

Increasing Value through Location-based Services

Michael L. Sena Consulting AB Berlin – December 2006



The Workshop

- What is the LBS Value Chain
- Who are the customers
- What is the situation today
- Where is the market headed
- Technical requirements for LBS
- Partnering strategies
- LBS for different target groups





Let's first define what we are talking about.

Mobile Services – Any type of service that can be delivered to or from a mobile device.

Location-based Services – The delivery of local environment information to or from a specific location to help the user of the service perform a task. A subset of Mobile Services.

In-vehicle Services - the application of digital information, location sensing and wireless communications <u>in the vehicle</u> <u>environment</u>. Commonly known in the automotive industry as telematics. A subset of Location-based Services.



Entertanment M-commerce PIM Mobile Services _ocationbased Intranet Services Financial Internet Services Access

Mobile Services - Any type of service that can be delivered to or from a wireless device, such as financial services, weather, Internet access, personal information management, mcommerce, entertainment and location-based services.







In-vehicle Location-based

Services - the application of digital information, location sensing and wireless communications <u>in the vehicle environment</u>. Commonly known in the automotive industry as **telematics**.

Systems with one-way communications to or from the vehicle involving such technologies as RDS-TMC,cell broadcasting, satellite and paging can also be classified as Telematics.





> Hello-oh I'm he-ere

What is a Location-based Service today

Location-based services deliver information and assistance to (and from) individuals who use positionenabled devices to communicate their location via a wireless network to service and content providers.

- Find it!
- Find me!
- Take that!
- Fill 'er up!



Microsoft Local Search Hybrid Aerial Photo and Map



What is the LBS Value Chain¹

A Value Chain is a sequential set of primary and support activities that an enterprise performs to turn inputs into value-added outputs for its external customers. The idea is to add value at each

stage and end up with margin.



1. The **value chain** was described and popularized by **Michael Porter** in his 1985 best-seller, *Competitive Advantage: Creating and Sustaining Superior Performance*, New York, NY The Free Press



The Traditional Linear Value Chain Applied to Location-based Services





The LBS Value Chain a la Porter





The Wireless Linear Value Chain



Turn inputs into value-added outputs and end up with margin.





The LBS Value Chain





Prepared for the IQPC

Advanced Navigation Conference Berlin

The SDRS Data Delivery Model in the U.S. December 2006

Dynamic Traffic Information Process Flow in U.S. Market: Navteq Traffic





Who are the Customers





2. The terms Find It and Find Me are described in a White Paper by TeleMapics owner and president, Michael W. Dobson, Ph.D. See <u>www.telemapics.com</u>. Take that! and Fill 'er up! are mine.



Find It! Customers



Results 1-10 of about 1,204 for Excel Conference Centre near London

- A. Express By Holiday Inn London-Southwark 103-109 Southwark St, London, SE1 0JQ 0870 400 9068
- C. Hemming Information Services 32 Vauxhall Bridge Rd, London, SW1V 2SS 020 7973 6404
- E. Naval & Military Club 4 St. James's Square, London, SW1Y 4JU 020 7827 5757
- G. Learnpurple Dudley House, 36-38 Southampton St, London, WC2E 7HF 020 7836 6999
- Radisson Edwardian Mayfair Stratton St, Mayfair, London, W1J 8LG 020 7629 7777 - 1 review

Business listings provided by Yell.com™

- B. 51 Buckingham Gate Suites & Apartments
 51 Buckingham Gate, London, SW1E 6AF 020 7769 7766 - 2 reviews
- D. The Hanover 32 St. Georges Drive, London, SW1V 4BN 020 7834 0367 - 21 reviews
- F. Abeno Too 17-19 Great Newport St, London, WC2H 7JE 020 7379 1160 - 1 review
- H. Mermaid Conference & Events Centre Puddle Dock, Blackfriars, London, EC4V 3DB 020 7236 1919
- J. British Universities Film & Video Council 77 Wells St, London, W1T 3QJ 020 7393 1500



Google Maps Pushpins



Find It! Customers

- Integrated navigation systems in cars and trucks:
 - Factory-fit Aftermarket-fit
- Portable navigation systems:
 - PDAs
 - **Smart Phones**
 - Personal Navigation Devices





