Rayport, Jaworski 2003, p.81) that guides the entrepreneur to uncover trapped value or find opportunities to create new value. Opportunities have been identified for activities in the value chain (Appendix B). The questions analyzed where:

- Is there a high degree of asymmetric information between buyers and sellers or colleagues in the value system that traps value?
- Are considerable amounts of time and resources consumed in bringing people together to make a transaction or complete a task?

6.1 Summary and analysis

Is there a high degree of asymmetric information between buyers and sellers or colleagues in the value system that traps value?

This is a summary of opportunities from asymmetric information. See Appendix C for a more detailed analysis.

Consumer information is of importance to most players in the value chain in order to provide maximum user satisfaction and value. From the consumer point of view it is important to have control of what information is received. The service shall act as a filter to block unwanted information. This filter may for example block certain advertisements. The service may also provide a consumer-rating feature where consumers can say what parts of the service or content they like and

dislike. This would assist in offering or consuming the right content. May be used by service provider in selection of suppliers. A consumer is also concerned of privacy in order that personal information is not leaked and misused (payment details and other parts of the personal profile). An advanced security system must be in place. From the point of view of the marketer the service should include a market research feature to automate collection of consumer marketing data. This may not be appealing to the consumer and should be possible to turn off by consumer. The billing provider needs to know how a consumer wants to be billed, which may vary based on the context. This information together with account details shall be part of or accessible through a user profile. Billing provider must also know who uses the service for other revenue management activities. Story providers and others are naturally also interested in consumer/marketing information in order to tailor their offerings. Depending on how stable the business and links between actors in the value chain will become there may be possibilities to provide an information system to share and charge for consumer information between partners. There is a knowledge gap between the consumers and the environment (City and its people) and the service provider, story and content providers need to bridge that gap. Story providers need to understand what stories are attractive and how much they can charge for them. A tourist has other needs than the need for knowledge about the place. For example, game like stories that take place in the real and the virtual world, treasure hunts and theme stories may be provided. There are opportunities in providing complementary information including local weather, events, telephone directory, currency and payment and restaurants. Also the creation of advertisements of other local products or services is an opportunity for the content creators. Service providers and network operators may use the consumer information for capacity dimensioning and utilization optimization. Mobile device providers may use it for advertising their handsets or promoting use of mobile services. An increase in usage is in the interest of all technology enablers of the service. In order to serve the consumer in a business with so many players and partnership agreements (see Appendix B) there is a need and an opportunity for coordinated customer service

function that taps into each partner for quick response. All interested partners need to share this cost in some way.

Are considerable amounts of time and resources consumed in bringing people together to make a transaction or complete a task?

Story Creation: Researching and developing a story can occupy significant time depending on the previous knowledge of the subject and the area or location and people in the area (Research methodology, Table 2, Ref 7). Figures from this brainstorming session shows that it can take between 8 months and 12 months to develop and produce a context aware (distributed context based) story. A result is that content becomes very costly. In order to reduce time and costs it is advisable that content creators use the good storytellers in the community to provide relevant stories.

The artistic or creative process in story making is hard to define. Everyone does it differently. This causes the output to be unpredictable, which means that quality becomes inconsistent, and the time taken to make a story varies. In order to maintain quality and limit the time until particular stories are available it is advisable for the story aggregator to source stories from many different content creators, reporters or stringers whom are experts in particular fields or knowledgeable about a particular location or area. On the other hand story creators should if possible try to make deals that allow for this creative unpredictability.

The structure is a fixed framework within which a story (content) is placed. An author may design a structure or modify an existing structure. The creation of a structure takes time and not many structures for context aware stories exist today (Table 2, Ref 7). Also learning a structure takes time and if several authors shall write to the same structure workshops needs to be held. While creating a structure is working with logic, the authoring of the story is creative. These parts can be separated to an extent and the different activities may be suitable to different

types people. There may be a possibility to create a standard structure here (or several standard structures), which can be reused. Standard structures that are taught in writing courses would become well known by authors in general. This would reduce this cost in the medium to long term. There is an opportunity here to make an easy to use mobile context aware story design tool that enforces one or a number of standard structures (figure 2). This would be putting restrictions (how do these restrictions affect quality?) on the author, but on the other hand it would certainly reduce time to produce stories. May be suitable for smaller story creation firms that cannot afford complex and expensive tools. Can this become an industry standard? Flash is an industry standard for interactive media. There is no standard for context aware stories (distributed location based stories). Authors or artists don't want constraints imposed on them. They want to find the constraints themselves. Sometimes constraints can increase creativity especially if they are in line with the particular creativity style. The way constraints affect quality depends to a large degree on personality and the author's environment.

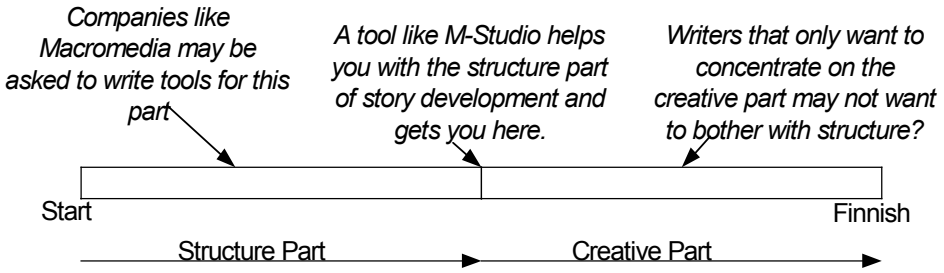

Figure 2. Tool support for developing context aware stories

M-Studio is a software tool for assisting in the development of context aware stories built at MIT. It provides a whole package to use. As any software tool it imposes a structure to some extent putting restrictions on the author.

The fact that the consumer can also be the producer has to be considered (Table 2, Ref 7). People like to tell stories and like to empathize with stories. There is an

opportunity to incorporate the possibility for consumers to create their own stories and for other users to consume them. This creates cheaper content and interaction between users, which may open up the service towards local community users. Who want to consume at this quality? How much money can be charged for such stories?

The context of the story may be determined by audience (user preferences or profiles) or sensor data. There may be a need for parallel production for different media (video, photo, animation, audio) (figure 3), audiences (user preferences) or devices. This activity is extremely resource consuming. Can this be bridged by technology in order to reduce costs?

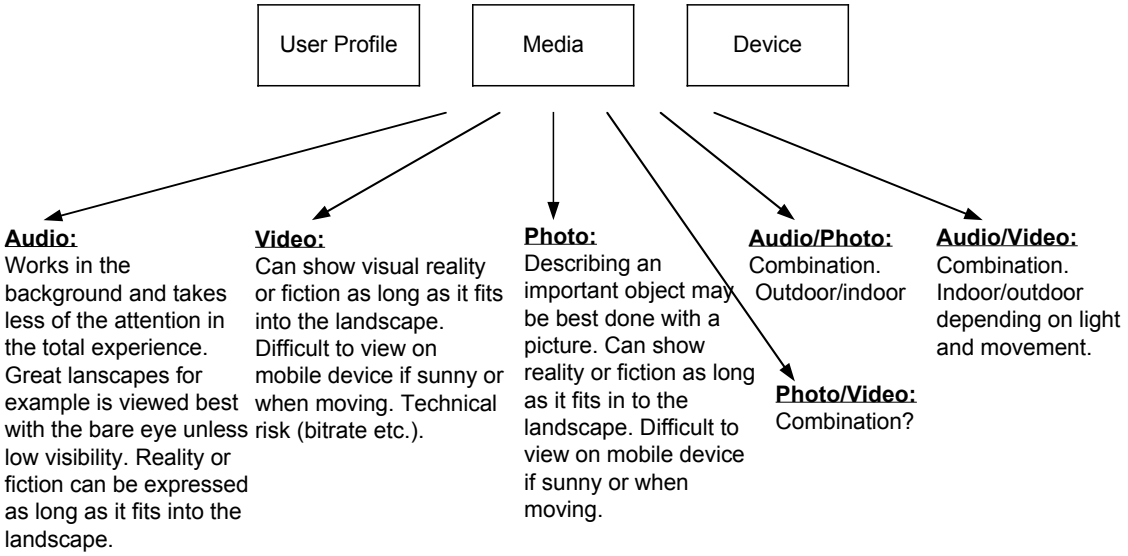

Figure 3. Parallel production

According to one interview (Table 1) there are no tools today that can handle conversion to different devices in a transparent way.

The needs of the audience and their priorities may change depending on the situation. Being on a busy shopping street, taking part in a festival or being in a quiet park or a museum. It will be costly and difficult to provide everything, perfectly matching expectations to every user. A question is if or how this can be generalized? Can it be categorized, where one wants to be alone, where social interaction is wanted etc.? How far should one go in personalizing or conceptualizing media from the view of commercial reality? Cost/benefit analysis would be required.

As context is changing there may be different structures needed? Indoors in a museum or on a busy shopping street the service may connect to Wireless LAN and derive positioning information from the WLAN nodes. Outdoors in open air (park) the service connects to the mobile network and uses the Global Positioning System (GPS) for positioning information. Social interactions between people and streaming may be needed in certain contexts. If you can generalize context you can generalize structure for each context because here is a dependency between Structure and Context.

STRUCTURE <= Dependency => CONTEXT

Can this mapping between context and structure be done dynamically in real time or does it need to be pre-produced in linear sequences? Suitable structure can depend on consumer action, location, type of consumer and real-time setting. If this can be automatic it will reduce cost and improve the experience for individual users. Technical interoperability and interoperability partnerships and roaming agreements are crucial here. Both issues are huge problems when realizing context aware stories.

Time variable: What is critical at the time of consumption? Can the reason for doing this action be connected with the location you are in? Most of the time it is possible to understand the reason for doing something from the location you are in but not always. Depends also on granularity of location. What is the granularity? The granularity is probably different for different contexts (using GPS, WLAN triangulation, mobile network positioning etc.).

Events such as Blooms day or Saint Patrick's Day reoccur every year. Special theme stories could be made for these occasions. An issue is that such information

has to be kept current and there are a lot of stories needing to be updated regularly, which is costly. There seem to be an opportunity here for good distributed story management systems.

Story aggregation:

Because of the unpredictable nature of story creation story aggregators need to secure output. In order to maintain quality and limit the time until particular stories are available it is advisable for the story aggregator to source stories from many different content creators, reporters or stringers whom are experts in particular fields or knowledgeable about a particular location or area. There may be an opportunity here for supply chain or knowledge management systems.

Service application creation:

Technologies from a broad range of unique research fields are required to assemble the service application. It is envisaged that this activity will involve a lot of partnering to get all the different components and knowledge necessary. Specifically opportunities in areas including usability, personalization techniques, conversational interfaces, sensors, wireless networking, positioning, vision systems, artificial intelligence and agents, data mining and searching, mobile platforms and market research are seen as significant. Collaborative working applications and smart development tools may also be opportunities for service application creators.

Mobile device development:

By providing context aware story application developers with an easy to use platform including the tools needed to access personal user profiles, networks, sensors, story engines, smart agents, cameras etc. they will enhance the value of the mobile platform, operating system or device. Application developers can concentrate more on innovating new applications, which can differentiate their offering. It possible that the functionality provided by this platform is

implemented in the mobile device or in another place accessible through radio communication.

Chip development:

The amount of simultaneous activities ongoing in context aware applications like this one may require more flexible multiprocessor chips, potentially controlled by software in order to use the processors for different purposes depending on context. Also the multitude of radio access, positioning and sensor technologies required to experience a context-based story might require integrated chips where one chip provides all necessary hardware support. This would be valuable for mobile device developers. Today mobile devices contain for example specialized camera chips. Will they in the future contain context based story chips?

7. Mobile Technology

This Chapter is intended to provide a view of the feasibility of the technology that enables the implementation of a mobile city exploration tour guide service based on context aware stories. The questions asked where:

- 4.3 What mobile device capabilities will be available by 2006-2008?
- 4.5 What percentage of mobile usage, coverage and revenue will be based on 2G, 2,5G, 3G, 4G and WLAN/WWAN access in 2006-2008?
- 4.10 What are the most important standards used for Location Based Services (example: positioning, Information retrieval, security)?

The numbering of the questions comes from the questionnaire (see Appendix A). A sample size of six is too small to draw any valid conclusions from. It can however give an idea of what people think.

7.1 Summary and analysis

7.2.1 Summary of research

What mobile device capabilities will be available by 2006-2008?

The results indicate that a convergence of mobile devices (doing different things) should take place (at least partly) within this timeframe. Exact time frame for the inclusion of WiFi/WLAN is difficult to predict. The introduction of WiFi/WLAN in mobile phones (when it happens) together with handover and the Session Initiation Protocol provides a potentially powerful solution that can compete with 3G. The mobile device is a fashion item packed with technology. For a summary of device capabilities and frequency of occurrence in interviews see table 5.

The most likely capabilities within this time frame seem to be Video, WiFi/WLAN, GPS and increased battery capacity. Other possible capabilities includes streaming pictures (next generation MMS), MP3, touch screens, sensors, memory and expansion slots.

Capability	**Indicated in number of interviews**
Video	3
WiFi/WLAN	2
GPS	2
Increased battery capacity	2
Streaming pictures (next generation MMS)	1
MP3	1
Touch screens	1
Sensors	1
Memory/expansion slots	1

Table 5. Device Capabilities

Critical for the mobile device developers is to engineer devices smartly so as they can be bought by and/or subsidized for consumers.

What percentage of mobile usage, coverage and revenue will be based on 2G, 2,5G, 3G, 4G and WLAN/WWAN access in 2006-2008?

The research indicates that it is the applications that drive revenue that is important and not the type of networks used. Traditional operators will continually face issues of operational cost.

New revenues will come from interactive data services rather than voice services which are at a plateau. It is indicated that there is a possibility that revenues from data services can grow from a current level of 10-15% of Average Revenue Per User (ARPU), to 20% in March 2005, to a possible level of around 85% of ARPU by 2008.

4G will only be a matter of higher capacity and bandwidth management and will be introduced in 2006 and established around 2008.

How fast interactive data services and 4G will be adopted depends on how developed a particular country is. Technology awareness, education level and the frequency of upgrading phones will play a role in the rate of adoption.

The impact of the development of Wireless LAN technologies is not clear from this set of interviews in isolation.

What are the most important standards used for Location Based Services (example: positioning, Information retrieval, security)?

The research indicates that standardisation, although moving slowly is critical to the adoption of location-based services. Convergence may also be a threat to the application because users could do the same thing with standard devices. Positioning methods used would include be cell identity and infrared (IR). Bluetooth is a maturing technology and will be important for use in location-based services.

7.2.2 Wireless Local Area Network standards

The predominantly most popular wireless LAN standards (Abate 2004) are the WiFi IEEE 802.11x family of standards:

- 802.11a - works in the 5GHz spectrum, have a capacity of up to 54Mbit/s and a range of up to 100m. More radio channels available than 802.11b and less risk of interference than in 802.11b.
- 802.11b - works in the 2.4GHz spectrum, have a capacity of up to 11Mbit/s and a range of up to 100m.
- 802.11e – quality of service, standardization issues remain
- 802.11g - is similar to 802.11b, but with a capacity of up to 54Mbit/s
- 802.11i – security, standardization issues remain

Another standard currently being developed is the WiMAX or IEEE 802.16x standard family. Devices supporting this standard are expected to be available in 2006.

- 802.16 – the basic standard works in the 10-66GHz spectrum, promises capacity of 32 to 134Mbit/s in 20, 25 and 28MHz channels, It has a typical line of sight range of two to five Km. The line of sight requirement is present because the high frequency signals will be absorbed by material in a built up area.
- 802.16a – works in the 2 to 11 GHz spectrum and provides non line of sight fixed broadband wireless access system.
- 802.16e – works in the lower 2 to 6 GHz spectrum, supports nomadic or mobile operation and provides vertical handover between 802.11 and 802.16 systems, local mobility, handover and inter network roaming. User mobility is supported up to a speed of 150Kph and the capacity is 15Mbit/s symmetrically uplink and downlink.

One of the main problems has been to come up with a standard way for managing handover between networks using different standards. Another issue has been vulnerable security solutions for these technologies.

While the most deployed technology is based on the WiFi IEEE or 802.11b standard, the more suitable technology for the mobile city exploration tour guide

would include better security as in 802.11i, quality of service as in 802.11e and higher capacity as in 802.11a. The most promising technology at the moment is based on the WiMAX or IEEE 802.16e standard. It is however unclear whether it will be introduced in many mobile handsets by 2006.

7.2.3 The IP world versus the incumbent operator world

There are at least two different views of how mobile technology will develop (Table 2, Ref 4) in the future. These two different views, here called the "IP World" and the "Incumbent Operator World" scenarios.

In the IP world (Internet protocol world), the clients or mobile devices are intelligent while network has only basic packet oriented routing and addressing functions. Client intelligence means that the client or mobile device knows what to do and when to do it without the help of services or functionality in the network. This is also called peer to peer networking which uses minimal network services. One of the main enabling technologies in peer to peer networking is the Session Initiation Protocol (SIP). It allows applications on clients or mobile devices to signal (send control information) between each other with minimal network support. Because applications on clients or mobile devices can talk to each other directly, the network providers or operators will have limited control over what information is exchanged and thus are limited in how to charge users of the network. A comparison can be made with the peer-to-peer file sharing where music files can be shared for free over the Internet. This scenario would involve free or almost free communication services similar to the Internet today. There would be Websites or wireless portals making money on advertising, referrals or E-commerce (electronic commerce) and M-commerce (the mobile equivalent to E-Commerce).

We can see an extension of the Internet with wireless hotspots (cells) based on Wireless Local Area Networking (WLAN) technology, which can provide access for "free". An example is Starbucks, which wants people to come there and drink

coffee so they provide broadband wireless access. If these wireless hotspots are connected to the Internet it will extend the Internet accessibility significantly.

Intel is one of the most powerful supporters of WLAN technologies. They are pushing WLAN, and include specific support for it in their processors. They are now also pushing to introduce handover capabilities in WLAN. This will enable users to roam from one WLAN hotspot (cell) to another. A problem is to provide handover for fast moving users passing through a small hotspot (cell) within a few (in the region of 4 seconds) seconds. It may take in the order of 3 seconds for the handover signaling to take place. This means that fast moving users may be passing through the cell before recognizing it and thus will be loosing contact because users (devices) moves out of range and has to start searching for a base station again. More frequent searching (mobile looking for base stations and base stations looking for mobiles) requires more bandwidth resources, device computing resources and battery resources (overhead). This is what the so-called "compressed mode" in 3G-radio technology does. It introduces more frequent searching, which means that a base station and a device can detect each other faster.

An interesting model is where the phone has the intelligence and decides when to handover and the hotspot or cell just say yes or no (access or no access). Assuming there is free access this will take away existing operators subscription based business models. If this happens WLAN becomes a big threat to big mobile operators built around old incumbent business models and technology. Calls can be routed using IP on the Internet between interconnected hotspots (cells) using peer-to-peer communication between users (mobile devices that supports roaming). Previously the reach of WLAN hotspots (cells) has been short. However things are changing with WLAN standards like WiMAX, which have higher capacity and reach and are sometimes used for replacing copper or microwave transport links. This may be due to cost of cables and lack of microwave frequencies? It is obvious that incumbent telecom operators and network equipment manufacturers need to consider this scenario. It is a possible

threat or an opportunity to them depending on how one looks at it. There is a threat in that it this may be a discontinuous innovation (Christensen, Johnson, Rigby 2002) that can cause big changes in existing technology and business models. It is an opportunity in that it needs new products to be developed and can create new business models to be adopted. Maybe the extended wireless Internet will only be a best effort, less reliable, but cheaper way of communication after all.

