Title	First life location-based services developing a business concept for seamless positioning systems : Design of seamless positioning platform
Sub Title	
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Abstract	As GPS embedded smart phones are becoming increasingly available, many location-based services are penetrating the market. Furthermore, the ubiquitous nature of social networks is allowing for a collective power to transform the way we make decisions. Their combination in the form of Mobile Location Based Social Network Services is, not surprisingly, proving to be the new killer business that combines both physical and virtual spaces in a real-time user environment. In this report, we dive into this market to identify the role that a service based on a seamless indoor and outdoor positioning technology called IMES (Indoor Messaging System) could play in this market. What we find is that the value of accurate indoor positioning technology lies not just in the extension of existing services to an indoor environment, but it also allows one to attain categorically different information from the behavioral patterns of people. Having information on both indoor and outdoor location makes it possible to build a mapping and profile of someone's lifestyle. Creating the possibility to provide people with more personalized information both in a non-commercial and commercial fashion. We therefore present the business concept of the 'first', lifestyle enhancing, location-based social network service. Having performed research on the market of location-based services, (growing at 50% year-over-year, to a worth of $13.4 Billion in 2014 worldwide and $1.7 Billion in just Japan, that's a 142 Billion Japanese Yen) analyzed the opportunities within this market, (competitors are quickly entering and while not much can be said about their staying power they have yet to find the power of seamless indoor-outdoor positioning systems) found untapped market trends, (consumers want personalized information, to be aware of their choices and be able to make better choices, but cannot yet by most location-based services... we designed the business concept.) and calculated net present value in a profitability study, (showing a profitable base case for development and implementation of our business concept) we arrived at the following recommendation. Dive even deeper into this emerging market of (mobile) location-based services and by the use of the methods presented throughout this report finalize this concept to an implementation ready business plan. Because where technology meets opportunity in an exponentially growing market, opportunities should not be left in vain.
Notes	Student final reports Group 13
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Group 13

Group 13's Theme Proposed by GNSS Technologies Inc.

Theme 2:
ALPS "safety and security" theme title: Design of Seamless Positioning Platform

Proposer Organization's name : GNSS Technologies Inc.
Supporter Name and contact info: Makoto Ishii＜ishii@gnss.co.jp＞www.gnss.co.jp

Abstract of your project theme:

【Background】
・GPS has become standard device for mobile phones
Number of GPS-enabled mobile phones has been increasing(up to 60M units), driven by E-911 in the U.S. and the similar legislation for emergency calls in Japan.
Also, GPS is becoming standard device for mobile PC, consumer electronics(CE).
・Rapid growth of **LBS**(Location-based Services), **LBA**(Location-based Advertising) market
・Joint development of indoor GPS =IMES with JAXA(**IMES**, **I**ndoor **ME**ssaging **S**ystem, is a small transmitter which enable indoor positioning by transmitting GPS-like signal. LSI is under development for the realization of low cost and downsizing.).

【The Issue of IMES-based Position for Safety & Security Applications】
・Guarantee of position information to be used in emergency calls(110, 119)
・Security of position related information(public position information, private position information, etc.)

【Expected Theme for ALPS】
IMES is unique indoor positioning technology invented in Japan and we must develop it to become a social infrastructure for location related services. For this purpose, system design as platform is important. System design includes wide range of consideration in terms of cooperation with government organization for emergency calls, development of business model to promote the installation into various facilities, cooperation with LBS and LBA service providers, standardization of transmission messages, safety and security assurance.

【Target – Example of Application Services】
・**Large shopping malls**- service to allow safety shopping with children, digital signage, etc.
・**Large terminals such as stations and airport** – appropriate information and guiding services based on his destination even for first visitors

Fig. 1:Indoor Positioning Platform

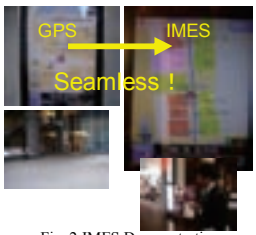

Fig. 2:IMES Demonstration From Outdoor to Indoor

ALPS Final Report 2010

Group 13

PROJECT TITLE:
“First Life Location-Based Services
Developing a business concept for seamless positioning systems”

Theme:

“Design of Seamless Positioning Platform”

Proposer Organization: GNSS Technologies Inc.

Proposer Organization’s Supporter: Makoto Ishii

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ALPS FINAL REPORT 2010
TEAM 13

FirstLife Location-Based Services

Developing a business concept for seamless positioning systems

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Executive Summary

As GPS embedded smart phones are becoming increasingly available, many location-based services are penetrating the market. Furthermore, the ubiquitous nature of social networks is allowing for a collective power to transform the way we make decisions. Their combination in the form of Mobile Location Based Social Network Services is, not surprisingly, proving to be the new killer business that combines both physical and virtual spaces in a real-time user environment.
In this report, we dive into this market to identify the role that a service based on a seamless indoor and outdoor positioning technology called IMES (Indoor Messaging System) could play in this market. What we find is that the value of accurate indoor positioning technology lies not just in the extension of existing services to an indoor environment, but it also allows one to attain categorically different information from the behavioral patterns of people. Having information on both indoor *and* outdoor location makes it possible to build a mapping and profile of someone's *lifestyle*. Creating the possibility to provide people with more personalized information both in a non-commercial and commercial fashion.

We therefore present the business concept of the 'first', lifestyle enhancing, location-based social network service.

Having performed research on the market of location-based services,
(growing at 50% year-over-year, to a worth of $13.4 Billion in 2014 worldwide and $1.7 Billion in just Japan, that's a 142 Billion Japanese Yen)

analyzed the opportunities within this market,
(competitors are quickly entering and while not much can be said about their staying power they have yet to find the power of seamless indoor-outdoor positioning systems)

found untapped market trends,
(consumers want personalized information, to be aware of their choices and be able to make better choices, but cannot yet by most location-based services… we designed the business concept.)

and calculated net present value in a profitability study,
(showing a profitable base case for development and implementation of our business concept)

we arrived at the following recommendation.

Dive even deeper into this emerging market of (mobile) location-based services and by the use of the methods presented throughout this report finalize this concept to an implementation ready business plan. Because where technology meets opportunity in an exponentially growing market, opportunities should not be left in vain.

Contents

List of tables

List of Figures

Project Introduction

This report is written as part of the ALPS Design Project of Keio University Graduate School of System Design and Management.
This project utilizes a systems design approach to develop or propose a system in collaboration with a sponsor. Various systems design methods are used to aid and guide the design process and will be presented throughout this report.

For the sponsor of this project, GNSS Technologies, the goal and mission of the project are set using a simple To-By-Using structure. From the initial project description the high level goal is set as,

To:
Promote the installation of IMES into various facilities.
By:
Proposing and developing a business concept and model.
Using:
The ALPS system design methods.

Investor pages

Introduction

The current document aims to make a convincing case for the business opportunity existing in the mobile location-based social network services market. To achieve this, the Investor Pages are divided into three main sections.

The first section, *Opportunity Identification*, describes the process of identifying a business opportunity, the formulation of a problem statement surrounding this opportunity and what, in broad terms, is being proposed to efficiently respond to this problem. Specifically, we identify an opportunity within the Location-Based Social Network Service market that specifically combines GNSS technology with current market trends.

The second section, *System Characterization*, operationalizes the business opportunity by giving a detailed account of the interaction between our product characteristics and the stakeholders involved. Product Specifications are elaborated using a wide variety of tools. Specifically, we set out to design a web-based social network service that facilitates users in the making of better lifestyle decisions and allows for clients (retailers) to optimize their marketing efficiency.

The third section, *System Validation*, critically reflects upon the feasibility of our system in terms of relevant business criteria. Specifically, we believe a lucrative business opportunity exists given sufficient upfront investments are available to cover a range of specific hurdles in product development and implementation.

After a system is validated and implementation is commenced, the fourth phase of *System Implementation* sets in. Although the question whether the system is validated and to be implemented is still open, it is important to understand how the different steps within this phase might feed back to the things we do here. The Figure below, a so-called Design or Dependence Structure Matrix, identifies some of the key interrelationships between the different project steps. The key information to take home from this figure is that, much of the steps we treat in the current writing (Opportunity Identification, System Characterization and System Validation) carry significant risks due to their unpredictable dependence on collective user experience. This is related to the dependence of our product on social networks and novel forms of interaction.

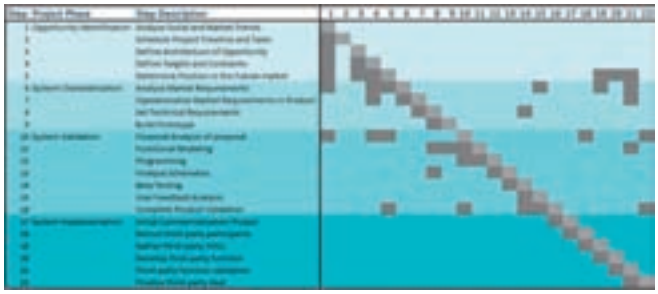


Figure 1 Dependence Structure Matrix

Opportunity Identification

GNSS Technologies, together with the Japanese Aerospace Exploration Agency (JAXA) developed the Indoor Messaging System (IMES). This novel technology allows for seamlessly determining location coordinates of a GPS-receiver equipped device, also in indoor environments. While it can facilitate many areas of application, such as emergency rescue, indoor navigation, location targeted advertising, billing and entertainment, a viable business model is needed to promote the adoption of the IMES technology into the market.

Technology by itself never attracts customers unless there is a fit between technical function and customer benefit [1]. Earlier research into potentially viable business models for IMES technology [2] identified the commercial Locations Based Services (LBS) market of malls and department stores in a business to business model to be highly attractive. This report builds on those conclusions and proposes a business concept to bridge the gap between technical function and customer benefit.

To be able to understand the problem space in which GNSS operates and tries to promote its IMES technology, a context map of the problem space was created that identified the main stakeholder and the potential markets in which GNSS competes. This context map can be observed in figure 1.

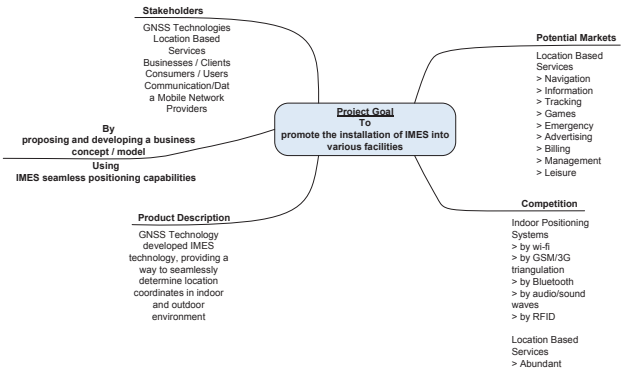


Figure 2 Context Map: Problem Space

The entities in the context map of problem space do not make clear which opportunities are available as it is of a primary static nature. The relevant markets, being those of indoor positioning systems and of (mobile) location based services are subsequently researched in a context map of opportunities which elaborates upon the more dynamic factors that are relevant in the current context. The context map of opportunities contains many factors, from societal changes and market trends to core competencies that together form the opportunity landscape and can be seen in figure 2.

Most of the factors are analyzed using ALPS methods which are first individually described below, after which their results are synthesized in a discussion of the final opportunity space to which the system in the next chapter is designed.

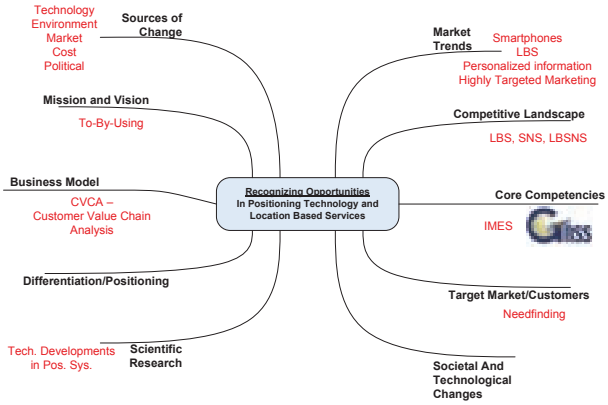


Figure 3 Context Map: Opportunities

Societal and Technological Changes

Societal and Technological changes are not specific to the context of positioning systems and location based services, but identifies the potentially global trends existing on a cultural and technological level. These can be analyzed with respect to their effects and relevance on the current market.

Starting at the higher level, societal changes of importance in the last decades have come from various sources such as technology-driven globalization [3][4]. Leading manufacturers and producer to reach economies of scale (facilitated by mass-manufacturing) and consumers to be much more aware of what is available to them in different marketplaces (stimulated by the growth of the internet). Arguably to this, a culture of discounts [3] sustained by low wages and mass-manufacturing, and choice overload [5] have emerged.

Another important source for societal change has been the global climate and environmental change and people's awareness of it [6]. It is changing an increasing number of consumers and manufacturers perceptions of value beyond that of cost-driven models and increasing the awareness of the pollution-footprints on our world.

Placing societal change and technological change into the context of positioning systems and location based services a few notable changes are emergent. One being the diffusion of the mobile phone and more recently the Smartphone with embedded GPS-receiver modules into society [7][8]. Another is the penetration of internet and its diffusion from local static lines into mobile availability. More and more people have access to the internet, through their mobile phone, anywhere they go, anytime.

Market Trends

Market trends are emerging as a result of societal and technological changes. In the context of location based services the diffusion of the smartphone can be seen as the catalyst to which mobile location based (social networking) services rapidly emerge. And while there is no firmly established player in these markets yet (further analysis in the competitive analysis) the market outlook [9] [10] for 2014 is:

- Global mLBS market 2014 $13.4 Billion
- Combined Avg. Growth Rate of 51.3%

- Japan is biggest market in Asia-Pacific
- Japanese mLBS market 2014 $1.71 Billion
- Combined Avg. Growth Rate of 42.5%

Market trends are also emerging from the higher level societal and technological changes. Global climate and environmental change awareness have led to the growth of many market segments, such as that of low-emission vehicles, green energy and, combined with the argument of societal change against discount culture and choice overload, to increased interest for personalized and customized information and products (i.e. mass-customization, personalized advertising, self-awareness) and the heritage of products (i.e. fair-trade, organic products, etc.). Also in Location-based services [11].

Differentiation within the Competitive landscape

In order to determine the relationship between opportunity and product or service characteristics, the competitive landscape must be clearly mapped out. Existing and future expected trends within this competitive landscape will determine how opportunities are expected to arise.

Location-based services (LBS) are seen as one of the most promising business areas subsequent to SMS (Short Messaging Service), with huge market share and profit margin prospects. Social Networking Services (SNS) refers to the internet application service aimed at assisting people in establishing social connections.

A new type of service, going by the name of Location-based Social Networking Service (LBSNS), is build upon the integration of a LBS and SNS. Through information on, and the combination of, time series, behavioral trace and geographical location, a LBSNS helps the user to establish wider and closer relationship with the outside world. More specifically, by acknowledging and intensifying the relevance between personal life, social networking and geographical proximity, huge potential is created for highly tailored service and recommendation platforms.

Through the use of check-in records and behavioral responses in different geographical positions, users can layer a virtual environment with different forms of self-expression, as well as interact with other players in (secured) parts of virtual space. For example, LBSNS users can generate a relationship with business activities of local enterprises, enabling the local enterprises to further clarify the scope of target consumers and improve the correlation degree and accuracy of advertising services so as to raise the value of their marketing campaigns.

Location-based Services takes off relatively early with the well-known LBS and LBSNS providers including:

Foursquare (www.foursquare.com),
Loopt (www.loopt.com),
Shopkick (www.shopkick.com),
GyPSii (www.gypsii.com),
MobiLuck (www.mobiluck.com),
Brightkite (www.brightkite.com),
Gowalla (www.gowalla.com), Yelp (www.yelp.com)

and still welcomes many new entrants such as

Aka-aki (www.aka-aki.com),
Where (www.where.com),
Google's *HotPot* (www.google.com/hotpot)
and Rummble (www.rummble.com).

Of these, Foursquare and Brightkite currently boast higher market shares. Additionally Twitter, Facebook, Apple, AT&T and other traditional SNS websites, leading internet firms, terminal manufacturers and telecom operators are all potential entrants of the LBSNS market.

The trends within LBS and LBSNS show some variation but are dominated by certain common threads and themes. *Foursquare* provides users with a virtual 'social city guide' and a 'friend-finder', to facilitate personal discovery as well as commercial benefits related to movement and purchasing behavior. *Shopkick* provides users with a virtual shopping experience that extracts value through its influence on individual and social commercial activity. *Gowalla*, on the other hand, is not founded upon commercial benefits, and utilized virtual environments to facilitate tailored socialization. Other location-based services, like Google's *HotPot* and Twitters' *Where* combine individual ratings of taste and opinion to facilitate customized advice on where to go with 'smarter recommendations'.

There are currently three major modes of LBSNS, i.e. Mobile Client, Web Client and SMS. Most LBSNS providers have supplied a Client mode for each mainstream smart phone platform, among which, iOS and Android turn out to be the preferred Smartphone platforms.

Many LBSNS have introduced game elements and shaped corresponding competition and incentive mechanisms so as to increase the interactivity of C2C and C2B as well as the degree of consumer activity and viscosity. This has improved the popularity and advertisement marketing value indirectly and favored the positive circulation of the business ecosystem. Even though the local advertising market of LBSNS possesses fine development outlook, the entire market is in a period of cultivation.

In general terms, the competitive landscape within LBSNS builds upon the personalization and socialization of interests and activities, often in combination with commercial agents.

Integrating the societal trends with the technological potential currently utilized in the LBSNS market, we have asked ourselves the question to what extent LBSNSs can and do help people make *better* choices. This involves an operationalised definition of *better* as well as a way to utilize the information on, and the combination of, time series, behavioral trace and geographical location with other external inputs and those from other users to improve user decision making. The current market trends show that people are becoming more aware of the fact that their behavior, especially their purchasing decisions, has an effect on other people and other environments. Formulating a working definition of *better* around such societal concepts, there is a need to bridge the decisions of users to their effects on these concepts.

We believe this can be achieved through clever algorithms that capture a users' lifestyle using both information from

indoor and outdoor activities. This deviates from current LBSNS due to its focus on making better choices, as opposed to the pure facilitation of purchasing choices in connection with local commercial space, or the meeting of friends that are close-by. By having specific indoor location-based positioning technology, lifestyle algorithms can make full advantage of both indoor and outdoor user location, getting a more reliable and unique picture of a users' behavior, desires and intentions. By combining the user benefits in facilitating the making of better choices and the client (retail sector) benefits of having more efficient marketing capabilities, consolidates into an opportunity and differentiating market opportunity.

Target Market / Customer

From looking at the market trend of a growing LBSNS market, the ongoing societal changes leading people to want more personalized information and more awareness of their doing and how it influences their environment, and the current availability of LBSNS we established that an opportunity exists for designing a new service. This service would utilize the IMES technology and combined with lifestyle algorithms create the picture of a users behavior, desires and intentions, As described in the previous paragraph. This information would be highly personalized and valuable to both the user and businesses intended on using lifestyle targeted marketing campaigns.

Before being able to further specify this, the activity of 'Needfinding' is undertaken to put the identified opportunity into context and allow for further elaboration of potential stakeholder interaction.

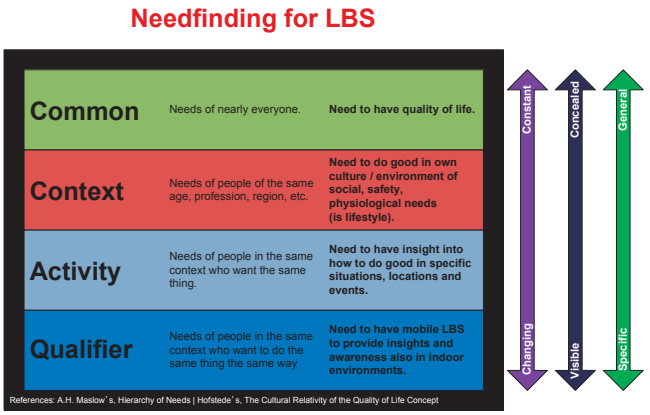


Figure 4 Needfinding for LBS

The Needfinding method places the identified "need to have insight into how to do *good* or achiever *better* in specific situations, locations and events" into the Activity box. This Activity is put into a Context and Common Need as a rationale for *Why* the need exists. The highest Common Need being: The Need to have quality of life. The Qualifier to which the Need belongs can be seen as a *How* and serves as a justification for the use of IMES technology being: The Need to have mobile LBS to provide insights and awareness, also in indoor environments.

