

Mobile Location Directory Finland



Tekes

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Mobile Location Directory Finland 2007

Foreword



Source: ESA

Welcome to the Mobile Location Directory Finland 2007.

Mobile Location Services are fundamentally characterised by two aspects: mobility and location information. The end users themselves may be mobile, it may be their friends, relatives or even their pets. In the market the interest may be in the location and status of the mobile workforce, fleet or assets.

The provision of services enhanced by the location information requires partnership between many players

present within the complex value chains.

This is the second edition of the Finnish Mobile Location Directory presenting most of the players from all aspects of the value chain in Finland. We hope that this directory will help the reader in finding suitable partners.

Kari Tilli

Director

Tekes, the Finnish Funding Agency for Technology and Innovation

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Introduction

The purpose of this directory is to give a short presentation of Finnish companies and organisations working in the mobile location services sector. An overview, the expertise and product offering as well as the contact details are provided for each

organisation. For additional information please contact the company or organisation directly or visit their websites. Although the aim of this directory has been to cover the sector as thoroughly as possible some companies and organisations are not yet

included in this edition. If you are unable to find the expertise you are looking for, please contact Tekes, the Finnish Funding Agency for Technology and Innovation – contact information can be found on page 34.

Overview

Background

Mobile location services are services that exploit the knowledge about where a mobile terminal capable of wireless data transfer is located. The end user or another person may carry the terminal, or it may be attached to an object or an animal. The wireless data connection is typically based on cellular technologies or wireless LANs. The location of the terminal can be defined by network-based positioning, satellite positioning or indoor positioning technologies. The most suitable technology depends on the application, the environment and the terminal capabilities. As the mobile location services sector is still in its early phases, the terminology varies and they are also called location based services, location enhanced services and location dependant services.

The mobile location services are designed for both the professional and the consumer market. Typical professional applications include e.g. fleet and mobile workforce management as well as routing and navigation. Typical consumer services include community services such as "friend finders", proximity services, traffic and weather information, navigation services and public sector emergency services.



Source: Tekes



Source: ESA

National programmes

Tekes, the Finnish Funding Agency for Technology and Innovation, has recently launched several technology programmes, which will include development of mobile location applications and services.

MASI – Modeling and simulation

The duration of the technology program is five years (2005–2009).

Program overview

The aim of the MASi technology programme is to develop modeling and simulation knowledge and methods, enhance their utilization in Finnish industry and service sector, and thus create a competitive edge for the Finnish companies on the global markets. Furthermore, the programme is expected to catalyze new businesses based on modeling and simulation.

The approach of the technology programme will be multidisciplinary and therefore, the research and development projects funded within the programme will combine knowledge and skills from a wide variety of technology areas and scientific disciplines.

The estimated total volume of the technology programme is approximately 92 million euros, whereof the share of Tekes is 46 million euros.

www.tekes.fi/masi

Serve – Innovative Services Technology Programme 2006–2010

Serve programme targets to increase and broaden the services development of the Finnish industry and to promote academic research in service related areas. Innovative service concepts and internationally competitive business models renew and strengthen the Finnish economy.

Service business models

A service innovation is a service product or service process that is based on some technology or systematic method. Service innovations can for instance be new solutions in the customer interface, new distribution methods, novel application of technology in the service process, new forms of operation with the supply chain or new ways to organize and manage services.

www.tekes.fi/serve

VAMOS – Value Added Mobile Solutions 2005–2010

The programme aims to find ways to utilize the newest mobile technology solutions.

VAMOS focuses on implementing wireless technology solutions widely regardless of business area. Selected areas are industry, transportation, construction and services. Second important goal is to launch successful commercial mobile prod-

ucts, generate lucrative business and create new jobs.

The budget of the programme is appr. 202 million Euros. Tekes' share is appr. 76 million Euros.

www.tekes.fi/vamos

GIGA – Converging Networks 2005–2010

Telecommunications is one of the fastest growing industries worldwide. The growth is mainly based on the mobile telephone and related services. Finland is a pioneer in certain areas and now one of the leading players in wireless communication.

GIGA in brief

The development of broadband technologies – especially wireless broadband – converge network technologies, services and content in a newly profound way driving different players into ever closer collaboration. In order to boost this collaboration Tekes, the Finnish Funding Agency for Technology and Innovation, launched GIGA technology programme. The programme is a combination of research and industrial projects working together for a common goal. In addition to project funding, GIGA offers networking, seminars, and market and technology surveys to its participants. The five-year GIGA programme, with a budget totalling EUR 240 million and ending in 2010, is funded by Tekes with EUR 100 million. The Finnish Funding Agency for Technology and Innovation

Focus areas of GIGA

- wireless access, e.g. radio interfaces, radio channels, terminals
- seamless networking, e.g. handover, QoS, security
- network support, e.g. management, monitoring, testing

- telecommunication business, e.g. new business models, value chain evolution.

www.tekes.fi/giga

Embedded Systems – Ubicom 2007–2013

Ubicom aims at developing and piloting new embedded system technologies. Their utilization in entirely new fields is promoted. Ubicom also targets at strengthening Finnish research community for the future technologies in this field. Anticipated European ARTEMIS Joint Undertaking will be financed through Ubicom.

The estimated total volume of the technology programme is approximately 294 million euros, whereof the share of Tekes is 117 million euros.

www.tekes.fi/ubicom

Galileo

Galileo is being designed to be Europe's own global navigation satellite system, providing a highly accurate, guaranteed global positioning service under civilian control. It will be inter-operable with GPS and GLONASS, the two other global satellite navigation systems. A user will be able to take a position with the same receiver from any of the satellites in any combination. By offering dual frequencies as a standard, however, Galileo will deliver real-time positioning accuracy down to the metre range, which is unprecedented for a publicly available system. It will guarantee availability of the service under all but the most extreme circumstances and will inform users within seconds of a failure of any satellite. This will make it suitable for applications where safety is crucial, such as running trains, guiding cars and landing aircraft.