Research in the area of Fourth Generation Mobile Networks (4G) is ongoing. The big question at the moment is: What is 4G? It is probably a compromise between 2G, 3G and WLAN with handover and interoperability between them. Mobile IP may be used to provide the mobility at the network layer (International Organization for Standardization OSI architecture)? Data speeds of up to 100Mbit per second can be expected. This can be compared to 384Kbit per second using current 3G technologies.

In the Incumbent Operator World, circuit or emulated circuit communication with quality guarantees is mostly used. Network operators are making money on being the access points to the Internet or mobile Internet. The network operator business model is dependent on the subscription and control of subscribers in central databases or network services like the HLR. The network and the operator provide network centric services, which the user pays for. The network operator tries to keep the subscription or customer ownership, which makes it possible to make money.

But there are signs that incumbent operators are seeing the opportunity in the WLAN threat. Mobile network operators like T-Mobile are very aggressive in building WLAN hotspots particularly in the USA. Business models are starting to emerge and systems for billing in such environments are being developed. The advantages of being tied to an incumbent operator that has a large number of WLAN hotspots is that they would guarantee a certain level of service and

coverage and that users don't have to sign on to the WLAN hotspots individually. The incumbent operator may have own WLAN hotspots and/or agreements (roaming or access) with other hotspot providers. Incumbent operators can probably find successful new business models here.

8. Business Models

This Chapter is intended to provide a view of possible business models that can be adopted, including value generation, costs, resources and revenue models in the vertical business of a mobile city exploration tour guide service based on context aware stories. The questions asked where:

- 5.1 How do you intend to make money from Location Based Services and multimedia content?
- 5.2 What are the possible business models to enter this business?
- 5.2.1 Corporate strategies?
- 5.2.2 Value chain configurations?
- 5.3 Who will "own" the customer?
- 5.4 How much are you charging for access to multimedia content?
- 5.4.1 How much are you charging for the multimedia content itself (applications, text, picture, video, music, location based, other)?
- 5.5 How is this being billed (volume (per packet, per KByte), time, other)?
- 5.6 How much would you see multimedia content costs changing until 2006-2008?
- 5.7 How much does multimedia content cost you?
- 5.8 How is the revenue divided between the different players in the value chain?
- 5.9 How do you see the breakdown of revenue generating services today and by 2006-2008?
- 5.10 How do you see the business model for mobile devices (phones and PDAs)? Are they application bearers like PC's?

The numbering of the questions comes from the questionnaire (see Appendix A). A sample size of six is too small to draw any valid conclusions from. It can however give an idea of what people think.

8.1 Summary and analysis

8.1.1 Summary of research

How do you intend to make money from Location Based Services and multimedia content?

The research indicates that the following ways of making money from location based services and multimedia content may be used:

- Being a *mobile network operator* or bit carrier and making money by *transferring more data* to end users based on increased use of mobile data services.
- Being a *mobile network operator* and providing a *location data feed* to service or application providers.
- Being a *mobile network operator* and providing application-programming interfaces (APIs) and use a let the *1000 flowers bloom approach* letting companies use the network to try their services and then *acquire the ones who succeed.*
- Being a *service provider* delivering the service to end users through a mobile network operator. If outsourcing the billing to the mobile network operator and using *reverse SMS charging* you would immediately loose 50% of the revenue.
- Being a *service provider* delivering the service to end users and making the money on *advertising*. This may be possible in the long term when the market needs have matured.
- Being an *enabler* and providing/*selling* technology, content and other particular competencies to other businesses that deliver the end service.
- Being a technology or content provider/*owner* and *licensing* that to other businesses that deliver the end service.

What are the possible business models to enter this business?

The research indicates that both business to consumer and business-to-business models are relevant to entering into this business. The business to consumer revenue models include:

- Sponsor or advertising – free or cheap service financed by advertising or sponsors. Service provider attracts an audience interesting to sponsors.
- Subscription – service providers attracts consumers that subscribe to the service for a specific time.
- Transaction based – Consumers pay for what they use (pay per use) in a more granular fashion. May be charged per MMS or video clip consumed.
- Free information – A service provider offers relevant and compelling information for free that draws users to do other things, which generates revenue.

The business-to-business models include:

- Enabler – Providing technology, content or competences that enables the final service to be realized and delivered to consumers.
- Concept owner – Inventing the concept, possibly implementing the system, building up the initial business relationships and certifying suppliers

The enabler or concept owner can make money by licensing out or selling the technology, content or concept to a business providing the final service. A revenue share agreement may be specified where the enabler or concept owner have good possibilities of getting a decent share.

Considering that brand recognition is very important, takes a long time and a lot of money to achieve, enablers or concept owners need to partner with a well known brand owner. It is also identified that marketing cost will be the largest expense when launching the service on the market. Therefore it may be necessary for enablers or concept owners to partner with large resource rich organisations to deal with the marketing expenses.

An indication was also given that it is too early to launch this kind of service because some very fundamental enablers are missing including user friendliness, demand and culture. It is also needed to look wider than existing business models to find the right business model.

Corporate strategies?

Very limited information is collected in the area of corporate strategies. The strategies include:

- Differentiation strategy – doing different things that add value and give competitive advantage.
- Enabler strategy – doing what others does not or cannot do.

Value chain configurations?

For an analysis see question 3.8 in Chapter 5.1.

Who will "own" the customer?

The research indicates that there are two types of customers namely *consumers* and *business customers*.

The *reasons* for the consumer relationships was indicated to be:

- Billing relationship (two interviews)
- Brand recognition (one interview)
- Customer care relationship (one interview)
- Distribution or service provisioning relationship (one interview)

Mobile network operators and *media companies* are the two players most likely to have the consumer relationships. Enablers are less likely to have consumer relationships.

How much are you charging for access to multimedia content?

The research indicates that businesses to consumer data services are charged in a variety of ways. The most common method is *time* based charging followed by *transaction* based (per message or call), *volume* based (per KB) and charging for the content itself based on its quality and attractiveness. See table 6 for current mobile data access costs. These costs may change.

Data access method	**Approximate Cost**
Data streaming or download (1MB of data)	€12.80
WAP browsing	€0.14 per minute
Picture/audio message (MMS)	€0.30 per message
E-mail	€0.29 per message
Text message (SMS)	€0.14

Table 6. Mobile data access costs

How much are you charging for the multimedia content itself (applications, text, picture, video, music, location based, other)?

Charges vary depending on the *type of content* (Table 7). There are cost *variations* within a content type. These variations may be due to complexity (more advanced game) or attractiveness (higher perceived value).

Content type	**Approximate Cost**
Java games	€2-7.20 per game
Ring tones	€1.20-4.30 per ring tone
Screen savers	€1.25-4.30 per screen saver
Sports alerts	€0.43 per message
Wall papers	€2 per wallpaper

Table 7. Mobile content costs

Is there a *relationship between* the *access speed* and how much can be *charged* for the content? An Internet Service Provider offers content for free when most customers use low bandwidth dial up service, but expects to charge for content when broadband access is used. This may indicate that more valuable content can

be provided which will be charged for or that the access speed impacts on the cost of content. Some companies charge for content services based on the volume of data (streamed or downloaded).

How is this being billed (volume (per packet, per KByte), time, other)?

The most common methods of billing are based on *time* (Premium numbers) followed by *volume of data* (Premium content). A consumer may be billed based on:

- *Subscription* valid for a specific period of time
- *Transaction* every time the service is *used*
- *Arrival of multi item bill* every time the *utility bill* arrives
- *Trial period*

Business to business billing may also be on a volume basis or by subscription. Billing systems are flexible and allows for many different ways of billing.

How much would you see multimedia content costs changing until 2006-2008?

The views on cost development for multimedia content vary to a large degree. The following points where made:

- Content is not going to be free
- Cost is not going up
- Premium price initially, increased competition => price drops
- Cost increases
- Difficult to tell today

This may be because of the varying backgrounds of the sample population or simply because of the uncertainty of the question (difficulty of prediction). A conclusion one can make is that multi media content is *expected to generate revenues* and *will not be free*.

How much does multimedia content cost you?

In *summary* there is a weakness in the research here and no interviews provided an answer to this question.

How is the revenue divided between the different players in the value chain?

The research shows that the *power position* is most important for capturing value. A better power position creates a larger share of revenue. The power position is enhanced by the player who have:

- Monopoly
- Customer base
- Billing relationship
- Strong brand

The players that generally have a *strong power position* include:

- Distributors or Mobile Network Operators (most powerful)
- Publishers, Service Providers or Concept Owners/Application Providers (medium power)

Distributors and Mobile Network Operators are in the best position to capture value. The research indicates that Distributors or Mobile Network Operators can capture up to *50-75%* of revenue. Publishers or content providers may capture in the order of 25% of revenue.

The players that generally have a *weaker power position* include:

- Enablers including niche players who perform smaller activities and provide complementary competence, tools or technology (low power)
- Content creators including authors, researchers etc. (least powerful)

These players may share what is left (in the order of 0 up to 25%).

How do you see the breakdown of revenue generating services today and by 2006-2008?

Today revenue-generating services for mobile operators are broken down as follows:

- Voice services (80-85% of ARPU)

- SMS (12-15%)
- MMS and GPRS (5-8%)

The revenue from *data services* is expected to *grow* by between *5%-7.5%* per annum over the next two to six years. The volume of voice traffic continues to increase so while the revenue per call decreases, the total revenues from *voice increases* slowly (Figure 4).

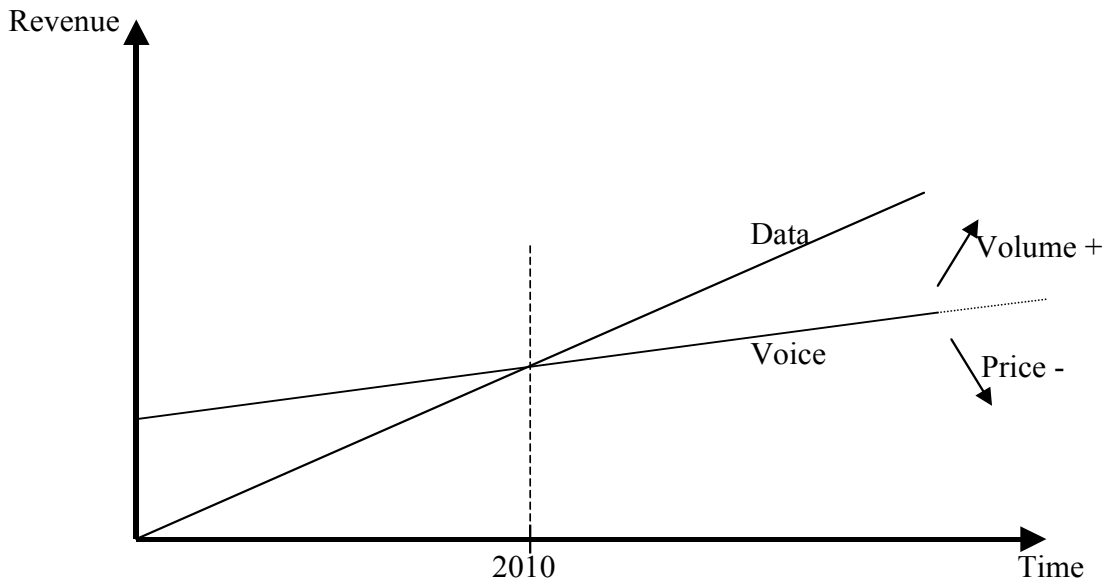

Figure 4. Voice and data service revenue growth.

At some point in time, which is not known, revenues from data services are expected to equal and surpass revenues from voice services. One interview indicated that revenues from voice and data services might be reversed by 2008. Another interview indicated that voice revenue would still be at 80% by 2006. This variation may reflect the difficulty in predicting what is going to happen.

For Internet service providers the *Internet access* provides the highest revenues, but broadband content offerings are emerging.
For broadcasters the highest revenues comes from *TV, Radio, Internet* and *auxiliary* services. The *mobile city exploration tour guide* would be a *niche product* in a potential portfolio of a broadcaster.

How do you see the business model for mobile devices (phones and PDAs)? Are they application bearers like PC's?

The research indicates that mobile devices are *application bearers*, but that the money is made on product sales rather than applications. The mobile city exploration tour guide would be free. Mobile devices are *fashion* items packed with technology, which are difficult to upgrade successfully similar to Windows. It is easier and cheaper to replace the phone than upgrading it. It seems to indicate that mobile devices will be replaced frequently because they get out of fashion or because new functionality has been introduced.

One interview *differed* significantly from the others stating that the mobile device will be *browser based* and that the functionality and applications will be located in the network. The arguments included smaller devices and less power consumption.

8.1.2 Business logic and costs in the value chain

The analysis of the business logic and costs in the value chain is based on brainstorming sessions with primary resources (Table 2, Ref 3).

8.1.2.1 Value chain

The *value chain* include the following players:

- Network Equipment Providers (NEP)
- Host Network Operators (HNO)
- Mobile Virtual Network Operators (MVNO)
- Content Creators
- Publishers
- Distribution Channels

Marketing is a parallel business function in the value chain.

8.1.2.2 Network Equipment Providers

The *business benefit* for Network Equipment Providers (NEPs) in this industry is the opportunity of selling network equipment to the Host Network Operators

(HNOs). As the volume of traffic grows for Mobile Virtual Network Operators (MVNOs), Network Equipment Providers can sell upgrades or expansions (more equipment) to HNOs and value added service nodes to MVNOs.

NEPs have an incentive to help MVNOs to drive an increase in sales of data services so that HNOs need to increase their network capacity. This causes an increased demand for network equipment. Now NEPs can sell more network equipment (mobile transceivers etc.). This incentive drives NEPs to stimulate communities of applications and content providers to come up with new innovative services that will drive usage of data services. NEPs are also often coming up with their own ideas of new services. It is important for NEPs to build relationships with the mobile operators marketing department in order to influence or learn how data services can be or have been stimulated. In order to do that successfully they have to learn to speak the language of marketing, which is very different from the language of technology.

In *earlier versions* of the General Packet Radio Service (GPRS) mobile systems, voice traffic (voice channels) took precedence over data traffic (data channels). Traditional mobile operators (often vertically integrated and including both the HNO and MVNO roles) started to sell data services that where used in the city areas where usage of the network was already high and it was difficult to get or establish data channels. In later versions of GPRS data channels can be reserved for usage of data services. Once these data channels could be reserved or dedicated, the mobile operators needed to increase capacity to cope with all voice and data traffic. Once data services where available, consumers also required higher quality or quality of service and speed, which also prompted mobile operators to expand the radio networks. Increasing usage of data services and the need for higher mobile transmission speeds in turn opens up the market for new 3G, 4G and WLAN systems and equipment. Example of additional new technology that NEPs can sell to HNOs is:

- High Speed Data Packet Access (HSDPA)

- Multimedia Broadcast Multicast Service (MBMS)
- Digital Video Broadcasting for Handheld devices (DVB-H)

The HSDPA technology, which is an extension to 3G Wide Band Code Division Multiple Access (CDMA) systems increasing the downlink transmission speed (from the base station to user equipment), from 384Kbps up to a theoretical limit of 14Mbps.

The MBMS and DVB-H technologies are providing networks with the capabilities of distributing broadcast or multicast media to multiple mobile users/handheld devices efficiently (resource and cost efficiently).

In the case where strong competition in supply of network equipment drives prices down, the NEP can move toward a services business where an increasing part of the revenues comes from services. As network equipment becomes a commodity while the use of data services increase more revenues may be achieved from the content. Depending on the capabilities a NEP may provide services related to the management of content, for example hosted data services to HNOs or MVNOs. Maintaining and building customer relationships is even more important when focusing the business on services.

MVNO

Mobile Virtual Network Operators (MVNOs) are operators focusing on customers, marketing and added value services as opposed to networks and operations of networks, which they outsource. There are many different configurations of an MVNO. Each case is different however we can categorize MVNOs into two main categories:

- Full Service Providers (FSP)
- Extended Service Providers (ESP)

Full Service Providers has the following capabilities:

- Brand
- Billing

- Customer care
- Databases, Home Location Registers (HLRs)
- Value added services such as Intelligent Network services.

An example of a full service provider is Turkcell, which serves major cities, highways and tourist areas in Turkey. National roaming agreements are setup between Turkcell and the "baby cells". They provide their own services and HLR databases etc. International roaming agreements are also setup to cover 156 countries.

Extended Service Providers have the following capabilities:

- Brand
- Billing
- Customer care

An example of an extended service provider is Virgin Mobile, which operates in the UK, USA and Australia and has a very customer focused service with the brand in focus. Extended service providers may only consist of the brand, or may decide to own the billing and customer care systems

Relationship between HNO and MVNO

The services offered by an MVNO depend also on the relationship between the HNO and the MVNO. In some cases the MVNO has its own HLR database if the HNO does not want to provide this service. The HNO may allocate International Mobile Subscriber Identity (IMSI) numbers, which identifies the user and his/her subscription with the network. An operator needs a mobile network code, which is part of the IMSI. This requirement is one reason why an MVNO may decide to provide its own HLR database. The IMSI number is located in the Subscriber Identity Module (SIM), which can be transferable from one phone to another. The reasons why an MVNO may provide its own Visitors Location Register (VLR) and Home Location Register (HLR) databases are:

- That the operator is required to have a mobile network code. Owning the mobile network code has implications for the branding at the phone, which is a part of determining who owns the customer.
- To be able to offer a convenient service where the mobile can be used at home and when on the move using different tariffs, but the same number. Number mapping may be done at the HLR.

Another requirement on the operators may be to have their own frequency spectrum. The GSM (Global System for Mobile communication) association for example forces network operators to have their own frequency bands to be able to act as an operator of GSM services.

When more data services are being used and network equipment such as mobile transceivers are being added, the incentive increases for MVNOs to buy own equipment including Home Location Register databases and *value added service nodes* including:

- Intelligent Network (IN)
- Multimedia Messaging Service (MMS) servers
- Billing Systems
- Operation Support Systems (OSS)
- Customer care systems
- Mobile Switching Centers (MSC)

There is a large benefit to MVNOs who have their *own MSCs*. A mobile operator who owns an MSC can terminate calls. There is a regulated termination charge applied to all call terminations. In Ireland the Commission for Communications Regulation (ComReg) regulates termination charges. Termination charges are a very important source of revenue, and today *80%* of operator revenues are made up of termination charges.
Ericssons AXE equipment was very modular and could easily be rebuilt to different types of nodes including HLRs, MSCs and IN nodes. The ability to reuse

was an advantage to using AXE equipment. In reality there are a lot of additional costs' including testing, documentation etc. and it is in many cases more cost efficient to buy a completely new node. Because support and maintenance contracts were agreed based on the AXE equipment, an operator could keep the support and maintenance costs constant by rebuilding existing AXE nodes to become HLRs, MSCs or IN nodes.