Mission and Vision

Before constructing a business model around the current economic opportunity, it is vital to understand the strategic role that GNSS would play in such a market. Previous analysis makes clear that the LBS provider would facilitate and direct information flows to and between users as well as between users and businesses upon a common interactive platform. The core incentives of participation and interaction that direct these parties should be efficiently accounted for by the platform. These functional requirements are broadly made explicit within the so-called *To-by-Using* framework as is displayed in the figure.

For Consumers	**For Businesses**
To: Help users make better choices and improve their lifestyle. **By:** Providing a mobile platform on which user behavior is mapped to lifestyles. **Using:** Location information, User inputs, Independent Sources and Company inputs.	**To:** Help businesses create more awareness and better communicate the value of their products or services. **By:** Providing a mobile platform on which clients can reach their customers. **Using:** The lifestyle maps that relate to customer needs and the values they treasure.

Figure 5 System Requirements with respect to core stakeholders

We find that both users and business operate upon a common platform but have different incentives to do so, requiring a different input structure and overall system interface design. The mapping from choice to welfare on the consumer side will not always be in the best interest of the business and vice versa. Sustainable platform functionality will depend on both parties having a continued positive experience with the system. The construction of a continued mutually beneficial incentive structure is not just a matter of how information is transformed into knowledge or transmitted from one party to another, it also depends on the relationship between the amount of users, the market share they represent and the timing of system implementation.

Both pull and push factors are at play. For the users, key benefits are channeled through the benefits of personal insight in combination with smart recommendations. For the business, key benefits rely on the net positive reward in terms of additional marketing capabilities. If a sufficient amount of market is represented by customers or potential customers that have adopted the system, push factors come into play that force adoption on both sides. In short, the success of the current system will depend on the precise business model that is adopted and if the system implementation within such a model allows for a continued mutually beneficial incentive structure for both users and businesses.

Before turning to the discussion of appropriate business models, it will be important to understand the precise role GNSS could play in this as a result of its key competencies in the field.

Core Competencies

GNSS is a technology provider that has the opportunity to vertically integrate within a niche market relating to a location-based social network service. As a technology provider of positioning systems and more specifically, indoor-position hardware, benefits could be obtained from both selling or licensing the hardware to existing LBSNS providers or operating within the market itself. Due to the fact that the current economic leverage on additional benefits from indoor positioning technology does not yet

exist in the current LBSNS market, much risk is involved in the licensing of the hardware.

Lack of a current existing user-base for combined indoor-outdoor positioning, carries the risk of an under pricing of the sale of technology. By helping construct such a user-base within the market itself, significant economic leverage could be achieved through the technological without risking the loss of economic potential. Based on the key asset owned by GNSS, we therefore adopt a business model around a market penetration strategy. This model will be discussed next.

Business Model

In order to identify the possible business model forms that can be designed around the business opportunity, a Customer Value Chain Analysis is made on the basis of previous insights. It shows how money and information flows run in the business model of a location-based service. From the analysis can be seen that while GNSS holds an important informative role from owning the IMES hardware and software, in that role it will only be able to generate revenue from external LBS provider(s).

The LBS providers directs most money flows, and as stated earlier this market has not yet developed services that make thorough use of indoor positioning and can thus hardly create enough economic leverage for GNSS to sell or license its IMES-technology to without the risk of under pricing the technology. While on the other hand the mobile location-based services market is growing rapidly and is forecasted to do so at a high rate.

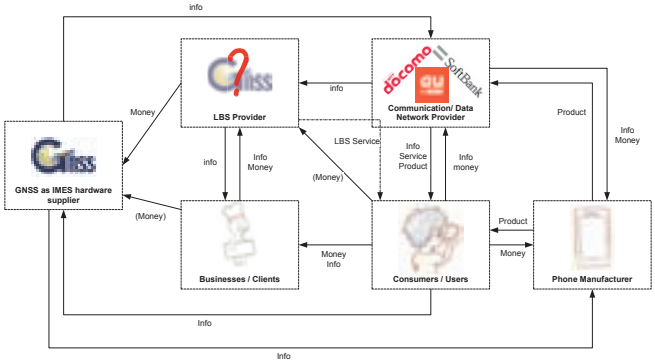


Figure 6 Customer Value Chain Analyses

It is therefore that we suggest for GNSS to become a LBS provider, using a market penetration strategy that links a powerful LBS platform to a powerful technology, IMES.

This LBS platform will provide for the fit between technical function and customer benefit. By the opportunity identified in the previous paragraphs this platform will create benefit to both consumers and businesses and take into account the competitive LBS and LBSNS platforms by playing to emerging market trends of increased awareness of environmental change and the choices we make.

We propose that while making choices in a society that overflows with products and services and thus overflows with choices to be made, the system that we characterize in the next chapter will help people make *better* choices.

System Characterization

The current section aims to operationalize the business opportunity by giving a detailed account of the interaction between our service and system characteristics with respect to the stakeholders involved with the aim of identifying the key characteristics of success that are to be adopted and used in the next section where the system will be validated in feasibility.

Robust Concept Development

In designing a system, the choices made in the early stages of development have a large impact on any of the choices that are made at later stages to adjust the system. To make the system *robust* to desired or forced changes that occur later on in development or use, it is important to consider this in designing a concept. The tool 'Robust Concept Design' is used to achieve this end. The concept of robustness can be defined as 'the quality to withstand stresses, pressures, or changes in procedure or circumstance. A system may be said to be "robust" if it is capable of coping well with variations (sometimes unpredictable variations) in its operating environment with minimal damage, alteration or loss of functionality.' These variations in its operating environment exert influence on the system through the mechanism of *interaction*. In order to develop our product in a robust fashion, a system definition must be chosen in such a manner that all relevant forms of interaction are taken into account and may be *accounted for*. After defining a broad system definition, we identify different causes of operational variation that might be relevant in relationship to the current system. We adopt the following system definition:

System Definition
A mobile software platform that enables the utilization of indoor positioning technology to facilitate the distribution of location-based services to users, in the form of lifestyle self-awareness and recommendation architecture, and to clients, in the form of facilitated and improved channels to communicate product awareness and product value

Table 1 System Definition

Several dimensions of operational variation can be identified. On the 'production side' of our product, the platform architecture of our software is of great importance in the robustness of our product with respect to the ease of absorbing product improvement and technological change. The opportunity costs of choosing the wrong initial platform architecture are immense due to the path-dependence of any future software development. Furthermore, unexpected internal and external software errors can arise and robust software development requires sufficient redundancy and an appropriate granularity in the program. Assuring robustness with respect to these two variational factors involves an analysis and comparison of different platforms and future platform utilization forecasts after which redundant and granular programming development should take place upon it, if no platform independence can be achieved.

On the 'demand side' we find variation in terms of the users that may operate the system. Users show variation in terms of their ability and motivation or interest to use the software. It is important to analyze the market characteristics so as to accommodate this variation within the software. This may be achieved by applying tools that analyze user needs and abilities so as to define an appropriate market segment and spatial-temporal environment on which to focus our software. Lastly, the competitive environment is a source of variation that has influence on the robustness of our product. Competition can come from both supply and demand sides within the value chain (Expanding Social Networking Sites or Location-based Services) and the industry itself can change by redefining the dimensions of competition itself. Employing an extensive industry analysis would help formulate the key dimensions along which the industry will develop in the nearby future. The table below shows these key sources of variation and explains their influence on the required system characteristics or on processes by which it must be constructed.

Dimension of Operational Variation	Interaction Mechanism	System Characteristics	Analytical Tools
Context of Software Code Execution	Unexpected Errors in Software due to internal and external problems that may result in total system malfunction	Build Sufficient Redudancy and Appropriate Granularity into the Software. Build up the platform in borad modular fashion	Use Robust Software Development Techniques
Platform Architecture	Operating System Compatibility and Phone Type Variation	Our software must be platform independent as much as possible or be adapted for the most widespread platform and be compatible with most phone types and displays	Market Analysis and Platform Forecasting (QFD, Variety VOC, etc.)
User Interest / Motivation	Intention of User to use software might vary considerably	Effective choice-welfare mappings of user time, location and intention and the solution space proposed by the software. The software must, at the same time, be customized To the user as much as possible	User Needs Analysis (Market Segmentation / Spatial-Temporal Variation)
User Ability	Ability of User to operate such software might vary considerably	User-friendly Interface and error-proof operating environment	User Ability Analysis (According to Market) and Error-proofing techniques (FMEA, etc.)
Competitive Environment	Competition within value chain and potential Industry Development	Our software must continuously define its unique selling point within the location-based indoor commerce market	Industry Analysis (SWOT, etc.)

Table 2 Robust Concept Design

We find that minimum system requirements include the use of robust software development techniques so as to assure sufficient system redundancy, clear insights into the platforms that users adopt to facilitate mobile communication, deep insights into the variety of system utilization by all stakeholders so as to account for these differences upon a single platform, user-friendly user interfaces for both users and clients to facilitate operative use and a focus on market segments that allow for clear product differentiation.

Use Case Analysis

As has been identified above, one of the key concerns that are to be tackled up front is related to the variety of ways users will interact with the system. This is strongly related to the interest and motives that drive people to use the system. In order to understand the functional requirements of the system that this variety makes pertinent, it is insightful to understand how different users (the 'who') would want to interact with the system to extract the most value out of it (the 'what'). Such a mapping can be achieved through a so-called 'Use Case Analysis', serving to capture the system's behavioral requirements by detailing scenario driven threads through the system.

The first step towards in a use-case analysis involves identified the scenarios that lead a user to interact, or want to interact, with the system. To identify these scenarios we

have distinguished the activities of users at any one moment in time according to certain characteristics of the good or activity that is performed. We distinguish between the dependency of product utility (or value) in terms of social presence (is the presence of other people required to get utility from the good or activity?) and its duration (to what extent is product utility stretched out over time?). The market differentiation of goods and activities thus attained can be observed in the figure below.

Types of Goods and Activities			
Main Types of Goods and Activities		Social Dependance of Utility	
		Local Physical Presence	Non-Local Physical Presence
Duration of Good or Activity Utility	Short term consuption	• Consumption in Bars, Café' s Restaurants • Local Social and Collaborative Activities	• Non-Social Retail such as FMCG • Online Social and Collaborative Activities
	Long term Consumption	• Offline Social Relationships • Luxury Goods • Fashion Goods	• Online Social Relationships • Electronics • Furniture

Table 3 Initial Product Context Identification

The benefit of using this form of market differentiation is that you include not only products or goods in commercial space, but maintain a clear user-centered focus that captures a broader spectrum of platform use. This allows for a more realistic scenario description. User and client operations on the platform are driven by the combination of the market in which the client operates as well as the ways in which users make decisions with respect to these kinds of goods. The benefits and tool requirements within these spaces are identified for both platform operators in the figures below.

Within the product group that depends on the physical presence of others and is consumed within a short time period, users might be looking for their friends, or their potential friends, present in a near bar that is suitable according to some criteria. He might be tempted by information (simply opening hours, type of place, the events taking place or the number of people inside) or some economical incentives (price levels, coupon capabilities, collective buying possibilities) as well as the social opportunities (what kind of people are inside somewhere). For products that are consumed over longer time periods (like furniture or electronics) and do not depend on the presence of other people (vacuum cleaning can be done alone) different shopping behavior and information channeling is appropriate. Information should be more content-based and less frequent in view of preventing large gaps in the usability of the system by facilitating information streams that are not asked for.

Before constructing the use case scenarios, the different operators are first treated separately. The desired tools related to the user side are captures in Figure 9, while the desired tools for the client side are captured in figure 10.

From Activities to Tools			
The Benefits of Valaware to Users			
Main Types of Tools		Social Dependance of Utility	
		Local Physical Presence	Non-Local Physical Presence
Duration of Good or Activity Utility	Short term consuption	Tools to find the right Products Locally and Quickly Tools to find the right People Locally and Quickly	Tools to find the right Products Tools to find the right People
	Long term Consumption	Tools to find the right Products Tools to find the right People	Tools to find the right Products Tools to find the right People

Table 4 System requirements for user based on types of activity

The Benefits of Valaware to Companies			
Main Types of Tools		Social Dependance of Utility	
		Local Physical Presence	Non-Local Physical Presence
Duration of Good or Activity Utility	Short term consuption	Tools to communicate product awareness and quality quicjly and efficientlyto both individuals and groups	Tools to communicate product awareness and quality quickly and efficiently
	Long term Consumption	Tools to communicate product or service awareness and quality to individuals	Tools to find the right Products Tools to find the right People

Table 5 System requirements for client based on types of activity

The key thing to conclude form the differences in benefits attained by the different platform users (users and companies), is that they can lead to friction. Where a user requires input that is highly tailored, not too detailed or extensive and highly related to a social base, a company might provide information about itself that is not directly related to that desired. In order to prevent these frictions from entering the system, different scenarios have been identified which can be observed in Figure 11 below.

The four blocks within the above diagram each correspond to a specific use case scenario. The top left block (Social and of short duration) has been termed *hyena forum* as it is a social and fast-moving environment driving platform interaction.

Below this block (Social and of long duration), we find the *value cluster* which is connected to product that are longer lasting and require a more elaborate content-based decision making process that the platform should facilitate. In the top-right we find *Solitude Highway* (Non-Social and of Short Duration), which is quick and highly tailored non-socially grounded decision-making and below that in the bottom left we find *Turtle Alley* (Non-Social and of Long-Duration) we have those products that require high comparative, content-based information streams that have little temporal pressure.

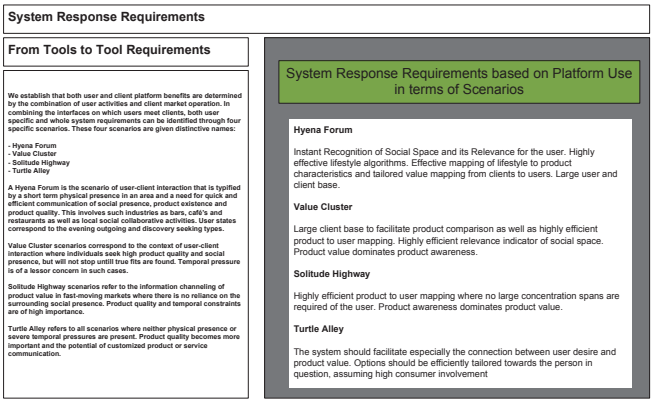


Table 6 System Requirements based on Scenario Types

Quality Function Deployment I

In order to transform the previously identified user demands into design quality, functions and methods that allow for the attainment of this quality have to be identified after which subsystems and component system parts can be chosen. The method to attain this insight goes by the name of QFD (Quality Function Deployment). QFD analysis gives general performance meter of final solution according to voices of customers (VOCs). QFD tools helps to setup engineering metrics and provides relative weights among final solution elements.-This can later be integrated to cost worth analysis.

The voices of customers (VOCs) are towards the users instead of the shop owners. The list of VOCs is shown below. Combining our personal experience with unpublished interviews in the context of the different contexts described above, we can operationalize the main system functions. In order to optimize user benefits we maximize output and minimize input factors. The resulting list of metrics can be observed below.

Input Factors to minimize

- effort / amount of inputs
- Privacy concerns
- Access time

Output factors to maximize

- Positioning Accuracy
- Product benefit
- Social benefit
- Individual / Lifestyle Benefit
- Sharability

These factors are sufficiently generic to be applicable to the variety of contexts and scenarios that were identified in the use casa analysis. Most of the voices are focused on personal benefit and ease of use. However, privacy and sharable might be contradicting to each other. To satisfy both needs of the customers, we decided to have anonymous member recommendation system, where the recommendation that is given to the customer is provided by another anonymous member who has similar entity.

The engineering metrics for the final solution is set as followings. (Parenthesis includes target goal)

- Amount of user input (less than 3)
- Networks between members (more than 10)
- Position Accuracy (3m)
- API adoptability (able to integrate third party APIs)
- User Interface Test (satisfy)
- Customer analysis accuracy (more than 60%)
- Product match accuracy (more than 75%)

Amount of user input is a critical for mobile web services. Users are easily distracted by surroundings, therefore, has difficulty to focus on tiny device operations. - conciseness is the key. Also, whole operation should make user feel the service is integrated to the life style. The user input is determined by user's intentions to do certain operation, but for this metrics, operation until data collection mode is regarded only.

The concept of operation is to collected data during any mode of operation. For example, as soon as user executes the operation, the application will show the map and seamlessly log the location of current place. Only few iteration will be required for user to see the result of the analysis. Network between members are targeted to be around ten links per user. This includes both registering friends by user and by our recommendation. We assume the ratio should be 7 to 3, where 3 represent anonymous members. Friends link created by user input should give general hint to identify the user's characteristic, where recommended anonymous member is more towards giving productive information to the user. Position accuracy has a relatively high target goal. This is due to spatial limitation of indoor environment. GNSS will have significant advantage over this metrics since they have exclusive rights to use IMES technology. API adoptability represents flexibility of the system. The system is more flexible when it is able to integrate with third party systems, allowing them to exchange information and share partial members. User Interface Test is more of a psychological factor. The user should feel easy using the system, almost to the point where they understand it instantly. Since, our system is focused on only recommendation for now, we assume the process will be very simple to operate. Customer analysis accuracy is probably the most important factor of your system. The input data are limited to location data, friends data, and minimal user input. However, some advantages are being assumed for our system compared to other social network service which mainly uses friends data to identify user entity.

Table 7 QFD I

The result of the QFD 1 table shows that increasing product match accuracy give the best result to satisfy the customers. (24%) This implies that users feel more needs of the service when there is tangible benefit given towards them. The second highest weight is positional accuracy and customer analysis accuracy. Positional accuracy stands out when compared to other competitors due to possession of IMES technology. Emphasizing this ability will likely impress customers with unique experience. As for customer analysis accuracy, the fact that customers value their personal information and lifestyle tracking is being reflected. The lowest weight was third-party API adoptability. The result suggests that making stand alone network makes not too much of difference than exchanging data with third-party in point of view of customers.

Morphological Diagram (Engineering Metric vs. Solutions)

Morphological diagram allows the developer to consider multiple alternative solutions and verify combinations between solutions. However, it does not necessarily provide best solution to the developer. The best solution will be decided after iteration of QFD II.
This version of morphological diagram is modified to suit our service. First the solution is limited to two path. Considering that the platform is limited to mobile phones, the only possible development is done through either OS specific application or web-based application. Other modifications are listed as followings.