The first experimental satellite, Giove-A, was launched in 2005. The objective of this experimental satellite is to characterise the critical technologies, which are being developed under ESA contracts. Soon four operational satellites will be launched to validate the Galileo space and related ground segment. Once this In-Orbit Validation (IOV) phase has been completed, the remaining satellites will be installed to reach the Full Operational Capability (FOC) from 2010 onwards. The fully deployed Galileo system consists of 30 satellites (27 operational + 3 active spares), positioned in three circular Medium Earth Orbit (MEO) planes in 23616 km altitude above the Earth, and at an inclination of the orbital planes of 56 degrees with reference to the equatorial plane. Once this is achieved, the Galileo navigation signals will provide a good coverage even at latitudes up to 75 degrees north, which corresponds to the North Cape, and beyond.

Finland supports the Galileo programme in the European Space Agency and the European Union. Financial contribution to the development of the European satellite navigation constellation is about 15 M leading to industrial participation in the satellite and ground segments of Galileo. In addition to investments in the Galileo large investments are foreseen in the development of end user technologies and applications taking full benefit of the inter-operability of GPS and Galileo.

Within several national research programmes navigation application development has been funded from the late 1990's and onwards. Collaboration between Tekes and the Ministry of Transport and Communications has been strong in this theme. Finnish organisations are also involved in navigation projects in the European Commission's Sixth Framework Programme.

4TS Finland Oy

4TS is an innovative ICT company based in Finland focusing on location based solutions, hardware, software and services for mobile telematics applications. The core competences of the company include development of complete mobile data transfer systems and location based services that improve the user's efficiency.

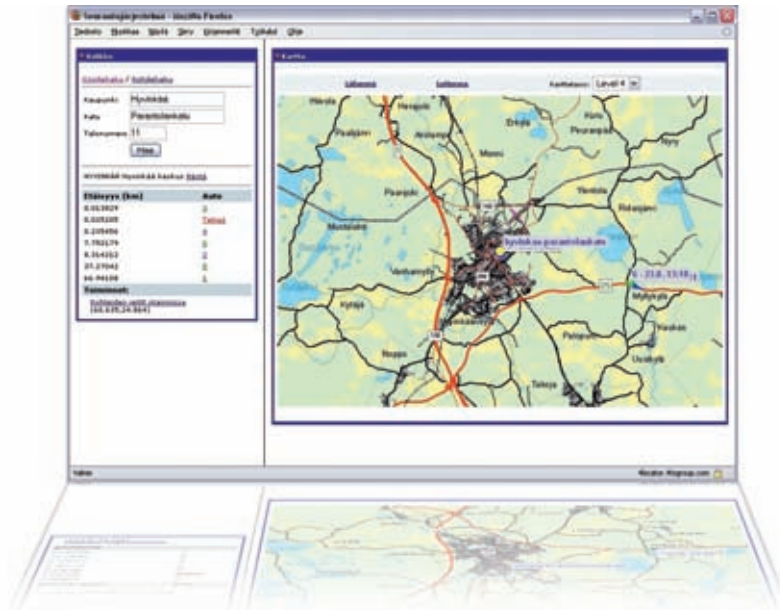
4TS produces innovative location based solutions and services for business clients and consumers. The company's broad product range covers positioning services, complete mobile data transfer and tracking systems, and tailor made solutions for corporate customers. 4TS's products are complete solutions, including software, hardware, maintenance and support.

Solutions are based on GPS or GSM positioning technologies and they support GSM (SMS, GPRS) and TETRA networks for data transfer. Solutions can be integrated with most of the available location based devices.

4TS has years of experience of integrating LBS to its customers processes and its solutions can be easily modified to meet all needs. All software solutions are designed with high usability, information security and operational reliability as the highest priorities.

Expertise in location based services

- Providing web or client based LBS for safety, security and fleet management purposes
- Developing tailor made mobile telematics applications
- Integrating location based solutions into existing IT systems
- Using GSM and TETRA networks as data transfer channels



Fleet management tool, 4TSFINDER™, is compatible with both GSM and TETRA networks.

- Delivering complete solutions including software, hardware, maintenance and support.

Main contracts and projects

Oy Rolac Ab

Volvo Care Track System is a fleet management system for construction equipment. The system, based on 4TSRTC™ software, is used by Volvo Ab's subsidiary Rolac and its customers.

Falck Rosqvist Oy Ab

The company offers 24-hour assistance, emergency and towing services nationwide, and uses 4TSFINDER™ software for fleet management.

Group 4 Securicor

G4S (Falck Security) is one of Finland's largest security companies. G4S uses 4TSALARM™ software to provide tracking and alarm monitoring services.

Oy Esperri Ab

Esperi, a subsidiary of the Finnish Red Cross, provides emergency and care services for the elderly. 4TSALARM™ is used to provide their Safe Line Plus™ tracking and alarm monitoring service.



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Aplicom Oy

Aplicom is a European pioneer in professional vehicle telematics and fleet management equipment, offering a complete range of vehicle computers. With over fifteen years' experience in mobile data communication design and production, Aplicom focuses on developing and marketing high quality, technologically advanced, fully programmable vehicle computers for professional use. Aplicom's strategy is based on openly programmable hardware platforms, an easy-to-use applications environment and professional support processes for an expanding network of partners. The focus is on vehicle telematics and other wireless m2m (machine to machine) market segments.

Productivity with Aplicom vehicle computers

With Aplicom's products companies can link vehicles into their information system and improve the productivity of their vehicle fleet. Their service improves and fleet management becomes more effective, which enhances their competitiveness in the market. Aplicom solutions are dedicated to maximising the advantages of mobile data communication, from goods and passenger fleets through to emergency services and vehicle hire. Aplicom vehicle computers offer a wide range of benefits:

- Improve process workflow, providing fast and error-free data communication links to and from vehicles and office-based IT systems
- Increase transportation efficiency by maximising the productivity of each vehicle, which improves fleet control and makes better use of cargo space
- Cut administration/vehicle related/communication costs,



Aplicom C-series vehicle computer and DT1000 display.

offering measurable cost savings on fleet management

- Improve service quality, with fewer errors and better control over unforeseen events
- Improve safety, by providing a secure link with office-based data and IT systems
- Enable and introduce new business opportunities.