In *summary*, opportunities for Network Equipment Providers from the increase in usage of mobile data services include that they can sell:

- More value added service nodes to Full Service Providers (one kind of MVNO) and HNOs because of increased sales of data services driven by FSPs.
- More network equipment (mobile transceivers etc.) to HNOs due to the increased sales of data services driven by Extended Service Providers (one kind of MVNO).
- Services to MVNOs and HNOs due to increased sales of equipment and value added service nodes, increased usage and sales of data services by MVNOs.

8.1.2.3 Host Network Operators

The *business benefit* for Host Network Operators (HNOs) in this industry is the opportunity of better utilizing the network resources. As utilization goes up, the delivery cost per Mega Byte (MB) of data or per data channel (user) goes down. More cost efficient use increases the benefits of and the economies of scale. The HNO is selling network capacity to the MVNO in bulk for a wholesale rate (lower than the retail rate) or per minute of use. The HNO focuses on costs associated with network operation and service delivery. In addition to this, the HNO can offer extensions to customer care and billing by the use of their Operation Support System (OSS).

Host Network Operators (HNOs) have a number of large costs, which can be categorized into:

- Network costs
- Management costs

These costs depend on several factors where the most important ones are the *Capacity* required including number of subscribers, data volumes, and transactions per second supported, *Area of coverage*, *Frequency spectrum* (licenses), *Overheads* including people and building costs.

These costs are incremental and when a network investment is made, an operator will most likely consider the need for capacity in the near to medium future. The HNO will now have a network with overcapacity. This is what has happened in the industry, and there is huge over capacity in mobile data networks today. There is an opportunity to sell the over capacity in order to increase utilization. The HNO has to find a seller of data services that need additional capacity. The HNO should try to attract MVNOs that in turn will attract customers (subscribers) with a complementary usage profile that will complement slack hours in existing traffic cycles (Figure 5).

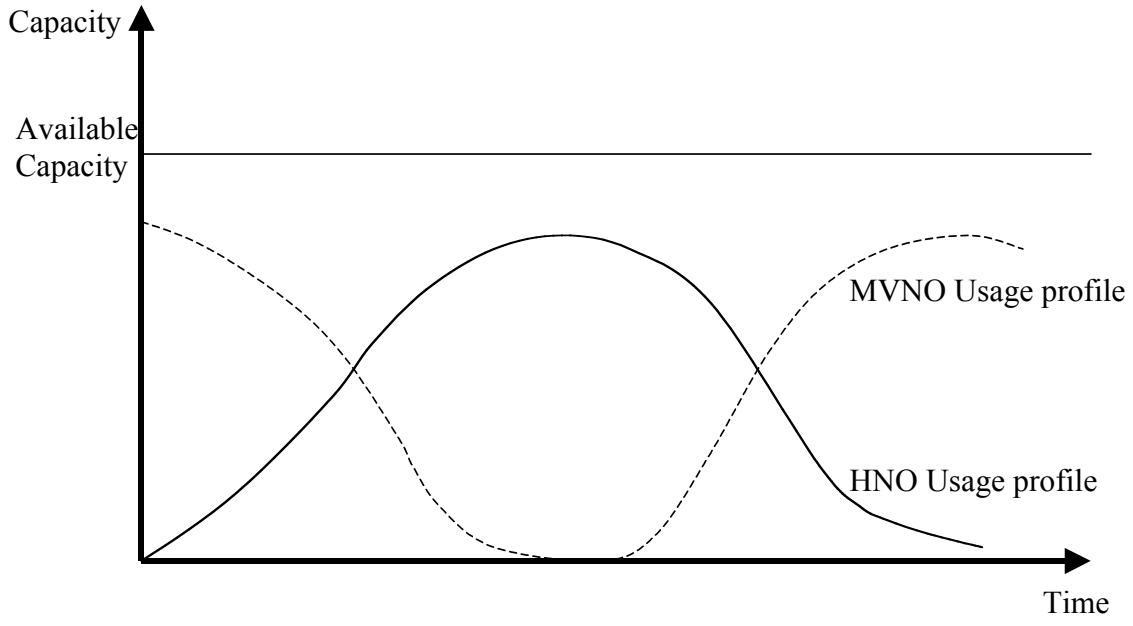

Figure 5. Network Utilization/traffic cycles

The HNO usage profile represents traffic generated by existing customers while the MVNO usage profile represent traffic generated from potential new customers (MVNOs).

As the number of transaction per second increases, network utilization increases and the cost per transaction decreases. Similarly as the channel usage increases, network utilization increases and the cost per channel or user decreases. One way of increasing utilization of the network is to introduce point to multi point or multicast transmission for delivery of the same data to many users. By sharing a common data channel and splitting up (copying packets) the data stream as close to the user as possible, duplication of data sent can be minimized. A demand for this type of systems could be foreseen by HNOs.

In *summary* Host Network Operators have already invested in network capacity and want to increase utilization and find alternative or complementary revenue streams. By utilizing the network better, the incremental cost can be spread over more transactions or channels (users) and increased revenue can be achieved.

8.1.2.4 Mobile Virtual Network Operators

The *business benefit* for Mobile Virtual Network Operators (MVNOs) in this industry is the opportunity of leveraging existing assets such as marketing capabilities and brand awareness to attract subscribers. By paying a low wholesale rate for network capacity sourced from the HNO and charging a higher retail rate from consumers/subscribers they create a margin (figure 6). The MVNO can add value to the consumer by both maintaining low costs and keeping low retail prices or by providing value added services, better customer service and charge a higher retail price.

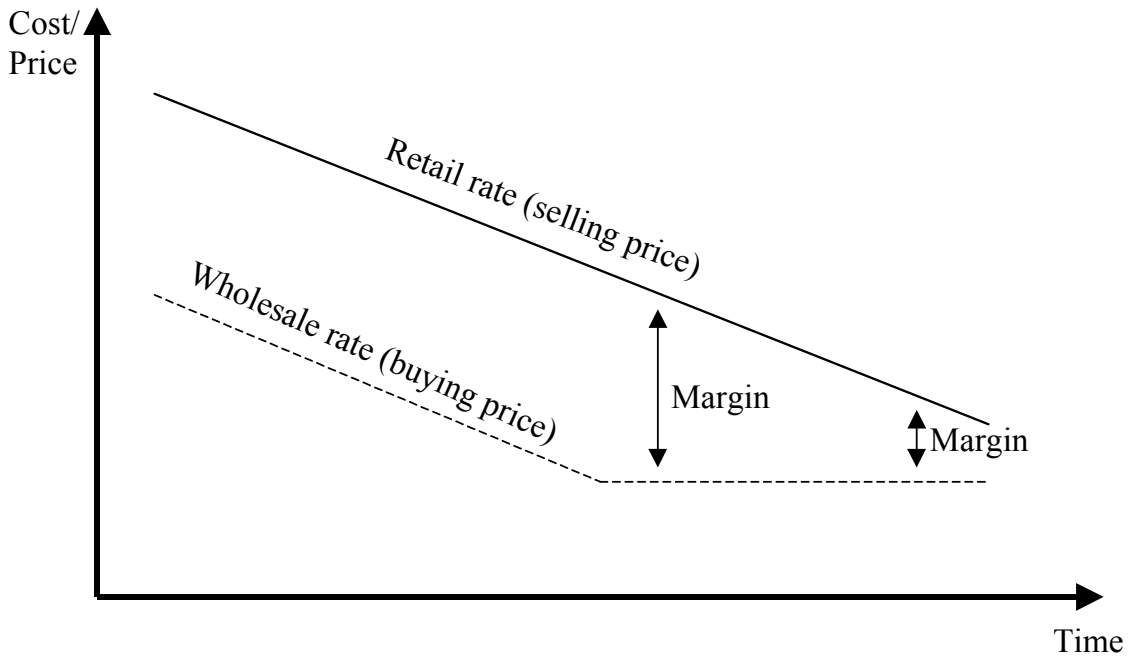

Figure 6. Decreasing margins over time using pure wholesale and retail price differential.

The MVNO is buying network capacity from the HNO in bulk for a wholesale rate that is lover than the retail rate it charges to create a margin. The continuous trend in retail and wholesale price is down wards. As there are certain costs involved in delivering network services, the wholesale price will bottom out after some time. Having a constant wholesale price while the retail price is continually decreasing due to competition, the margins are eroding. This means that in the longer term an MVNO cannot survive based on pure wholesale and retail price differential.

The MVNO has to cut costs and or leverage other capabilities or ways of creating revenue. The MVNO can add value to the consumer for example by providing valuable, user friendly functionality and content, more convenient services such as mobile at home (using mobile when at home at PSTN retail price), a single itemized bill, paying bill online or providing a one stop shop, better customer service, complementary products or services for using data services ("air miles") and managing the services better to offer more reliability and quality. By having an own Mobile Switching Center, the MVNO can collect call termination charges.

An own billing system may allow new, more flexible and advantageous ways of charging and billing customers.

8.1.2.5 Content Creators

A well-known brand in the business of guidebooks Lonely Planet teams up with a service provider for a mobile city exploration tour guide. The information already produced for the guidebooks is repurposed for mobile devices and sold again. The product may become a substitute for guidebooks, but it may also reach new segments and augments the sale of guidebooks.

A small startup company finds local storytellers in the community and produces good quality context aware stories from local anecdotes as information combined with entertainment. The skill of finding good storytellers enhances the value of its stories and reduces time taken for production. The stories are produced so that they are available in suitable locations and so that users interact by their movement in the environment. Because the context (city area) can be generalized, the structure of the story can be generalized which means that the same structure can be reused (Table 2, Ref 7) thus time and money needed for production can be reduced. The stories are produced for mobile devices and are presented through acted audio, picture and video sequences. The company supplies to a number of mobile city exploration tour guide service providers or content aggregators in order to safeguard demand and decrease buyer power. The relevance to the users, the quality, the way it entertains and informs (satisfies user needs), the way it interacts with the environment and the level of advertisement will determine how much users will pay and subsequently how much money can be charged per story. End customers may be tourists or people living in the community. Another customer may be the mobile phone developer who in turn delivers the stories as added value or promotion material to their phones when sold in a particular place. Placing advertisements in the stories for commission may be beneficial should the market size and demographics be attractive to advertising customers. The

revenues from product placement may be used to fund the expensive phase of story development.

A football club like Manchester United needs to create more revenues to afford to buy expensive players and to deliver growth to share holders. They have a good product with around 5.5 Million supporters in 140 countries. Manchester United wants to turn those supporters into customers with a transaction relationship. In addition to offering credit card, insurance and TV channels they want to interact with the fans wherever they are. By teaming up with a mobile network operator like Vodafone they can offer interviews, goals, tickets, competitions, news, live matches etc. over the mobile network so that fans always have an opportunity to make a transaction.

BBC world services provide high quality news content with a reputation for objectivity. As they provide the service in the UK in exchange for license fees they cannot charge again for that service. However there is a market for BBC outside of the UK. When they go outside the UK, they can establish additional revenue streams and charge again for the news content.

Endemol one of the biggest producers of reality TV shows distributes non-scripted shows on the national, satellite or cable TV networks. The audience can interact with the participants in the show by wireless text messaging, picture messaging or over the web. Endemol, distributors like RTE or Fox Networks and mobile network operators like T Mobile make money from the audience interacting with the participants. People are calling in to vote, seeing or listening to what the participants are doing. They also make money from the use of theme music ring tones, video clips and sound bites, video games, images and wallpaper related to the show (figure 7).

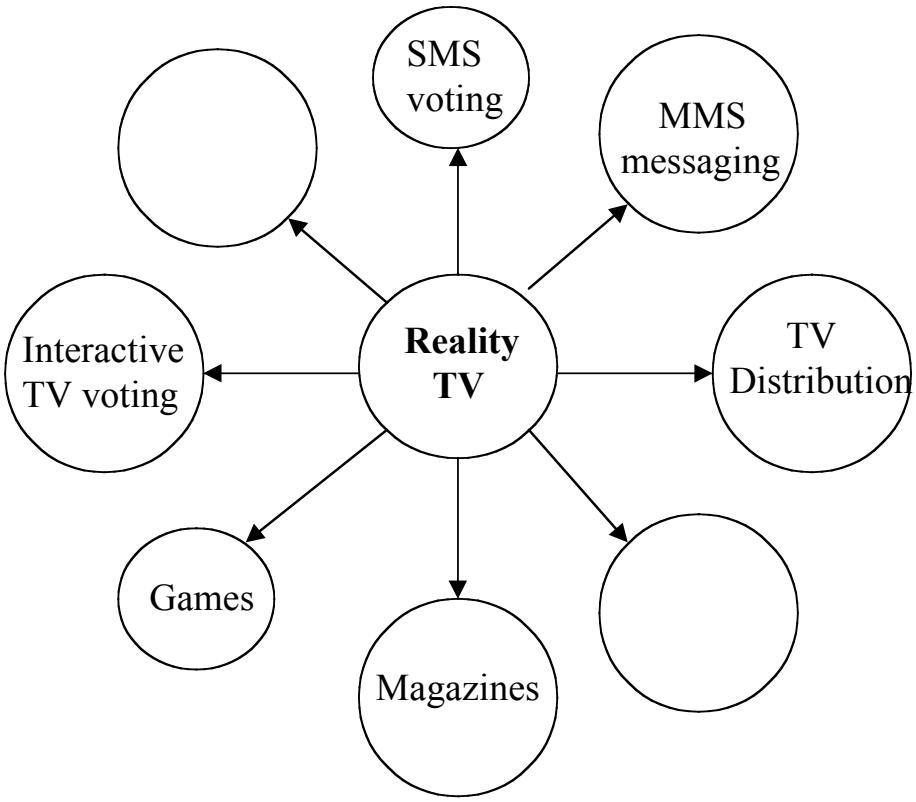

Figure 7. Revenue opportunities from reality TV

The concept for reality shows can be reused with different themes, in different places and can be distributed over different media channels. By making reality TV related content available over mobile networks, Endemol creates the opportunity to make sales wherever the consumer is. The customer has always access to Endemol content.

Once content is created, it can earn revenue several times by being sold to many publishers or distributors. The content can be formatted for distribution over many different media channels.

The split of revenue between the different players in the value chain depends on the *type* of content. The more *unique* the content is, the more revenue goes to the content creator. Because the revenue share for the content creator increases, the revenue share for the MVNO decreases. As an example, a premium rate SMS is

charged at €1.20. Out of this revenue the proportion may be distributed as follows for unique and less unique content respectively (Table 8):

Players	**Unique content (% of revenue)**	**Less unique content (% of revenue)**
Content Creators	80% (€0.96)	60% (€0.72)
Aggregators		
Distributors		
MVNOs	20% (€0.24)	40% (€0.48)

Table 8. Revenue share for unique and less unique content charged by premium rate SMS.

The content aggregators take 20% of the revenue distributed to content creators, aggregators and distributors in Table 1. This means that for unique content the *aggregator* gets *16%* of €1.20, which amounts to €0.19. The content *creators* and *distributors* together (has to be split further) get *64%* of €1.20, which amounts to €0.77, and the MVNO gets *20%* of €1.20, which amounts to €0.24.

Content creators own the content (have the copyright) unless this right has been sold or exclusively licensed to another party.

Other content service can include:

- Dial in doctor service – The doctor is the content provider. Charged at premium rate, €10 per minute (10 cents for normal call)
- Dial in lawyer service – The lawyer is the content provider. Charged at premium rate, €10 per minute (10 cents for normal call)

These kinds of services are common in IT. If you dial Dell or HP help lines you get charged a premium rate.

Pornographic content is very attractive for mobile consumers and a big industry has been created around pornographic content.

8.1.2.6 Publishers

The big publishers source content directly from content creators and aggregate it themselves. They also buy content indirectly via aggregators. They provide high quality branded content to consumers or distributors. Their prime resources are the brand recognition, the marketing capability and relationships with content providers (creators and aggregators) and access to market channels or distributors. Large resources are put on promoting the content and maintaining this brand awareness.

The *business benefit* for Publishers in this industry is the opportunity of increasing market access with their existing content through the new distribution channel. They have the possibility to horizontally integrate and become MVNOs or to use HNOs as distribution channels. In this way they can get access to the whole existing customer base of the HNO.

By knowing the consumer target profile they are looking for, they can choose an HNO with the relevant subscriber profile. It is important to consider how many subscribers the HNO has and how many of those subscribers fit the wanted consumer target profile. In Ireland for example, the majority of customers of the mobile operator Meteor has a youth or kids profile while a majority of customers to Vodafone and O2 has a business profile. However Meteor has the least number of total subscribers followed by O2 and Vodafone, which have the most number of subscribers. Hutchison has not been considered, as they are new to the Irish market.

As MVNOs, publishers can in addition build up their own customer base with the desired target profile using their recognized brand and marketing capability. Another benefit of being an MVNO is that the publisher creates a revenue stream from the margin created from buying network capacity at a wholesale rate, which

is lower than the retail rate charged to consumers. Publishers can also get a percentage of the price per minute for voice traffic and call termination charges.

Mobile network operators or HNOs charge per MByte of data transferred over its network. They are also able to charge explicitly for content.
If a publisher:

- Sells its content directly through a HNO there is a 60%-40% split of revenue (60% for the content providers (content creators, aggregators, publishers) and 40% for the HNO).
- If the publisher is an MVNO that sells its content directly to consumers, the HNO is not aware of what kind of content is transferred over the network. This means that the HNO cannot charge different content specific rates. Instead they have to charge the standard rate, which may be in the order of 12 cents per MByte of data. Now the Publisher, which is also an MVNO, will get to keep much more of the value or revenue from its content in addition to call termination charges, voice revenue and wholesale/retail margin as discussed previously (figure 8).

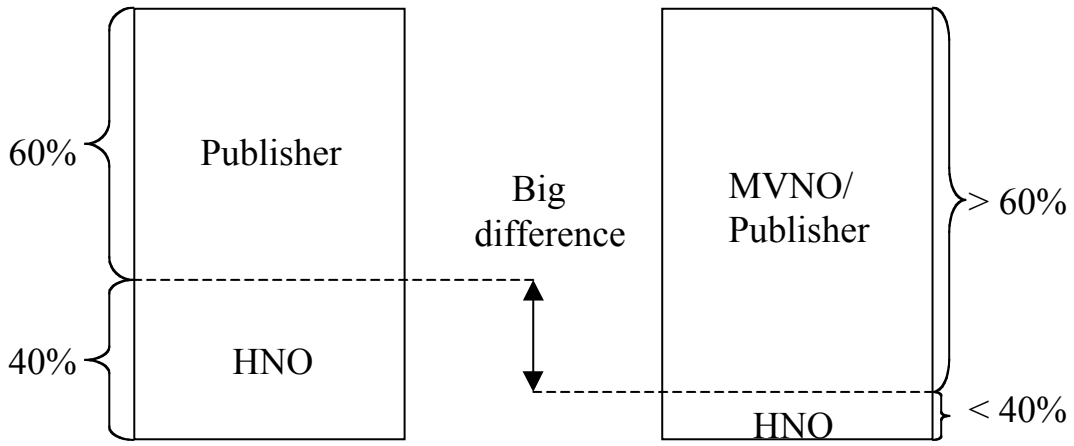

Figure 8. Differing ability of publisher in capturing value from content

The minimal share for the content providers should be in the order of 60%.