- Each selection (shapes) is categorized by size (L/M/S)
- Large – High Impact
- Medium – Normal Impact
- Small – Negative Impact

Small shapes are only shown when there is same solution in other engineering metrics with medium or large shapes
Same (or highly correlated) solutions are grouped by numbers inside parenthesis
Solutions might not be marked although feasible due to smaller impact than other solutions with multiple engineering metrics combined

Some key insight of results are web-based applications might give lesser user interface test score due to more iterations to get transaction data through QR-code. Unless the browser features integrated camera operations, users needs to launch separate camera application to scan the QR-code. Another insight is Rating system. Rating system can give good data for increasing analysis accuracy. However, the uncertainty of contribution level towards accuracy and negative impact for amount of user input puts the solution in jeopardy. We decided to apply this system after gathering certain amount of user base.
Using this Morphological diagram result, we mapped the solution lists for QFD II by categorizing some of the key solutions. Using this Morphological diagram result, we mapped the solution lists for QFD II by categorizing some of the key solutions. The key solutions will be explained in next chapter. (QFD II section)

Figure 7 Morphological Diagram (Modified)

Quality Function Deployment II

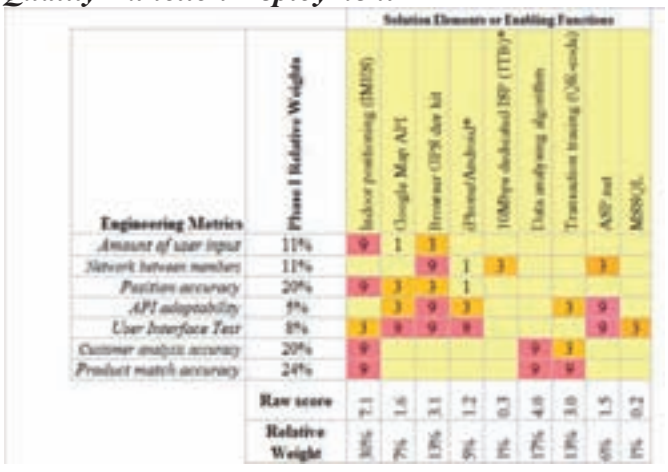


Table 8 QFD II

The solution elements are selected as followings

- Indoor positioning (IMES)
- Google Map API
- Browser GPS dev kit
- iPhone/Android*
- 10Mbps dedicated ISP (1TB)**
- Data analyzing algorithm
- Transaction tracking (QR-code)

* cost of Apple yearly iPhone Dev kit license fee + estimated development cost according to IndiaNIC outsource quote. ($100 / 12 month + $5000)
** Dedicated web hosting service by iweb.com (Celeron D 2.66 1TB Windows server)

The selections are chosen by following reasons. Google Map API is a freeware with the most geological information and has great amount of flexibility in terms of adaptation compared to other GIS APIs. Some features such as imbedding customized marker and customized interaction with users makes a great choice for the solution element.

Browser GPS dev kit element and iPhone/Android element has some overlapping function between them. When using web-based application, Browser GPS dev kit is necessary, which requires iPhone or Android based smart phones. The integrated browser (Safari, Android browser) has a feature to access GPS hardware through Javascript code. Since Javascipt is executable XHTML, ease of programming and distribution among users will allow cheaper cost compared to building OS specified application. Alternative of making iPhone/Android OS specified application will neglect browser GPS dev kit solution element. The pros of building OS specified application is that operation process is smoother and more optimized towards the hardware. The cons of this is that each OS needs to have customized application, therefore, will require at least twice more developing cost.

Assuming the user pool will be small due to localization of usage, we decided 10Mbps dedicated server is a good option. The accumulation of data will grow in a fast pace due to frequent logging per user. As the user pool grows, the traffic should be larger (around 100Mbps) and so as the storage.

Data analysis algorithm is one of the most essential element of the solution. This will determine the accuracy of the user categorization/identification as well as product match. Some key factor that affects the optimal algorithm is the accuracy of positioning and amount of user's location data. However, at the start up, the insufficient user's location data makes it impossible to find a concrete algorithm. Also, this new concept of indoor location based-service makes it worse to get a general idea of what the algorithm will look like. Therefore, in cost-worth tool, this element will be flexible in terms of cutting or rasing the cost.

Transaction tracking uses QR code for some reasons. First, the QR code is license free. Second, QR code is the simplest input of data which has multiple data/queries. Third, QR can be modified for single user and can be made exclusive, preventing from redundant usage. Some detailed solution to use this is to embed QR code on the receipt or use it at partial deal structure. Embedding on the receipt requires no complicated financial model but requires user's motivation to participate. In the other hand, deal structure (coupon type) give better motivation for the user to log the transaction, but requires somewhat complicated financial model so the shops will not lose money from discounts.
ASP.net and MSSQL is a server-side language that is needed to keep record of the users and filter out necessary data. This solution element has no flexibility except to change to PHP and MySQL. ASP.net MSSQL requires license fee to use it, but has a slightly cheaper development cost because of distribution Microsoft products. Therefore, we decided when using browser GPS dev kit, we use ASP.net and MSSQL and when building OS specified application, we use PHP and MySQL (iPhone development kit and Android development kit has better compatibility with MySQL).

The result shows there is a significant weight on IMES technology element. This validates that GNSS has a huge advantage towards competitors due to possession of IMES. Other noticeable elements is web-based application development. Web-based development shows heavier weight compared to OS specific application. The optimal solution would be to build web-based application with Smart phone specific features such as GPS.- more weight on the web platform and lesser weight on Smart phone specific features. Data analyzing algorithm and transaction tracking were also highly weighted elements. Transaction tracking gives significant accuracy towards development of algorithm. Investing in this area will increase confidence level of accuracy of identifying users and their needs.

The least was the internet server. The result suggests that we should start off with narrower traffic line and increase gradually as the user pool increase.

Complexity/Cost-Worth Analysis

By using cost-worth analysis using QFD, resource (funding) allocation by elements should be clear in theory – High 'cost/worth'(above 1) value means that the element (or part) is not worth investing. Concerning this solution is a service, cost-worth analysis is done using initial development cost.

For our solution, there are two distinctive methods to build final product. The first method to use OS specified application. In this case, the service will only run through the application. This allows to fully utilize the hardware specification which leads to more flexibility of expanding service or gathering personal information data such as 'contact list'. However, the users must download through specific OS application store and might be compatible with other devices in terms of service or analysis, therefore, limits the user potential user pool. Second method is to use web-based application. Web-based application is an application that runs through web browser. Since this solution requires network framework, the use client-side programming (JavaScript, VB) and server-side programming (ASP.net) is essential. Web application does not require any installation (except for JavaScript, which is imbedded in most of the recent browser up-to-date), therefore let's easier access among many different platform users.

Part #	Solution Element	Cost	Relative Worth * From QFD Phase II	Relative Cost	Cost / Worth
1	Indoor positioning (IMES)	$0.00	32%	#N/A	#N/A
2	Google Map API	$0.00	7%	#N/A	#N/A
3	Browser GPS dev kit	$0.00	14%	#N/A	#N/A
4	iPhone/Android**	$5,008.30	5%	49%	9.35
5	10Mbps dedicated ISP (STB)**	$124.00	2%	1%	0.80
6	Data analyzing algorithm	$5,000.00	18%	49%	2.69
7	Transaction tracing (QR-code)	$0.00	14%	#N/A	#N/A
8	ASP.net	$0.00	7%	#N/A	#N/A
9	MSSQL	$0.00	1%	#N/A	#N/A
	Total Cost	$10,132.30	100%	100%	

Table 9 Cost-worth table of Smart phone OS specified development plan

Table 1 show that using OS specific programming has a high 'cost/worth' value of 9.35. This means the relative worth, which corresponds to how much this elements satisfies the VOC, is low (5%) to invest 49% of the development cost. ($5,008.30) Although 'Data analyzing algorithm' development cost-worth is over 1 (2.69), the importance of this development makes it hard to cut down the cost. However, the feasible solution to this is cut to algorithm development cost down to $1000, which the cost-worth value will be 1, and invest more later in the future growth plan. The reason for this is because the algorithm is heavily depended on the size of the user pool. In the start-up phase, it is relatively difficult to find the optimal algorithm because of uncertainty of human behavior.

Other elements such as ASP.net, MSSQL is included in the OS application development. Google Map API, and QR-code are license-free. For IMES, the business model of our solution is operated by GNSS, who has patent rights over IMES. Therefore, GNSS will not have to pay separate license fee. However, the price of the hardware is still unknown due to confidentiality of GNSS Company, therefore marked as 0 cost.

Part #	Solution Element	Cost	Relative Worth * From QFD Phase II	Relative Cost	Cost / Worth
1	Indoor positioning (IMES)	$0.00	32%	#N/A	#N/A
2	Google Map API	$0.00	7%	#N/A	#N/A
3	Browser GPS dev kit	$1,000.00	14%	11%	0.77
4	iPhone/Android**	$0.00	5%	#N/A	#N/A
5	10Mbps dedicated ISP (STB)**	$124.00	2%	1%	0.89
6	Data analyzing algorithm	$5,000.00	18%	55%	2.98
7	Transaction tracing (QR-code)	$0.00	14%	#N/A	#N/A
8	ASP.net	$2,000.00	7%	22%	3.19
9	MSSQL	$1,000.00	1%	11%	10.54
	Total Cost	$9,124.00	100%	100%	

Table 10 Cost-worth table of web-based application development plan

Table 2 gives more realistic result of cost-worth analysis. Instead of developing OS specified application, this solution developed a webpage with CSS style sheet which is exclusive for smart phones. In other words, the whole application is a webpage. The development cost is distributed by sections. Web-based application requires multiple programming language simultaneously. Since we developed the prototype and have a general view of the works that needs to be done, the cost distribution is set as Table 2. The result is slightly better in terms of number of elements that is has a higher relative worth. MSSQL development cost came out to be high compared to the worth weight. The reason for this is that MSSQL is more of a technical requirement rather than customer requirement. Only alternative that is possible is to change to MySQL (which also involves switching ASP .net to PHP). There are some upsides and downsides to each sides, but the development cost should be very similar to each other.

From cost-worth analysis, results show that web-based application is a better investment towards our solution. Also, cutting cost on data analysis algorithm development in the start up stage might give us better chance to improve on other aspects, such as browser GPS API optimization or faster ISP server. The total cost of the solution is relatively low for a start-up venture company because of possession of IMES usage. GNSS has a great potential to start this service with minimal risk.

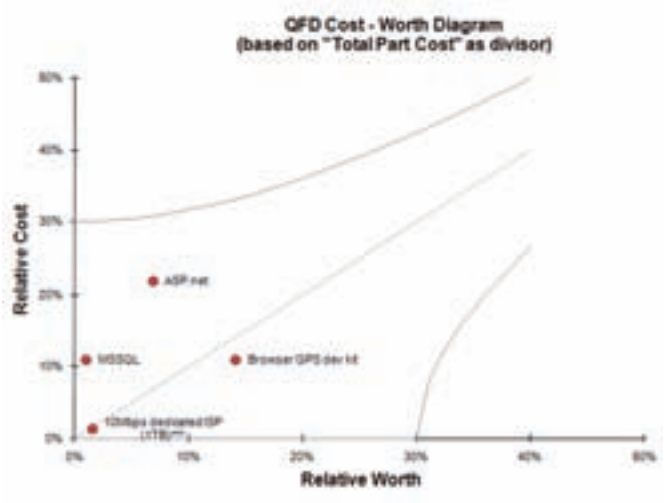


Figure 8 QFD Cost-Worth Diagram

Prototypes

In order to test the different system characteristics, several prototypes have been conducted and tested in public arenas.

FirstLife G-spatial EXPO G空間EXPO Firstlife

The first prototype that was created was the *G-Expo Firstlife Game*. Its purpose was to test commerce oriented indoor location-based social network feasibility. The results have been presented by one of our members (Ro, J.) as a poster presentation at the Informs Annual Meeting 2010, Austin, Texas, USA.

The results are summarized and presented here in short, (the complete poster presentation can be found in the Appendix)

Figure 9 G-Expo Firstlife Game

While the participation rate of visitors to the G-Expo to our prototype system was not very high there was a dataset created of roughly 300 users who recognized the availability of an Indoor Social Network.
Of these participants 42% was convinced by the value offered, namely visiting a number of places in a solo/individual or in a collective mode to redeem a small reward.
Of the participant that accepted only 14% opted to partake in a collective. This is a fairly low proportion, for which the exact reason could unfortunately not be deducted from the prototype dataset. Some reasons for this low proportion of collective participation could be a too low perceived benefit from joining a collective, the simplicity of the task to visit three places within a relatively small local environment, or a combination thereof.
However there were also notable positive and stimulating results from the acquired dataset. Namely, the observation that one-third of collective participants contributed to reaching the set goal outside the set minimum required contribution. Visiting not only one of the places required, but also visiting others to share its location with other users in the collective.
Also individual players showing a 59% activity rate after opting to participate in the system is considered quite high. This could possibly be due to the fact that benefit (redeeming of the small reward) within the local indoor social network could be achieved in a short time frame.
Future recommendations from the experiences of the first prototype were to develop a web platform that would extend the scale to that of a district or local town center and adding social functions such as messaging for allowing collective buying or deal structures to be tested.

Harahetta

The second prototype developed was the *Harahetta App*. This web-platform was targeted towards shop-owners and local consumers, and build to test local collective buying or deal structures.
It included social functions in the form of a localized message posting function and friend invite system to create social and collective behavior in order to reach a sales goal set by various shop-owners.
The sales/demand goal set would have to be reached by consumers using the Harahetta App and registering their purchase through the use of QR-codes at the specific shop. When the demand goal was reached, all contributing consumers to reaching that goal would receive a reward in the form of a discount offer or special deal type offer.

The flyer for this prototype can be found in the Appendix.

We targeted this prototype to local restaurant owners in the district of Hiyoshi, Kanagawa, Japan. Unfortunately we were not able to get this prototype running in the local community because of restaurant-owners unwilling to adopt the system and partake in the experiment. This might be due to the limited argumentation for value creation to businesses and due to this a high skepticism among the restaurant-owners.

However, from the conversations with over 20 restaurant-owners in the Hiyoshi-area we observed a high interest by the owners into the use of a (collective) mobile location based social network to drive sales. On the condition that this service entails a well structured business model and value proposition for the restaurant.

Another valuable aspect of creating this prototype, even without the actual usage by shops and consumers, was the testing and experimenting with technology.
The web-platform that was created for the Harahetta App was specifically targeted to the Japanese market and as such to users of Japanese mobile phones and carriers. This meant that for the system to be accessible to a large potential user base it had to function on smartphones (iOS, Android OS) and to the more traditional Japanese Keitai.
While the underlying architecture of the system was programmed in ASP and Java, the smartphone users were presented with a version of the web-platform developed for HTML5 with a CSS style-sheet where users of Japanese Keitai would be presented with an iMode 2.0 compatible version without losing functionalities such as message posting and friend inviting.
A notable observation made by us while developing, testing and using the smartphone HTML5 version versus the iMode version was the user friendliness and overall impression and experience from the system were much greater for the smartphone version.
Having identified the market trend of rapidly growing smartphone adoption we concluded that developing a platform that focuses on smartphone users will still provide a sufficiently large potential user base.

ValaWare

The third prototype came forth from this conclusion combined with the insights gained from previous prototypes and the ALPS methods. Altogether identifying an opportunity space for providing consumers with personalized information and better choice awareness while also generating value for business owners to use this information for better (highly) targeted localized marketing.

The *ValaWare* platform as a prototype was developed to test the possibilities of mapping user location information to preset dimensions for lifestyle. And on the basis of these mappings generate an overview of 'interesting places' based on a user's personal lifestyle mapping powered by what places users with a 'comparable lifestyle' have visited.

This prototype was developed for smartphones using the Harahetta App as a basis and adding functionality by use of Google Map's API.
The final prototype was able to map a limited number of locations (5) to three lifestyle dimensions, being Social, Health and Love.
While this is not enough to generate much better insights into the broad range of possible algorithms for mapping location to lifestyles on a much larger scale it did show us the power of API's and web-platform development.

This Prototype has become the starting point to which the system proposed in this report is further characterized.

The poster presentation of this prototype can be found in the Appendix.

System Validation

The third section, *System Validation*, critically reflects upon the feasibility of our system in terms of relevant business criteria. The financial return of proposed business model is captured within a Net Present Value Calculation that clearly states the assumptions and risks involved in establishing the business. The identification of key factors influencing the feasibility of system implementation, its financial return is first identified using a so-called Influence Diagram.

Influence Diagram

The influence diagram graphically presents the relationship between contributions terms, uncertainties, decision points and value nodes in the system. It thereby uses inputs from QFD analysis (the cost factors) and from the CVCA and the business model (the revenue factors). It serves as a primary input for a Net Present value (NPV) Analysis. The Influence Diagram can be observed in the figure below.

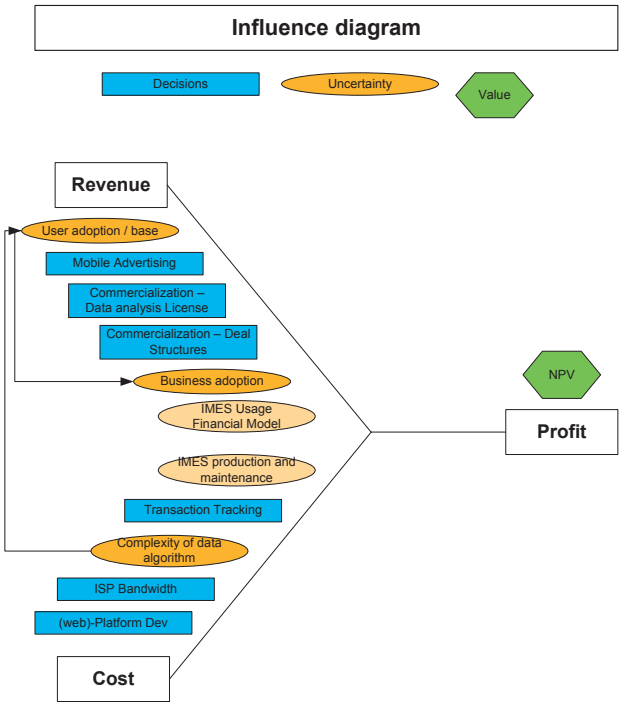


Figure 10 The Influence Diagram

We find that a large component of profit-uncertainty is a function of the relationship between user-adoption, algorithmic success and business adoption. These different corners of uncertainty show a subtle interrelationship. Business adoption is positively affected by a large customer-base (which represents potential market share in an important local market) while algorithmic success is strongly related to the benefits that users might perceive and pass on to facilitate the viral spread of system adoption.

This complex interrelationship between uncertainties in both revenue *and* cost factors makes a synchronized system implementation essential. A reduction in the cost of algorithmic complexity (assuming that this facilitates perceived user benefits) will iterate through the system in an increased user base and potential for client (business) adoption. it is essential to develop a well founded rationale for user adoption, growth and commercialization plan.

A Net Present Value of FirstLife

The market for Location based services is highly volatile and it is therefore hard or almost impossible to perform an accurate profitability analysis. However with the use of assumptions and implementation of broad ranges of uncertainty such a profitability analysis still serves to show the cost structures and how value is created throughout the lifetime of the system. The revenue and cost sources will be extracted from the influence diagram analyzed previously.

The first assumption made is for the average gross profit margin. For Software Businesses this is in general between 80 and 90%. For this Analysis and we've chosen 80%. (http://www.investopedia.com/articles/fundamental/04/042804.asp)

Market

The market for mobile Location-based services is growing rapidly and many new entrants in for example the United States have shown quick and exponential growth of user base. However, many entrants have not been able to gain momentum and create such growth. Instead they survive in the margins of the market or disappear altogether, often switching to a new opportunity in the market.

Because profitability analysis in this sense is always quite arbitrary we model this analysis to a case for a mobile Location-based service of moderate success applied to a certain region, for example the Tokyo central region. A moderately successful service in Tokyo region would grow to about 500.000 users in 2 years. This means for example that, divided over 168 local areas (the number of stations of Tokyo Metro), every localized area would on average contain 3000 users with user lifestyle mappings to be targeted. To this user base the service platform can be commercialized for businesses. Reaching on average 20 businesses in every local area within 3 years after commercialization would lead to 3360 businesses using services provided by the platform.
(We've added a deviation of 50% to these forecasts)

Revenue

In the proposed system there are three sources of revenue, also mentioned in the Influence Diagram earlier presented.

1. Market data analysis for businesses

    Mode 1: Providing businesses with data analysis on users lifestyle mappings within their local environment, and giving them access to a web-based platform through which they can target local users of the Firstlife system and increase their marketing effectiveness.

    Mode 2: Extends the usability and accuracy of the market data analysis by use of locally installed

IMES transmitters within businesses. For which a premium price can be charged.
(The installation and operation costs of IMES are included in such premium service charge, as the uncertainties for cost price of IMES production, installation, maintenance are unknown.)