Innovation and experience in mobile data communications

Unique experience and know-how on open platforms for mobile data solutions makes Aplicom the ideal partner for solution suppliers. Aplicom sells its innovative products through a strong partner network covering over 30 countries.

Aplicom has a large and versatile reference base:

- International transportation companies, e.g., Craiss, Danzas, De Dijkers, Hungarocamion, Schenker-BTL, ADR-Haanpää, BP, Shell, Cementbouw, Rocla
- Public services, e.g., ambulance trusts in the UK, ambulance fleet in Paris, police and fire service in Norway, ambulance organisations in Spain, Ontime Rescue and Recovery in the UK
- Public transportation, e.g., Athens buses, Oslo city buses in Norway, taxi companies in Denmark, Neisseverkehr

in Germany, Gschwindl in Austria (Wiener Stadwerke)

- Field service organisations, e.g., many drivers' associations in Central Europe (ADAC, ÖAMTC, TCS, ANWB), Securitas, Athens airport, SAS/Copenhagen airport, Primatel, Cardo Door, Schiphol Express
- Postal and courier services, e.g., Norwegian Post, Royal Mail and Federal Express in France, Irish Post, Schenker Express
- Authorities e.g. the Dutch customs, the Bulgarian border guards, Försvarets Materialverk in Sweden
- Waste management e.g. SITA, Waste management for Athens 2004.

Aplicom[®]
MOBILE DATA FOR PROFESSIONALS

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Arbonaut Ltd

Arbonaut is a Finnish technology company that develops information-management and GIS solutions for assessing and managing forests.

All kinds of forestry operations need to be tied to a definite geographical unit. Management operations aiming at both ecological and financial goals require a “mooring” to which the operations are to be applied. Forests need to be delineated in relatively homogeneous units of varying size, most often called ‘forest stands’. Arbonaut’s ArboGIS platform features advanced semiautomatic forest stand delineation functionality.

The process of carrying out forest inventories is currently becoming airborne. The efficiency of forest assessment is, quite literally, being taken to new heights with the latest technology. State-of-the-art inventory methods based on remote sensing imagery, such as digital aerial photos, satellite imagery and laser scanning data create an entirely new perspective for forest resource management. As an innovation-driven company, Arbonaut has been at the forefront of remote sensing technology development since 1996.

One of the best examples of the innovative thinking and development work of Arbonaut’s professionals is the first forest inventory tool in the world that is based on detecting individual trees from optical aerial and satellite imagery. It has been used for forest inventories in Finland and in the USA since 2000.

Arbonaut’s ArboGIS platform now uses aerial images, laser scanning and optical and SAR satellite images for forest assessment and analysis. The accuracy obtained with ArboGIS is frequently 90 per cent in timber volume on stand level, which far surpasses the accuracy of ground-based surveys.

Arbonaut’s Web-based GIS solutions and hosted services bring this accuracy to the desktop. They make it easy for forest management organizations to communicate to their forest customers the value of their forestlands, as well as their plans on when to harvest each stand, together with the associated costs and revenues.

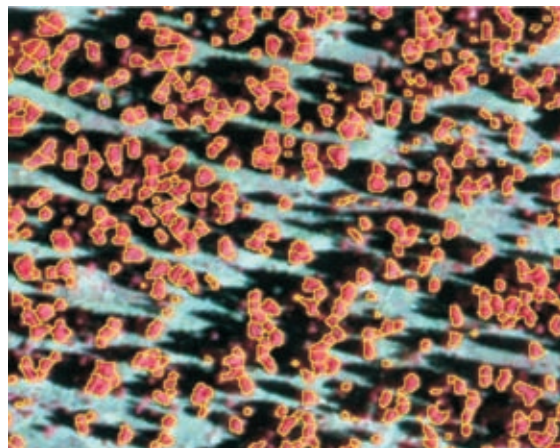
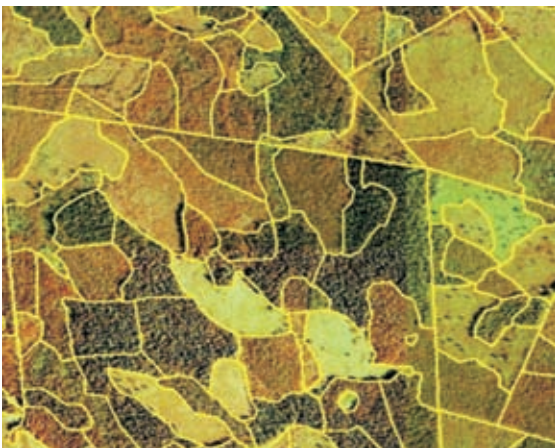
Turnover: 0.6 million €

Personnel: 10



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Benefon Oyj

Founded in 1988 in Finland by the early GSM pioneers, BENEFON is a leader in GSM/GPS mobile telematics terminals and solutions. Benefon is now at the forefront of innovation and research in mobile telephony and GPS navigation. It is now with the birth of TWIG that BENEFON is able to truly offer the world a navigation system and a series of TWIG handsets that can be easily understood and enjoyed in both professional and leisure contexts. For more information please visit: www.benefon.com

TWIG handsets and terminals are widely used by organizations and companies that are active in fields of safety and security, fleet and assets managements, forest industry, transportation, logistics and utilities management

TWIG Discovery

The new TWIG Discovery is the first mobile device on the market to combine GSM mobile telephony with GPS navigation and location-based services capability. It combines the comfort and ease-of-use of in-car GPS voice guidance systems with the familiar, user-friendly and portable format of a mobile phone. The

pre-installed navigation system on TWIG Discovery uses an integrated module removing the need of an additional expensive GPS receiver. The broad range of Discovery functions include the 'TWIG Finder' service, an easy way to locate fellow Discovery users. Simply by requesting a position from a specific Discovery user, the device calculates navigation instructions on how to reach their exact location. 'TWIG Alert' allows the user to press the pre-defined "alert" key on the top of the TWIG Discovery and open a voice call and/or send an SMS with the position, time/date stamp and if applicable direction of travel of the handset.