Some of the Publisher or Publisher/MVNO revenue share shall be given to content creators and aggregators. Because of the limited value added by content aggregators they should get in the order of 12% (20% of the 60%) of revenue. Note that the revenue share percentages depend on the type of content being offered.

There are also a number of *downsides* to a publisher integrating horizontally to become an MVNO. Firstly there is a huge marketing cost involved in acquiring customers to the services at the network. Secondly managing the sourcing, configuration and distribution of mobile devices/phones is a complex task. Thirdly users have been accustomed to cheap phones, which means that the Publisher/MVNO need to spend money on subsidizing mobile devices/phones. As these phones are becoming more capable and technically advanced, they become more expensive to produce for the mobile device developers and more expensive to buy for the Publisher/MVNO. If the customer perception of cheap mobile devices change and they are willing to pay, there is also an opportunity for the Publisher/MVNO of earning a percentage on the sales of mobile devices/phones.

Today one would not build a business purely on the difference between the value capture of being an MVNO/Publisher as compared to being a publisher (Figure 8). Today the uptake of data services is too slow. As or if the uptake and volume of data services grows in the future, the viability of this business model will increase.

8.1.2.7 Distribution Channels

Mobile networks, broadband networks, cable TV networks, digital broadcast networks, satellite networks, they are all different channels for distributing content and services to consumers.

Mobile operators Like Vodafone and T-Mobile build 3G networks and wireless LAN networks, betting on that users will adopt the service and use the content they provide.

Similarly in countries like Sweden, the local councils (government) are deploying broadband fiber optic infrastructure and renting it out to operators, which means a large proportion of Swedish homes, now have broadband access.
Utility companies such as the ESB of Ireland has the billing relationship with large numbers of utility consumers. They send a monthly bill to every household. This relationship could be used for other purposes including billing of mobile services usage. In the UK, it is common for utility companies to get into telecommunications. One of the main reasons for this is their existing billing relationship.
There is a retailer such as an Xtra-vision shop in every corner of Ireland. They could sell other things than renting out videos and DVDs. They have started to take advantage of their presence by selling electronic equipment and phones.

While some companies may be able to afford to build the distribution channels and see who comes, it is fundamental to ask what is the need for them? For example government bodies that have a need for the distribution channel may act as a driver of the market for which commercial operators will provide the needed distribution channels. This may be a more cost efficient way of providing for example broadband access. For example towns in Ireland are sponsored to introduce broadband networks to all places even where there is no need for it. This will leave a lot of broadband capacity unused while taxpayers still had to pay for them. Instead by saying, we are locating our government departments in towns, x, y and z and we need (will lease) this much broadband capacity; who will put the infrastructure in place? The cost would be lower for taxpayers.

8.1.2.8 Common across the value chain

The share of revenue achieved by each participant in the value chain depends mainly on the amount of *value* they add to the final product, service or information and the amount of *power* they have in the *market*. The power in the market is largely defined by the value of the *brand* and the control over media sources. An example of a company with big market power is Virgin. The Virgin

brand can achieve access to markets that others cannot access for a whole range of products and services including music, air travel, trains, mobile telephony etc. A media company with big market power is Time Warner, which owns many media sources including Internet service provider, TV, film and entertainment producers, broadcasting and cable businesses. A company like Vodafone has big market power due to the ownership of a world wide wireless distribution network and large customer base. The *Brand* is key to all these powerful companies.

In an Irish context we can compare Vodafone and Meteor for the ability of capturing value. Vodafone who has around 1.2 million subscribers are in a position to capture a larger revenue share than Meteor who has around 200.000 subscribers. Providing the customer profile is right for the product service or information in question, the value of providing a larger customer base is key in order to maximize the usage of the products, services or information being offered.

The marketing efforts and costs depend on the role in the value chain. Those companies that only have business-to-business relationships would spend very little resources on marketing. For example T-Mobile (HNO) don't spend resources on marketing to potential MVNOs. On the other hand companies with the access to consumers or end customers spend a lot of resources on marketing activities. For those companies customer acquisition, retention and brand building is very important. Publishers for example, market their content through a broad range of different marketing channels. A franchiser may also do marketing from a central marketing budget on behalf of franchisees. An example of this is TV advertisements from McDonalds.

9. Operations

This Chapter is intended to provide a view of the costs and efforts involved in managing the stories and other content for a mobile city exploration tour guide service based on context aware stories. The question asked was:

- 6.1 What are the costs and efforts involved in managing content?

The numbering of the questions comes from the questionnaire (see Appendix A). The number of questions in the operations part was reduced due to time limitations during interviews. A sample size of six is too small to draw any valid conclusions from. It can however give an idea of what people think.

9.1 Summary and analysis

What are the costs and efforts involved in managing content?

Content management is very costly. The costs are in the order of millions of Euros. In house content development is costly, however in the cases of this research, technology cost was at least as high as the people cost. Varying degrees of in house content development was taking place within the researched companies. The more in hose content development taking place the higher the number employees. Although most companies managed their content in house, one company outsourced all content management activities to a third party.

10. Future

This Chapter is intended to provide a view of what the future of mobile media is. The question asked was:

- 7.1 What is your organisations/your own view of the future developments of mobile media?

The numbering of the questions comes from the questionnaire (see Appendix A). A sample size of six is too small to draw any valid conclusions from. It can however give an idea of what people think.

10.1 Summary and analysis

The future of mobile media is *difficult to predict* partly because technology is often not used as expected, but here is a summary of the main views of how it would develop.

Rich interactive multimedia is seen as a future *growth area*. One view indicated that the current situation for revenue generated from voice (~80%) and data (~20%) services may have been *turned around by 2008.*

However, a number of *fundamental drivers are missing* to make this happen. These include:

- Culture
- Demand
- Proper use of technology
- User friendliness
- Mobile broadband transmission capability

In order to sense whether the market is ready or not we should define a number of *beacons in our environment.* One key question is what are those beacons?

One view was that mobile media services would mainly be used *killing time* when using *public transport* (on busses or commuter trains).

The speed in adoption of new technology is an important factor when estimating the growth potential of mobile media services. It was believed that the *adoption* of interactive data services would be *faster* in Ireland due to the following factors:

- High technology awareness
- Good education
- High turnaround of phones (changing phones frequently)

Wireless technologies such as *WiFi and WiMAX* are believed to increase broadband coverage to *enable mobile media revenues* going forward. This area can however be vulnerable to *regulation*.

The *criteria for success* of mobile data services to a mobile network operator was given as follows:

- The service is *good* if it assists in increasing revenue from data services beyond 20% of revenue
- If it generates revenue when including the costs for implementation, operation and maintenance it is *better.*
- If it also enhances the competitive position in relation to rivals it is *best*

Future mobile media may be a mix of *audio* and *photos* and possibly *animation* (Table 2, Ref 6 and Ref 7). Problems exist viewing a screen while *on the move* outside and during disadvantageous *light conditions*, however *specific/important objects* can be viewed as pictures. Video is questionable??

11. Startup Companies

11.1 New venture creation

The shape and form of a startup company can naturally vary to a large extent. Typically an entrepreneur has a business idea for which he/she prepares a business plan. The entrepreneur decides at what scale to start at, typically small scale in a local niche market. But the business could start big and on a global scale (international market). The entrepreneur needs to decide how to fund the company initially and in the long term. Funding may initially be achieved through own funds, bank loans, government grants or venture capital investments. There is a balance between control of the company and the amount of capital raised. Venture capitalists want to be able to direct the company in order to extract a gain when exiting or selling their stake. The Entrepreneur also needs to have an exit strategy in place determining if or how to exit the venture. Relying on own funding will restrict an entrepreneur's ability to expand the company, but it will enable him/her to maintain control. The ability of the entrepreneur to build and attract a good team to lead and run the venture is very important. This is important for the viability of the company and for creating a trustworthy impression on potential investors. A small startup typically uses a flat, functional organization structure where a few people have a broad set of responsibilities. As the company grows, new organization structures processes and culture needs to be established in order to coordinate a larger number of people and activities. The focus changes from high flexibility toward organizational efficiency and growth. The company must also renew itself, which may mean innovating to develop new products or exiting the business to pursue other ventures.

11.1.1 Venture creation process

There is a distinct identifiable process of new venture creation (Roche 2004) where the six main stages are:

- Awareness of entrepreneurship
- Opportunity recognition and screening; modes of entry
- Preplanning including feasibility testing and business plans
- Launch
- Growth and consolidation
- Renewal

The real strategic potential is established at the idea stage, with the choice of product and market. Preplanning can help to reduce risks and anticipate problems during the early post launch period. If sustained growth is to be achieved, entrepreneurs must become general managers and develop a real strategic vision of their business. It should be noted that the entrepreneur may or may not be the best person to lead the company. In any case complementary skills are often needed to balance the skills of the entrepreneur.

12 Big Media Companies

12.1 The media business

Regulation (Rayport, Jaworski 2003) in the telecommunications and media industries has slowly changed from being regulated industries toward becoming a converged market driven industry where greater competition is encouraged. In order to compete in this converging industry companies have been (and are) collecting multiple media and distribution resources through mergers and acquisitions. The goal is to utilize synergies in the organizations and digital distribution platforms and networks in order to create multiple revenue streams. Growing media usage pattern fragmentation makes it interesting to distribute the same content on several distribution channels to reach more users or the same users more of the time. Cross promotion on traditional and new media channels becomes interesting in building the brands and audiences. Cross selling of media

products into for example consumer products like toys and games create additional revenue streams for media companies and others.

There are however some barriers to creating organizational convergence. It can be very difficult to execute a corporate strategy across several heterogeneous businesses in order to achieve potential synergies. High expectations from investors and board members create increased pressures should the synergies not immediately be realized. Attempts at organizational convergence require strong leadership that can implement the strategies while convincing internal and external stakeholders of the appropriateness of the direction taken.

A typical big media company would be targeting an international market. It may have a divisional organization structure for example based on the different markets it is active in or the different products or services offered.

13. Summary and Conclusions

The research has provided an analysis and forecast of the vertical industry around a mobile city exploration tour guide service, mainly in Ireland and the UK, based on context aware stories. A number of business opportunities and business models have been identified for startup companies and big media companies respectively. A crude estimation of the market size, measured in number of transactions and Euros has been presented for the main target segment as identified in the study. The information in this study makes it possible for entrepreneurs and business leaders to see the opportunities in this industry and to understand the business logic behind them. It is subsequently possible to build specific business cases and economical forecasts for assessment of their viability for commercialization. Particularly cost estimations have to be done on a case-by-case basis.

The business models identified in this research builds on already existing models. However one constantly has to *look wider* than the existing business models in order to find the revolutionary models for the future.

13.1 Value chain

By performing in depth interviews (Table 1) with the help of a designed questionnaire (Appendix A), performing brainstorming sessions (Table 2) and analysis of required activities (Appendix B) to realize the end user service, a model of the value chain (Figure 1. and 9.) was assembled. A startup company or a big media company will implement their strategies by combining these value-adding activities into a system of consistent and reinforcing activities that will create competitive advantage. By having many sources of competitive advantage that are difficult to imitate and constantly creating new advantages, a company can sustain its competitive advantage. The value chain also to an extent shows the relationships between different players in the industry.

The share of revenue achieved is a function of the value created and the amount of market power the company has. The value created depends on the strategy that is implemented including what activities are performed, how they are performed and the fit between the activities. The market power depends on the markets that can be accessed, which in turn depends on the value of the brand name, the customer relationships, the access to media sources and distribution channels. According to the research, the ability to capture value, and the power distribution in the value chain for the mobile city exploration tour guide, would be as follows:

- *High power* - Distributor (mobile network operator)
- *Medium power* - Publisher (application provider, service provider, concept owner or media company)
- *Low power* - Enabler (niche player, small activity, complementary competence)
- *Least power* - Content Creator (author, researcher etc.)

13.2 The future

Rich interactive multi-media services, of which the mobile city exploration tour guide is one, are seen as a future growth area. Mobile network operators predict a growth from data services of 5-7 % per annum over the next two to six years.

There is however a number of fundamental drivers missing that can hinder this growth from maturing. They include the lack of cultural acceptance in using these types of services, the lack of demand for mobile data services seen today, the lack of user friendliness of existing mobile data services and a lack of mobile broadband capacity.
In the short term, growth is also dependent on the overall market situation. This is something that has been re-learned from the recent economical downturn that started in year 2000/2001, where demand for mobile services dropped significantly, in part depending on uncertainty and lower consumer confidence.

It is difficult to predict the best time for a market entry with the mobile city exploration tour guide. In order to sense whether the market is ready or not we should identify beacons in our environment. A key question is what are those beacons? The speed of technology adoption of people in the target markets is very important to the success of the service and may be acting as one beacon. The faster the technology adoption is in a particular market, the earlier it becomes economically viable to offer the service. Measures of technology adoption could include education level, turnaround time of mobile phones or general technology awareness. Stock market trends could also act as market beacons. The area of market beacons needs further investigation.

The type of interactive multi-media services that mobile network operators would like to offer should fulfill the following criteria:

- Helping to increase revenues from data services beyond 20%
- Creating revenues higher than costs when including cost of implementation, operation and maintenance.
- Enhancing the competitive position in relation to rivals in the industry.

Mobile devices are becoming more like fashion items, through which people express their personality or beliefs, and it is expected that users would want to consume the service on their personal device, as opposed to renting a special

device. Consumers will put more demands on mobile services in the areas of price, added value, adaptability and consistency/reliability.
In order to create higher value to the end user, stories (or content) should become more relevant to the end user needs at any one time and augment the context, which the user is in. By sensing the user context, the stories can be compiled and presented according to the particular contextual situation. Users interact with and change the story by changing the context. This is the basic idea of context aware stories. Context information can for example be retrieved from user profiles, smart agents, mobile devices, timers, sensors for location and weather and other ubiquitous computing sources.
The vision is that many objects in the environment can handle information. They will contain stories and can tell their own stories, which mobile city exploration tour guide users can consume and potentially add stories to.
To achieve cost efficient commercial deployment of such systems, development of new technologies in this field is required.

The media in context aware stories may be a mix of audio, photos and animations. Problems exist when viewing a small screen while on the move outside and during disadvantageous light conditions. Specific important objects can be viewed as pictures. Video is questionable from a usability viewpoint although users seem to want or expect video content.

To reach the required target tourist segments, it is of highest importance that the:

- Users/devices can roam between networks internationally
- Devices can recognize and use the different wireless access alternatives available.
- Users/applications can access their personal user profiles possibly located in the home network or on the device.
- Devices and applications can access and interpret location information and other sensory input universally.
- Applications can handle multiple languages.

Most of these issues can be solved through standards and de facto standards. To get the industry moving, players would have to cooperate with each other to a degree.

Finally and most importantly usability has to be in focus in order to derive profitability from the service. One of the usability issues is the prioritization of multiple tasks (Table 2, Ref 8) for individual users of the mobile city exploration tour guide on their mobile devices. Technology, although important for the realization of the behaviour, now has to take the back seat.

13.3 Industry trends

Deregulation in the media and telecommunications industries has created a converged and more competitive industry. To compete in this industry the players involved need to decrease costs, become more efficient by create synergies, look for new business areas and target a larger international market. As growth is required to satisfy shareholders, an increased pressure to show growth has been applied internally by the boards. A trend in media companies has been to collect different media sources, and with the help of media convergence and digital convergence creating synergies that increases the bottom line. This organizational convergence has been achieved largely through mergers and acquisitions. Convergence is a phenomenon that is continuously happening and there are mainly potential savings and efficiencies that drive it.

Convergence may be summarized as handling all information in the same way. There are many aspects to convergence, for example:

- Digital technology has advanced and low cost digital networks appeared. This has lead to a convergence of transmission networks for voice and data, mobile and fixed networks, Internet, Telecommunications and TV networks.
- Handheld computers and mobile telephones are converging. It is attractive for customers to only need to carry a single, multi-purpose device. It is still a long way until mobile devices are good at doing computer tasks, telephony tasks and other media tasks in the same device.

- Media convergence is taking place where many different media including audio, text, pictures, video and animations can be delivered over a single digital, IP based platform.
- Increased use of wireless communications together with outsourcing of services for business may lead to a trend of outsourcing wireless services. It should however be noted that the application service provider model for the Internet has not been very successful to date.

By handling information in the same way, more equipment can be shared (less specialized) and there are opportunities for consolidation and vertical integration leading to efficiencies and savings.
Having a more stable underlying system structure can enable application developers to quickly and costs efficiently develop new applications that can provide differentiation in the consumer market.
Technical developments in processors and memory are encouraging showing an increased performance, decreased physical size and decreasing costs.
Convergence is however illusive. It is an ideal world for many businesses looking to sell their products internationally. The view of how things should be done still differs between people from different countries and continents around the world. It is certain that new requirements and technical innovations (discontinuous) will appear that creates other paradigm shifts in the future. It would be surprising if convergence ever caught up with the rate of innovation.

Among consumers in Ireland, the penetration of the Internet and mobile phones has been increasing rapidly over the last few years. While the Internet and e-commerce penetration is stronger in the US, mobile phone penetration is higher in Europe and parts of Asia.

13.4 The situation today

The most encouraging fact is that higher speed GPRS, 3G and Wireless LAN networks are being deployed, particularly within urban areas. The situation for

mobile data services is however not very encouraging today with the exceptions of SMS in Europe, I-mode in Japan and to some extent BlackBerry.

Culture – There is not much uptake of mobile data services even when they are free (free trials). One explanation is because they are not part of the culture. "Texting" (SMS) became part of the culture because of an arbitrage opportunity that provided a cheaper way of communicating than voice calls. Using the mobile city exploration tour guide has to be made culturally acceptable.

Demand - for mobile data services or applications is not very high. As an example is that not even the largest wireless portals, supported by well-known brands are profitable on their own (Table 1) today. An active GPRS user uses a maximum of 1MByte of data per month. There are very few sophisticated users today, which are the kinds of users that are expected to be interested in the mobile city exploration tour guide.

User friendliness – The user experience is appalling because services are built using a "because you can" approach with technology in focus. What is need is a focus on the user experience. BlackBerry is an example of a user-friendly application. Even though it is user-friendly, it only has in the order of 1 Million users worldwide.

Mobile device capabilities – Only around 4% of the population in the UK has handsets, sophisticated enough to support the service.

Consistency and robustness - What SMS did, was transferring 154 characters (Bytes) from end to end with consistent performance. The trick and the basis of its success (apart from being an arbitrage opportunity) was that it did what it said it would do and did so with consistent performance over and over again. BlackBerry is another example of a well thought through application. It is controlled from end

to end and performs very well. The other available services or applications are auxiliary and are not robust.