2. Mobile-advertising

Revenue can be generated from presenting users of the Firstlife service with Mobile-advertising and marketing within the POI (point-of-interest) search functions. This can be done in a traditional sense, showing local-advertisements through Google's API, or from presenting advertisements delivered by localized businesses within our system. Revenue is created by cost-per-click type structure. It is however still uncertain how many users will click to localized advertisements being presented to them. Also the cost for businesses to provide localized advertisements through our service is not established, but could be seen as part of the service of market data analysis and targeted marketing.

3. Deal structures

Businesses using the services of the system can also create deal structures for the localized community of users. These deal structures work as designed in the Harahetta App and can channel more consumers to a business by providing collective type deals while building customer loyalty. Revenue from this can be derived through the implementation of percentage-of-deal type revenue model (Groupon) or by implementation as add-on (premium) service.

Because this probability analysis serves as an illustrative case of profitability for a moderately successful mobile location-based service and because many uncertainties in the sources of revenue can be taken away by adopting a service type model, we've chosen to present the modes of revenue into the following three services models for businesses.

Basic: Local market data analysis with targeted marketing possibilities. $80, - per month,
Premium (w/ IMES): Enhanced local market data analysis with enhanced targeted marketing possibilities and the possibility to create custom deal structures for customers. $160,- per month,

Synthesis of revenue definition

These prices are based on actual pricing schemes being used by mobile Location-based services providers in the United States[1]. And we assume that 1/3 of businesses adopting Firstlife services will choose the premium package. Especially mall operators can benefit from the enhanced tracking of consumers and targeting to users lifestyles.

Cost
There are several different types of cost associated with the current business proposal. These can be grouped according to their dynamic nature with respect to company output (fixed versus variable) and in relation to their role in facilitating the creation of the final product (direct versus indirect). The different cost groups so considered can be observed in the figure below.

Labor
Labor requirements change over time but account for the dominant cost group within the industry. We assume no revenue streams in the first year which is dedicated tyo developing a finalized product. We assume this requires 4 full0tim employees, in the form of a conceptual designer, a web-developer, a programmer and social scientist. If these are paid an average wage of $50 / hour each (which includes $25 / hour of overhead (such as insurance, benefits, etc.)) for 2000 hours in the first year / employee. Total Labor costs amount to at $400000 in the first year. The commercialization in the second year will require 2 sales people in addition to the existing workforce, increasing the costs to $600000. Due to the intensity of both sales and operational (system maintenance and development) costs, we assume that 4 additional employees are required in the next year and an additional 5 employees the year after to cover the complete Tokyo region with a total of 15 employees. We assume identical salary structure for each of these employees and consider them as fixed costs. This labor force will be working on system software changes, software interface issues (mobile platform compatibility) and data conversion issues as well as continuous database optimization. On an annual basis, hardware and software maintenance and changes are to be determined and performed.

Workspace
It will be vital to have access to our clients and users both online and offline, resulting in the necessity to have a workspace in or around Tokyo. Estimating Tokyo Office Space at $300 / square meter / month[2] and starting with a 20 square meter workspace, the Workspace costs are estimated at $72000 for the first year. Due to additional labor requirements, workspace demand will increase. We assume similar pricing levels for subsequent years and a doubling of workspace area to develop over the next two years after which sufficient workspace is available to respond to Tokyo market demands.

WorkStation
In addition to employees and a space to work in, workstations have to be set up. These are directly related to the amount of employees in the company. If we assume a Workstation cost of $2500 / employee, we arrive at $15000 for the first year and $5000 increase for the next without taking replacement into account. Including replacement costs, we assume a constant $15000 / year.

Software Licenses
Upon these workstations software has to be installed (legally) that is directly related to the tasks to be performed by the employees. A software license for a year would amount to around $1000 / employee / year. This amounts to around $6000 for the first year and $8000 for the second year, and we assume an increase of $2000 / year increase for the next two years after it stabilizes at $10000.

[1] http://scvngr.com/pricing

[2] http://www.venturejapan.com/japanese-office-space-rent.htm

Server Space

An important direct variable cost is related to the hosting and facilitation of data streams as a result of additional customers. Not only Server space itself is important but also the costs involved in facilitating efficient data transfers to and from the server. As a software service company, efficient data traffic is essential. We therefore set up a dedicated server installation that amount to an initial $200 / month[3] in the first year. This will increase by $200 / month every year for the first two years. Due to lower rates of increases in server demand space in later years when the market has become more saturated, we account for an additional cost of $100 / month / year in every subsequent year.

Results & Sensitivity Analysis

The NPV according to setting previously described results in a Healthy Investment which can be observed in the figure below for different values of discounting.

Rate of Return Required	Net Present Value
10%	$ 6.879.000
15%	$ 5.450.000
20%	$ 4.366.000

Table 11 Benchmark NPV for different rates of return

We have determined the risk in the current investment by executing a sensitivity analysis with respect to both cost and revenue groups in the NPV calculation. Due to the fact that most our costs are fixed costs, variation in the volume of goods sold (contracts made with retailers) do not lead to cost reductions within any year but *will* be taken into account in subsequent years in terms of hiring policy. Therefore, the sensitivity of the NPV with respect to changes in Volume is based on a company that does not adapt its fixed-cost structure which is unrealistic. An NPV is calculated with an error of 80% in variable costs and three different levels of error in the volume (10%, 50% and 75%).

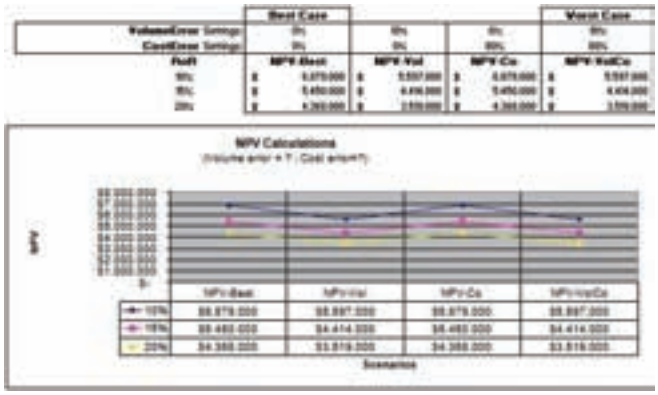


Table 12 NPV for a 10% error in Volume and an 80% error in variable costs

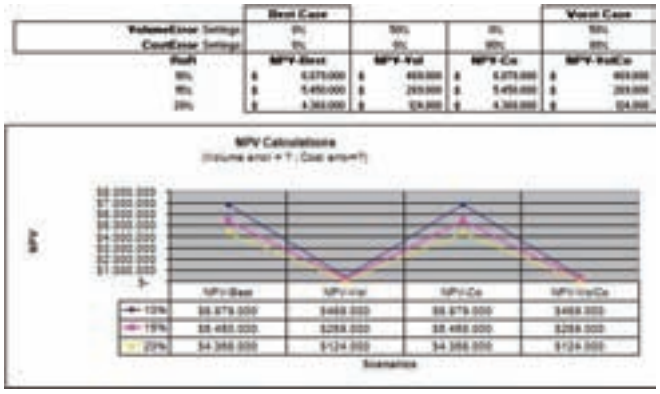


Table 13 NPV for a 50% error in Volume and an 80% error in variable costs

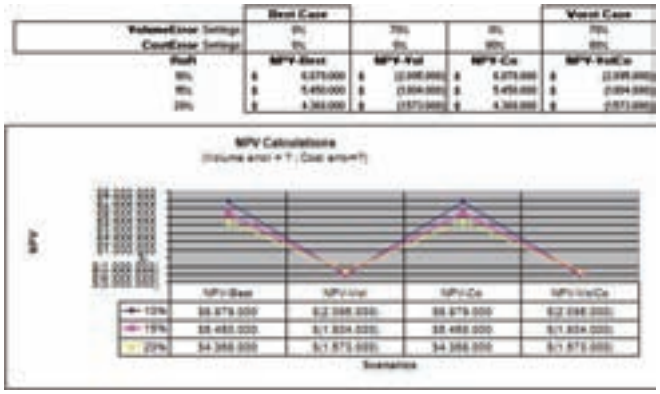


Table 14 NPV for a 75% error in Volume and an 80% error in variable costs

It is clear that the risks involved in the current project are a function of fixed costs and volume expectation as the variable costs (those that are controllable for periods of considerably less than year) are small. The fixed costs primarily evolve around labor costs and some expansion policies with respect to labor. Due to the fact that these costs can be controlled for on a yearly basis, the above NPV calculations are biased towards a non-adaptive firm. However, knowing that a 50% error in volume predictions would still amount to a positive NPV calculation (and identical company cost structure) is reassuring, especially since the real NPV would likely turn out higher given that volume turns out to be off target in practice.

Conclusions from the NPV Analysis

Given the dependency on volume of services sold, additional research into the market is advised. This involves personal contact with potential clients and a renewed volume expectation based on that feedback. The current NPV also excludes the precise developments in terms of strategic alliances, intellectual property and the competitive environment that can all have an influence on scalability and the speed of market penetration. However, these are things that are hard to predict in advance and depend on the contingency planning that is adopted with respect to changing future environments.

[3] http://www.crucialp.com/dedicated-servers/

Contingency Planning

An initial contingency planning is set up so as to identify to what extend can be accounted for the main risks in the project. Three risk groups have been identified (Service Development Related Risks, Revenue Factor Risks and Cost Factor Risks) in the hope of capturing the key criteria of project success. With respect to every risk group and specific risk, trigger architectures are designed that allows one to observe when certain risks require reactive response. Furthermore, for every specific risk, a preventive measure is proposed to prevent the risk from negatively affecting the project at a later stage.

The most effective measure with respect to risks is to reduce their existence by preventing them prematurely. With respect to both Cost and Revenue risk factors, much preventive action can be achieved by establishing intense communicative ties with both users and clients in the development stage of the project. These communication sessions with key stakeholders allow for synergies in risk management, resulting in reducing overall project risk through efficient means. In terms of service development, it would be wise to talk to web-developers and programmers, in addition to social scientists that have worked in this field, to establish the feasibility of system requirements in terms of both algorithmic depth and system operability. Due to the relative ease with which many of these risks can be mitigated for, the overall project risk level can be easily reduced.

Contingency planning				
Risk Region	Contextual Description	Trigger Architecture	Reactive Response	Preventive Response
Service Development	Functional Requirements are unattainable or develop too slowly	Design clear functional milestones on a monthly basis	Find the root cause of failure and attempt speeded integration	Talk with developers to clealry specify feasability of requirements
	Technological changes have influence on the competitive landscape	Technology introduction that proves of substitutive significance	Attempt integration of service with new technology	Conduct technological analysis and talk to research centers in telecom
	Market Trends develop away from ethical consumerism	Governmental and User Antagonism against ethical consumerism	Reconsider market size, Redesign service in lighter terms or towards different market segment	Establish market size through local user-group surveys
Revenue Factors	Insufficient Initial Shop Cooperation	Design clear milestones on a functional basis (10 shops / salesman / week)	If cooperaiton is not contracted, identify the causes. If they are shop related redesign service or employee	Start talking to shops with respect to service and identify criteria of cooperaiton, seek partnerships with large venue owners
	Insufficient Initial User Adoption	Design clear milestones (additional users / month)	If userbase shows meageer growth, identify its cause in social architecture of service and adapt it	User-based prototyping and identify the functional requirements with respect to network formation
	Negative Feedback from Shops with Respect to Usability	Communication that shows signals of negative feedback with respect to usablity	Redesign client interfact to accomodate critiques	Intense communication with shops in design phase
	Negative Feedback of Shops with Respect to Financial Rate of Return	Communication that shows signals of negative feedback with respect to Finance	Cooperate with shopowners to identify how dealstructures and marketing techniques could be channeled	Intense communication with shops in design phase
	Negative Feedback from Users with Respect to Usability	Communication that shows signals of negative feedback with respect to usability	Identify the changes in user-interfact and system architectyure required	Maintain itense contact with Users and their opinions about the product and how they use it
	Negative Feedback from Users with Respect to Return on Effort	Communication that shows signals of negative feedback with respect to effort and reward	Idetnify root cause of unexpected deviation in cost-reward structyure for user. Adopt changes in design.	Maintain itense contact with Users and their opinions about the product and how they use it
	Service is used for purposes other than those for which it was intendid	Maintain intense contact with users and how they use the product, unexpected deviations are noted.	Attempt integration of interacvtion in current system. Otherwise consider the establishment of new service	Set up a focus group in which users and shopowners communicate online or offline
Cost Factors	Data Analysis and Mapping algorithms are too complicated for given personel	Design milestones around the development of social algorithmic efficiency	Consider different or additional personal based on origin of difficulties	Set up clear analytical requirements with respect to algorithm and talk to research centra
	IMES transmitters turn out more expensive	Development costs within GNSS result in significant variable costs	Reevaluate NPV based on renewed variable cost structure and act upon it	Intense communication with the deevlopments within GNSS with respect to technology
	Additional licensing requirements with respect to overlapping technologies are required	Infringements of our service are identified or opted by third parties	Re-evaluate NPV based on expected contracting or licensing outcome	Conduct extensive IP-search to identify the potential for infringements
	Insufficient manpower to achieve volume of sales	Design Trigger architecture around sales effectivity (10 sales / salesman / week)	Consider additional or different salespersonel for next period	Intense communication with clients beforehand to facilitate later contacting and contracting
	A rise in Tokyo region workspace costs	Triggered through a necessary 200% of predicted workspace costs	Re-evaluate NPV based on new fixed cost structure	Communicate with office space suppliers in Tokyo area and get guaranteed quota's
	Insufficient manpower to maintain and develop software platform	Triggered through an unacceptable downtime of system	Identify root cause, consider additional personal and re-evaluate NPV	Talk to web-developers and programmers to identify key difficulties
	Server adoption turns out to be insufficient for traffic demand levels	Slow response of system	Consider additional or more powerful server architecture and re-evaluate NPV	Identify typical server requirements based on current competitive landscape

Table 15 Project Contingency Planning

Conclusion and Future work

Concluding from the System Characterization and System validation that were presented, there are still some major sources of uncertainty. These will need to be further researched before this business concept can be developed into a functioning mobile Location-based service and be able to promote the usability of IMES.

Uncertainties

From the System Characterization uncertainties still exist in how collected data on location is mapped to lifestyle dimensions. Also specifically, the extra value of data gathered by the use of IMES installation is not researched in depth further than the recognition of value from higher accuracy positioning and the possibility to push targeted marketing. In the provided contingency plan we advise to start communication with user groups and specifically the shops and large venue owners (as possible clients of the service) as early as possible.
Besides this it is recommendable to involve both developers (web, program, IMES) and social scientists to create the data analysis and data to lifestyle mapping algorithms as this greatly influences the potential value the final system is able to provide to (consumer) users.

From the profitability study performed by net present value calculation in the Systems Validation section there are still some major uncertainties on the sources of cost and revenue. While the provided net present value calculation is a positive case for developing and operating a mobile location-based service in the Tokyo region, even at varying services success rates, it is up to this point merely a base case.

More research has to be done into how the service will be received by potential clients in the business sector as well as by consumers. This can be done in various ways, such as by establishing the contact with larger venue owners and potentially partnering.
More information from consumer users could be gathered by survey or organizing focus groups to identify specific consumer wants and needs in terms of mobile location-based services they would expect from the partnered venues.
Having this information would allow for the net present value calculation to be revisited and provide a more accurate analysis of the profitability of this concept.

Getting things right

Since many uncertainties still exist we present a revised version of the Design/Dependence Structure Matrix, identifying the steps that could be undertaken to come to a point where actual system implementation can be commenced.
These operations combined with the key points and problems presented in the Contingency Plan should provide for the framework to which a better system design can be created.

Project Phase	Step Description	Revisit	Step	1	2	3	4	5	6	7	8	9	10	11	12
System Characterization	Analyze Market Requirements - Consult Users and Clients		1												
	Operationalize Requirements in Product	Morph / OPM	2												
	Define Technical Requirements	OPM / QFD	3												
System Validation	Financial Analysis	NPV	4												
	Functional Modeling	OPM / [UML2]	5												
	Finalyze Schematics	[UML2]	6												
	Programming		7												
	Beta Testing		8												
	User Feedback Analysis	Surveys / Focus Groups	9												
System Implementation	Finalize deals with Business Clients		10												
	Complete Product Validation		11												
	Finalize Beta Testing - Alpha Programming		12												
	Deploy Platform to Users and Clients		13												

Table 16 Design/Dependence Structure Matrix for Future Work

ALPS Pages

Introduction

The ALPS pages serve a double purpose of both facilitating the visibility of the ALPS tools employed by summarizing and treating them separately here, as well as, reflecting on the experience in a structured fashion.

In 'Analysis and Discussion of ALPS Methods', the key tools are treated according to the processes that were identified in the investor pages, relating to *Opportunity Identification*, *System Characterization* and *System Validation*. In addition to the tools used, other tools that might prove relevant to the processes but are not explicitly mentioned in the core text, are also treated in this section.

Our ALPS reflections are contained within an ALPS Roadmap which is discussed in the 'ALPS Roadmap and Reflections' Section.

Analysis and Discussion of ALPS Methods

Summary

Numerous tools have been used to guide the conceptual mind and operationalize concepts in more detail. The final goal of all these methods was to map the non-existent product or service within a relevant generic framework of aspects or dimensions of existing products and services so as to illuminate its environment and potential economic relevance. Several reflections are worth mentioning.

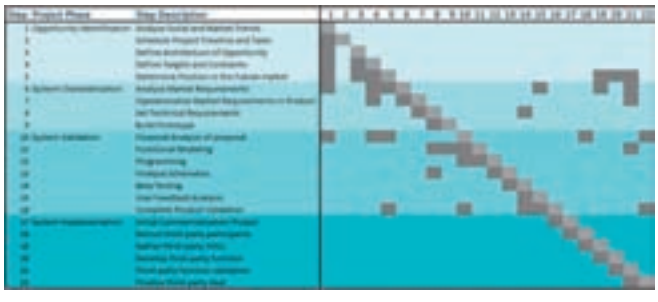
The conceptualization of three general phases in the form of Opportunity Identification, System Characterization and System Validation allowed us to find the overlap and value of and between the tools. The most relevant questions for the survival of an idea are at the end of the tunnel, with the NPV and the business model structure. These tools, however, are obviously fully influenced by all preceding work in terms of conceptual fine-tuning and the determination of raw economic architecture. As it is never truly possible to think all steps through carefully beforehand, and it is unacceptable to repeat all steps through endless iterations, it proves useful to build up the argument from the bottom and connect all of them together piece by piece, tool by tool.

Coincidentally, it was not any specific tool that gave us the true eureka moments in the project. These came through team sessions, both formal and informal, in which different points of view, interpretations, opinions and focus points came together and converged. None of the tools have any value without a good team to operate and get the most out of them. However, getting the most out of a team also depends on using a wide range of different tools because it is through the tools that we help communicate to each other.

ALPS Methods

Following is the list of methods used in the course of the ALPS project. They are generally structured to describe in short what the method/tool is used for, what inputs are used and what outputs are generated from it.
Many of these have been described in the Investor pages section of this report, while those that have less relevance to that part of the report are also presented here.

Design/Dependence Structure Matrix



Tool Description

In order to capture the process interrelationships between different project phases, it is insightful to conduct a Design or Dependence Structure Matrix. In addition to helping one decide the order and identification of critical steps, the dependencies of processes allow one to infer the risks associated with the phase outcomes.

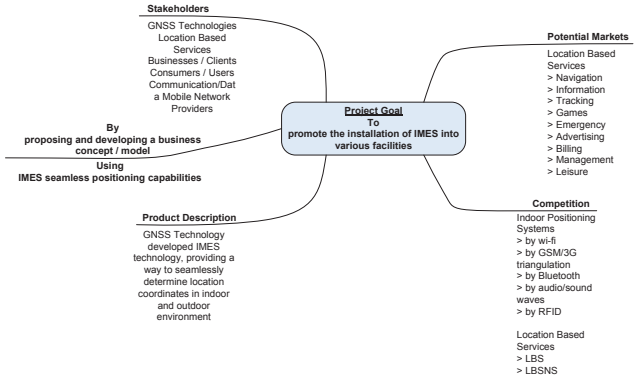
Inputs Justification

Information for the DSM is available once a specific product design has been decided upon (after Opportunity identification) but before it is finalized or specified in detail. One must be aware of what output can be expected from a certain phase and whether or not this might reasonably be the input to other phases or processes.