TWIG Locator

Locator is intended for a variety of applications including surveillance, and personal protection as well as asset protection and tracking of cars, vehicles and boats. The Locator is easily tracked using a TWIG handset such as the TWIG Discovery or by subscribing to TWIG Internet Services.



Typical areas of use are:

- Theft
- Personal protection
- Personal surveillance
- Positioning
- Anchor alarm & tracking.

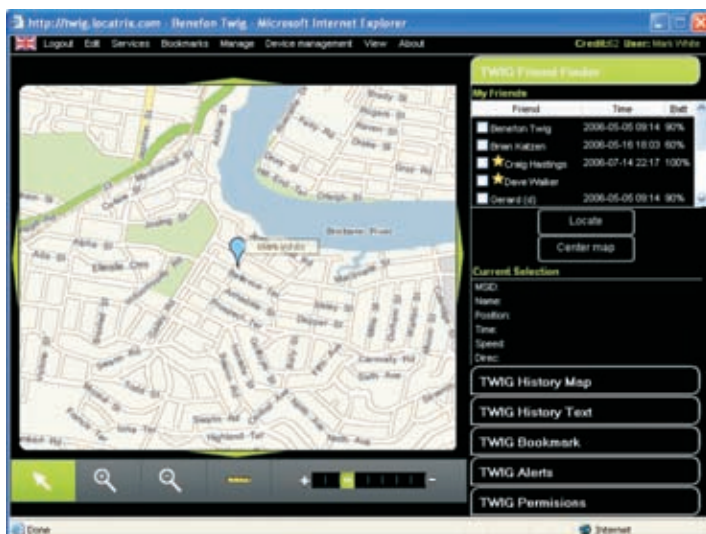
TWIG Internet Services

TWIG Internet Services allows you to track TWIG users anywhere in the world. The internet interface allows friends and family to track and locate someone carrying the TWIG handset via any web browser, providing them with peace of mind as to their location and current status.

TWIG Internet services are also available for business and corporate users with extended LBS feature set. Please visit: www.twigworld.com

TWIG LBS platform

Benefon has developed a scaleable for business users end service providers. Benefon is managing 24/7 Customer Gateway with international network connectivity where our partners can integrate seamlessly their LBS application through Application Protocol Interface (API). This high-availability platform reduces service delivery costs and enhances reliability and scalability.



BENEFON

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DNA Finland Ltd

DNA Finland Ltd is a growing Finnish mobile operator and the country's third largest, which offers Finnish private, business and institutional customers high-quality mobile messaging services using state-of-the-art technology.

DNA Networks Ltd, the sister company of DNA Finland, is a network operator providing service providers with sophisticated national mobile communication network services.

At every level of DNA's operations we focus on the customer. Right from the product development stage, our customers' needs come before anything else. For the customer, this means easy-to-use, high-quality and affordable services. Compared with its competitors, DNA is a very different operator, with a young, courageous and fast-moving organisation. Structurally, it is light and adjusts well to the challenges of future technology breakthroughs and market turbulence.

Our strength lies in customer-driven thinking, good service, competitive pricing and our brand. Customers have reacted positively to the clarity, cheerfulness and good humour of our communications.

Customer satisfaction with DNA is also clear from our growing subscription volumes: in September 2006 we had over one million subscribers. This is a significant watershed on the scale of Finnish operators, since DNA's market share is now nearly 20%.

*Turnover in 2005: 292 M€,
in 2004: 271 M€
Personnel 362 in 2005 and
428 in 2004.*



DNA Finland and DNA Networks are entirely owned by Finnet Ltd. Finnet Ltd is a holding company with no dedicated business operations, owned by 33 regional telephone companies. Finnet Ltd and its subsidiaries, regional telephone companies and the trade organisation, Finnet Association, form the Finnet Group.

The total net sales of Finnet Group in 2005 amounted to one billion euros, and it employs ca 5,000 people. Finnet's main market area is Finland.

Expertise in Location Based Services

Since 2000, DNA has offered GSM/GPRS/3G network services and service platforms, including LBS, to meet the needs of customers.

These comprise service operators, providers and developers, to whom we offer services and interfaces to our network and service platforms.

Our external service operator customers at the moment are Fujitsu Services Ltd, Go Communications Ltd, the Swedish M2M operator Wireless Maingate, the Aina Group and Setera Ltd.

We are actively developing our network and services using the latest technologies.

We offer our LBS system interface to service operators, providers and developers that wish to develop and test positioning-based services.

Our experts work in multiple fields of telecommunication. We are prepared to meet the needs of future's mobile industry and ready to provide high quality services in close cooperation with our customers.



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Ekahau Inc.

“Location made easy”

Background

Founded in 2000 by a group of scientists from Helsinki University, Ekahau is the leader in location-enabling enterprise Wi-Fi networks.

Since 2004 company's business has been strongly focused on healthcare industry, for patient, staff and asset tracking purposes, with additional business in manufacturing, MIL/GOV and several other industries. For healthcare customers, Ekahau's wireless RTLS system, that comprises software and wireless location tags, allows hospital professionals to synchronize workflows, reduce inventories, and increase patient throughput and safety. The company's systems are currently installed or being installed in dozens of hospitals around the world. U.S. customers include The Cleveland Clinic, Palmetto Heath, Carolinas Health, Mercy Hospital(Miami) and DD Eisenhower (DOD) Hospital in Georgia.

Ekahau Wi-Fi based real-time location system (RTLS) is a disruptive solution to traditional Active RFID systems, and complementary solution to passive RFID. According to Frost and Sullivan 2005 RTLS report, Ekahau RTLS represents the # 1 leading technology and brand available in the RTLS market. F&S estimates the worldwide RTLS market to grow to a \$1B market by 2010.

Company's technology is protected with several patents, and has evolved over 10 years of development at the University of Helsinki. Today Ekahau is U.S. based Delaware Corporation and has offices in Helsinki, Finland, Saratoga, CA, and Reston, VA. Company has over 100 certified resellers worldwide, and has an extensive network of channel partners including HP, Symbol Technologies,



McKesson Inc., Sybase Inc., St. Croix Systems, Siemens and others.