Energy – The low performance of batteries is one of the biggest problems in mobile devices today, one that annoys users a lot. Going forward we expect to perform much more data processing intensive tasks than what we do today, for example encoding and decoding of video signals and transmitting and receiving data at high speeds. Although processors are becoming more energy efficient, more energy is needed in the devices.

Heterogeneity - The mobile world is very diverse with regard to technology. There are different radio access technologies, location technologies, operating systems, mobile hardware platforms, browsers, application protocols and transport protocols. In contrast the Internet has a few dominating standards like the IP protocol, HTTP, Wintel (Windows and Intel), Unix and Mac platforms. These standards (and de facto standards) have given some maturity to the Internet industry and have guaranteed a level of interoperability for customers.
The repurposing and management of content and applications on different mobile devices is difficult to handle. Standardization is essential, especially for the success of location-based services and context aware services.

Mobile operators – There is apathy amongst consumers and operators. Nobody wants to keep pushing to create the market. Mobile operators within a country like the UK are mostly competing head to head and exchanging existing customers using existing services between each other. In Ireland two major players control the market in a form of duopoly. A change may be seen with the launching of 3G services where operators may try to create the market, but again even the fact that this is marketed as 3G, points to the operators technology focus or lack of customer orientation.

The key success factors for the mobile data services that has been successful to date are:

- Adding value to customer (SMS, I-mode, BlackBerry)
- End to end control of service (I-mode and BlackBerry)
- Well engineered with consistent performance (BlackBerry, SMS, I-mode)
- Customer focus (BlackBerry, I-mode)
- Becoming part of the culture (SMS, I-mode)

Today 80% of Irish adults have a mobile phone and 18% of those have purchased mobile media services other than voice calls.

13.5 Business opportunities

A fundamental reason for business opportunities provided by the mobile Internet in contrast to the fixed Internet is the possibility of utilizing the context of the mobile user to provide more relevant services and information.

Drivers of the mobile city exploration tour guide vertical industry includes:

- Consumers demand more relevant mobile services
- Media companies want to leverage their brand names, consumer relationships with the audience, customer relationships with advertisers, marketing capabilities and financial resources and digital platforms to generate additional revenue streams.
- Traditional mobile operators want to leverage their wireless distribution networks and consumer relationship to generate more traffic to increase utilization and revenues
- Mobile device developers want to sell more high spec handsets
- Chip developers want to sell more chips and processors for mobile devices
- Network equipment developers want to sell more equipment and services

In order to succeed in the mobile city exploration tour guide venture, a company has to cross the chasm and move from the early market into the bowling alley and

the tornado. This can be extremely difficult and many companies fail at this step. Some of the tasks involved are:

- The market niche has to be found
- The right devices has to be available
- Suitable networks and sensors has to be available
- A good user experience has to be provided
- The performance have to be repeatable and consistent
- The market has to be made aware of the service and the company
- The market has to be educated so that they know the application
- Using the mobile city exploration tour guide has to be an acceptable thing to do as part of the culture
- Customer support and billing has to be provided

The research indicates that there are more opportunities for big resource rich companies to offer the mobile city exploration tour guide consumer service than for small startups. The reasons are:

- The cost of marketing activities and creating the market.
- The need for brand awareness and customer contacts
- The cost and complexity in billing relationship and customer service
- Access to market channels

However there are some business-to-business opportunities for startup companies.

13.5.1 Startup companies

Businesses-to-business opportunities may be suitable for both large companies and startup companies. They are particularly suitable to startup companies because the need for marketing and brand recognition is lower and the scale of customer service and billing operations are smaller. This requires less capital, which is in short supply for startup companies in general. The research indicates that the following business-to-business models would be suitable to startup companies:

- Concept owner

- Technology enabler
- Story provider or content provider

Concept owner – If you build it they will come. The concept owner invents the concept and provides an implementation of the system platform. The concept owner also builds up the initial business relationships and certifies suppliers to the concept. The system may be conceptualized as a hosted or managed solution located in one or a few places. It becomes a hub, with links to the various content providers and wireless distribution networks. It may provide billing and content management functions. Money can be made from being the concept owner that brings media sources, distribution channels and service functions together in a cost efficient way. A concept owner may rent out service/media access or platform functions, license out or sell the technology, content or concept to other businesses providing the final service. The ownership of particular domain knowledge and competence, the implementation of the platform, intellectual property rights on aspects of the technology and being seen as the de facto standard also enables the company to extract value. The startup company that is a concept owner is seen as having "medium power" in the negotiation with business partners in the value chain, for example when establishing revenue share agreements. An example of a concept owner is NTT DoCoMo who developed the I-mode concept.

Technology enabler – The technology enabler provides specific technology or competences that enables the final service to be realized and delivered to consumers. The technology enabler may provide the mobile city exploration tour guide application, special sensors, chips, algorithms, personalization techniques and smart agents, search engines, data formatting and parallel production tools, fast distributed databases, human-computer interface technologies, context aware story authoring and production tools, location technology with high granularity and coverage, content management and billing tools, market research tools,

artificial intelligence, computer vision technologies, context based marketing platforms, collaborative working and smart development tools etc.
The technology enabler can make money by licensing out or selling the technology or intellectual property rights, developing products around the technology or providing services using unique competences and domain knowledge. Its customers would be downstream businesses in the value chain including service providers. The startup company that is a technology enabler is seen as having "low power" in the negotiation with business partners in the value chain. This is especially true when many such enablers exist creating a large choice for downstream businesses. An example of a technology enabler is Changingworlds who develop technologies for personalization of wireless portals that reduces click distance (personalization and short click distance is important to make consumers use mobile services)

Story provider or content provider – One business opportunity for companies in this sector lies in finding and providing the content that the largest amount of people are interested in and will pay the most for. The research indicates that the types of stories users are interested in depend to a large degree on what situation they are in. The situation (context) controls their preferences for stories so it is extremely important to develop stories with user context in mind. The top six most popular types of content for the mobile city exploration tour guide was found to be:

- History (most preferred)
- Leisure, travel guide and holiday reading (most preferred)
- Culture, local foods and tradition
- Business
- Sport
- Video or movie

The demand for factual stories was higher than that for fiction stories in the research.

Researching and developing a story can take a long time. In order to get the best stories in the shortest possible time, the local storytellers should be used. It is however important that the quality of stories are high, which require professional in house development and production.
Another way of increasing the speed of story production is to use a context aware story creation tool with generalized structures for particular contexts. Parallel production tools for different users (preferences), devices and media types will reduce the cost of story production. These tools and methods may be sources of competitive advantage in the industry. Advantages from tools are however easy to imitate.

There is an opportunity to replace or complement tourist guidebooks. By taking existing information from guidebooks and building up context aware stories, the mobile city exploration tour guide can replace or complement the paper-based guidebooks. The advantages include that information can be more up to date, it can remove the need for backpackers to carry heavy guidebooks in a particular language and it may be complemented with warnings for, terrorism, political unrest or natural disasters, providing a sense of security. Parallel services may be provided to cater for different traveler needs and segments. An example is that budget travelers may use the Lonely planet guidebooks while up market travelers may use other guidebooks. Tourists who are especially interested in art and architecture may use the very thorough and informative Blue Guides. Blue Guides, are written by local people or people who are passionate about the subject. This indicates that quality requirements do not always lead a need for in-house production.

Due to the need for cross promotion between different media channels and the high costs of buying advertisement space on events etc. it is expected that location based advertisement will take off. The advertisement may be based on any kind of context and there are opportunities to develop context aware advertisements and

to integrate them into other context aware stories. The price consumers are willing to pay will however decrease when advertisements are introduced.

The research indicated that product placement would be a very small business and that it would be very complex and costly to develop. However comparing with the development of promotional games, this may be a niche opportunity to consider for context aware stories.

There is an expectation that video/movie services and video commercials will be provided for mobile users. It is however questionable from a usability viewpoint how feasible video is as a media for context aware stories. The reasons include difficulties in viewing video on a small screen when on the move or in bad lighting conditions.

The research indicates that the under 25 segment are early adopters of technology and that they are particularly interested in entertainment. The skills and technologies required to develop context aware stories for the mobile city exploration tour guide could be used to develop games, which take place partly in the real world and partly in the virtual world. Game like stories, theme stories and treasure hunts could be developed. It may be possible to develop these games in such a way that they attract a number of segments.

A large number of city visitors are business travelers. There is clearly an opportunity to provide business related stories and content. One idea is to provide context aware stories for traveling sales representatives, providing local knowledge that can increase sales locally. Another opportunity is to provide local market statistics. This can be useful when someone wants to position a retail store in a favorable location etc. It may be possible to charge a premium price to business users?

Marketing channels most suitable for business-to-business marketing includes Web sites, conferences/trade shows, articles, marketing journals and case studies. If startup companies want to offer business-to-consumer services they most likely have to partner with companies who own well-known brands, have established customer relationships and sufficient resources for marketing activities and access to market channels.

13.5.2 Big media companies

Big media companies have a number of valuable assets to their disposal in addition to content. These include:

- Brand name
- Consumer relationships (audience)
- Customer relationship (advertisers)
- Marketing capabilities and access to market channels
- Financial resources
- Digital content platform and content management expertise

To be really effective, the brand name has to be recognized in the countries from which the tourists come. Because of this, it can be argued that the brand has to be international.

The strategic position a media company can occupy depends (in addition to effects of external forces and competition) on the activities in the value chain (Figure 9.) that it can successfully perform. The strategy it chooses to pursue and the particular activities it chooses to perform depends on the individual strengths or assets of the company.

A media company with large financial resources and a broad set of competences have the possibility to become more vertically integrated, thus being able to capture more of the total revenues and maintain end to end control of the service. Another media company, with another resource structure, may decide to concentrate on performing a few key activities and partner with other companies to deliver parts of the end service.

The core opportunity for a big media company would be to become the *story/content aggregator, service provider and service marketer* for the mobile city exploration tour guide consumer service. Leveraging the strengths of the brand, marketing capability, content management, experience with consumers and relationships with advertisers this media company could successfully take on these roles. Partnership agreements would need to be established with companies performing other parts of the value chain including network operators (wireless distribution channels) and story/content creators (stories and complementary content). In this scenario the research indicates that the main players could share the revenues proportionally as follows (all players not included):

- 15% Story and content creators
- 45% Media company (aggregator, service provider, marketer)
- 40% Mobile Network Operator

The media company could utilize its financial capabilities and ability to invest to forward integrate to take on the network operator or MVNO role. This would enable the company to capture the value of data transmission/airtime, location information and other network functions. It will however also add to cost of sales due to the additional tasks of managing the telecommunications domain. In the *MVNO* scenario it is indicated that the main players could share the revenues proportionally as follows:

- 15% Story and content creators
- 65% Media company (aggregator, service provider, marketer, MVNO)
- 20% Host Network Operator

In the *HNO* scenario it is indicated that the main players could share the revenues proportionally as follows:

- 15% Story and content creators
- 85% Media company (aggregator, service provider, marketer, HNO)

If a media company has significant capabilities in story/content creation and wants to control the quality of stories and content for the service they may backward integrate to take on the story/content creator role. In this case the media company would keep close to 100% of revenues. However the cost factor of vertical integration has to be examined. Note that other players such as the technology enablers or application providers, integrators etc. also get a share of these revenues.

The positioning in the value chain determines which activities to perform, how to configure them and how they fit with each other to create a company that is more than the sum of its activities. Gaining competitive advantage is dependent on differentiation from competitors. Differentiation can be achieved by choosing to perform activities differently or to perform different activities or different combinations of activities than rivals. Awareness of customer demand and prediction of technology development may also lead to competitive advantages.

The most likely business to consumer *revenue models* includes sponsor or advertising, subscription, transaction or free models. The transaction model or pay per use is expected to dominate.
The marketing channels most suitable for marketing the mobile city exploration tour guide to consumers are viral (mouth to mouth) marketing, retail and customer service marketing. Direct channel (mobile advertising) and marketing through WAP sites may also be used.

Mobile Network Operators - The most valuable *assets* of a mobile network operator include the customer relationships, the brand and the ownership of the wireless distribution network. A mobile network operators controls the right to transmit in the radio spectrum, the SIM cards, the default portal settings, location information, billing and customer care relationships and the services offered.

Mobile network operators in Ireland has been reluctant to let third party players rent the network resources, however regulation (ComReg) is now forcing them to open up their networks to competitors. In this scenario air time or bandwidth may be sold on a wholesale basis to the MVNO.

13.6 Market size for the mobile city exploration tour guide service

The market size of the main target segment (tourist, family, sophisticated mobile user, interested in city bus tours, Europe tourist cities) as identified by the research was estimated (Appendix E) to be in the order of 51,744,000 users or transactions, and €13,453,000 at €5 per transaction, or €21,526,000 at €8 per transaction. The assumption is that €5 per transaction was applied when using a penetration-pricing model to break into a new market, and that €8 per transaction is applied when trying to extract value out of a more mature market. The market share that can be captured will decide how much revenue a particular company can achieve.

For more accurate market estimations the individual (per city) relationships between foreign and domestic visitors and the relationship between business travelers, holidaymakers and other traveler types has to be taken into account. When studying the visitors to European cities in general, the large numbers of business travelers are striking. There is an opportunity here to offer and design services that target the business segment.

13.7 Cost issues

In order to understand if there is a profitable business opportunity available, the cost of sales also has to be examined. There are a large number of ways in which a business can explore the opportunities highlighted by this work. Therefore cost estimation is outside the scope of this study.

A number of conclusions can however be drawn from the research with regard to cost issues:

- Marketing
- Customer service
- Story/content management
- Story/content creation
- Radio network technology
- Network ownership

Marketing: First of all the expense of creating a market and educate consumers can be extremely high, especially if cultural values has to be changed.
Customer service: Servicing a large number of consumers can be very costly, especially if the service is not very robust or easy to use. This can drain the resources of many companies very quickly.
Story/content management: Content management is very expensive. The technology is as costly as the people needed to perform this activity. The cost is in the order of millions of Euros annually for a larger operation.
Story/content creation: The cost of producing high quality, context aware stories is high due to the time it takes to research the markets and contexts, to research and design structure, the story and produce for multiple contexts (or preferences), media types and devices. The cost also depends on the amount of content that need to be produced, the number of interesting attractions or sites and how frequently the information needs to be updated. The stories have to be fresh and up to date in order to impress users.
Radio network technology: The choice of radio network technology is very important. The coverage or reach of the radio signal in urban areas (non line of sight) needs to be good in order to minimize the number of radio access points that needs to be deployed. The cost of renting radio access points is significant (Appendix F). Another issue is the use of licensed or unlicensed radio spectrum. Licensed spectrum will provide less interference from other traffic on the radio link, but it will add to cost of sales and it may be difficult even to obtain a license.
Network ownership: There is a trade off between the cost of ownership, the revenue share obtainable and the volume or consumers that are using the service

or utilization. At lower volumes of consumers, renting the network capacity may be preferable. At medium levels of usage, being an MVNO may be preferred and at high levels of usage owning the network may be suitable. The cost element has to be examined in any particular case. In certain circumstances, for example when outsourcing the billing aspect to mobile network operators through reverse SMS charging (using the bill of the mobile network operator) significant amounts of revenue is lost.

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BT Mobile. Available from: http://www.bt.com/mobile/

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Euro surveillance. Available from: http://www.eurosurveillance.org/

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15. Appendices

Appendix A

Mobile Context based Story questions

Introduction

A set of research questions has been defined and categorized into seven areas. Out of those, some questions have been set to highest priority. They are marked in RED colour with three asterisks (***) behind each question. In the interview I aim to go through the high priority questions and then take other questions if (or as) time allows. I estimate an effective interview to take ~1.5-2 hours to complete. Note that the questions are high-level questions intended to trigger a discussion in

the particular area (not suitable for tick box type response). The purpose is to explore the area of Context-based Stories for Mobile Users from a number of different angels.
Each source will be kept anonymous and the data will be used exclusively for this research. However I intend to present the name of each organisation that I interviewed in a table as part of the research methodology chapter to highlight to examiners the level of primary research conducted.

Scope/Area of study
I am investigating the business opportunities in the area of Context-based Stories for Mobile Users. By context I mean features in the users environment. These contexts affect what stories the user can access on a mobile device. The most obvious context is location and parallels can be drawn between for example: localised media (local news, local history, local tales, local advertising, local yellow pages, other local community information) and 'location based mobile services' and Context-based Stories for Mobile Users. However other contexts can be used such as the weather type, time etc.

To set the scope of the interview we can imagine a mobile application and distributed stories creating a location based City Tour or City Exploration experience involving the types of media information mentioned above. Interactive real or fiction multimedia stories are distributed in the environment. They enhance the sense of place/context and subtle links exist between a set of distributed stories to create a more cohesive user experience.

I am investigating the market, value chain, business models and strategies to exploit or enter into this area. By first identifying where you see your company could be in the value chain for Mobile Context-based Stories by 2006, the questions can be approached from that point of view.

For a broad introduction to the subject please read "Thesis introduction.doc".