Output Justification

We have chosen to present the DSM in the very beginning because it shows how much of the analytical and conceptual work taking place in the current work, are built upon contingent factors of adoption and feedback that can only be achieved at later stages or through the preventive reactions specified in the contingency planning. A detailed DSM would help you to optimize project processes and identify the critical processes in the project. In our case, we find that the system characterization and system validation phases show both dependence on past and future phases, creating uncertainty in the processes that require mitigative action.

Context Map: Problem Space



Tool Description

This is a brainstorm context tool that indentifies contexts and areas that need further exploration

Inputs Justification

Potential Markets and Probable Competition information is derived from various sources on Location Based Services.

References

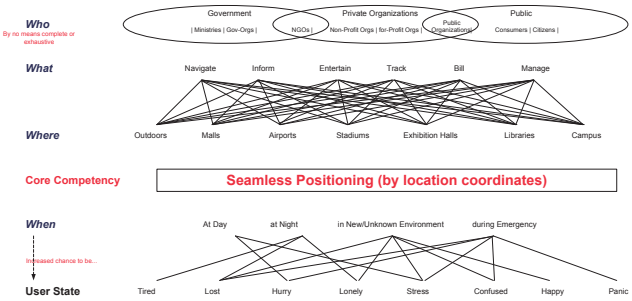
- Steiniger, S., et.al., (2006). *Foundations of Location Based Services*, Cartouche Lecture Notes
- Desiniotis, J., et.al., (2006). *Mobile LBS Market*, Vodafone Technology Strategic Planning

Output Synthesis

IMES and more specifically, means of promoting IMES into various facilities means looking at more than its technological competitors, it means looking at the market of Location Based Services.
Within this market, many different categories of application exist of which many can be and are interlinked. These context are further researched in the context map of opportunities.

The identified stakeholders are the players actively involved in the market for location-based services and are the basis for the Customer value chain analysis.

Scenario Graph



Tool Description

This scenario graph is a tool for capturing the possible contexts in which a solution is sought and offered

Inputs Justification

"Where": brainstorm on potential Indoor locations, identifying places that facilitate larger groups of people of which some contain clear commercial operations.

"What": range of LBS type applications from;

Steiniger, S., et.al., (2006). *Foundations of Location Based Services*, Cartouche Lecture Notes

Desiniotis, J., et.al., (2006). *Mobile LBS Market*, Vodafone Technology Strategic Planning

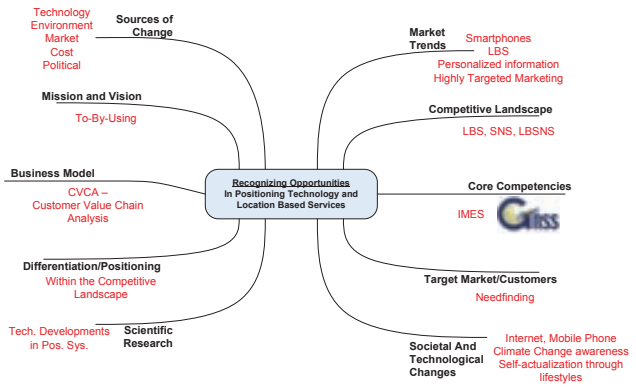
Output Synthesis

The many connections between the "Whats" and "Wheres" show the broad applicability of seamless positioning and LBS (the solution space is very big)

"When"indicates the 24/7 nature of possible seamless positioning and LBS use, also it shows the user states most likely to be affected by the two events in which seamless positioning is said to be very relevant, In new/unknown environments and during Emergencies.

The affected user states are interesting reactions to be researched and for a LBS to be targeted towards or taken into account. This is done by Needfinding and creating the Context Map of Opportunities to see if opportunities arise from the use of LBS and IMES in new/unknown environments and during emergencies.

Context Map: Opportunities



Tool Description

This map is used when the project objective is at a very high level, such as in this project. In which case it is useful to map external factors, such as the Voice of Society (market trends, sources of change, societal changes) and the Voice of Technology (Scientific Research) as well as map the internal factors such as the Voice of Business (competitive landscape, mission and vision, target market and customers, core competencies, business model).

In doing so it creates a structured and justified overview of factors composing the opportunity space in which a design can be characterized and recommended.

Inputs Justification

Inputs to this map are many of the tools used in the design project ALPS as well as extra information gathered and represented. They are detailed in the Investor Pages of this report, section Opportunity Identification.

Output Synthesis

The major output of this context map is the identification of the opportunity space to which the design recommendation is given.

The opportunity space consists of a technological change towards a society where people are always connected to the internet, seeing the market trend of rapid smartphone adoption. And a market trend towards personalized and customized information and products to fulfill the need of people to reach a better quality of life through self-actualization and greater awareness of their choices. In the competitive landscape of location-based services many platforms aim to provide benefit to customers (both consumers and businesses) based upon these market trends and societal changes, leading to a market trend itself, the rapid growth of LBS.

Finally, the core competencies together with the mission vision and business model lead us to suggest that there is not yet a LBS or LBSNS that can create a fit between technical function and customer benefit that would do justice to sell or license IMES technology to. Therefore we conclude that there is opportunity for creating a Location-based service that links a powerful and valuable LBS platform to the powerful technology, IMES.

To-By-Using

Tool description

The To-By-Using is a simple table that can be used for defining the system concept.

Inputs Justification

The first to-by-using table that was made was that for GNSS. Using the initial project description, the overall goal and mission of the project was defined as the stated to-by-using.

The to-by-using for consumers and businesses are a result of the context map of opportunities. Having identified opportunity space for designing a new mobile platform on the basis of competitive analysis, societal changes, market trends, etc. we could describe the mission of the platform for consumer and for businesses as these to-by-using.

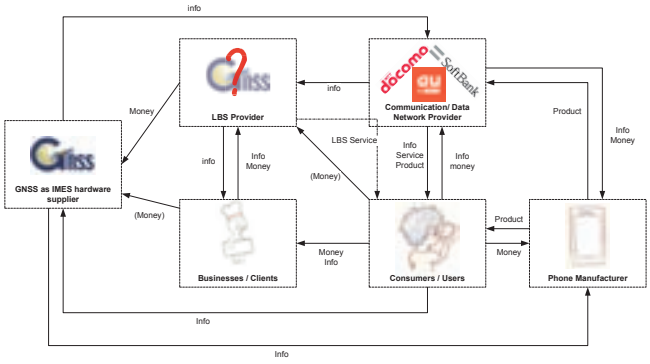
For GNSS
To: Promote the installation of IMES into various facilities. **By:** Proposing and developing a business concept and model. **Using:** The ALPS system design methods.

For Consumers	For Businesses
To: Help users make better choices and improve their lifestyle. **By:** Providing a mobile platform on which user behavior is mapped to lifestyles. **Using:** Location information, User inputs, Independent Sources and Company inputs.	**To:** Help businesses create more awareness and better communicate the value of their products or services. **By:** Providing a mobile platform on which clients can reach their customers. **Using:** The lifestyle maps that relate to customer needs and the values they treasure.

Output Synthesis

The output of these to-by-using tables is not actively used in other design methods but it served as a guideline and a reminder to the overall goal and mission of developing a LBS platform and on a higher scale to the overall mission of the project. Which is quite functional.

Customer Value Chain Analysis



Tool Description

CVCA is a system analysis tool that captures the system stakeholders and their relationships in terms of money, information, material/product and complaints flows. It can form the basis of further stakeholder analysis, use case descriptions and Voice of Customer definitions, and contribute to identifying engineering metrics, customer requirements and solution elements.

Inputs Justification

Stakeholders from Context Map: Problem Space

Establishiment of relationships from, a.o.

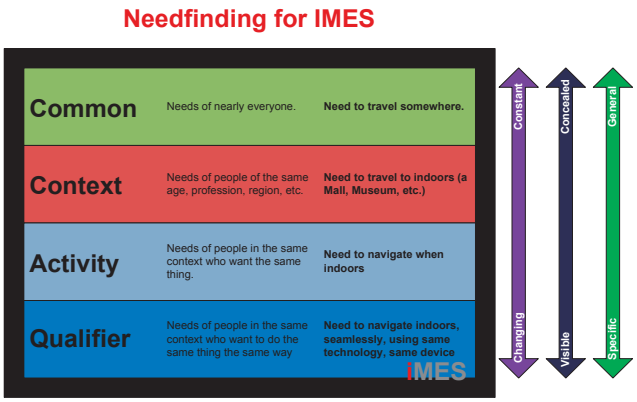
- Steiniger, S., et.al., (2006). *Foundations of Location Based Services*, Cartouche Lecture Notes
- Desiniotis, J., et.al., (2006). *Mobile LBS Market*, Vodafone Technology Strategic Planning
- Kim, S., et.al., (2010). *Transforming Seamless Positioning Technology into a Business using a Systems Design Appraoch*, IEEE

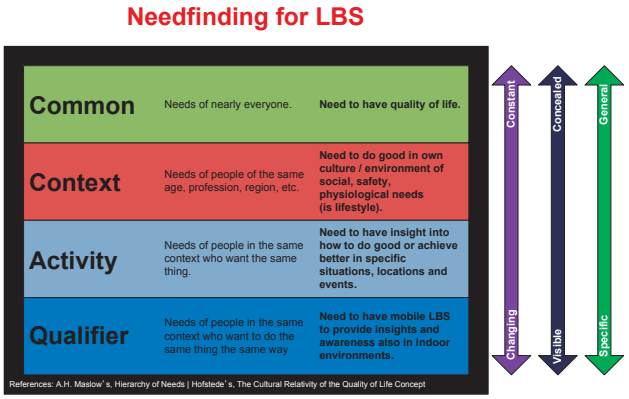
Output Synthesis

Identification of the flows illustrates the important and facilitating role of the LBS Provider, connecting most money and information streams. However it is yet unclear who this LBS Provider is or should be.

The current market for LBS is developing and growing very rapidly. Also there is not yet one big player that is forecasted to be the dominant player in this market. This means there is difficulties in choosing potential LBS Provider(s) to partner with as well as there are opportunities for entering the market as a LBS Provider. These things are further researched by market analysis, competitive analysis and business plan.

Needfinding





Tool Description

The Needfinding tool places an identified activity into context of a higher level need and into a qualifier need for operationalisation. The way to which the levels of Common, Context, Activity and Qualifier are distinguished is largely based on A.H. Maslow's Hierarchy of Needs that presents humans fundamental levels of needs in a pyramid, with the most fundamental ones at the bottom and at the top Self-Actualization. Needs are according to Maslow generally divided into D(eficieny)-needs at the lower half and B(eing)-needs at the upper half. Although Hofstede opposes that the Being Needs identified by Maslow are formulated from an ethnocentric and American perspective and disregards the cultural influence on a person's needs, the hierarchical classification of needs allows for this tool to place more operationalized statements into higher need context and justify their intention.

Inputs Justification

The Needs for the Needfinding for IMES table are derived from the Scenario Graph, identifying what people want to do where and when. And also the mission and goal from the to-by-using for GNSS. To promote the installation of IMES into various facilities.

The Needs for the Needfinding for LBS are derived from the Context Map of Opportunities, identifying societal changes in a higher Context and towards Qualifier needs the market trends of LBS establishment in society and the need to have this available when indoors.

Output Synthesis

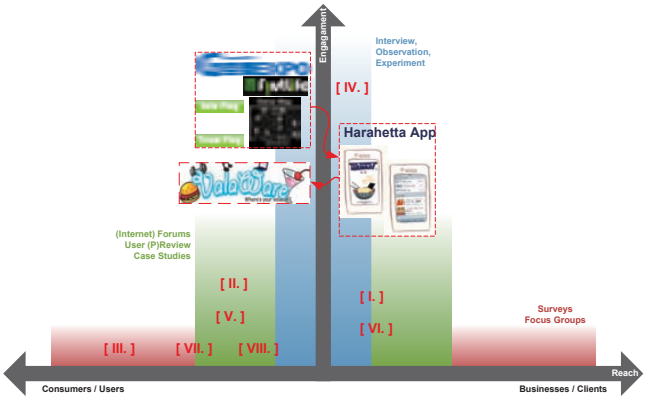
The Needfinding method for IMES places the "need to navigate indoors, seamlessly, using same technology, same device" into the Qualifier box. This statement is derived from market trends in smartphones and their role in aggregating technology and function into one device, but also from the Scenario Graph which shows where and how people navigate and how seamless positioning by IMES facilitates this. The above Needs are in this sense the rationale to justify the functionality of IMES to fulfill part of peoples higher Context and Common needs.

The Needfinding method for LBS places the identified "need to have insight into how to do *good* or achiever *better* in specific situations, locations and events" into the Activity box. This Activity is put into a Context and Common Need as a rationale for *Why* the need exists. The highest Common Need being: The Need to have quality of life. The Qualifier to which the Need belongs can be seen as a *How* and serves as a justification for the use of IMES technology being: The Need to have mobile LBS to provide insights and awareness, also in indoor environments.

References

- Maslow, A.H. (1943): A Theory of Human Motivation, Psychological Review **50**(4) (1943): pp.370-96.
- Hofstede, G. (1984): The Cultural Relativity of the Quality of Life Concept, The Academy of Management Review, (July 1984): pp.389-398.

Trendmapping, Interviews, Observations and Prototyping



Tool Description

The trendmapping and prototyping figure shows the broad range in which Trends and Voice of Customers can be found. Different types of informational sources contain different levels of reach and engagement.

Surveys and Focus Groups can reach a large range of customers on both business and consumer side, but only establish a low level of engagement as the customers knowledge of the system remains limited.

(Internet) Forums, User (p)reviews and Case Studies have a smaller reach because they contain or require more knowledge on the system, but thus they create a higher level of engagement.

Interviews, Observations and Experiments contain or require the highest level of engagement because they can be targeted specifically to a group of customers that the researcher intends.

Prototypes fall into this category as they are also a useful way to capture customers trends and voices. Prototypes can perform experimental functions to research both customers reaction/voices but also test scientific concepts or technological feasibility.

Inputs Justification

For the Trendmapping part of the figure a selection of literature is mapped to their function in identifying trend by survey, focus group, case study, etc.

The list of literature is as follows:

[I.] Shiraishi, Y., (2009): The Japanese Smartphone Market and Case Studies, MCPC Smartphone Committee, Whitepaper, 22 June 2009

[II.] Little, R., (2010): Collective Purchase: Moving local And organic foods beyond the niche market, Countryside and Community Research Institute, University of Gloucestershire, Working Paper

[III.]Fusco, S., (2009): Exploring the Social Implications of Location Based Networking, University of Wollongong

[IV.] Stephen, T. and Toubia, O. (2009): Deriving Value from Social Commerce Networks, forthcoming: Journal of Marketing Research.

[V.] Consolve, S., et.al. (2005): Location Disclosure to Social Relations: Why, When, & What People Want to Share, Intel Research Seattle, (CHI 2005), Portland, Oregon, USA

[VI.] IE Market Research, (2010): 3Q.2010 Global GPS Navigation and Location Based Services Forecast, 2010 - 2014: Global market for GPS navigation and location based mobile services to rise to $13.4 billion in 2014, a CAGR of 51.3%, IEMR, 19 july 2010

[VII.] eMarketer, (2010): Mobile Users: Fans of Personalized Location Based Services, 04 March 2010

[VIII.] IDC, (2010): Worldwide Smartphone Market Grows 89.5% Year Over Year in Third Quarter As New Devices Launch, IDC, 04 Nov 2010

For the prototyping part the presented prototypes are the ones developed during the ALPS project and added to the figure later.
In order, the prototypes developed are:

- G-Expo FirstLife Game (Indoor Group Formation)
- Harahetta App (Local Group Deal Structures)
- Valaware Platform (Lifestyle based recommendation system)

Trendmapping

Output Synthesis
From the literature we identified some of the major trends driving (mobile) location-based services adoption. Some being the rapid growth of smartphone users (worldwide and also in Japan) and the positive forecasted growth of the mobile location-based services market in general.
We also identified trend among consumers and users of location-based services. Seeing a need for increasingly personalized and customized information by consumers, while on this aspect the disclosure of personal information and privacy are also important factors.
This information has been used in the Opportunity Identification section of the Investor Pages in this report and linked to many other methods used, among others to the Value Graph, Needfinding and Use Case Analysis.

Prototyping

Output Synthesis

The first prototype that was created was the *G-Expo Firstlife Game*. Its purpose was to test commerce oriented indoor location-based social network feasibility. The results have been presented by one of our members (Ro, J.) as a poster presentation at the Informs Annual Meeting 2010, Austin, Texas, USA.
The results from this prototype were of varying nature. Identifying some negative outcomes, such as the low participation in collective mode, and some positive ones, such as the high level of contribution in collective mode and the high activity rate in individual mode.
The implications are further discussed in the Prototypes section of the Invest Pages in this report.

Overall this prototype left us with the need and drive to develop a further extended web platform that would test the formation of collectives within real world local environments.

(the complete poster presentation can be found in the Appendix)

Harahetta App

The second prototype developed was the *Harahetta App*. This web-platform was targeted towards shop-owners and local consumers, and build to test local collective buying or deal structures in a real community.
While it did not get adopted by any shop-owners it did give us insights into what shop-owners expect from a mobile location-based service, namely a well-structured business model, and an extensive user base so that they can specifically target their customers. Shop-owners value their local customer base very highly and while wanting to reach their local customers better, they do not want to discount their products very easily.
Another function of the Harahetta prototype was to test and experiment with development on different platforms. It led us to conclude that development for smartphones by use of a web-platform is feasible for such application and considering the adoption rate of smartphones and mobile internet also very attractive.

More elaborate explanation of this prototype is given in the Prototype section of the Investor Pages.

(The flyer for this prototype can be found in the Appendix.)

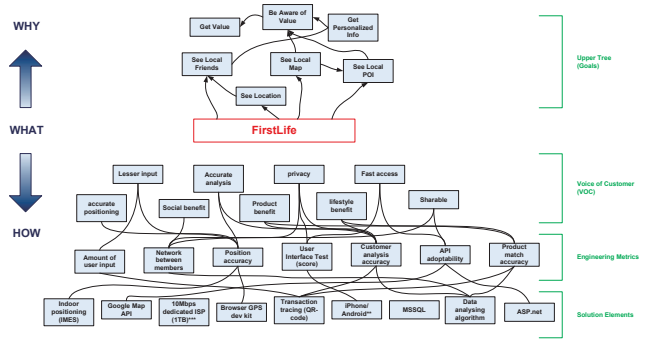
The third prototype was developed after the insights gained from the previous prototypes and the identification of a new market trend, that of personalized and customized information.
It was developed for smartphones using the Harahetta App as a basis and adding functionality by use of Google Map's API.

The prototype system functions as designed and gave us insights into the extensibility of lifestyle mapping and data analysis.
This Prototype has therefore also become the starting point to which the system proposed in this report is further characterized.

More elaborate explanation of this prototype is given in the Prototype section of the Investor Pages.

(The poster presentation of this prototype can be found in the Appendix.)

Value Graph



Tool Description

The Value Graph is a brainstorming tool for clarifying the goals of a product and exploring alternate concepts. It also captures the "What" of the system – The voice of the customer, the engineering metrics and the solution elements (design structure components).

Inputs Justification

Inputs from and to tools on design functions (QFD, Pugh, Morph, etc.), brainstorm and Literature.

Output Synthesis

The Engineering metrics and Solution elements from the Value Graph make up the system requirements to which the proposed system in this report is characterized.