Turnover in 2006 (estimated):

6,0 MUSD

Personnel in 2006: 55

Expertise in Location Based Services

Ekahau RTLS solution components:

Ekahau Positioning Engine

- *Ekahau Positioning Engine* is the core software element for generating location-based information.

Ekahau LBS Applications

- To ensure easy and fast location-based service deployment with RTLS, Ekahau provides ready-made applications for people and asset tracking:

Ekahau Tracker is an end-user application for real-time tracking, dispatching alarms and analyzing the locations of assets and people.

Ekahau Finder is an end-user application for grouping, locating and viewing the location of people and assets in real-time.

Ekahau WLAN tags

- *Ekahau WLAN* tags are small attachable devices for tracking assets or personnel.

Ekahau Site Survey

- *Ekahau Site Survey* software provides an easy-to-use, visual approach to 802.11 design and verification.

Ekahau RTLS Benefits

With Ekahau RTLS, the position of equipment and people is automatically updated and can also be delivered to other systems and personnel requiring the same information. This enhanced information flow ensures that assets are utilized more efficiently and workflow is optimized meaning significant cost savings. Moreover, the system also enables additional automated security functionality, such as directing emergency personnel to the location where a tag alarm button has been pressed or a tamper switch activated.

For cost-free Ekahau RTLS product evaluation, please check www.ekahau.com/eval.



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Elisa

Elisa Corporation is a Finnish teleoperator concentrating on mobile, fixed and broadband communications services for private and corporate customers.

One part of our mission is to create and promote the wireless lifestyle, and that is the main reason why we have developed our location based services for content and service providers.

Elisa and Radiolinja Eesti were the first ones in the world to facilitate the use of location services that exceed national boundaries in November 2004. Previously the use of location services abroad has not been possible. The technical term 'location roaming' refers to the uninterrupted use of services even when the mobile phone user travels to the coverage area of another operator in another country.

Elisa offers various location based applications enabled by modern and open operation systems in mobile terminals. An example of of-

fered services is "find the nearest" which can be used with mobile phones through SMS messages. Interfaces to service providers include SMS (CIMD) and OMA MLP that allows them to identify the location of Elisa subscriptions in Finland as well as in Estonia, in both 2G and 3G networks. Elisa offers in server applications XML-interfaces for content and service providers.

Thanks to the data transmitted over the mobile phone network, the location of the GSM or GPS device can be determined – with the owner's consent. Owner will understand that she or he will be located by phone network when using for example the local weather forecasts.

The development work concerning location accuracy is ongoing task in our network department. That is one important reason why Elisa has participated and will participate several national and EU level projects where location based services represent remarkable part.



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Fastrax Ltd

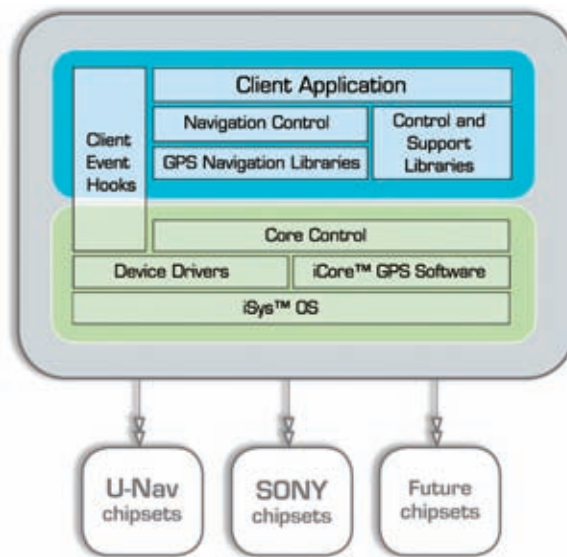
Fastrax Ltd is a high-technology company specializing in the development of industry-leading iSuite embedded GNSS receiver software and iTrax OEM GNSS receivers. The iSuite Software Development Kit and firmware are utilized by GNSS IC vendors and location-aware product developers. iTrax receivers are used by companies developing tracking, recreational and navigation products. Fastrax's annual revenue has grown rapidly in recent years. In 2006 more than 85% of the revenue came from export markets. Fastrax was founded in 1999 and it employs 28 people. Key shareholders include private equity investors CapMan and Eqvitec Partners as well as the sports instrument manufacturer Suunto.

Software technology, research and development

The iSuite Software Development Kit (SDK) for embedded GNSS applications enables the utilization of the spare Central Processing Unit (CPU) and memory capacity in OEM GNSS receivers. This eliminates the need for a separate control unit or application processor leading to smaller, lower power and lower cost-location-aware product design. The iSuite SDK can also be used to tailor the performance of the receiver for a specific use profile very easily. The unique open programming architecture and access to GNSS signal carrier phase measurements enables development of low-cost centimetre- accurate solutions.

Hardware technology, research and development

Fastrax focuses on transforming new GNSS technologies into easily usable solutions with open interfaces and ultra-low power, and miniature hardware design. With their industry-leading performance, Fastrax programma-



Fully featured iTrax130 OEM GPS receiver (below) weighs less than 3 gr and fits into 16 mm x 19 mm footprint.

ble iTrax130 and iTrax03 OEM GNSS receivers and NMEA (National Marine Electronics Association) compatible iTrax300, iTrax100 and uPatch OEM GNSS receivers navigate continuously – even in extreme conditions. Receivers are ideally suited for tracking applications and high-volume consumer products such as personal navigation devices and sports accessories. Hardware manufacturing is outsourced to cost-effective, high-quality EMS partners in South Korea and Hungary.

Fastrax products are widely used in asset-, person- and animal-tracking devices, recreational products and personal navigation devices. Fastrax Ltd. currently employs 28 people at its Helsinki-Vantaa headquarters in Finland.