Find It! Customers

- Roaming Holidays with IntelliTours
 - San Diego, CA Tour Coupes Montgomery, AL – Lighting Route
- CityShow in NYC

Map tracking your location as you walk throughout NYC
Continuously updated
'Nearby' list - tells you what is exciting near your location
'Subway Finder' and
'Restroom Finder' features
Selected Restaurant and Shopping Information





These are Tour Coupes, threewheel vehicles rented from IntelliTours. Narrated tours of sights the vehicles pass are triggered by GPS technology built into the vehicles.



Find It! Customers

Top Ten Local Search Brands in UK

- Tesco
- Pizza Hut
- McDonald's
- ASDA



- Domino's Pizza
- Premier Travel Inn
- Halfords (Consumer Electronics)
- Sainsbury's
- KFC
- Argos (Competitor to ASDA)

UK Taxi Supermarkets

Fast food

Drinking

- Cinema
- Hotels
- Bed & Breakfasts
- Home & Garden
- Electrical & Electronics
- Clothing & Fashion





Prepared for the IQPC

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Top Ten Local Search Categories UK

Find Me! Customers

Vehicle-related Safety and Security Services

- Emergency assistance
- Roadside assistance
 Personal Safety and Security
 Services





Volvo On Call System and Customer Service Center Workstation



Find Me! Customers

Tracking your every move

 Verizon Chaperone - \$10 per month. Child Zone, an additional \$10 per month for when your child strays out of a specified area (geofencing).

- Disney Mobile based on Sprint with similar service.
- Nextel/Sprint AccuTracking for \$6 per month keeps track of kids, spouses, personal belongings.



- Locate with Chaperone
- Programmable Keys
- Speakerphone
- Dedicated Emergency Key

ABI Research estimates consumer tracking services will be worth \$2 billion a year in North America by 2011, up from \$30 million in 2006.







Take that! Customers

Send information from the vehicle to a data processing center.

- Floating car data
- Vehicle performance
- Systems status
- Delivery status

Send information from the vehicle to other vehicles.



BMW Assist Extended Floating Car Data



Take that! Customers

An OnStar customer who has a GM Oil Life-equipped vehicle can subscribe to **OnStar Vehicle Diagnostics**. Enrolling entitles the customer to a monthly report listing the status of a set of his or her vehicle's functions By enrolling, the customer authorises OnStar to request the report from the vehicle approximately every thirty days. There is no additional charge for this service.





Fill 'er up! Customers

Download the latest maps for the area where a customer is driving. Download guidebook information for a region or town.

Download software that the customer needs for the specific country or terrain



Number of Users Receiving the Same Information



What is the Situation Today



FAQ: Why hasn't LBS taken off?

Answer #1 – What planet are you on? Google, Microsoft, Yahoo, MapQuest are in the LBS business

Answer #2 – Garmin, Magellan, Navteq, TeleAtlas, TomTom, Xanavi, Zenrin, Denso, Autoliv, Siemens, Blaupunkt are in the LBS business

Answer #3 – OnStar, BMW Assist, Volvo On Call, Fiat, PSA, Cobra, PTV, Tracker, Securitas, Allianz, Norwich Union are in the LBS business

Answer #4 – Tolling, Pay-per-Use Insurance, Intelligent Speed Advice, Traffic Information are all LBSs.

Download MapQuest Find Me Now!

What? You don't have MapQuest Find Me yet? Well, you should. For just \$3.99 a month on select Sprint, Nextel and Boost phones (\$5.99 w/out a dataplan on Nextel or \$1.50 Daily on Boost), you can use your phone's GPS to find points of interests, get directions and even find other Find Me users.



AGILE Project

 To precisely characterise the LBS market in terms of classes of applications.

 To push further for an open business model as a framework for success of Galileo-based applications and consolidate the position of European industry.