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Robust Concept Development

Dimension of Operational Variation	Interaction Mechanism	System Characteristics	Analytical Tools
Context of Software Code Execution	Unexpected Errors in Software due to internal and external problems that may result in total system malfunction	Build Sufficient Redudancy and Appropriate Granularity into the Software. Build up the platform in borad modular fashion	Use Robust Software Development Techniques
Platform Architecture	Operating System Compatibility and Phone Type Variation	Our software must be platform independent as much as possible or be adapted for the most widespread platform and be compatible with most phone types and displays	Market Analysis and Platform Forecasting (QFD, Variety VOC, etc.)
User Interest / Motivation	Intention of User to use software might vary considerably	Effective choice-welfare mappings of user time, location and intention and the solution space proposed by the software. The software must, at the same time, be customized To the user as much as possible	User Needs Analysis (Market Segmentation / Spatial-Temporal Variation)
User Ability	Ability of User to operate such software might vary considerably	User-friendly Interface and error-proof operating environment	User Ability Analysis (According to Market) and Error-proofing techniques (FMEA, etc.)
Competitive Environment	Competition within value chain and potential Industry Development	Our software must continuously define its unique selling point within the location-based indoor commerce market	Industry Analysis (SWOT, etc.)

System Definition

A mobile software platform that enables the utilization of indoor positioning technology to facilitate the distribution of location-based services to users, in the form of lifestyle self-awareness and recommendation architecture, and to clients, in the form of facilitated and improved channels to communicate product awareness and product value

Tool Description

A Robust Concept Design is founded on the idea that much opportunity and risk of a product or process design and its related economic value in the context of use is concentrated in the conceptual stages of the designing and characterization phase. The term Robustness is then related to the degree to which potential variation in the final product context (be it interaction or other effects), is accounted for in its design or its flexibility thereof.

Inputs Justification

All Outcomes of the Phase Opportunity Identification form an input to a robust concept design such as:
Context Map: Problem Space
Context Map: Opportunities
CVCA
To-By-Using
Business Model Outlines

Output Synthesis

Key Dimensions of Operational Variation have been identified that will serve as an important input for the development stages in the System Characterization phase. Further Research and Tools should be used to identify to what extent system robustness can be implemented in the system. For example, with respect to platform architecture, does our user base show high correlation with one of the platforms? What is the risk of a change in consumer base on such questions as platform architecture. The most pressing issue related to product robustness is related to the user and client interest and motivation. If our service does not accommodate the needs of both parties, our concept design was not sufficiently robust.

Use Case Analysis

Tool Description

The Use Case Analysis is a tool that allows for more insights into the functional requirements of the system by mapping out who uses it and how they would like to use it. Scenarios of use are identified which are then related to certain system response requirements.

Inputs Justification

It helps to have a clear understanding of how your product or service creates value for the stakeholders involved. This means that at least the To-By-Using of the different stakeholders must be identified. Needfinding-like tools help illuminate aspects of the system that require special focus.

Output Synthesis

By identifying the different use case scenarios, more insights is attained surrounding the circumstances with which the product will be used. We have identified four scenarios (Hyena Forum, Value Center, Solitude Highway and Turtle Alley) to typify the different circumstances and their corresponding expected benefits for each stakeholder involved. We find that certain system characteristics show variety in relevance with respect to these scenarios. There are sophisticated trade-offs between the amount, quality and swiftness of different types of information required under different circumstances.

User Incentives

From User Context to User Activity

Types of Goods and Activities

Main Types of Goods and Activities		Social Dependance of Utility	
		Local Physical Presence	Non-Local Physical Presence
Duration of Good or Activity Utility	Short term consuption	Consumption in Bars, Café's Restaurants and Local Social and Collaborative Activities	Non-Social Retail such as FMCG and Online Social and Collaborative Activities
	Long term Consumption	Offline Social Relationships Luxury Goods Fashion Goods	Online Social Relationships Electronics Furniture

From Activities to Tools

The Benefits of Valaware to Users

Main Types of Tools		Social Dependance of Utility	
		Local Physical Presence	Non-Local Physical Presence
Duration of Good or Activity Utility	Short term consuption	Tools to find the right Products Locally and Quickly Tools to find the right People Locally and Quickly	Tools to find the right Products Tools to find the right People
	Long term Consumption	Tools to find the right Products Tools to find the right People	Tools to find the right Products Tools to find the right People

The Benefits of Valaware to Companies

Main Types of Tools		Social Dependance of Utility	
		Local Physical Presence	Non-Local Physical Presence
Duration of Good or Activity Utility	Short term consuption	Tools to communicate product awareness and quality quicjly and efficientlyto both individuals and groups	Tools to communicate product awareness and quality quickly and efficiently
	Long term Consumption	Tools to communicate product or service awareness and quality to individuals	Tools to find the right Products Tools to find the right People

System Response Requirements

From Tools to Tool Requirements

We establish that both user and client platform benefits are determined by the combination of user activities and client market operation. In combining the interfaces on which users meet clients, both user specific and whole system requirements can be identified through four specific scenarios. These four scenarios are given distinctive names:

- Hyena Forum
- Value Cluster
- Solitude Highway
- Turtle Alley

A Hyena Forum is the scenario of user-client interaction that is typified by a short term physical presence in an area and a need for quick and efficient communication of social presence, product existance and product quality. This involves such industries as bars, café's and restaurants as well as local social collaborative activities. User states correspond to the evening outgoing and discovery seeking types.

Value Cluster scenarios correspond to the context of user-client interaction where individuals seek high product quality and social presence, but will not stop untill true fits are found. Temporal pressure is of a lesser concern in such cases.

Solitude Highway scenarios refer to the information channeling of product value in fast-moving markets where there is no reliance on the surrounding social presence. Product quality and temporal constraints are of high importance.

Turtle Alley refers to all scenarios where neither physical presence or severe temporal pressures are present. Product quality becomes more important and the potential of customized product or service communication.

System Response Requirements based on Platform Use in terms of Scenarios

Hyena Forum

Instant Recognition of Social Space and its Relevance for the user. Highly effective lifestyle algorithms. Effective mapping of lifestyle to product characteristics and tailored value mapping from clients to users. Large user and client base.

Value Cluster

Large client base to facilitate product comparison as well as highly efficient product to user mapping. Highly efficient relevance indicator of social space. Product value dominates product awareness.

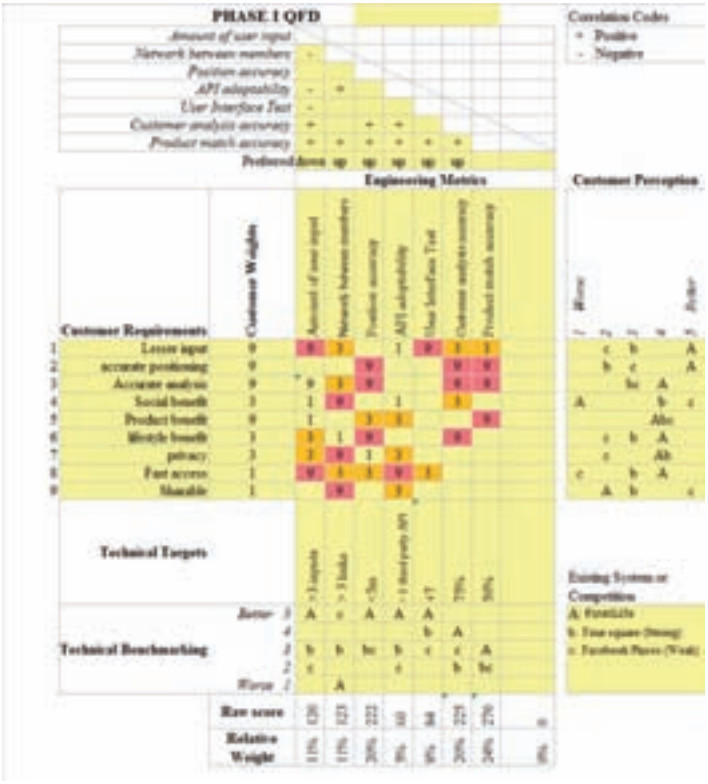
Solitude Highway

Highly efficient product to user mapping where no large concentration spans are required of the user. Product awareness dominates product value.

Turtle Alley

The system should facilitate especially the connection between user desire and product value. Options should be efficiently tailored towards the person in question, assuming high consumer involvement

QFD I



After filtering customer's needs (VOCs), QFD I results shows blueprint of which part (or element) of the system to improve in order to get the maximum satisfaction of the customers.

Input: Voice of customers - user oriented / Engineering metrics / Competitor's data in terms of selected engineering metrics

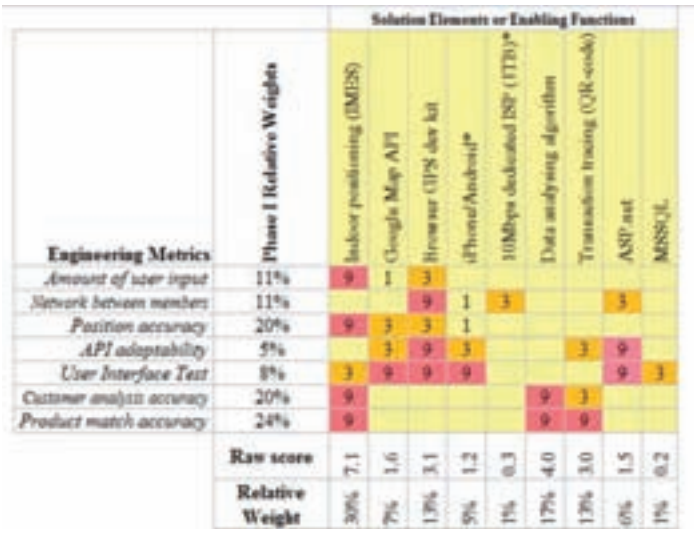
Output: weight scale of engineering metrics according to customer needs / competitor comparison

Key insight: To satisfy customer effectively, the algorithm that decides the character of the customer and finding matching product for them is the key. This may not be suitable to develop in the beginning phase. However, with other advantages, such as positional accuracy and boundary (indoors) our system hold noticeable advantage compared to other competitors in the market.

Morphological Diagram

Morphological diagram enables developer to visualize and compare between possible solutions before deciding which one is the most feasible.
Input: Engineering metrics / Technical development data (programming, web system) / Available Technologies
Output: Map of required technologies / Estimation of impact towards each final solution / solution comparison
Key insight: The two solutions show required technologies to be developed. Each solutions has somewhat similar impact towards engineering metrics. This implies the better (coastwise) solution may be determined after cost-worth analysis.

QFD II



Engineering Metrics	Phase I Relative Weights	Indoor positioning (IMES)	Google Map API	Browser GPS dev kit	iPhone/Android*	10Mbps dedicated ISP (ITB)*	Data analysing algorithm	Transaction tracing (QR-code)	ASP.net	MSSQL
Amount of user input	11%	9	1	3						
Network between members	11%			9	1	3			3	
Position accuracy	20%	9	3	3	1					
API adaptability	5%		3	9	3			3	9	
User Interface Test	8%	3	9	9	9				9	3
Customer analysis accuracy	20%	9					9	3		
Product match accuracy	24%	9					9	9		
Raw score		7.1	1.6	3.1	1.2	0.3	4.0	3.0	1.5	0.2
Relative Weight		30%	7%	13%	5%	1%	17%	13%	6%	1%

QFD II weights each solution's contribution to engineering metrics. This will later iterated by cost-worth analysis to allocate resources among solutions
Input: Engineering metrics / Possible solutions from morphological diagram / Technical evaluation data
Output: Weight of each solution's contribution to engineering metrics
Key insight: Investment in Indoor positioning system will give huge advantage in the market. Since, GNSS owns the patent of IMES technology; they will have significant advantage by spending less cost. Algorithm, which only can be developed later stage, needs to have more investment compared to other fields. GNSS will better off spending this cost in a long-term. Browser GPS development kit shows significantly higher weight compared to Smart Phone OS application (iPhone/Android). The solution1 (web-based application) from morphological diagram seems to be better choice.

Complexity/Cost-Worth Analysis

Part #	Solution Element	Cost	Relative Worth * * From QFD Phase II	Relative Cost	Cost / Worth
1	Indoor positioning (IMES)	$0.00	32%	#N/A	#N/A
2	Google Map API	$0.00	7%	#N/A	#N/A
3	Browser GPS dev kit	$0.00	14%	#N/A	#N/A
4	iPhone/Android**	$5,008.30	5%	49%	9.35
5	10Mbps dedicated ISP (ITB)***	$124.00	2%	1%	0.80
6	Data analysing algorithm	$5,000.00	18%	49%	2.69
7	Transaction tracing (QR-code)	$0.00	14%	#N/A	#N/A
8	ASP.net	$0.00	7%	#N/A	#N/A
9	MSSQL	$0.00	1%	#N/A	#N/A
	Total Cost	$10,132.30	100%	100%	

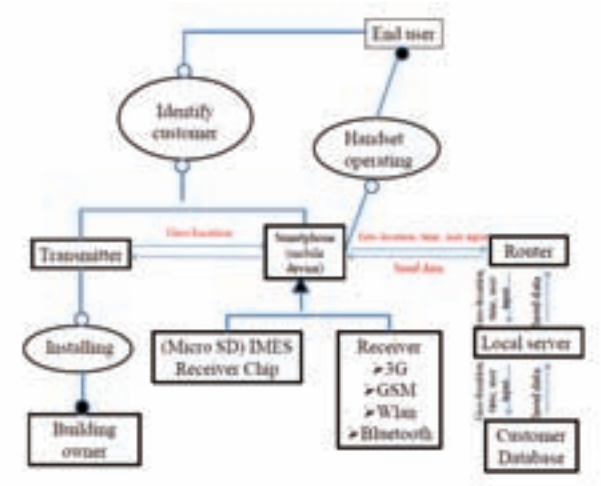
Version 1 Smart Phone OS Specific Application

Part #	Solution Element	Cost	Relative Worth * * From QFD Phase II	Relative Cost	Cost / Worth
1	Indoor positioning (IMES)	$0.00	32%	#N/A	#N/A
2	Google Map API	$0.00	7%	#N/A	#N/A
3	Browser GPS dev kit	$1,000.00	14%	11%	0.77
4	iPhone/Android**	$0.00	5%	#N/A	#N/A
5	10Mbps dedicated ISP (ITB)***	$124.00	2%	1%	0.89
6	Data analysing algorithm	$5,000.00	18%	55%	2.98
7	Transaction tracing (QR-code)	$0.00	14%	#N/A	#N/A
8	ASP.net	$2,000.00	7%	22%	3.19
9	MSSQL	$1,000.00	1%	11%	10.54
	Total Cost	$9,124.00	100%	100%	

Version 2 Web-Based Application

Cost-Worth Analysis decides resource (investment) allocation among each solutions determined in QFD II. The resource can be manipulated to make the project more efficient.
Input: Solutions from QFD II / Market Data / Budget data
Output: Relative Cost-worth / optimal resource allocation
Key insight: Web-based Application is a better choice then Smart Phone OS application due to less total cost (~$1000 difference). Spending too much budget on data analyzing algorithm might not be good solution due to high cost/worth ratio (<2.5). The result clearly shows that this is better done in long term investment. ASP.net and MSSQL also have high cost/worth ratio, however, this is due to lack of connection to voice of customers. These are more technical requirements that must be done, therefore, customer's might now know the advantage of using these platform (or even PHP and MySQL)

Object Process Methodology



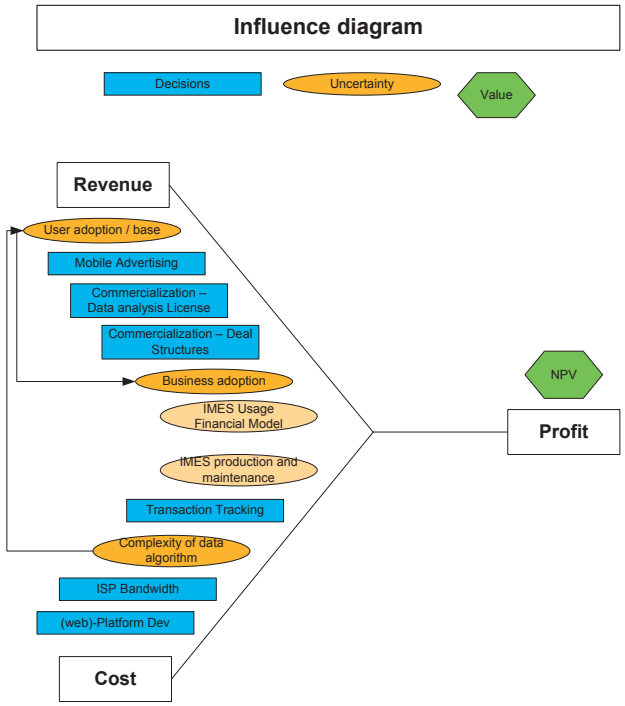
Tool Description
The Object Process Methodology maps the major (technical) system components. It is useful for easily spotting interfaces between components for which the system is further designed in later stages.
Input Justification

GNNS for IMES technology infrastructure.
Dave Chaffey's work on E-Business Infrastructure, from:

- Chaffey, D. (2009): E-Business and E-Commerce Management, 4th Edition, Pearson Education Limited, Harlow, Essex, England.

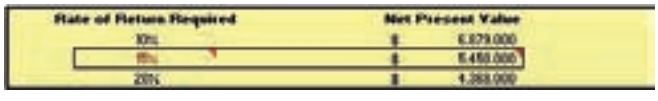
Output Synthesis
The modern smartphone is the crucial component to the system. It functions as an aggregator and distributer of data and information, communicating the geo-location data to the service databases through the use of mobile data networks, while receiving back data from the service through the same networks and presenting this to the end user. All of this has to be designed in a way that is almost effortless to the end user.

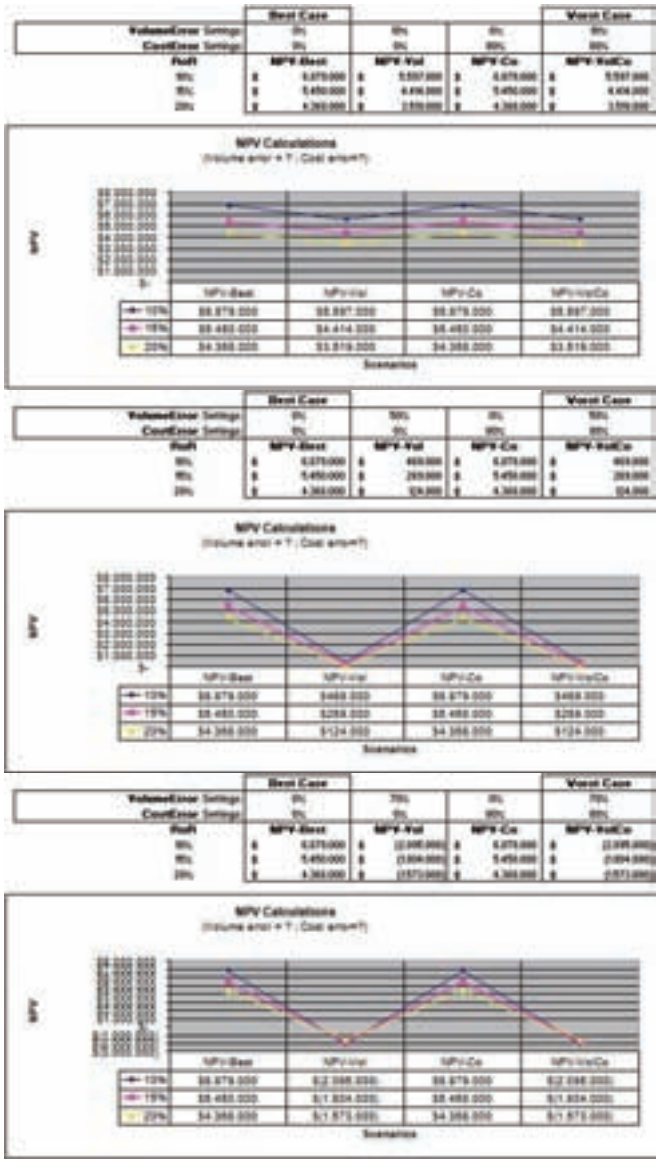
Influence Diagram



Tool Description
The Influence Diagram graphically presents the relationships between contribution terms, uncertainties, decision points and value nodes. It shows their contribution to value/profit and can be used as a basis for future NPV calculations.
Inputs Justification
The inputs for the cost factors are identified in QFD analysis, the inputs for revenue factors are identified through the business model and CVCA.
Output Synthesis
On the basis of this diagram a Net Present Value Analysis is made. However the uncertainties on some cost factors as well as revenue factors are quite large.