1. The product or service (7Q)	1
2. Mobile user profile (8Q)	2
3. Market feasibility (19Q)	3
4. Mobile Technology (17Q)	4
5. Business models (14Q)	5
6. Operations (5Q)	6
7. Future (1Q)	6

1. The product or service (7Q)

1.1 What do you think of the idea?

1.2 Would you like to have it? ***

1.3 Do you need it?

1.4 How much would you pay for the application?

1.5 How much would you pay for stories? ***

1.6 Would you prefer to buy or rent the application/mobile device?

1.7 What would you like to explore? In what types of stories would you be most interested? ***

2. Mobile user profile (8Q)

2.1 Do you have a mobile device?

2.2 Are you personally paying the bill?

2.3 Do you use mobile Internet?

2.4 What do you think about browsing on your mobile device?

2.5 Do you pay using your mobile device?

2.6 What type of payment methods do you use?

2.7 What do you think about viewing video content on your mobile device (outdoors, indoors, passenger in vehicle)?

2.8 Have you used Location Based services (what type?)? ***

3. Market feasibility (19Q)

3.1 What is your view of the markets for Location Based Services in 2006-2008?

3.2 Who do you think are the customers for Mobile Context based Stories? ***

3.3 How do you see this market being defined/segmented?

3.4 In what areas (places and types of media) do you see stories being deployed?

3.5 How big do you think the market is?

3.6 What trends do you see in this market?

3.7 What are the key trends?

3.8 Who do you think are the participants in the value chain for mobile context based stories? ***

3.9 Who are in the best position to capture value? ***

3.10 Who has the power (buyer power, supplier power, access to market channels…)?

3.11 Do you see an opportunity for startups here or would it be occupied by large resource rich organisations? ***

3.12 How competitive is this industry?

3.13 Who could be the competitors?

3.14 Do you know of similar products on the market?

3.15 What market channels could you see being used? ***

3.16 How do you see wireless portals developing? ***

3.16.1 What services and content will they have by 2006-2008?

3.17 What is your outlook for the mobile advertisement market 2006-2008? ***

3.18 What market channels do you use?

4. Mobile Technology (17Q)

4.1 What are fourth generation (4G) mobile systems? When do you see 4G being introduced?

4.2 Do you see a continuation of network centric mobile systems or do you see an increase in device centric systems?

4.3 What mobile device capabilities will be available by 2006-2008? ***

4.3.1 Storage capacity, battery “talk time”, processing capability?

4.3.2 Are they going to be extensible? Expansion slots?

4.3.3 Sensor technologies?

4.3.4 Positioning technologies?

4.3.5 Smartcards?

4.3.6 Mobile streaming technologies?

4.3.7 Data formats supported?

4.4 What type of Network capabilities will be available by 2006-2008?

4.5 What percentage of mobile usage, coverage and revenue will be based on 2G, 2,5G, 3G, 4G and WLAN/WWAN access in 2006-2008? ***

4.6 What type of WLAN/WWAN technologies will be most commonly deployed by 2006-2008?

4.7 Will deployed WLAN/WWAN networks support handover and be compatible with 3G networks by 2006-2008?

4.8 What mobile security technologies will exist by 2006-2008?

4.9 What mobile payment technologies will exist by 2006-2008?

4.10 What are the most important standards used for Location Based Services (example: positioning, Information retrieval, security …)? ***

5. Business models (14Q)

5.1 How do you intend to make money from Location Based Services and multimedia content? ***

5.2 What are the possible business models to enter this business? ***

5.2.1 Corporate strategies? ***

5.2.2 Value chain configurations? ***

5.3 Who will “own” the customer? ***

5.4 How much are you charging for access to multimedia content? ***

5.4.1 How much are you charging for the multimedia content itself (applications, text, picture, video, music, location based, other)? ***

5.5 How is this being billed (volume (per packet, per KByte), time, other)? ***

5.6 How much would you see multimedia content costs changing until 2006-2008? ***

5.7 How much does multimedia content cost you? ***

5.8 How is the revenue divided between the different players in the value chain? ***

5.9 How do you see the breakdown of revenue generating services today and by 2006-2008? ***

5.10 How do you see the business model for mobile devices (phones and PDAs)? Are they application bearers like PC's? ***

6. Operations (5Q)

6.1 What are the costs and efforts involved in managing content? ***

6.1.2 Costs of managing Location Based content? Multimedia content?

6.2 What are the costs and efforts involved in managing software applications?

6.3 What are the costs and efforts involved in managing the mobile network?

6.4 What are the costs and efforts involved in customer support, billing administration?

7. Future (1Q)

7.1 What is your organisations/your own view of the future developments of mobile media? ***

Appendix B

Identify major sets of activities in the vertical business

The major and detailed sets of activities central to the vertical business of mobile city exploration tour guides together with the related critical resources needed in order to create and sustain value successfully from those activities has been identified. The major activities identified and what entity performs them are:

1. Service Consumption – Performed by Consumer
2. Service Billing - Performed by Billing partner

3. Retailing - Performed by Retailer
4. Service Provisioning - Performed by Service provider
5. Data Hosting – Performed by Data Host
6. Service Marketing - Performed by Marketer
7. Service Integration - Performed by Integrator
8. Story Aggregation - Performed by Story aggregator
9. Story Creation - Performed by Story creator
10. Content aggregation - Performed by Content aggregator
11. Content creation - Performed by Content creator
12. Service Application Creation - Performed by Application provider
13. Network Operation - Performed by Network operator
14. Network Integration – Performed by Network Integrator
15. Mobile Device Development - Performed by Mobile device provider
16. Network Equipment Development - Performed by Network equipment provider
17. Chip Development - Performed by Chip provider
18. Business Support Activities - Performed by all

From these major sets of activities (Table 9) an initial representation of the value system is assembled (Figure 9).

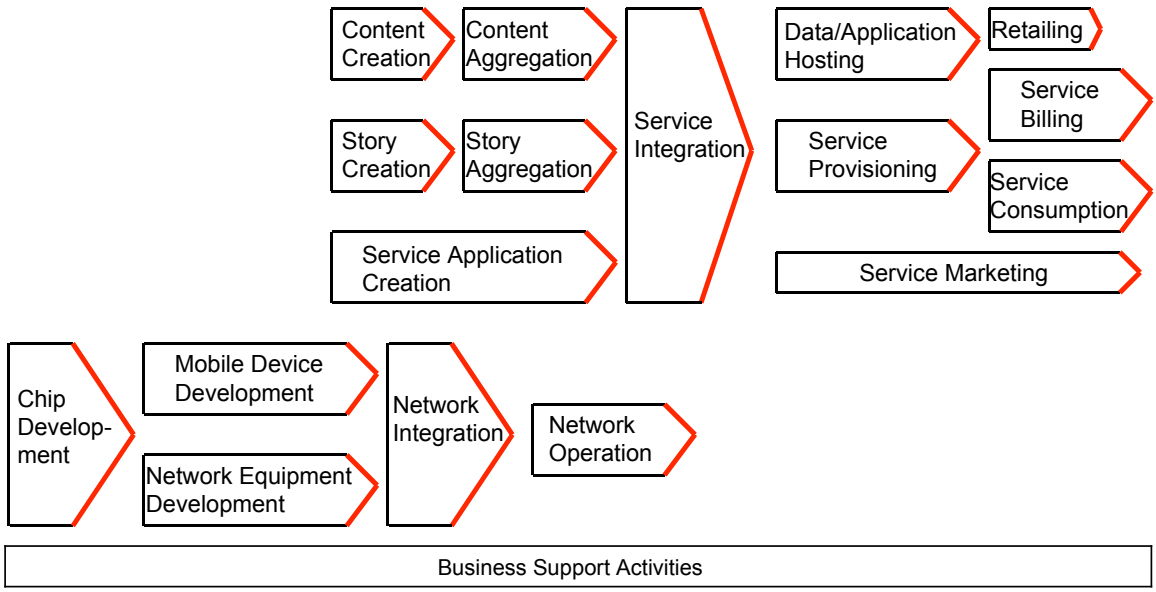

Figure 9. Value system for the vertical business of mobile city exploration tour guides. A red line in front of each activity represents an expected margin to be earned from performing the activity

Major and detailed activities plus critical resources required for the mobile city exploration tour guide service were identified based on information from primary research interviews and brainstorming sessions (Research Methodology, Table 1.), from analysing secondary sources including case study (Henderson, Yoffie 2004), articles (Abowd, Atkeson, Hong, Long, Kooper, Pinkerton 1997) and (Lillywhite 2004) and extended with the authors knowledge of software and the telecommunications industry. Note that the general support activities necessary for any business to be successful are only mentioned where perceived to be the most critical factors. It is clear that invested capital is essential to any business and money is essential for consumers to experience the products, services and information that they produce and therefore the resource of money is not mentioned for any activity.

Major Activity	**Detailed Activities**	**Critical Resources**
Service Consumption	Scenario: Learn and acquire certain interests and knowledge.	Time Buying power

(mobile city exploration tour guide)	Buy/borrow/rent mobile device Decide to travel. Travel to city. Become aware of the service, Access or setup personal profiles Get application and map to device (memory card) or device downloads in the background. If applicable group of people synchronizes devices (information) to form a user group before going downtown (walkie-talkie channel, time and message information for group decision making is setup). Tour city. Find the way with the map/navigation system. Sites with objects, history, fiction or contemporary information relevant to the user (profile and sensory context information) in the vicinity can be seen on the map. Select a site and gain a glimpse of what to expect through a media snippet. Visit site/be guided there by navigation system. As user moves through the environment sites appear on and disappears from display based on	Personal information Mobile device Personal mobility

	position of user. When indication is given that story is available, user can choose to consume the story. User zooms in on an interesting object on the site with the video camera. Indication is given if it has a story to tell. User can choose to consume story for more detailed information on special interest. A user may add information to and ratings of a story to the public story log. Other users can consume this information if they wish. The path taken together with stories consumed and photos or film taken are compiled and saved for later viewing. User explores next site of interest. Distributed and standalone stories and structures exist. In a distributed story, several sites have to be visited to get the complete story, however the order in which those stories are visited is not important. The user has now experienced the full, distributed story and some standalone stories and information	

	of specific interest, but feels it is time for dinner. He/she queries the service, which proposes a nice restaurant with food and price suitable for the majority of the group in close vicinity. The user proposes dinner to the rest of the group using the collaborative decision making tool. It has a four out of five star rating given by the average of the three most recent customer ratings. As predicted the majority agrees with the choice and 20 minutes later they are sharing a lovely dinner together in the restaurant. User gives a 5 star rating which can be viewed by other customers User walks to accommodation with the help of map/navigation system User travels home While flying home, the user can consume stories of interest from the cities they are flying over. At home user synchronizes mobile device and PC. Tour is stored and can be revisited on the PC at home. User may rate the service or recommend it to friends who will	

	travel.	
Service Billing	Revenue management. Payment exchange for usage. Distribution of revenue to partners (content, roaming, interconnect, termination fees). Revenue assurance (audit and control).	Billing system *
Retailing (Bricks and mortar)	Selling directly to consumers (application and local data may be sold on memory cards as opposed to being downloaded for example where network bandwidth is not being sufficient).	Location *
Service Provisioning (mobile city exploration tour guide service)	Buying/sourcing story application, story content, (, mobile devices if applicable), complementary information, network capacity and services Responsible for ordering and overlooking product development and integration Customer service (Mobile device distribution if applicable) Activation and authorization (notification to billing system that customers has begun taking the service) Service distribution over wireless network (and distribution in part	Brand, customer relationship, people Strong brand * Billing relationship Roaming agreements Size of customer base Marketing channels Consumer information Attractive services

	to retail outlets if applicable) But can be as simple as owning premises and providing mobile city exploration tour guide service (stories, maps, position) over WLAN to end-users. For example a McDonalds restaurant or a museum.	
Data Hosting	Hosting and managing data and applications (on behalf of service providers). Buying databases servers, LAN equipment and management systems. Capacity planning. Deploying databases and hosting servers. System integration. Establishing and monitoring service level agreements. Data and application management (operation and maintenance). Selling managed data and application services.	Technology * (databases, application servers, network and management systems)
Service Marketing	Market research. Segmentation, Targeting Positioning, Packaging Pricing. Advertising and promotion. Customer acquisition. Building customer relationships	Marketing people Marketing channels *

	(customer retention and loyalty). Market channels. Brand building. Monitoring satisfaction.	
Service Integration	Story to application integration and verification. Application/story to mobile device integration and verification (also rendering content for device) Mobile 'package' to network, sensor and server integration and verification (target environment) Usability and Stability integration and verification (target environment). Characteristics verification. Certification.	People, knowledge, tools Access to "friendly customers" (in real target environment) Knowledge and understanding of usability issues and user experience. * Test engineers Test tools
Story Aggregation	Brokering stories. Buying/sourcing stories. Owning stories, digital rights management, copyright clearing and licensing. Storing/managing stories. Bundling, rendering and repackaging. Marketing stories and brand building. Selling and distributing stories.	Brand, people, contacts, marketing, tools Strong brand * Market channels Sourcing, marketing and sales personnel Content management tools (digital rights management, storage, distribution)

Story Creation	Idea or requirements definition. Research. Structure (distributed, standalone or other). Real/fiction story development or authoring (storyboarding, character, setting, plot, point of view). Script writing. Visual media directing and capture (visual acting and recording). Audio directing and capture (acting and recording). Post production (editing, rendering, packaging).	People, Creativity, knowledge, tools Creative personnel (authors, artists) * Researchers (historians, reporters) Production technicians (sound, light, packaging) Media capturing, design and processing tools (software and hardware)
Content Aggregation (Supplementary content)	Brokering of content. Buying/sourcing content. Owning content. Storing/managing/licensing content. Bundling, rendering and repackaging content. Marketing content. Selling and distributing content.	Brand, contacts, marketing, people, tools Brand * Buyer and supplier contacts Market channels Sourcing, marketing and sales personnel Content management tools (digital rights management, storage, distribution)
Content Creation (supplementary	Content development or capture (measuring, research or authoring)	Volume, quality, timeliness and

content)	Production Verification Packaging Content management	reliability of content * Measuring tools Research personnel Creative people Content management system
Service Application Creation (Software)	User experience. Requirements capture. User interface design and usability (Graphical, conversation, gesture interfaces) Architecture (modular, client/server, database). Story engine (implements the story structure) component. Communication (networking) component. Positioning (indoor/outdoor navigation) component. Context/sensor component. Personalization engine component Advertisement support component Visual object recognition component. Group decision component. Usability Packaging Maintenance	People, knowledge, tools User experience * Software developers (with domain knowledge). Application platforms and operating systems Software development tools
Network Operation	Buying network equipment and services Network planning	Technology, knowledge, people, tools

	Deploying access and transport network capacity Deploying data hosting servers Network integration Network operations and maintenance Selling managed network capacity with basic network services (roaming, streaming), user information (position) and data hosting capacity This can also be the operation of a GPS system or it can be as simple as owning premises and operating WLAN access point(s).	Managed network capacity providing basic network services * Coverage (reach). User information. (Location, position, usage) Operation and Maintenance (O&M) personnel. O&M tools.
Mobile Device Development (Enabling technology)	Buying/sourcing raw material, tools and components. Form and Usability design. Research and development. Platforms Semiconductors Sensors Assembling Operating systems Application platforms Marketing Sales Distribution and logistics	Brand, knowledge, marketing, style, distribution, processes, people, tools Strong brand * Consumer information Marketing channels Form designers (fashion, style) Distribution and retail partners Supplier relationships Marketing personnel Efficient production processes and tools Innovation (patents)

		Engineers Researchers
Network Equipment Development (Enabling technology)	Buying/sourcing raw material, tools and components Research and development Semiconductors Exchanges Routers/switches Base stations Network services Network software Operation and maintenance software Services Marketing, selling distributing infrastructure equipment, services and solutions	Processes, knowledge, people, tools, brand Efficient production processes and tools * Innovation (patents) Service personnel Strong brand Supplier relationships Researchers Engineers
Chip Development (Enabling technology)	Buying/sourcing raw material (silicon, metal, chemicals) High level microchip design and construction (architecture) Application specific design Manufacturing or fabrication Testing Packaging Marketing	Design tools Efficient manufacturing processes * Intellectual property (patents) Market channels (technology push)
Business Support Activities	Finance Planning Human resources Technology Development Procurement	

	Training Business to business marketing and sales.	

Table 9. The activities and resources of the value system for the vertical business of mobile city exploration tour guides. The single most critical resource from the point of view of creating value is represented with an asterisk * in the far right column.

Appendix C

Identify trapped value or opportunity for new value creation in the vertical business?

Two of a series of defined questions (Rayport, Jaworski 2003, p.81) that guides the entrepreneur to uncover trapped value or find opportunities to create new value has been examined below. Opportunities have been identified with emphasis on service consumption and story creation activities in the value chain (Appendix B).

A) Is there a high degree of asymmetric information between buyers and sellers or colleagues in the value system that traps value?

Service consumption: The consumer is a central point in the whole value system. What the consumer needs, wants and prefers drives the whole business and therefore information of the consumer is interesting for all participants in the value system. It is believed that consumers of this service would be tourists interested in experiencing a city they travel to. Each one would have unique special interests in for example sport, art, culture, festivals, architecture, museums and contemporary information. Understanding consumer interests is essential to creating and providing the right content. The experience is central to the consumer and the content in the form of context-based stories; together with consumer preferences and context information are the most important components in delivering that experience. It is also essential that the service really do what it is

supposed to do and that interfaces are intuitive and simple. There are a number of other activities that tourists perform while traveling and sightseeing. The service may provide additional value to consumers by having the ability to pay for goods and services or withdraw cash in the local currency, interaction with tourist group members, provide local weather information, update user on local events, provide a local telephone directory or restaurant guide. It is important to know the consumers spending power when setting the scope for, targeting and pricing the service. The time consumers have available for using the service is also of interest in order to design the proper content. Consumers want to make sure that their information will not be misused and that they can control what information is coming to them (Lindgren, Jedbratt, Svensson 2002).

- *Consumers* want the experience (Weiler, Hall 1992) of the city. Any tool used to enhance the experience has to add value and be easy to use in order to generate user satisfaction. Core to enhancing the city tour are stories, personal information and context information. In addition complementary information services that assist in the customer decision process may be of interest and of value to the consumer. However consumer wants to control what information he/she receives. The consumer has the personal information needed by all others in the value chain.
- *Marketers*: The marketer is interested in knowledge of consumer preferences, opinions, behaviour, demographics, purchasing power and spending patterns. This information is very valuable because it can make marketing activities more effective by more accurate targeting, which should lead to less wasteful marketing campaigns as well as higher awareness of the service, and the brand (service provider) among intended users. The marketer finds out this information from consumers by different types of market research.
- *Billing provider*: The billing provider is interested in service usage in order to collect payments from the users. In order to add value in doing this, the billing provider must understand the users in order to provide the payment methods they prefer, when they prefer them (Lillywhite 2004). Payment may

be in the form of prepaid/postpaid, credit/debit card, Smart card, M-purse, loyalty points or electronic tokens from advertisers etc. There is an information gap between consumers and billing providers that may be bridged by market research.

- *Content providers (content creators and content aggregators)*: It is essential for content providers to understand the preferences of target consumers in order to produce and aggregate the relevant kind of information. Want to know how many consumes the different types of information. In this configuration of the value system there is a gap in consumer information filtering down to content providers. Content provider wants to maximize sales through more users and usage of information. If this is marketing information for other products or services, the consumer information is particularly interesting to the marketing customers (for those who's services are marketed).
- *Story providers (story creators and story aggregators)*: It is essential for story providers to understand the preferences of target consumers in order to produce and aggregate the relevant kind of stories. Want to know how many consumes the different types of stories. In this configuration of the value system there is a gap in consumer information filtering down to story providers. Story provider wants to maximize sales through more users and usage of stories.
- *Application providers*: It is essential for application providers to understand the preferences of target consumers in order to design the application, its interfaces and presentation etc. in the best, most seamless way possible to enhance usability and value. In this configuration of the value system there is a gap in consumer information filtering down to story providers. Application providers to maximize sales through more users of the application.
- *Integrator* is interested in customer feedback to know that the service performs to specification, that it has good usability and that it works well on different types of mobile devices.
- *Service provider*: The service provider wants to provide the service users want and that they want to pay for. Depending on the strategy the degree of

value differentiation and price level may vary. Service providers need consumer information and use the marketer and possibly the retailer in order to get that information from consumer. As they distribute the service wirelessly they have a certain amount of measured information. The number of consumers that are using the service, how much money they pay and how satisfied they are is of great importance for service dimensioning (network and database capacity, amount of content needed etc.) and revenue management purposes. The billing provider collects billing information. Service provider wants to maximize sales through more payment i.e. users and usage.

- *Network operators*: are interested in how many users exist, how quickly the user base will grow and how much network resources will be needed in different locations in order to plan capacity. They are also interested in user feedback on network performance and accessibility. They want to maximize sales of managed network capacity and services by increasing usage and predictability in utility.
- *Mobile device provider* is interested in fashion trends and other consumer information including age, sex and purchasing power in order to build devices that suits the taste of consumers. They are also interested in functional capabilities and characteristics like battery life and storage capabilities required. They are interested in more consumers buying devices and updating devices. Any service that can improve mobile sales should be welcome.
- *Network Equipment Provider*s are interested in how many users exist, how quickly the user base will grow and how much network equipment will be needed/they can sell in different markets. Any service that increases usage and number of network equipment sold should be welcome.
- *Chip providers* are interested in what services users want to access, how many mobile devices or how much network equipment is sold. If they know what services are going to be used they are able to produce chips that perform better in those particular applications and thus increase in value to mobile device providers/network equipment providers and subsequently to consumers.