Space expertise

- Software development environment for embedded GNSS applications
- GNSS signal search, tracking and position calculation algorithms
- GNSS receiver firmware
- State-of-the-art GNSS receiver reference designs



- Application-specific hardware solutions
- Custom antenna solutions
- GNSS receiver architecture and system development.



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Fifth Element Oy

Fifth Element Oy is an information technology company founded in January 2005 through a merger between GISnet Solutions (spatial information solutions), mElement (mobile technology) and XRSolution (SAP integrations). The turnover in 2005 was EUR 5.8 million and the company then employed about 80 specialists.

Fifth Element has offices in Helsinki, Tampere, Jyväskylä and Kuopio. The company boosts its customers' service ability and efficiency by combining the workforce outside the office, or even the whole distribution chain, into an integrated part of companies' control and report systems. Customers' processes work far more smoothly, or even automatically. Fifth Element's personnel comprise specialists in user interfaces, spatial information, map implementation, mobile hardware, processing, programming and SAP.

The most important sectors in our operations are all spatial information based: business solutions, SAP integration technology, business consultation (controlling mobile fieldworks, material/product flows and SAP integration) and controlling the mobile technology.

Oracle and SAP are Fifth Element Oy partners. We also support IBM, BEA, Mercator and Microsoft server and data base technologies.

Psion Teklogix of Canada and Fifth Element of Finland are jointly developing mobile solutions for Finnish SAP users, employing Psion TekRF and SAP technologies.

The two companies recently announced a cooperation agreement on the joint development of completely mobile systems designed to support the growth of corporate business operations.



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Fifth Element Oy

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Global Safety and Security Solutions Oy

General

Global Safety and Security Solutions Oy (GSSS) forms the privately owned GS-Group together with Telekoski Oy. The Group's estimated turnover for 2006 is EUR 1.5 million. Currently GSSS employs five people at the company headquarters in Nummela. It is a solid and expanding company. Our new ideas and innovations have enabled us to build a comprehensive product range for numerous tracking applications.

Products

We manufacture terminal equipment for wireless tracking systems under several trade names for security and logistics service providers throughout Europe, Asia and Africa. We focus on stolen asset tracking, logging systems and personal safety equipment.

GSSS is a company capable of generating new solutions for these applications that is always on the lookout for new trends in design, often in association with customers with special requirements. Our tracking terminal product line incorporates the most significant innovations in contemporary engineering design. Our aim is to fill the gap between the high-volume and fully-customized products on the market. We have a completely tried and tested hardware and software base for embedded terminal design including GSM/GPRS and GPS technology.

LBS Expertise

GSSS offers a superior technology for long-term battery-operated tracking and alarm transmission terminals. Our battery-operated tracking devices can operate for several years on a single battery in extremely severe outdoor conditions. These devices are especially intended for applications where very fast, easy installation is necessary or where a continuous external power supply is not possible. Most of the tracking devices are equipped with GSM or GPRS communication capability, enabling real time tracking and remote control. The tracking devices can be provided with different type of detectors and sensors for movement detection and temperature measurement, for instance.

Main business activities

- Battery operated tracking terminals for railway carriage logistics management systems
- Monitoring and tracking systems for trailers, containers and elevators
- Retrieval systems for snowmobiles, motorcycles etc.
- Battery based outdoor security system for border guard services
- Portable surveillance systems for military applications.

Our technical support team is available to assist our customers with their needs and enquiries. We aim for excellence in professionalism and our most valuable asset is flexibility, and therefore we are able to develop new products or modify existing solutions on a very short time schedule and with minimum total costs.



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Hannu Säles Oy

Hannu Säles Oy, founded in 1987, is a small Finnish company specialised in navigation and charting software. The main product line is based on the “Lux Navalis” navigation software family, also supporting telematics instruments. The Lux Navalis has many versions. The newest member of product family is the Lux Navalis Pocket. We can also tailor the Lux Navalis to meet the customer needs.

Expertise in LBS

Hannu Säles Oy specialises in

- Navigation programs for sea and land
- Telematics including AIS
- Routing and route optimization.

Main contracts, projects

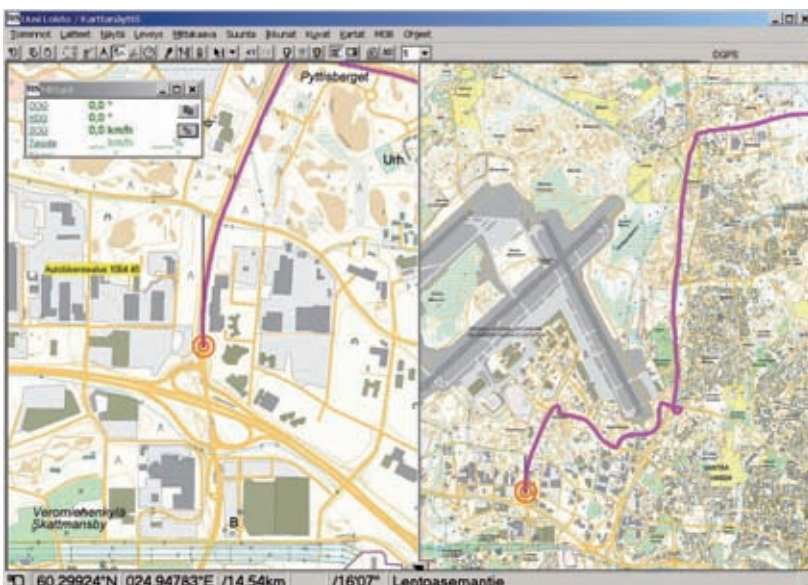
Some of Hannu Säles’ main references are:

- Finnish Marine Association
- Finnish Frontier Guard
- Finnish Navy
- Finnish SAR-organisations.



A trolling boat equipped with Lux Navalis.

Driving the car.



A typical Lux Navalis screen image near Helsinki-Vantaa Airport.