AGILE – The GNSS Market

- GNSS entered mass market in 2006.
- Nokia's acquisition of Navteq (€6 billion). Wake-up call for venture capital.
- Four systems GPS, Galileo,
 Glonass, Compass (China)
- Increasing prominence of GNSS enabled phones (Nokia N95, Samsung i550)





AGILE – The GNSS Market

Obstacles

- Positioning technology not always available
- Content and Integration lack of standards, and still not full content
- Mobile Phone Requirements fitting all of the functions in the mobile environment is a challenge
- Unproven Demand few successes of LBS outside of Japan and Korea

Overcoming the Obstacles

- Positioning technology Galileo and EGNOS bring improved performance
- Content and Integration Institutional push and R&D funding
- Mobile Phone Requirements Funding R&D in FP7
- Unproven Demand Field trials and development of end-to-end applications







AGILE Project – The Technology

• W





AGILE Project

Why Galileo?

- Shortcomings of existing GNSS (GPS)
 - Not designed as civilian systems
 - Only one signal for civilian users
 - Performance levels not suited for many commercial and safety of life applications
 - No service warranty or signal integrety
- Galileo Differentiators
 - Not

What is the status of Galileo?

- Galileo testbed V1 and V2
- EU intends by end of 2007 to make a decision on implementation of system and its financing.
- Publication of Interface Control Document 2008-2009
- First four satellites due to come on line in 2010.
- Fully Operational Capability 27 (+3)
 Galileo Satellites
- Operational phases begin in 2013



AGILE Project

Where is Galileo most relevant?

What is the status of Galileo?

- Publication of Interface Control Document 2008-2009
- First four satellites due to come on line in 2010.










The Psychology of New Product Adoption

Companies who <u>started</u> and then <u>stopped</u> their location-based services developments (e.g. Three, Ford Wingcast) were those who were looking at the new technologies as "easy sells" or "smash hits", rather than truly appreciating the amount of behaviour change that would be required by users to appreciate their real value.

Location-based services are like satellite radio, seat belts and even mobile phones. They are innovations that will take time for consumers to first understand, and then begin to demand from their car manufacturers and service providers. Those companies who tailor their introductions for the "long haul" will eventually be rewarded.





Stakeholders have to win

Stakeholders in Off-Board Navigation

- 1. Roaming network operator
- 2. Map server platform provider
- 3. End user
- 4. Licensed software
- 5. Map data supplier
- 6. Handset provider
- 7. Application provider -
- 8. Home network operator



The Application Provider's current location on the Pain/Gain chart is perhaps the reason why this particular application has not taken off.



Stakeholders have to win

Stakeholders in Telematics

- 1. OEM Local Dealer
- 2. OEM National Sales Company
- 3. Hardware Supplier
- 4. Roaming Network Operator
- 5. SIM-card Provider
- 6. Customer Service Center
- 7. Telematics Service Provider-
- 8. End User
- 9. Vehicle OEM Marketing Sales and Service



There is still too much pain and too little gain for the Telematics Service Provider and the Vehicle OEM



Understanding the Needs

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Compiled by SBD, 2005



Understanding the Needs

On an average month in the third quarter of 2005, OnStar North America was involved in: 900 automatic airbag notifications 500 stolen vehicle location assists 15,000 emergency calls 44,000 remote door unlocks 340,000 route support calls 25,000 roadside assistance 5,500 Good Samaritan calls 32,000 remote diagnostics 12.6-million hands-free calls

4 million subscribers to the OnStar Service



Cadillac: OnStar - North America Emergency Assistance

REF: Cadillac_EmergencyAssistance



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"When product functionality is not yet good enough"--which is where we are today--"integrated companies that design and make end-use products typically make the most money for two reasons:

> "The interdependent, proprietary architecture of their products makes differentiation straightforward; "The high ratio of fixed to variable costs creates steep economies of scale-larger companies can amortize high fixed costs."

"As the links between subsystems standardise, the subsystems that have internal architectures that are technologically interdependent are where the money flows." Clayton Christiansen (Disruptive Technology) on Dis-integrating Products.