Profitability Analysis – NPV



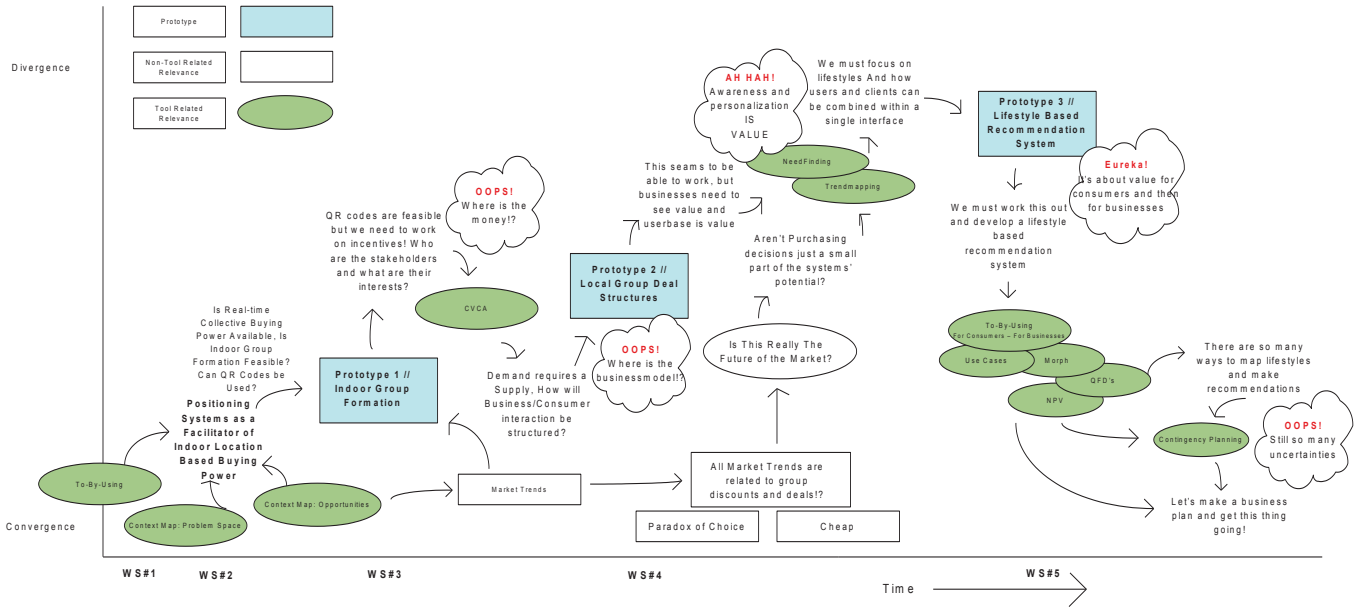


Tool Description
The NPV is one of the most important components within any economic project and serves to both illuminate and evaluate the financial potential of project outcome. It consists in identifying revenue and cost origins in detail, both in the present and in the future, so as to attain a complete financial picture of the project. In combination with a sensitity analysis, it will be possible to identify the assumptions that carry the most risk, or the most potential gain.
Inputs Justification
An NPV requires a detailed cost and revenue structure of the product and processes leading up to a finalized product. It is necessary that both Opportunity Identification and System Characterisation is completed before considering making an NPV. An Influence Diagram may serves as direct input to an NPV.
Output Justification
We found that the lucrativity in the service proposed heavily depends on the volume of clients that can be attracted to join. A 50% error in our Volume Expectation still produce positive NPV outcome but a 75% error will prove detrimental. This is a pessimistic reflection on reality, as it assumes that the cost-structure of the company would develop without taking the low volume of sales into account. This cost structure is still chosen in this way due to the special detachment of labor to the volume of sales in

software companies and the fact that labor contracts are somewhat fixed in any given year. An extended NPV analysis and Sensitivity analysis would take this into account, probably resulting in higher NPV.

ALPS Roadmap and Reflections

ALPS Roadmap



In this section we reflect on our ALPS project. It was a long and especially windy road which saw many hurdles but just as many moments of inspiration and creativity.
We present above our ALPS roadmap, showing key points as the project went on. Not everything could be included, as it would end up looking like a plate of spaghetti, so in the reflections below we revisit it in some more detail.

Reflections

Starting from Workshop #1 the project team, consisting of five members, started thinking of a system that would facilitate IMES technology into Indoor Location Based Buying Power.
The idea emerged to develop a Music service that would provide live broadcasts of music to customers inside music stores as a replacement for the traditional sound sampling stations. Using IMES broadcasting functions.
This idea was consequently presented at workshop #2.

At workshop #3 the project team saw itself expanded by two team members from The Netherlands, Delft University of Technology. Eager to see what ALPS was all about and which ideas the team had formed all members joined the third workshop.
By then the Music service concept had been killed in favor of a service that would facilitate not just indoor location based buying power but, indoor location based COLLECTIVE buying power. The new team member were quickly brought up-to-date on this idea.
During the workshop a quick experiment showed the audience how using three people that want a cup of coffee to generate 10 people willing to buy coffee in return for a discount incentive.

Towards workshop #4 the team worked hard to develop a prototype that would test the feasibility of this new indoor location based collective buying power. And with the help of a fellow student created the FirstLife Game experiment, using QR-codes to track people and register their behavior. It was used at the G-Spatial Expo in Yokohama to moderate success, collecting a dataset of about 300 participants.

During workshop#4 we tried to present our prototype and let the students and lecturers experience the power of the social collective by playing the game in both individual and collective mode. This unfortunately did not work that well.

Admirably our team leader, Jin-Wook Ro, went on to present the gathered results on Commerce Oriented Location-based Social Networks at the INFORMS Annual Meeting 2010 in Austin, Texas, USA.

OOPS!
Before he left though, a major conclusion was drawn. We had been focusing much on the feasibility of indoor group formations and technology to track behavior, but not much thought had gone into where the money is coming in.

Realizing that our purpose was to develop a business concept to promote IMES, we starting creating a model that would provide location based services to local businesses (restaurants to start with) and make use of collective powers and social networking. This concept was put into a prototype called the Harahetta App and we tried to convince local restaurant-owners in Hiyoshi to use our app so we could test and experiment Local Group Deal Structures.

OOPS!
No shop-owner was willing to participate in our experiment. However from their reactions we saw interest in mobile location based services indeed. What was lacking was

incentive. Incentive comes from value, and value lies in having the right user base and the right service.
We revisited some tools and by some Needfinding and Trendmapping found new insights.

AH HAH!
To establish value we need to focus not only on business but also on the consumer. Wanting to build a user base, we need to grasp onto consumer trends.
There is a trend among consumers who, in a society that is increasingly connected to the internet and increasingly aware of options, want to know what is 'good' for them. Consumers want more and more personalized and customized information. And with the right user base, we can create value / we own value, for businesses.

Upon the return of the team leader this idea had developed into a concept for a mobile location-based service that would provide a lifestyle based recommendation platform to consumers and be extendible to businesses for commercialization.
This was our EUREKA!
Developing a service that is valuable to consumers and becomes valuable to businesses. Combining the two into one platform that is social, collective, powerful and scalable.

To this new concept we extended the original Harahetta App prototype to test the functioning of a Lifestyle Based Recommendation System. Learning that web-platforms for smartphones are versatile systems, but also that mapping location data to behavioral patterns and lifestyles can be both very powerful and complex.

The results and work up to here were presented at workshop #5. Showing in a final presentation our business concept, as well as a video of the working of our Lifestyle Based Recommendation Platform.

OOPS!
After the final workshop we continued on the business concept by revisiting QFD and NPV analysis. While insightful, it also led to indentifying many uncertainties that require both contingency planning as well as further analysis and more revisiting of these important tools before a business plan can be composed.

That is where this final report ends. It contains many of the insights and things we learned about mobile location-based services, as well as concrete ideas for creating one that stands out.
However, as there are still many uncertainties, there is also recommendations for future work.

Acknowledgements

ALPS Project Team 13 would like to thank Assistant Professor Sun Kim for the guidance of the ALPS project and his advices to us during the course of the ALPS project.
We would like to thank Professor Kohtake and GNSS for providing us with IMES technology and allowing us to be part of the G-Expo in Yokohama.
Finally we want to thank Thomas Dall'agnese for helping us develop the G-Expo game experiment and doing the hardship of programming.

References

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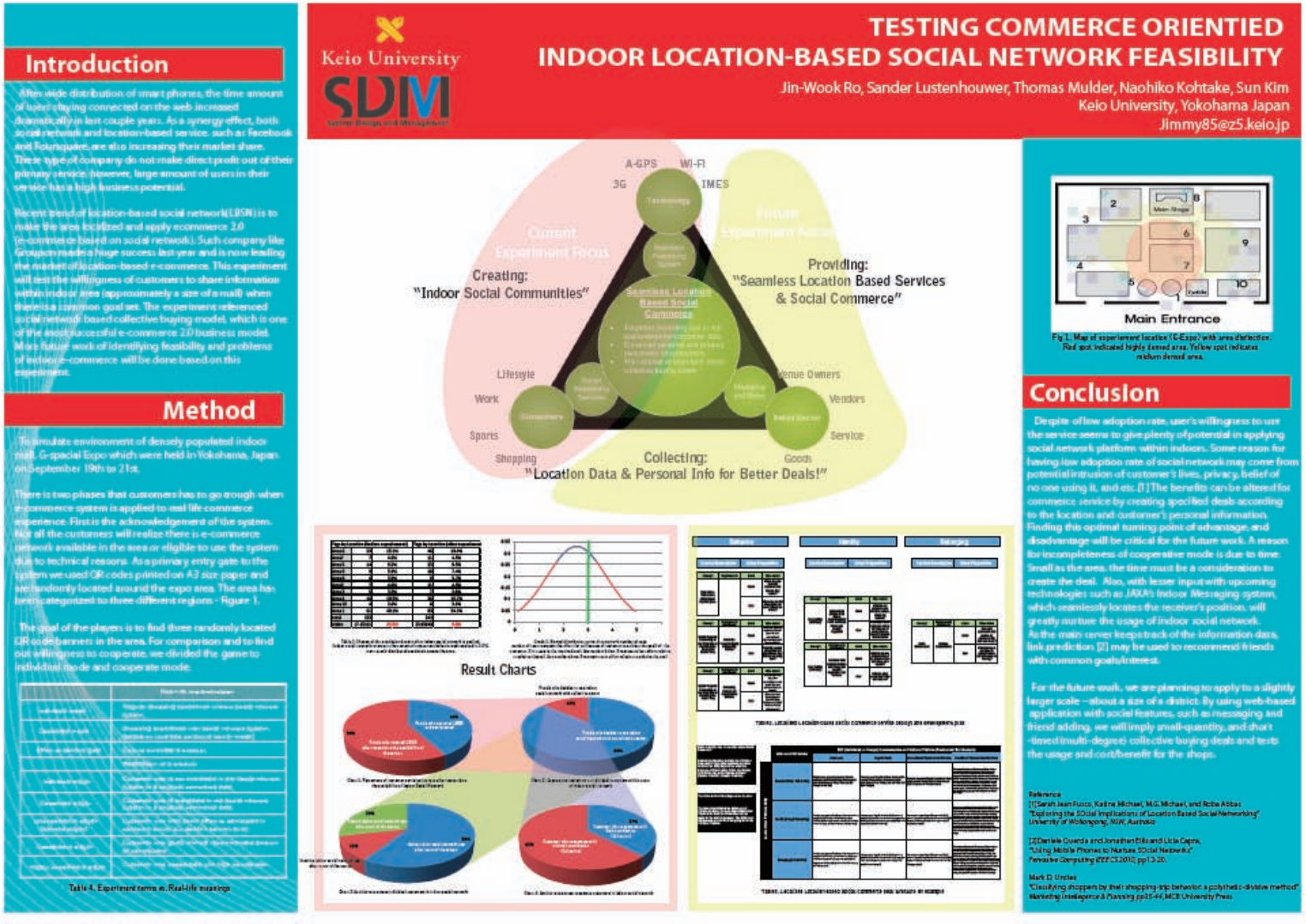
[Online: http://www.emarketer.com/Article.aspx?R=1007545]

Appendix

1. G-Expo, Firstlife Prototype
2. Harahetta App Flyer
3. ValaWare Poster Presentation

G-Expo, Firstlife Prototype

Inform Annual Meeting 2010, Poster – Testing commerce oriented indoor location-based social network feasibility, (2010). Austin, Texas, USA.



Harahetta App Flyer

ValaWare Poster Presentation

Group 13’s Final Presentation Slides

ValaWare

ALPS Group 13

Making better choices,
for yourself
and for others

GNSS Technologies

Our Project

To
- promote the installation of IMES into various facilities

By
- proposing and developing a business concept and model

Using
- ALPS Design Tools and a lot of creativity from our team!

IMES

IMES is an indoor positioning and messaging system, allowing for seamless indoor and outdoor positioning

Our Project

To
- promote the installation of IMES into various facilities

By
- proposing and developing a business concept and model

Using
- ALPS Design Tools and a lot of creativity from our team!

We propose...

ValaWare

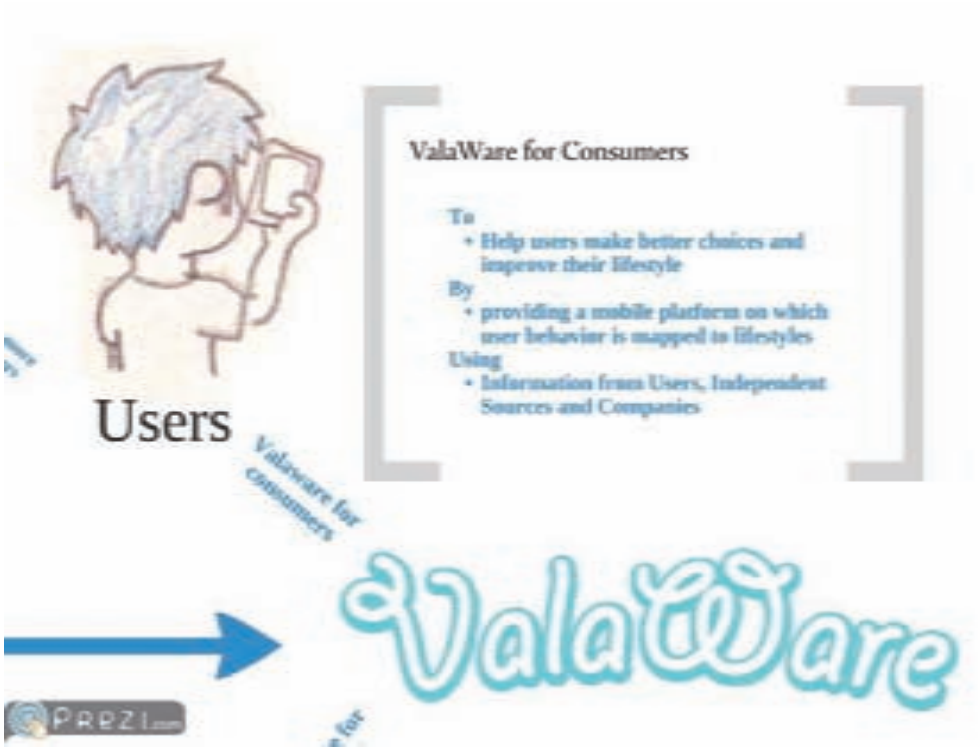
A mobile Location Based Service allowing users to make better choices in both commercial and non-commercial space

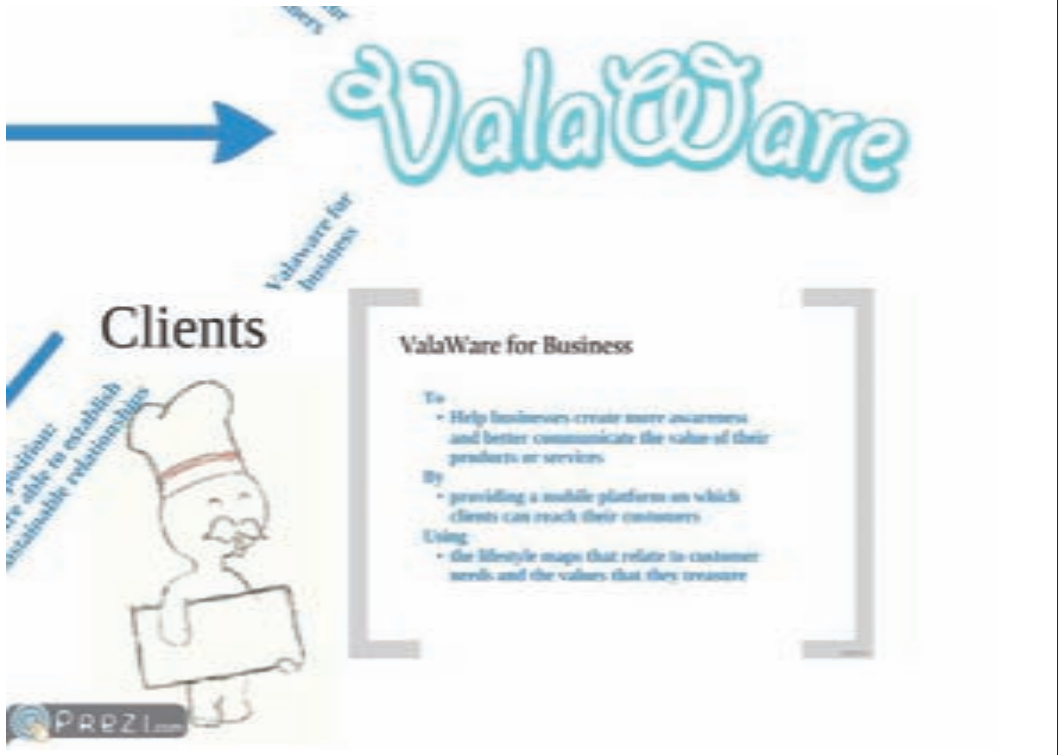
ValaWare for Consumers

To
- Help users make better choices and improve their lifestyle

By
- providing a mobile platform on which user behavior is mapped to lifestyles

Using
- Information from Users, Independent Sources and Companies





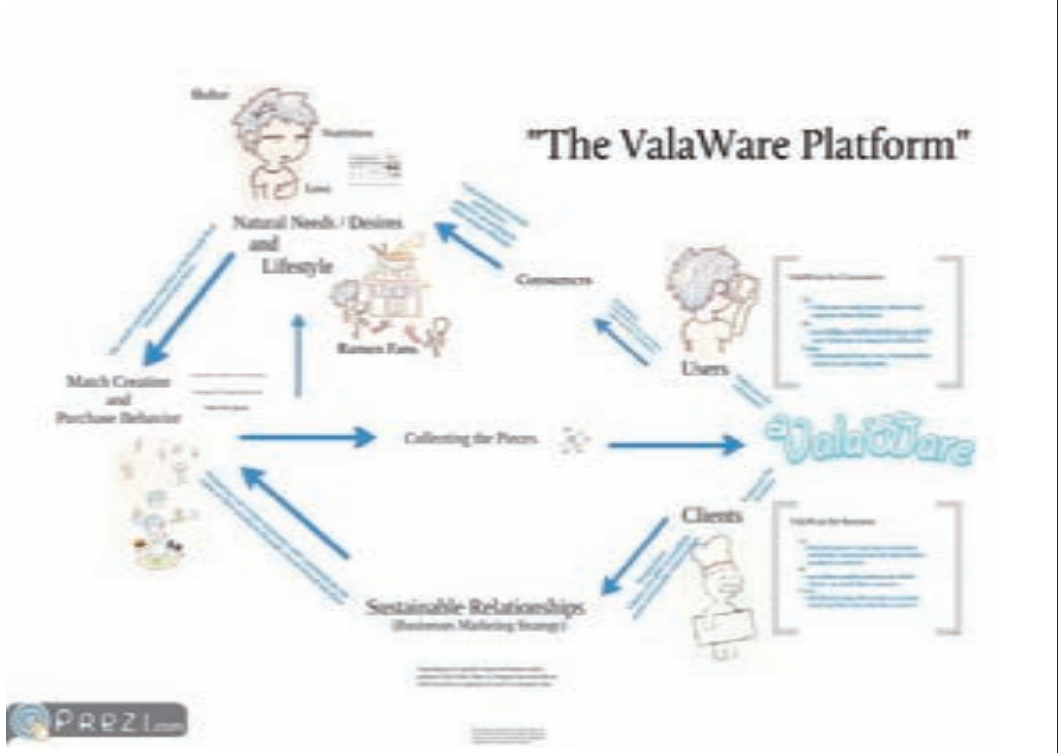
ValaWare for Business

To
- Help businesses create more awareness and better communicate the value of their products or services