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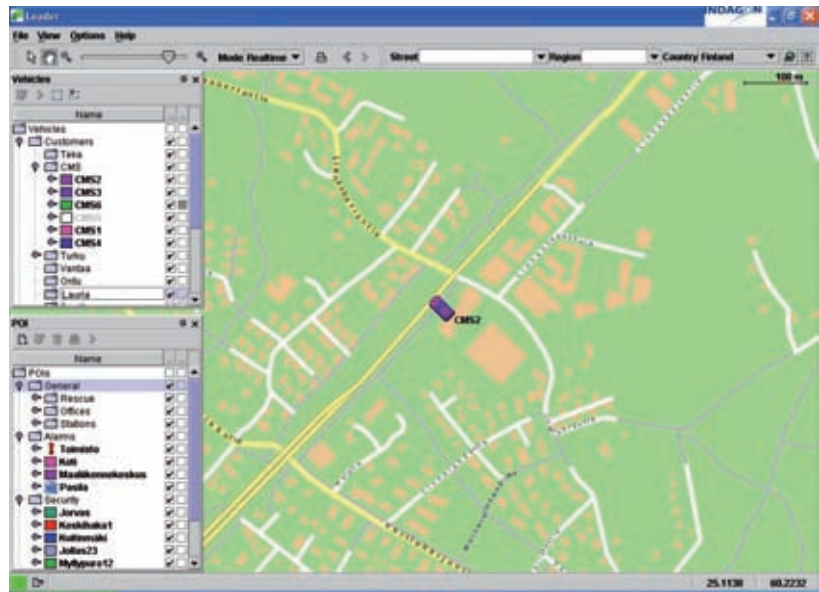
Indagon Oy

Indagon develops, produces and markets GPS-based positioning terminals, systems and applications for GSM and TETRA networks. Using our products operators and end-users can roll-out leading-edge positioning solutions for tracking vehicles and personnel out in the field thereby reaping positioning benefits such as increased efficiency, better customer service and greater employee safety.

We are a technology company with leading competences in positioning and telecommunications. This is evidenced by several first-in-the-world implementations and a growing patent portfolio. Indagon's key business sectors are positioning gateways for TETRA and GSM operators, integrators, service providers and end-users globally, and positioning-as-a-service (ASP) for end-users in Finland. We use standardized, open interfaces between terminals, gateways and applications and thus have experience of multiple installations with 3rd party terminals and applications.

Our products are used by some of the leading operators in TETRA nationwide state security networks as well as by end-user companies and service providers. We are continuously interested in expanding our global network of partners, value-adding resellers and service providers and thus welcome new contacts.

*Turnover: Year 2004 EUR 0,4 million,
Year 2005 EUR 1,1 Million,
Year 2006 app. 2,0 Million.
Personnel: 21.*



Expertise in Location Based Services

- Positioning gateways for GSM and TETRA networks for large scale, real-time positioning solutions including assistance data for GPS (A-GPS)
- Positioning/AVL/APL terminals for GSM and TETRA networks and related technologies
- Positioning map-applications and integrations with command & control -room solutions.

Main contracts and projects

- Several implementations of positioning solutions with leading TETRA operators



- Positioning solution and service provider for some leading integrators and end-users in the fields of security, transportation and maintenance in Finland.

More information

www.indagon.com/en/releases.php



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MGPosition Oy Ltd

MGPosition Oy Ltd was founded in 1993. The offices are located in Kuusamo and Ylivieska.

Having offices in these two locations enables MGPosition to combine an efficient cost-structure with a highly trained staff in offering customers truly cost-effective solutions. Though MGPosition is a small family company, we are extremely well connected. Our key partners include many Finnish companies known internationally as well as in Finland. MGPosition also has alliances with specialist consulting groups, system integrators, IT firms and research institutions in several countries to ensure it has all-round capabilities to serve demanding customers worldwide.

MGPosition has been delivering intelligent GIS services and applications for over a decade. We design their solutions around customers' needs, not around technology. This is made possible by the company's long experience, understanding of customers' needs and clear vision of the potential of GIS technology.

MGPosition supplies intelligent, end-to-end geographic information systems to the public sector, energy companies, police, fire and rescue services, communities and end organizations in travel and tourism. Satisfied MGPosition customers include corporations both small and large, communities, police departments, energy companies, contractors and many more.

The possible ways of using MGPosition applications are as diverse as the needs of our customers. The intelligent design and highly compact structure of the spatial information enables its use in local area networks, over the Internet, and even over low-bandwidth wireless connections. A single application can be used over multiple channels simultaneously, satisfying the needs of both office-based and mobile users.

MGPosition offers a full palette of products and services that provide our customers with complete solutions.

- **eMap** is an innovative Internet-based map service for national and local authorities, regional organizations, travel organizations and travel-related businesses. The application is available as a cost-effective hosted service, removing the need for internal servers.
- **Menergy** is a complete spatial information system for maintaining and monitoring electricity, gas, water and sewer networks. MEnergy is tailored for public utilities, electricity and water companies, energy companies, and gas and oil companies.
- **Mtourist** is an Internet-based guide to creating high visibility meant for all tourism-related services. It can also bring the power of digital mapping directly to an organization's website.

Mtourist offers tourists an interesting and fun route to local travel destinations, helping them plan their itineraries at their leisure before embarking on a trip. Professionally presented services create confidence and increase demand, which means that the system can directly increase tourism-related revenues.

- **Mrescue** is a fast and accurate spatial information system for police, fire and rescue services. It is also an excellent planning and field management tool in various accident and disaster management situations.



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Mitron Oy

Mitron Oy is an international company that designs and manufactures public transport information systems. Mitron's information systems currently ease and speed up the flow of public transportation all over the world providing maximum traveling comfort to the passengers. Besides passenger information displays for stations, platforms and stops, Mitron also offers information display, announcement, entertainment and security systems for trains, trams and subways. Mitron's principle is to offer its customers cutting-edge products that combine long-term partnership with comprehensive service, covering research and development, effective project and supply chain management as well as installation and after sales services.

Turnover: 6 M€ / 2006

Personnel: 58 / 2006

Expertise in Location Based Services

- Communication, electronics and software solutions for rail vehicles.

Main Contracts and projects

- Train, tram and bus information and broadcasting systems.