A few examples



PTV AG

PTV AG

PTV is the leading provider of online navigation technology worldwide Successfully enhancing mobile navigation with LBS, such as:

- Connection to business directories and other data operators
 - Combining navigation and external data bases
 - Example: looking for the nearest restaurant
- Scenic routing







© PTV AG 2000 1



PTV AG

PTV AG

- > Emergency calls
 - > Locating mobile phones in cases of car breakdown or emergencies
 - > ADAC
 - > Björn Steiger Foundation
- > Dynamic POIs





Webraska

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- 1. Leading company, profitable and experienced
- 2. Most powerful and reliable server technology
- Best client technology with support for: Windows Mobile SP & PPC, Symbian S60 & UIQ, Blackberry, Java
- 4. Support for **on-board** (local) AND **off-board** (server) navigation
- 5. Support for true real-time traffic for route optimisation
- 6. Dynamic POIs: user dynamic for consumer and enterprise needs
- 7. Virtuous circle: more users => more value => more users
- 8. International support (support, map coverage and updates, languages)
- 9. Partner of device manufacturers and LBS application developers
- **10. Partner of operators** with flexible pricing model and complete product:

logistics, support, admin server, stats, POIs integration, billing, call centre)





Telmap Navigator

Unique patented MOND technology allows

- Autonomy once on route (independence of drops in network coverage)
- Spontaneous reroute with no server connection
- Voice calls while navigating
- Also used for map matching and map rendering

Full-featured pedestrian navigation

- Detailed moving maps featuring street labels & pedestrian centric POIs
- Available even with no GPS coverage







Telmap Navigator

Fuzzy smart search

- Advanced address search that uses both "look-alike" and "sound alike" matching provides smart input-error correction
- Graphically rich and intuitive UI providing a smooth user experience
 Multi platform enabling the support of a wide range of devices
 - BlackBerry, Java, Symbian, Windows, BREW

Real-time traffic

- Automatic dynamic updates and traffic-aware rerouting, full event information with location and delay estimates information
- Speed camera information
 - Drive safely, arrive on time











Where is the Market Headed



It's headed toward building viable LBS businesses

Understanding the difference between the basic business models:

Buyer-Seller Relationships

Many of the current LBS businesses are simple buyer-seller relationships. Someone has a product or service to sell, and a user can be found to purchase it.

Two-sided Markets

LBS requires an intermediary, and this has not been well understood.



Market for Navigation Systems

A Buyer-Seller Market

- Map data supplier sells to OEM or system developer or directly to end user.
- System developer sells to OEM or after market distributor.
- OEM or aftermarket distributor sells system to end user via dealer.





What is a two-sided market? ³

Transactions in a two-sided market always have a triangular set of relationships. Two user groups interact with each other through one or more intermediaries, called *platform providers.* There is an appropriate platform to connect the parties on both sides.

• There are two sides of the network, one who wants something and the other who can deliver it.

• Either the person who wants something needs to be found by the person who has the product or service, or the person who wants the services needs to find it.

• One of the parties has to subsidize the provision of the platform.

3. Strategies for Two-sided Markets: Thomas Eisenmann, Geoffrey Parker, and Marshall W. Van Alstyne; Harvard Business Review, October 2006







Two-sided Networks

Platform providers have to choose a price for each side, factoring in the impact on the other side's growth and willingness to pay.

Same side effects – Increasing the number of users on one side of the network makes it either more or less valuable to users on the same side.

Cross side effects – Increasing the number of users on one side of the network makes it either more or less valuable to the users on the other side. \longrightarrow On-line Auctions and Searches

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Proprietary Platforms

- Operating Systems
- Search Engines
- Game Devices

Shared Platforms

- PCs
- DVDs
- Petrol Fueling Stations
- Petrol Stations and OSs



The Ultimate Two-sided Network – Yellow Pages





Another Classic Two-sided Network



Many stations require that the person purchasing the fuel is able to operate a fuel pump.



Two-sided Networks – Find me!

Ambulance, Police, Rescue, Fire Roadside Assistance

Vehicle Security Service

CSC Operator



This is not yet functioning as a perfect two-sided platform since service side is not realising enough value through their connection to the user side, and the platform provider (WirelessCar) is not yet delivering recognisable value to either side of the network.