They want to maximize the sales of chips through higher sales (more users and uses) of mobile devices and network equipment.

Retailing: The retailer has physical direct access to a certain percentage of local tourists depending on location, appearance, number of customers, type of products sold etc. Face to face selling and demonstration, understanding customers and personal customer service can add significant value to *consumers* and *service providers*. Less technology savvy users will need assistance and there is a need for personal assistance in combination with online customer service. The retail channel is a problem-solving place (Table 1). Retailing is an additional market channel and it would be possible to sell the application, local maps, stories and other content stored on a memory card, which users can slot in to their mobile devices. There may be a possibility to rent out mobile devices (for a valuable deposit) with the complete service ready to go.

- *Retailers* get additional customers, revenue share and cross-selling opportunities. The retailer will have the consumer or billing relationship and will learn about customer preferences, behaviour and opinion. This information is valuable to most of the participants in the value chain, but particularly to the service provider. These factors will increase negotiation position when determining share of revenue for the retailer. The amount of work for staff will increase which may lead to higher staffing costs.
- *Consumers* get personal advice/customer service and service access where broadband network coverage is low. Accessing the service components through a retail outlet may be preferred by some consumers
- *Service providers*: The service generates higher revenue due to higher customer satisfaction from retailer activities, which should lead to increased sales. More customers and sales would be an advantage when service provider is negotiating with downstream suppliers. However the revenue has to be shared with the retailer and the risk for piracy of content may increase. The service provider is interested in the consumer preferences and feedback in order to improve the service.

- *Marketers*: The marketer is interested in the additional market channel created by the retailer. It will increase awareness of the service; build brand awareness and customer relationships. The knowledge of customer preferences, opinions, behaviour and demographics can make marketing activities more effective by more accurate targeting which should lead to less wasteful marketing campaigns.
- *Billing provider* is interested in knowing what payment methods consumers want to use.

Service Marketing: The marketer needs to find out what consumers want and does this through market research, measurements taken by service providers or network operators and retail information. Marketers have the knowledge required to find this information and to apply it to the service market. The information it finds makes the marketer valuable and a central player in relation to the service provider in the areas of customer targeting, service composition, positioning and pricing, advertising, customer acquisition and maintenance and brand building. Needs to work with service provider to understand strategic intent, costs and resources.

Service Billing: The billing provider manages revenue in that it collects payments in the way consumers prefer, manages revenue share agreements and distributes funds in accordance with those to the relevant partners and auditing and controlling accounts to detect revenue leaks. It must know when a customer uses the service i.e. using the service must prompt the billing provider to collect payments. For example in a scenario of subscription the billing provider must be notified (by the service provider?) that subscription has started or ended.

Service Provisioning: The service provider is the spider in the web of bringing the service to market. It finds out about the potential market from the marketer and it knows the suitable technology, networks and content components to source in order to build the service as envisioned. It has the vision and the capabilities,

motivation and resources to pull it all together. It is the initiator and partnership builder, which decides what suppliers, can participate depending on the value they add compared to cost they incur. It is the partner that owns the billing relationship and the brand which service users become aware of although the billing provider performs the revenue management.

Service integration: The integrator has a broad set of competences in areas including software and computer science, content, and usability, wireless networking, positioning, mobile devices, verification techniques and test tools. It also has the ability to run successful tests in real environments with friendly users. This partner is of great importance to the service provider in bringing together several heterogeneous components. The integrator needs to be in constant communication with users and suppliers to solve any issues.

Story aggregator: The story aggregator has a contact network with many story creators through which it sources stories. It also has a contact network with potential service providers or buyers of stories. Being able to match what the service provider wants (type, cost quality, context) with what particular story creator's produces and then create bundles of relevant stories provides the value of story aggregators.

Story creation: A story creator consists of creative authors and artists together with skilled researchers in the fields of interest to service providers (in reality consumers) and production personnel. The story creator goes from idea or customer requirement to research, story structure definition, context input definition, real or fiction story development, script writing, acting and recording to post production and packaging. The bulk of the creative work is done here. The story creator has knowledge and creativity but needs information about subject, location etc.

Service application creation: The application is really the service framework that shall support the stories, information, context information etc, present the experience to the user and handle user requests. A large set of specialized skills including context based stories, usability, imaging, artificial intelligence, sensor technology, speech and gesture interfaces, wireless networking, mobile device platforms and operating systems.

B) Are considerable amounts of time and resources consumed in bringing people together to make a transaction or complete a task?
Full analysis described in Chapter 6.1.

Appendix D

Results from and analysis of research interviews (Research methodology, Table 1). The questionnaire used can be found in Appendix A. A sample size of six is too small to draw any valid conclusions from. It can however give an idea of what people think.

Mobile user profile
2.8 Have you used Location Based services (what type?)?
All interviewed persons that were asked the question had used some form of location based service. A range of different services had been used including find nearest, get direction, museum tour guide, call a cab, vehicle tracking system and GPS hiking map. This indicates that the people interviewed has a higher than average level of exposure to real mobile services. This has to be taken into account when analysing the research results.

The fact that four out of six people (66%) where not happy with the services possibly indicate an *immaturity* of location-based services.

The product or service
1.2 Would you like to have it?

The question was asked in five out of six interviews.
Four out of six people (67%) where personally interested and two people (34%) where not interested based on the introduction they had been given.

One company was not interested and thought the service should be outsourced. Another company thought the service has potential but that it is not part of their strategy to offer it. Three companies (60%) where interested pending some form of investigation with regards to the market, sales potential and profitability in producing this kind of content.

There is however a long way from being interested to actually buying/using or providing the service or content.

1.5 How much would you pay for stories?
The question was asked in six out of six interviews.
In five out of six interviews (83%), people always wanted to *pay as they use* the service. In one case, pay as you use was preferred when on holiday while a *subscription* was preferred at other times. The *average price* people wanted to pay per use was (1.5+3.5+3.5+10+20)/5 interviews= *€7.70* assuming a total data volume of 1MByte (paid at 2 cents per KByte). The subscription price was indicated to be somewhere between *€5 and €25* per month by one person.

How much companies would pay for stories depended on:

- The volume of traffic (MByte) the story would create
- How many minutes of time online the story adds
- Required payback period and return on investment

An amount of between *€50 and €200* would be paid to the creator of a story depending on the subject of that story.

1.7 What would you like to explore? In what types of stories would you be most interested?

The question was asked in six out of six interviews.

In three interviews out of six, the importance of what type of *situation* the user is in was stressed. Different *profiles* were suggested to drive the type of stories the user is interested in. The profile may describe what type of content a user wants based on the trip the user is on, who the user is with, if the user is still or moving, what day in the week or what time of the day it is and what kind of environment the user is in. This emphasizes the importance of context to the value of information.

The most popular types of content have been summarized in Table 10 below. In one interview it was specifically pointed out that fictional stories was not of interest.

Types of stories wanted	**Popularity (mentioned in number of interviews out of six)**
History	3
Leisure, travel guide, holiday reading	3
Culture (local foods, tradition)	2
Business	2
Sport	2
Video or movie	2
Contemporary information	1
News	1
Weather	1
Children	1
Adult	1
Family	1
Outdoors	1

Action	1

Table 10. Popularity of content types.

From a company point of view two out of six interviews (33%) emphasized the importance of providing the content that *pays the best* and attracts the *largest user base or market* that is the business opportunity.

Market feasibility

3.2 Who do you think are the customers for Mobile Context based Stories?

The question was asked in six out of six interviews.

In four interviews out of six (67%) the *tourist* was identified as the main business to consumer customer. The fact that the service is geared towards tourists and that a tourist is going to new unfamiliar environments and need information that is location-based makes the tourist the most likely customer to this service. A strong sub segment of tourists appear to be the *family*, which includes members of the young and fun (YAF) 10-18 segment, WAP friendly 18-30 segment and the mature +45 segment. While only one (17%) interview explicitly highlight the family as a consumer, four out of six (67%) interviews include segments that make up the family.

Three (50%) out of six interviews explicitly specify the *under 25 segment* as a potential business to consumer market. 18-25 year olds are early adopters of technology and would prefer entertainment type stories. However, it is important to understand what level of entertainment they are accustomed to.

One (17%) interview out of six includes people with limited mobility as a potential business to customer. They may be interested in advise of how to get from A to B in a wheelchair.

Two (33%) interviews out of six include the *business traveler* as a potential business-to-business market. One (17%) interview out of six includes the *advertiser* as a business-to-business customer. One (17%) interview out of six

includes the *big companies or service providers* that want to add this service to their current portfolio of services.

One (17%) interview out of six includes the *business itself* as and end customer to the service using *commercial stories*. This may be part of an ERP (Employee Resource Management) system that informs sales people of product offerings suitable to a location or customer or a logistics system in the transport communication industry.

3.8 Who do you think are the participants in the value chain for mobile context based stories?

The question was asked in six out of six interviews.
In five out of six interviews (83%) content creators or providers was mentioned. In four out of six interviews (67%) some kind of application provider, core technology provider or service integrator was mentioned. In five out of six interviews (83%) some kind of content aggregator, content owner, publisher, media-company or marketer was mentioned. In five out of six interviews (83%) a network provider in some form was mentioned. In six out of six interviews (100%) Service provider or operator was mentioned. In one interview out of six (17%) a retailer was mentioned. In one interview out of six (17%) a GPS (Global Positioning System) provider was mentioned.

3.9 Who are in the best position to capture value?

The question was asked in six out of six interviews.
In five interviews (83%), power in the form of monopoly position, customer base or billing relationship and brand value enabled a company to capture most of the revenues from the end product or service. One of those five interviews explicitly stated that in the reality all participants in the value chain does not get awarded equally or in proportion to value generated. In one interview (17%) a win-win relationship was seen as most important to attract companies to the value chain.

In three interviews (50%) the publisher, application provider, service provider or concept owner was seen as being able to capture value. In two out of those three interviews they where seen as the second best positioned partner and in one interview it was seen as the best positioned partners to capture value.
In one interview the power distribution in the value chain was given. This is interpreted as follows:

- Distributor (example mobile network operator) – *high power*
- Publisher (application provider, service provider, concept owner or publisher) - *medium power*
- Enabler (niche player, small activity, complementary competence) – *low power*
- Content Creator (author, researcher etc.) – *least power*

A mobile network operator has the advantage of owning a marketing channel. It is an issue to find the market channels when not being a network operator.

3.11 Do you see an opportunity for startups here or would it be occupied by large resource rich organisations?

The question was asked in six out of six interviews.
In five interviews (83%) it was indicated that there is an *opportunity for startups*. Four (80%) of those five interviews stated that the opportunity for startups is mainly as *concept owners*, *technology enablers* or *content providers*. One (20%) of those five interviews indicated that the opportunity was *primarily* for startups. Two interviews of those five indicated that the startup needed to *partner* with, *license* or *sell* to a large company with a recognized brand and customer contacts. In one (17%) interview it was indicated that there was *no opportunity* for startups.

Six interviews (100%) indicated that there are *opportunities for large* resource rich companies. Three of those six interviews emphasized the high *costs* involved in *marketing* and the *difficulty and cost of creating a market* for this service as major factors leading to the need to be big. Three of those six interviews emphasized the importance of *brand* recognition and *customer contacts* for this

service. It is very difficult and costly to build up a new brand and therefore one should *use* an *existing*, well-recognized *brand* and customer contacts.
One interview (17%) was very negative about the present opportunities even for large companies. The interview indicated that there is no market; fundamental things like user friendliness (appalling user experience), demand and culture are not present. Also fundamental infrastructure is missing, there are not enough capable phones in the market. The interview also pointed out that there are very few if any that make money on mobile data services today. A wait and see approach was recommended.

One interview indicates that the role of *concept owner* is an opportunity for large and small companies alike. Another interview indicates that large mobile network operators and media companies would *block smaller* content providers from accessing the market which further inhibits them from building own vertically integrated business and have to partner with bigger players which have brand, customer contacts and access to market channels.

3.15 What market channels could you see being used?
The question was asked in six out of six interviews.
In four interviews (67%) it was indicated that a *retail channel* could be used to market this service. The retail channel could be part of the travel industry (travel agents, travel companies, tourist office), mobile agency, big retailer heavily branded mobile network operator retail outlet for telephones, accessories or services etc. The travel industry market channels would be relevant in that tourists who are in transit or in need of information can be targeted. A mobile agency or branded mobile network operator retail outlet would be relevant as enthusiastic sales personnel and customer service representatives could sell, suggest or promote a trial of the service when users visit the retail outlet. A big retailer such as Tesco would be relevant because of the amount of customers they have circulating in their stores.

In one (17%) interview it was stated that this service would *not* be sold in a shop or retail outlet.

Another (17%) interview indicated that because the most likely users would be *technology savvy* users, the marketing channels would have to reflect this. High technology market channels would include WAP sites and Web sites as opposed to leaflets in newspapers.

One interview suggested that the service should not be pushed through a mobile network operator.

Two interviews suggested that innovative ways of *viral marketing* should be used.

Two interviews indicated that the service could be promoted with *free trials*.

Other methods that were suggested included *direct channel marketing (email, mobile advertisement)* or showing how good the service is through *conferences, articles, marketing journals and case studies*.

3.16 How do you see wireless portals developing?

The question was asked in six out of six interviews.

One interview states that wireless portals are *destined to fail* based on current usage. The reasons given are that the portals are technology driven with appalling usability. Most portal services also lack end-to-end control. An indication of the low level of user friendliness may be the low data usage even by active GPRS users.

Another interview states that personalization techniques and profiling is being developed to *increase portal usability* and reduce click distance.

A third interview indicates that wireless portals will not develop in the same way as Internet portals because the public is not exploring the wireless web.

A fourth interview indicates that wireless hot spots are becoming like portals that can be accessed using short-range radio like Bluetooth. This space is still unregulated and it is envisaged that local government will regulate to take a share of the revenues.

A fifth interview indicates that wireless portals will contain video services such as pay per view TV, video commercials and some free content. It also indicates that there is an opportunity for location-based advertisement.
A sixth interview indicates that wireless portals will be walled gardens (controlled) using selected content and unique look and feel.

3.17 What is your outlook for the mobile advertisement market 2006-2008?
The question was asked in six out of six interviews. In one of the interviews the interviewed *did not know* about mobile advertisement and did not comment further. In three (60%) interviews out of five the belief in the future of mobile advertisement was *very strong*. In two of those interviews location based or *location sensitive advertisement* was seen as a *very likely* development. In one interview the importance of *cross promotion* between mobile and other channels was stressed. In the other interview it was indicted that users would accept mobile advertisement if the service that was used to advertise in was *free*. In the third interview it was described that new ways of marketing was *desperately needed* due to high costs of buying advertisement space. Mobile advertisement together with viral marketing was seen as two major alternatives
In one interview (20%) it was indicated that mobile advertisement *might take off*. Mobile advertising exists today in the form of push SMS. It was stated that advertisers need more stable platforms in order to make it attractive in large scale and that new interesting tools that can be used for mobile marketing are developing, but not utilized yet.
In one interview (20%) it was stated that it is *too early* for mobile advertisement. Mobile advertisement is not established yet and it is only one of many available marketing channels competing for a limited marketing budget.
Two interviews brought up the issue of *managing many small marketing sponsors* in a location based mobile advertising environment. One interview indicated that the overheads and risks in managing many small sponsors were *not worth the effort*. The other interview however indicated that management of sponsors could be made *automatic* with the help of a technology system.

Mobile Technology

4.3 What mobile device capabilities will be available by 2006-2008?

The question was asked in six out of six interviews.

In five interviews (83%), people generally believed in the *convergence* of mobile devices would take place. Two interviews stated that *WiFi/WLAN and GPS* would be part of converged mobile handsets within this time frame. One of those two interviews indicated that the adoption of WiFi with handover and Session Initiation Protocol (SIP) in handsets would create a potentially powerful solution that can compete with 3G Mobile systems. In four interviews an *uncertainty of the adoption* of or inclusion of *WiFi/WLAN* capabilities in mobile phones within this timeframe was seen. One of those four interviews indicated that network operators would *slow down* the adoption of WLAN due to *conflicts of interest*. Another one of those four interviews indicated an *uncertainty* of the adoption of *GPS* in handset's due to consumers desiring small devices, which consumes small amounts of energy or battery power. The interviewed had the opinion that a *network centric* view where functionality reside in the network rather than the device would be followed which would also assist in fulfilling these consumer requirements. A third interview (of those four interviews) indicated that the rate of *adoption of smart phones* would impact the feasibility and the uptake of this service.

In one interview (17%) the *convergence* of mobile handsets was seen as *questionable* whether it would happen at all.

In three interviews it was stated that *video* capability and the *streaming of pictures* (new generation MMS or multi media messaging) would exist within this time frame. Other capabilities including *MP3, touch screens, sensors, memory/expansion slots, increased battery capacity* was also mentioned. One interview specifically highlighted increased *battery capacity* as the *single most important technological development* for mobile devices.

One interview stated that mobile devices are a *mixture of fashion and technology*. When a lot of technology and fashion design is introduced in the devices there is a

risk that they become expensive. The *ability* for mobile network operators *to subsidize* phones or consumers to *pay* for the phones has to be considered if the mobile device industry shall remain successful. The success depends to a large degree on *how smart* mobile device developers can *engineer* the handsets.

4.5 What percentage of mobile usage, coverage and revenue will be based on 2G, 2,5G, 3G, 4G and WLAN/WWAN access in 2006-2008?

The question was asked in three out of six interviews.

In two (66%) out of three interviews it was stated that *voice and data services* are the main revenue generators. Up until now these revenues have been generated from the existing *2G* and *2,5G* networks and related applications. Both interviews indicate that increased revenues will mainly come from *mobile data services* (voice revenues plateau). One interview indicates that while in mainland Europe the split of revenue is *50/50* between voice and data services, the situation is *10-15%* of revenues generated by data services and *85-90%* generated by voice services in Ireland. It is believed that this situation *may be turned around* (15% of revenues from voice services and 85% from data services) *by 2008*. The other interview indicates that *20%* of revenues in *Ireland* and *25%* of revenues in *Japan* will come from data services by *March 2005* (quarter one).

While one out of three interviews indicates that *WiFi and WiMAX* (Wireless LAN technology) will increase broadband coverage and *enable new revenues* going forward, another interview indicate that *WLAN is ignored* due to no impact on business.

One interview out of three indicates that *4G* is nothing more than higher capacity and bandwidth management and will be introduced around *2006* and be established around *2008*. It also indicates that it is hard to know *how fast the uptake* of interactive data services and 4G will be. It will *depend on how developed a country is*. The uptake may be *faster in Ireland* than in most other countries due to high technology awareness, high education levels and high turnaround of phones.