By
- providing a mobile platform on which clients can reach their customers

Using
- the lifestyle maps that relate to customer needs and the values that they treasure

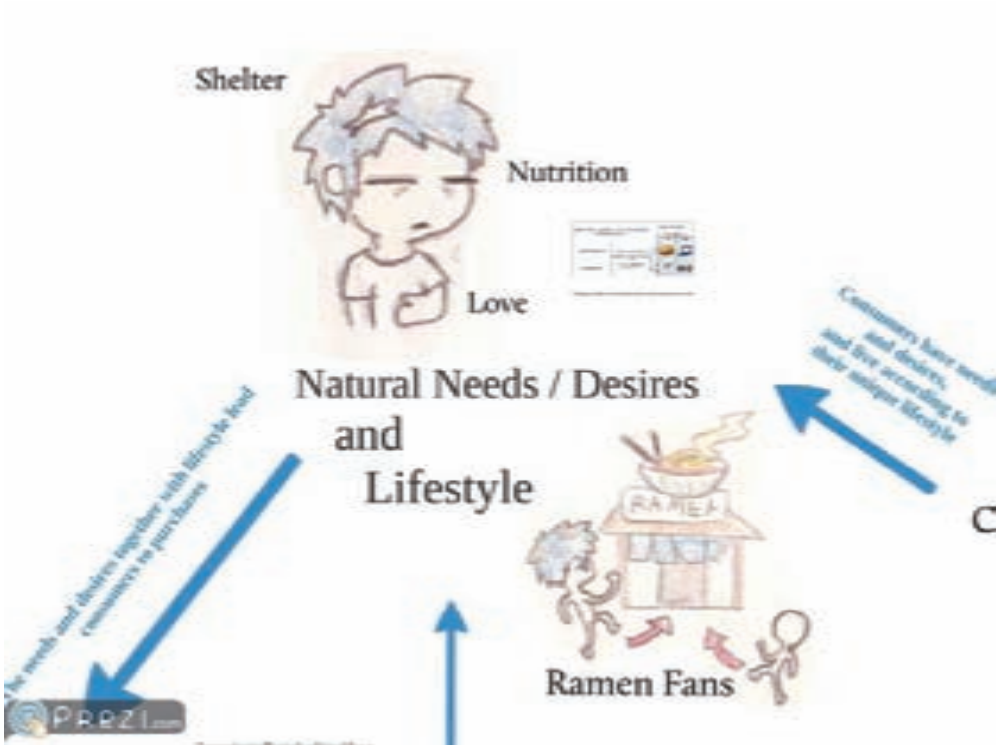
PREZI




Proposition:
Valaware Users are more
value aware Consumers
Users
ValaW
To
By
Usi


Proposition:
Valaware Users are more
value aware Consumers


Consumers have needs
and desires,
and live according to
their unique lifestyle


Shelter
Nutrition
Love
Natural Needs / Desires
and
Lifestyle
Ramen Fans

Market Structuring within Location Based Social Networking Services				4 types of goods	
				Temporal Utility Spread	
				Short	Longer
Location Component	2 Questions we asked ourselves To what extent is product utility spread out over time? To what extent is product utility dependent on others?	Dependency on others	Weaker		
Social Component			Stronger		

Helping us define what channels and tools help consumers the most

PREZI

The needs and desires together with lifestyle lead consumers to purchases

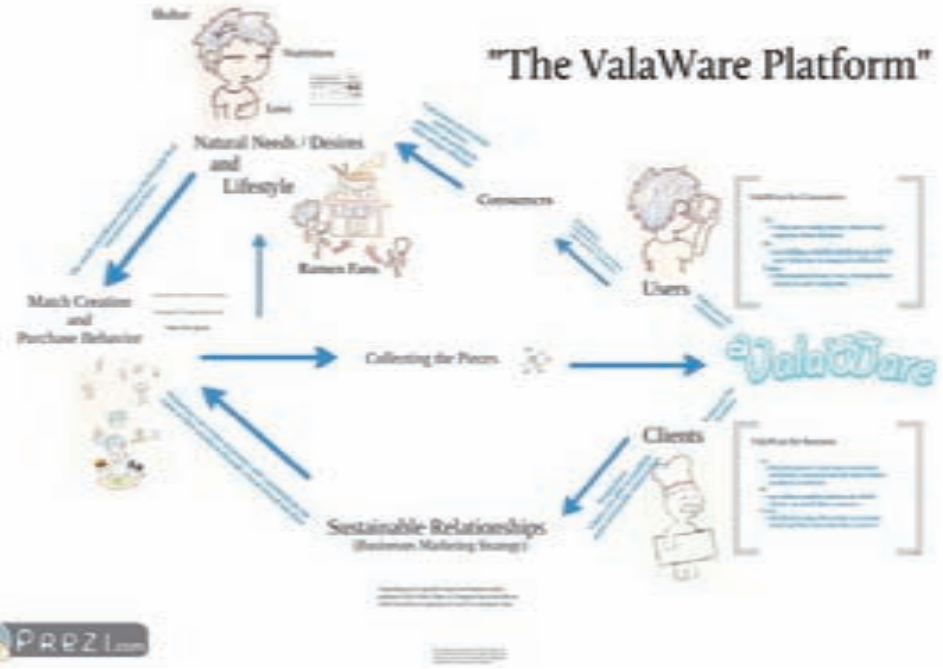
ation

PREZI

Match Creation and Purchase Behavior

PREZI

"The ValaWare Platform"



PREZI

Clients

Proposition:
Clients are able to establish
more sustainable relationships

ValaWare for B

To
- Help business
and better com
products or se

By
- providing a m
clients can rea

Using
- the lifestyle m
needs and the

PREZI.com

Proposition:
Clients are able to establish
more sustainable relationships

PREZI.com

Sustainable Relationships
(Businesses Marketing Strategy)

Depending on its Specific Front-End Market and its position in the Value Chain, A Company has to decide on which interfaces to operate to reach its customers-base

PREZI.com

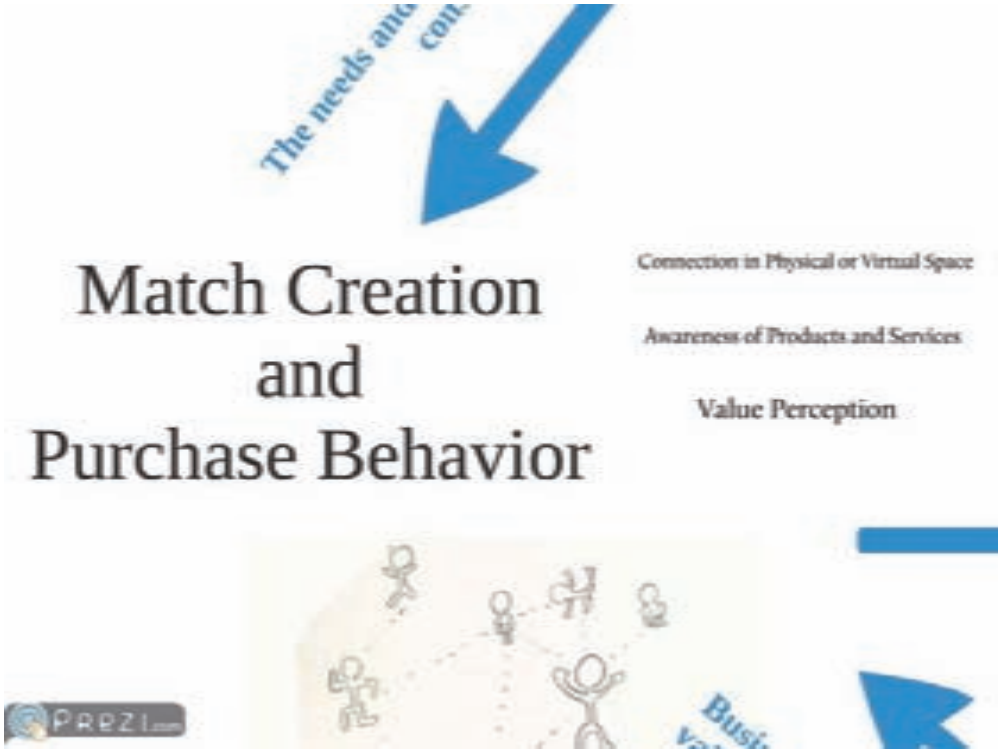
usinesses Marketing Strategy

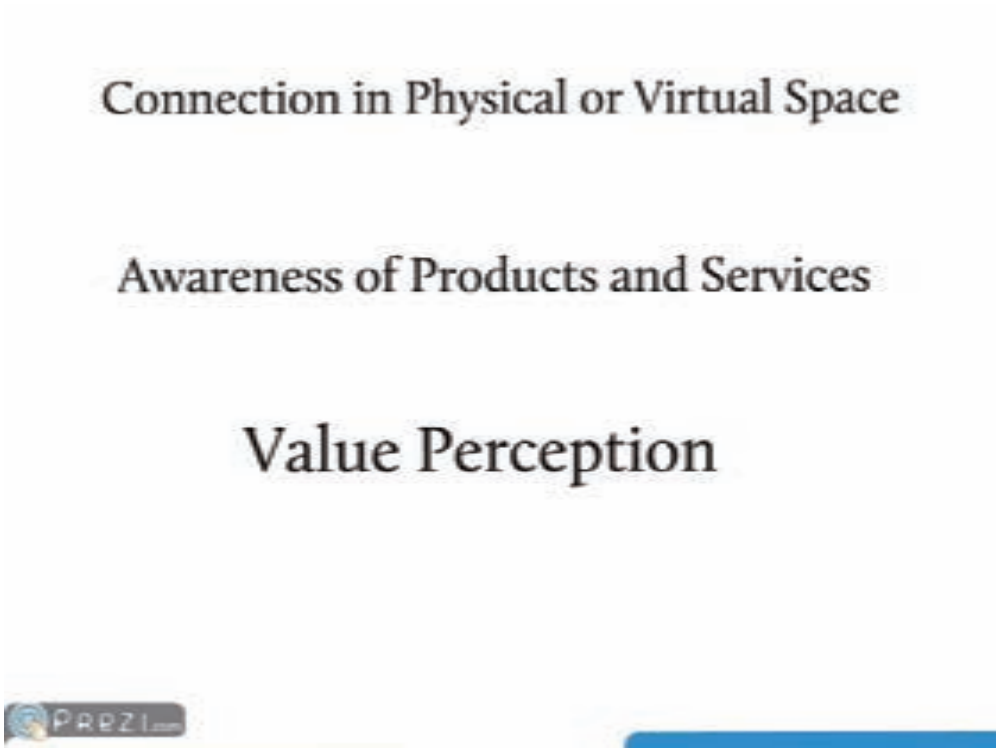
Depending on its Specific Front-End Market and its position in the Value Chain, A Company has to decide on which interfaces to operate to reach its customers-base

PREZI.com

By Providing new channels for the acquisition and

By Providing new channels for the acquisition and distribution of information, Companies will want to be present to have more competitive advantage and they will need to be present, to be heared.





With Valaware we improve on the existing forms of physical and virtual interaction by creating a location based virtual envirnoment. Users and CLients can now communicate between and through eachother wherever they are.

Connection in Physical or Virtual Space

Awareness of Products and Services

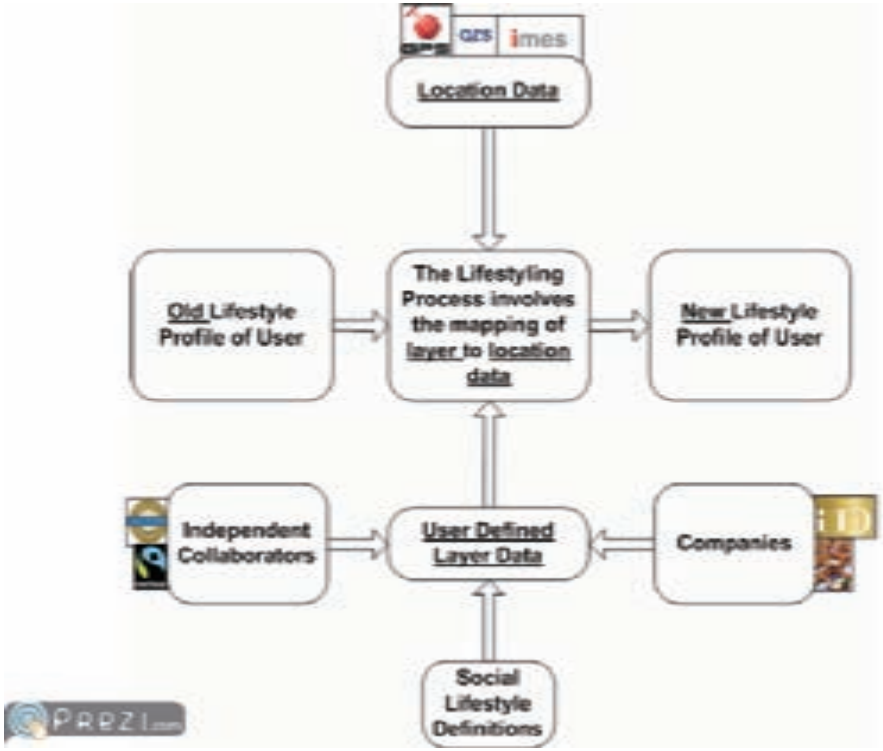
Value Perception

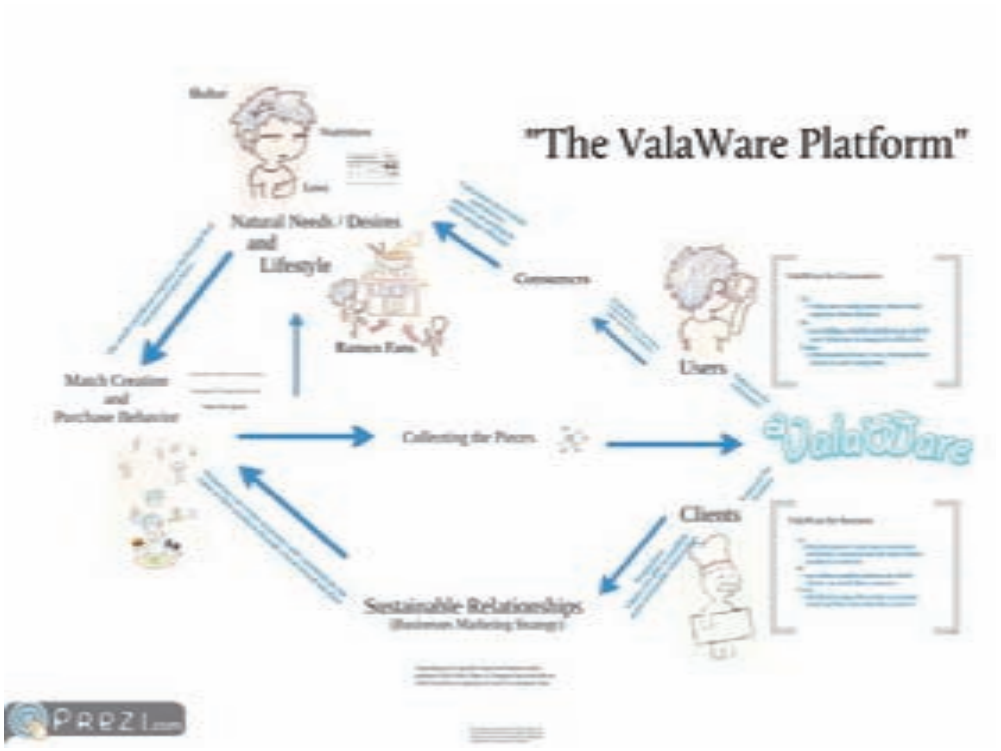
Connection in Physical or Virtual Space

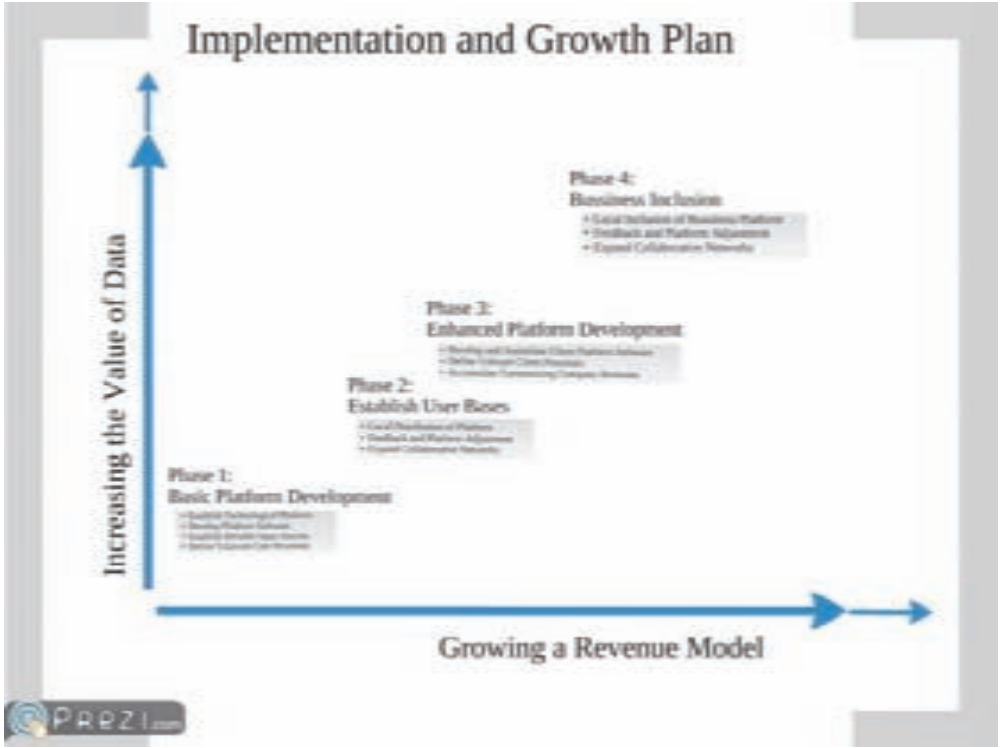
Awareness of Products and Services

Value Perception

Collecting the Pieces


gps
imes
Location Data
Old Lifestyle Profile of User
The Lifestyling Process involves the mapping of layer to location data
New Lifestyle Profile of User
Independent Collaborators
User Defined Layer Data
Companies
Social Lifestyle Definitions
PREZI


"The ValaWare Platform"
Natural Needs / Desires and Lifestyle
Commerce
Users
Match Creation and Purchase Behavior
Collecting the Pieces
ValaWare
Clients
Sustainable Relationships
PREZI


Implementation and Growth Plan
Increasing the Value of Data
Phase 4:
Business Inclusion
Phase 3:
Enhanced Platform Development
Phase 2:
Establish User Bases
Phase 1:
Basic Platform Development
Growing a Revenue Model
PREZI


ValaWare
PREZI