Volvo On Call Platform

Architecture

Proprietary protocols provided by Volvo and Autoliv

> Platform subsidised by Volvo and provided by WirelessCar

Proprietary platform provided service w to Mondial/Viking . single pus

Rules

Customer pays one-time cost of system and service

Delivers data



Vehicle Owner

Receives rovided service with a single push of a button







Two-sided Networks – A working model

Ambulance, Police, **Rescue**, Fire **Roadside Assistance** Vehicle Security Service

> **Delivers report** to customer on status of vehicle

OnStar Operator



Delivers requested services to customer

Vehicle Repair Service **Telephone Service Location Services**

OnStar Platform

Architecture

Proprietary protocols provided by OnStar

Platform subsidised and operated by GM/OnStar

Proprietary platform provided by OnStar

Rules

GM receives valuable information from OnStar about possible vehicle faults, saving money on warranty repairs

Customer pays one-time cost of system and annual subscription fee.

Delivers data from vehicle on vehicle performance



Vehicle Owner

December 2006

Receives service with a single phone call

> **Customer receives** benefits in peace of mind, convenience,



Two-sided Networks – Take That!

Insurance company lowers premium claims and has a higher retention rate for customers		Pay As Insu Archi Pro	You Drive rance tecture ducts	Vehicle owner has lower premium COStS (depending on his or her own driving performance)		
Insurance Company	Subsidizes Platform	Services Rights	Infrastructure Pricing Terms	Customer receives		
By subsidizin platform, the insurance co enables othe services	ng the mpany r P	Pro Ru Proprietary on-b connectiv	tocols ules oard units require vity solution.	additional services Traffic Information eCall a bCall Route Guidance Stolen Vehicle Tracking		



Two-sided Networks – Take that!





Vehco Co-Driver is a product for streamlining the flow of information between staff at the office and the driver and truck in the field. In the truck Co-Driver consists of a standard pocket PC with a mobile GPRS connection and the Co-Driver software. The device in the truck is, at the same time, a tool for the driver and a system that collects information from the vehicle. At the office Co-Driver is installed on a standard PC and is used for gathering, analysing and transmitting different kinds of information to and from the driver and the truck.





Two-sided Networks – Take that!







Two-sided Networks – Fill 'er up!



conditional access broadcast by SDR network



Technical Requirements of LBS



Evolution of Location-based Services Technology





The usual approach to choosing an LBS platform

Major Strengths	Webraska	MapQuest	NavTech	Google	DeCarta (Telcontar)	Telmap	ESRI	MapInfo	Autodesk
Routing and Mapping	•	•	•	•	•	•			
Spatial Searches				•		•	•	•	•
Multi-modal	•								
Map Display		•		•		•	•	•	•
Traffic Content	•		•						
Multiple Data Source Integ	•	•		•	•	•			
Telecom Facility Managem't							•	•	•
Size and Stability		•	•	•			•	•	•
S.W. Dev. Track Record		•	•				•		•
Number of LBS Customers									
In-vehicle Applications	•		•	•	•	•			
Real Time Map Updating									
Total Points	N	М	0	Р	Q	R	S	Т	U

Like a dinner in a Chinese restaurant, rather than just one dish for everyone, it is always better with a taste from many dishes. What you really want is the best from each one.







Prepared for the IQPC

December 2006

SENA

ITS Strategies

Advanced Navigation Conference Berlin

Atomotive OEMs In-vehicle Systems Development Roadmap - 2003-2013



Prepared for the IQPC

Advanced Navigation Conference Berlin

Automotive OEMs In-vehicle Systems Development Roadmap - 2013-2023

December 2006




Technical Requirements for LBS

- Accurate map data
- Different types of map data
- Position-enabled devices
- Free-form location parsing
- Web services
- Flexible platform





Different kinds of data

- Navigable data
- Detailed geometry and slope
- Geo-coded locations
- Aerial photography
- Digital terrain models
- 3D building geometry
- Traffic information and other types of travel-related data





Mash-ups

Asynchronous JavaScript and XML AJAX coding provides application-

like functionality in a browser.

JavaScript running in the browser pulls in new map tiles from the server as needed for smooth panning.