Finally one interview states that it is the issue of *applications* that will *drive revenue* rather than *type of networks* that is important. There are a lot of *operational issues* that will face traditional mobile operators within the next few years including cost of operations, diminishing call termination charges (regulation), cost of large scale marketing machines, many competitors and a limited customer base. The one who gets it right first will win.

4.10 What are the most important standards used for Location Based Services (example: positioning, Information retrieval, security)?

The question was asked in four out of six interviews.

In two out of four interviews the interviewed did not know about what standards was important, but in one of those two interviews it was indicated that *convergence* may be a *threat* to the application because users could do the same thing with standard devices.

One interview stated that *standardisation is critical* to the adoption of location-based services, but indicated that standardisation *moves slowly* because companies continue to argue their own corners.

One interview indicated that the *positioning methods* used would be *cell identity, infrared (IR)*. *Bluetooth* is a maturing technology and would be important for use in location- based services.

Business Models

5.1 How do you intend to make money from Location Based Services and multimedia content?

The question was asked in four out of six interviews.

One interview stated that money would be made in the same way as for any other service.

In one interview it was stated that by *leveraging the core competencies* of *providing wireless networks* we will increase revenues from data services of which some are location based. A lot more data will be carried if the *usage of data services increases* and being a *bit carrier* we can make more money.

In one interview it was indicated that the money was going to be made by *providing a location data feed* to the service or application provider. The *GPS relationship* is *important* because cell identities give too inaccurate position. Will GPS be part of handsets?

In the same interview it was also indicated that a by providing application programming interfaces (APIs) and use a let the *1000 flowers bloom approach* letting companies use the network to try their services and then *acquire the ones who succeed* it may be possible to make money.

In one interview four possible ways of making money was given:

- Being a *service provider* delivering the service to end users through a mobile network operator. If outsourcing the billing to the mobile network operator and using reverse SMS charging you would immediately loose 50% of the revenue.
- Being a *service provider* delivering the service to end users and making the money on *advertising*. This may be possible in the long term when the market needs have matured.
- Being an *enabler* and providing technology, content and other particular competencies to other businesses that deliver the end service.
- Being a technology or content *provider/owner* and *licensing* that to other businesses that deliver the end service.

5.2 What are the possible business models to enter this business?

The question was asked in six out of six interviews.

Five (83%) out of six interviews where giving examples of *business to consumer* business models while four (66%) out of six interviews were giving examples of *business to business*, business models.

Business to consumer (B to C):

In three interviews out of the five that gave examples of B to C models, a free or very low cost *sponsorship or advertising* customer revenue model was proposed.

In three interviews (50%) out of the five, a *subscription* based customer revenue model was proposed. Two of those three interviews proposed a transaction based or pay per use customer revenue model. One of those three interviews proposed a *hybrid* between a subscription and a sponsorship model.
One interview indicated that the service provider should *provide special information* that *draws users to do other things*, which generates revenue.

Business to business (B to B):
In four interviews out of the four that gave examples of B-to-B models, a technology *enabler* or *concept owner* model was proposed. Two of those interviews indicated that the enabler or concept owner needed to *partner* with a known *brand* owner. One of those interviewed identified the *marketing cost* as most significant and advised the enabler or concept owner to *partner* with a *large resource rich organisation* in order to afford to bring the product to market.
Two of the four interviews indicated that the enabler or concept owner should *license* out the technology or concept so a business providing the final service.
One of the four interviews proposed *a revenue share model* to be established.

One interview indicated that it is *too early* to tell what business model to use. No clear business models are emerging yet. There are some very *fundamental enablers missing* including:

- User friendliness
- Demand
- Culture

One has to *look wider* than the existing business models to find the one for this business.
This interview also draws parallels between the Internet industry prior to the crash of the "Internet bubble" and the wireless industry. Many Internet startups didn't have well thought through business models. It indicates that the crash in the wireless industry is happening in slow motion and that we are a few years away from the "Internet bubble" in the wireless industry.

Corporate strategies?

The question was asked in two out of six interviews.

Very limited information is collected in the area of corporate strategies. The strategies include:

- Differentiation strategy – doing different things that add value and give competitive advantage.
- Enabler strategy – doing what others does not or cannot do.

Value chain configurations?

The question was asked in six out of six interviews.

For an analysis see question 3.8 where identical results where achieved.

Who will "own" the customer?

The question was asked in six out of six interviews.

In five (83%) interviews out of six, the *consumer* or end customer was highlighted. In one (17%) interview the *business-to-business customer* was also highlighted.

Consumer relationship:

In six (100%) interviews out of six, the *mobile network operator* was specified as a major player having consumer relationships mainly in the form of billing and customer care relationships. In one interview it was indicated that the *media company* would have consumer relationships. In another interview it was indicated that the *utility company* would have consumer relationships due to their current billing relationships. In a third interview it was indicated that the *big brand* owner has the consumer relationships. The big brand could for example be a mobile network operator or a media company. A fourth interview indicated that the *distributor* (or service provider as a separate entity from network operator) has consumer relationships.

One interview was indicating that Microsoft (enabling technology provider) tried to get control over the customer accounts through common registration using the .net technology, but had not succeeded yet.

The reasons for the consumer relationships was indicated to be:

- Billing (two interviews)
- Brand (one interview)
- Customer care (one interview)
- Distribution or service provisioning (one interview)

Business to business customer relationship:

One interview indicated that small or large *enablers* are more likely to have business-to-business customers than consumer relationships.

One interview emphasized that *nobody owns the customer* because the customer decides for him/her self. It also indicated that although mobile network operators have a lot of customer relationships they *don't realize the value of their customer base*. Instead the network is often seen as the main resource.

How much are you charging for access to multimedia content?

The question was asked in five out of six interviews.

The answers given in four out of five (80%) interviews prompted the author to retrieve charging information from the web pages of the respective companies (Table 11). This information consisted mainly of *business to consumer* prices. From three out of those four interviews a charge per minute was indicated, thus *time* based charging was the *most common* method for charging for content.

Two interviews indicated that charging in some cases are based on per *call* or per *message transaction* information. *Premium-rate services* vary a lot in price and can be charged based on transaction, content attractiveness or time.

One interview indicated that content was charged based on the *volume* of data used measured in Kilo Bytes (KB).

One interview indicated that content was charged depending on the quality and the complexity of the content (games etc.).
Access to content over the fixed *Internet* was an order of magnitude *cheaper* than accessing content from a mobile due to lower costs and higher data rates. While one interview showed a *flat rate* pricing model for Internet access no interview indicated flat rate for mobile.

In one out of five (20%) interviews, *business to business* prices where highlighted. It was indicated that content is paid for based on a *licensing* agreement or a *revenue share* agreement between the seller and the buyer of content.

Type	Cost (approximate)	Charging basis	Comment
Short Message Service (SMS)	€0.14	Per message	
Multi Media Messaging Service (MMS)	€0.30	Per message	Pictures, sound and text
Premium rate SMS	Up to €8.60	Per message	Based on the type of content accessed
WAP and multi media services	€0.14	Per minute	Browsing etc.
E-mail	€0.29	Per message	Send is charged separately from receive
GPRS data	€0.02/KB up to 512 KBs. €0.005/KB for any usage over 512KBs	Data volume per KB	Pay as you use
Fixed Internet	€0.0126 per minute off peak. €0.0507 per minute at peak.	Per minute	
Fixed Internet	Flat rate €9.99-29.99 +€0.20-0.40 per hour	Flat rate + charge per hour online	ADSL Broadband cost is between €33.99-39.99 per month.

Table 11. Costs to Irish and British consumers for accessing data

How much are you charging for the multimedia content itself (applications, text, picture, video, music, location based, other)?

The question was asked in four out of six interviews.

In two (50%) out of four interviews it was indicated that the charge varies dependent on the *type of content* (Table 12).

Content type	**Approximate Cost**
Java games	€2-7.20 per game
Ring tones	€1.20-4.30 per ring tone
Screen savers	€1.25-4.30 per screen saver
Sports alerts	€0.43 per message
Wall papers	€2 per wallpaper

Table 12. Mobile content costs

In one interview it was stated by an Internet service provider that the content was *free*. Once broadband access would be available, content would not be free. This indicates that there is a *relationship between* the *access speed* and how much can be *charged* for the content.

One interview indicated that they only charge for content based on the *volume used* (streamed or downloaded).

5.5 How is this being billed (volume (per packet, per Kbyte), time, other)?

The question was asked in five out of six interviews.

In *summary* the research indicates that the most common methods of billing is based on *time* (Premium numbers) followed by *volume of data* (Premium content). A consumer may be billed based on a *subscription* valid for a specific period of time, every time the service is *used*, every time the *utility bill* arrives or after a *trial period*. Business to business billing may also be on a volume basis or by subscription. Billing systems are flexible and allows for many different ways of billing.

5.6 How much would you see multimedia content costs changing until 2006-2008?

The question was asked in five out of six interviews and was interpreted as meaning the cost to consumers.

One interview indicated that the cost for content is *not going to be free* when broadband access will be available. People will get used to paying for it.

In another interview it was stated that the cost is *not going up*. This can indicate that the cost may decrease.

A third interview indicated that a *premium price* would be achieved *initially*, but as more entrants arrive and *competition* increases the *price will drop*.

A fourth interview states that as the *cost increases* for producing the content, those costs will be passed on to consumers.

A fifth interview indicates that it is *difficult to tell today* how multi media costs will develop.

5.7 How much does multimedia content cost you?

The question was asked in three out of six interviews.

None of the interviews provided answers to this question, which indicate a limitation in the research. The reason may be the limited number of interviews in which the question was asked or a discrepancy in the population selection.

One interview indicated that chargeable content offerings are emerging, but at this point it is more relevant to *have content that keeps users on line longer*. This is related to the ways in which billing is currently done. However this does not answer the question of how much multimedia content cost.

5.8 How is the revenue divided between the different players in the value chain?

The question was asked in six out of six interviews.

For an analysis see question 3.9.

5.9 How do you see the breakdown of revenue generating services today and by 2006-2008?

The question was asked in five out of six interviews.

In *summary* the research indicates that current revenue generating services for mobile operators is:

- Voice services (80-85% of ARPU)
- SMS (12-15%)
- MMS and GPRS (5-8%)

The revenue from data services is expected to grow by between 5% and 7.5% per annum over the next two to six years. The volume of voice traffic continues to increase so while the revenue per call decreases, the total revenues from voice increases slowly.

One interview differed significantly from the others stating that voice traffic would still stand for 80% of revenues even in2006. Another interview indicated that revenues from voice and data services might be reversed by 2008.

For Internet service providers the Internet access provides the highest revenues. Broadband content offerings are emerging.

For broadcasters, the mobile city exploration tour guide would be a niche product. Highest revenues come from TV, Radio, Internet and auxiliary services.

5.10 How do you see the business model for mobile devices (phones and PDA's)? Are they application bearers like PC's?

The question was asked in four out of six interviews.

In *summary* the research indicates that mobile devices are application bearers, but that the money are made on product sales rather than applications. The mobile city exploration tour guide would be free. Mobile devices are fashion items packed with technology, which are difficult to upgrade successfully similar to Windows. It is easier and cheaper to replace the phone than upgrading it. It seems to indicate that mobile devices will be replaced frequently because they get out of fashion or because new functionality has been introduced.

One interview differed significantly from the others stating that the mobile device will be browser based and that the functionality and applications will be located in the network. The arguments included smaller devices and less power consumption.

Operations

6.1 What are the costs and efforts involved in managing content?

The question was asked in six interviews out of six.

One interview indicated that there are *good models* for content management solutions for the Internet, which can be used, in mobile systems.

In another interview it was stated that mobile network operators already have content management systems in place. This seems to indicate that they are *prepared* for managing stories and other content.

In three out of six interviews it was indicated that they where managing content in house. *Varying degree of in house content production* was reported from most content produced in house to most content bought from third parties. The companies who produced content in house had more employees than the other companies. All three companies *sourced at least some content* from third parties.

Level of in house content production compared to number of employees for companies that do in house management of content:

- Most content produced in house – 26 employees
- Only some content produced in house – 12 employees
- No content produced in house – 6 employees

Two interviews indicated that *content management is very costly*. A high level management system is needed which costs millions of Euros. The *technology costs are as high or higher than the people costs*. A *seven-digit budget* in the Millions of Euros should be expected for content. This includes marketing, technology, maintenance, design, content and editorial tasks.

In one interview it was indicated that distribution rights, upstream revenue share, copyrights and the proprietary solution was *outsourced* to a third party. In this case the company did not do any content management itself.

Future

7.1 What is your organisations/your own view of the future developments of mobile media?
The question was asked in five interviews out of six.

In two interviews, the *difficulty to predict* the future of mobile media was stressed. One interview indicated that mobile media *will come*, but not as fast as people think. The technological infrastructure is in place, but a number of fundamental *drivers are missing* such as:

- Culture
- Demand
- Proper use of technology
- User friendliness etc.

We should define a number of *beacons in our environment* so that we can see when the market is ready. The key question is what are those beacons?

The other interview indicated that things would happen when *mobile broadband* will be available. Mobile media services will mainly be used *killing time* when using *public transport* (stuck on busses or commuter trains). However technology are *never used in the way it was supposed to* be used. That is why it is so difficult to predict.

Two interviews specifically sees rich interactive multi media content as a growth area. This can include high quality content, audio, video and interactivity.

In one interview it was predicted that we would move towards a *higher level of interactive data services* as a percentage of Average Revenue Per User (ARPU). It argues that by *2008* the current situation for revenue from voice and data services may have been *turned around* (~80% from data services and ~20% from voice services). It believes that *adoption* of interactive data services will be *faster* in Ireland due to the following factors:

- Technology awareness
- Good education
- High turnaround of phones (changing phones frequently)

Wireless technologies such as *WiFi and WiMAX* are believed to increase broadband coverage to *enable mobile media revenues* going forward. This area can however be vulnerable to *regulation*.

In one interview the criteria for success of mobile data services is given. The service is *good* if it assists in increasing revenue from data services beyond 20% of revenue. If it generates revenue when including the costs for implementation, operation and maintenance it is *interesting*. If it also enhances the competitive position it is *best*.

Appendix E

Crude initial market size estimations for 2006

For simplicity only the number of foreign visitors are included. Each city has a varying proportion of business travelers to holidaymakers and domestic visitors to foreign visitors. This is not considered here; instead the assumption is made that the number of business travelers that do not wish or have time to use the mobile city exploration tour guide would be similar to the number of domestic visitors that would like to use the service. This may not hold true in reality. For a summary see Table 13.

Dublin (Ireland) – The initial market would be the Dublin city area. The market consist of:

- Tourists, predominantly families (Ch 5.1)
- That are interested in taking a bus tour of Dublin
- That have mobile devices of required standard
- That are sophisticated mobile users
- That can roam or connect to Irish wireless networks

There were 3,444,000 tourists visiting Dublin in 2003 (Failte Ireland). Assuming this figure is the same in 2006 and assuming there are three main tour bus operators in Dublin (including Dublin Bus and Irish City Tours), each with 33% market share and a passenger number of 400,000 each (per year), the potential

market is 1.2 million people in 2006. The figure is based on passenger numbers received from the Dublin Bus tour operator, which have 400,000 passengers per year.

Based on the small market research conducted (Ch 4.1) it was found that 67% of individuals in the sample was interested in the service. Assuming that the technology awareness of the segment will be lower than the research population and being conservative, it is assumed that 15% of tour bus consumers would try the service, the market size is in the order of 0,15*1.2 million = 180,000 consumers, or ~5.2% of Dublin city tourists in one year.

London (UK) – London had 11.6 million foreign visitors in 2002 (Virdee, Williams 2003). Assuming this figure is the same in 2006, and that the relationship between the number of visitors and the number of users of the service is the same as in Dublin (5.2%), the market size of London would be in the order of 603,000 consumers.

Barcelona (Spain) - Barcelona have in the order of 11 million foreign visitors per year (Istanbul Metropolitan Municipality). Assuming this figure is the same in 2006, and that the relationship between the number of visitors and the number of users of the service is the same as in Dublin (5.2%), the market size of Barcelona would be in the order of 572,000 consumers.

Rome (Italy) - Rome had in the order of 9.9 million foreign visitors in 2000 (Euro surveillance). Assuming this figure is the same in 2006, and that the relationship between the number of visitors and the number of users of the service is the same as in Dublin (5.2%), the market size of Rome would be in the order of 515,000 consumers.

Paris (France) - Paris had around 9 million foreign visitors in 2002 (About). Assuming this figure is the same in 2006, and that the relationship between the number of visitors and the number of users of the service is the same as in Dublin (5.2%), the market size of Paris would be in the order of 468,000 consumers.

Amsterdam (Netherlands) - Amsterdam have in the order of 4.6 million foreign visitors yearly (Amsterdam.nl). Assuming this figure is the same in 2006, and that the relationship between the number of visitors and the number of users of the

service is the same as in Dublin (5.2%), the market size of Amsterdam would be in the order of 239,000 consumers.

Stockholm (Sweden) - Stockholm had in the order of 2.2 million foreign visitors in 2003 (Business Arena Stockholm). Assuming this figure is the same in 2006, and that the relationship between the number of visitors and the number of users of the service is the same as in Dublin (5.2%), the market size of Stockholm would be in the order of 114,000 consumers.

City	**Foreign visitors/year**	**Market size, 5.2% (users)**	**Market size (€) at €5/transaction**	**Market size (€) at €8/transaction**
Dublin	3444000	179000	895000	1432000
London	11600000	603000	3015000	4824000
Barcelona	11000000	572000	2860000	4576000
Rome	9900000	515000	2575000	4120000
Paris	9000000	468000	2340000	3744000
Amsterdam	4600000	239000	1195000	1912000
Stockholm	2200000	114000	570000	912000
Total	51744000	2691000	13453000	21526000

Table 13. The estimated market size in 2006, of a selection of attractive European tourist destinations. Note that all figures are rounded to nearest thousand

The price of €5 per transaction was applied to show the market size when using a penetration-pricing model to break into a new market. The price of €8 per transaction was applied to show the market size when trying to extract value out of a more mature market.

Appendix F

Assumptions for network cost estimation in Dublin city:

- There are 60 main sites of interest in Dublin city
- The network shall support 20 simultaneous users per site
- The radio network shall be homogenous and support routing so as to allow service maintenance, information update etc. over the wireless network.

Items	**Number**	**Cost (€)**	**Total (€)**
802.11a access point	60	75 (Abate 2004)	4500
Storage servers	60	500/server	30000
Site rental	60	10000/year	600000
Installation	60	500/site	30000
Maintenance	1	30000/year	30000
			€694500

Table 14. WiFi network costs estimation. Operation and maintenance costs are in the order of 634500 per annum from year two.

Items	**Number**	**Cost (€)**	**Total (€)**
802.16e base station	10	10000	100000
Storage servers	10	1000/server	10000
Spectrum	1	140000	140000
Site rental	10	15000/year	150000
Installation	10	1000/site	10000
Maintenance	1	30000/year	30000
			€440000

Table 15. WiMAX network costs estimation. It was assumed that licensed spectrum was used in this calculation. Unlicensed mobile access can be used in many places, which removes the spectrum cost of €140000 for a similar calculation. Operation and maintenance costs are in the order of €180000 per annum from year two.