Simple-to-use APIs from Google lowered the boundary for entry into LBS. Anyone is an expert.









After Mash-ups





Web Services

A self-describing, self-contained modular unit of application logic that provides some business functionality to other applications through an Internet connection.

Accessible by means of messages sent using standard web protocols, notations and naming conventions like XML.





Road Traffic Information Provision

Road Traffic Information Provision

- Service implementation
 Public data provision
 Private companies
- Status of standardisation
 - **Current generation**
 - Next generation TPEG
- Trends

Location referencing DAB versus Satellite Digital Radio

TPEG International Profile





Driver Support Using Map Data

Progress in public/private cooperationSOLVI

Status of FeedMap and plans for future developments

Progress and results of Maps&ADAS Developments with ADASIS Forum

- Status of standardisation
- New working groups

Summary of new initiatives

ADAS Electronic Horizon





Mapping Mobile Phones

ITIS Holding's Estimotion TomTom's Applied Generics

Applied Generics' RoDIN24





Real Time Rome

SENA ITS Strategies

Partnering Strategies



Prepared for the IQPC

Advanced Navigation Conference Berlin

The Mapping Industry Circa 1982

December 2006





Prepared for the IQPC

Advanced Navigation Conference Berlin

The Paper Mapping Industry Circa 2002

December 2006





Customer Daimler On Star BMW Volvo Others Chrysler Management Service and Appell PTV Microsoft Webraska De Carta Navteg **TeleAtlas** Google Content 0 Service T-Mobile Wireless TargaElda On Star ATX Connexis Integration Car Services Hardware and Others Continental Autoliv Delphi Software On Star ATX TargaElda WirelessCar Connexis Others Connectivity Network Others Vodafone t-Mobile Telenor

In-vehicle Location-based Services - The Horizontal Industry Structure



LBS for Different Target Groups



Size Versus Number of Opportunities

The number of large opportunities with big returns are few.

The key is to deliver meaningful results to smaller and smaller groups.



Number of Opportunities





Integration Risks Who has to adopt the solution before the customer can? PSAPs? FIA providers? Police? Inferdebendence Platalion Interdependence Risks Whose project must succeed before yours can? Telecoms? Connectivity providers? Automotive QEMs? The project must be coordinated with complementary innovators. Initiative Risks Initiative Risks What to do. What to leave to others. What to avoid.

Risk Management

First you need to chart the risks to which your project initiatives are subject.

- Are you doing the right thing?
- Who controls access to your eventual customer?
- Whose initiatives need to succees before yours can?



The Truck Cockpit

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Entertain me.

Protect our truck.

Make me efficient.



- High quality sound
- TV/Video
- Talking books
- Own language programs

- Advanced Driver Assistance Systems
- Emergency services

- Routing with truck attributes and real time information
- Logistics and Fleet Management



Develop an LBS product for a heavy truck

Product category

- Entertainment
- Protection
- Efficiency

Risks

- Initiative
- Integration
- Interdependence
 Size of Opportunities
 Numbers of Opportunities





A Fifteen Minute Drill

Truck Product	Red Group	Blue Group	Green Group
Product	Entertainment	Protection	Efficiency
Initiative Risk			
Integration Risk			
Interdepencence			
Size of Opportunity			
Number of Opps			





Map of the Best Places to Visit in Waikiki, Hawaii. (For the on how to use this map, including in

Kaliwa Gahu Vacation Your Kalua Vacation Dream Rentali Vila, Horne, & Apartment Sentals www.HawalamDeathSentals.com Hawaii Vacation Rontals. Gorgeous Hawai rentals. Great value. Photos Unk to web stiss. www.12hawait.com

Haloiwa Howali Find Low Hotel Ratesi Sa Before You Sook Online. Italeiwa OneTime.com

Ada by Googie



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Questions

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Michael is an internationally recognised expert in telematics, digital map databases, location-based services and navigation. He has owned and run a successful consulting practice since 1983 with clients in Europe, North America and Asia in the automotive, software, system development, service and database industries. He served as an expert delegate to both the European CEN and international ISO standards committees, and has participated in and managed international ITS projects. He is project manager for IVSS-SOLVI.





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