MITRON

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Mobisoft Oy

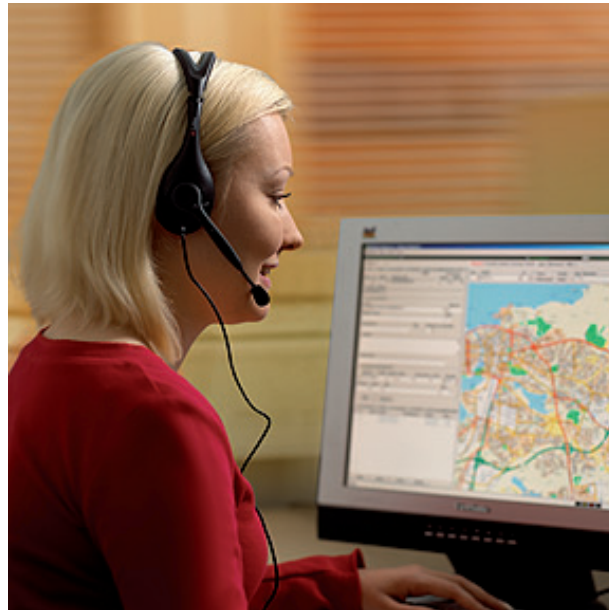
Founded in 1994, Mobisoft Ltd is a Finnish market leader in mobile data software applications for the transportation industry. The company's headquarters are located in Tampere, Finland and it has a branch office in Oxfordshire England. The turnover of Mobisoft is some 3 M€ and the amount of personnel some 30 employees. Mobisoft platforms and applications for transport industry utilise wireless networks for data transfer. The main business sectors of Mobisoft are related to mobile data software, i.e. demand responsive transportation systems, automated travel dispatching systems, taxi dispatching system and communication applications for and between the abovementioned software products. In all of these products the location of the vehicles and customers is an important factor.

Expertise in LBS

The Mobisoft dispatching systems have been planned and developed in Finland for improving the service levels of taxi and bus companies, as well as freight transporters. The systems are based on modular open architecture solutions and standard technologies. GPS positioning lets the dispatcher know the exact location and status of each vehicle in the fleet. Mobisoft can offer various system features such as floating car data (FCD) collection, navigation, safety camera, taximeter interfaces telephone system interfaces, chip and pin payment (EMV), etc. Several vehicle terminal types can be used from mobile phones to on-board computers.

Main contracts and projects

In Finland there are a few dozens of users of the Mobisoft dispatch sys-



Dispatcher's work station.
PDA as Driver Terminal. (below)



tems. Remarkable share of the sales comes from outside Finland, especially from the UK, Ireland, Denmark, etc. The European Commission has partly supported the research and development work of the solutions for taxi and industry during the Fourth, Fifth and Sixth Framework Programmes. Mobisoft has been involved in the EU projects such as SAMPO, SAMPLUS, INVETE, IMAGE, WH@M, FAMS, EMIRES, eDRUL, CONNECT, etc. which all have developed location based services.

MOBISOFT
MOBILE DATA SOFTWARE

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Navicore Ltd

Navicore Ltd. is the premier provider of interactive navigation products for smartphones and connected mobile devices which is one of the fastest growing categories in the navigation market. Navicore Personal software together with a GPS module turns your mobile phone into a fully functional navigator which is always with you. A smart phone based solution provides the most convenient and easiest way to finding way while driving a car, cycling or walking.

Keys, wallet and mobile phone form the standard survival kit for anyone on the move. With embedded navigation on the phone this combination not only lets us enjoy a stay at a location, but liberates our movement from one location to another. With a graphical map and voice guidance in multiple languages, it offers the quickest and most reliable routing. Excelling in adaptability and portability, Navicore's navigator is a versatile mobile application that already runs in all Symbian based smartphones.

Navicore has consistently been among top three suppliers of on-board smartphone navigators and a test winner in international press reviews. Navicore's high quality standards have resulted in a product that is appreciated not only by users but also the distribution channel. Navicore products are distributed already in 20 countries across Europe by over 7000 retail outlets across Europe.

Navicore Personal – The Easy to Use GPS Navigator for Mobile Phones

Features

- GPS navigation on your mobile phone
- Intuitively easy to use and very responsive operation
- Detailed street maps containing street names and numbers of all public routes
- Navigation with clear voice guidance, map display and route-plot, featuring extremely fast route calculation and automatic re-routing
- Pedestrian, biking and car navigation modes for optimal route selection
- Free traffic information and dynamic routing to avoid traffic jams, toll roads or roadblocks
- Safety camera warning system
- Extensive point-of-interest directory with direct dialing support
- Location messaging to keep track of friends and family
- Handy pocket map and pedestrian navigation
- Easy and fast installation without network settings.



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POSITRON Oy

Positron – founded in 1995 – is a Finnish expert company adding value to professional satellite navigation projects, products and applications. Positron's expertise and solution palette range from knowledge services to GPS RF OEM products and complete GPS/Galileo navigation satellite simulation systems. We offer consultancy services over a wide range including system designs, feasibility studies, solution evaluations, training and the like.

Turnover, personnel and facilities

Positron currently has 2+1 full- and part-time expert employees, generating an annual turnover of just below one million euros. Our location in the city of Hyvinkää in southern Finland is excellent, only 35 km from the Helsinki-Vantaa international airport and a short drive to Helsinki (50 km), Tampere (130 km) and Salo/Turku (120 km/170 km). Our office, which we own, is immediately next to the Hyvinkää TechVilla high-tech centre.

Expertise in Location Based Services

- Deep, long practical and theoretical experience with satellite navigation systems since 1980's, GPS, Glonass, future Galileo. Theoretical and heuristic knowledge of satellite navigation methodologies, applications, hardware, software.
- From single-point positioning to DGPS differential methods, code and carrier differential, RTK, real and virtual base station systems, GPS networks, real time data links, post processing methods and software, statistical testing and results evaluation, attitude and direction finding solutions.



- A-GPS, pseudolite, support and hybrid sensor systems, including inertial, RF and others.
- GPS receiver and antenna technology, RF transmission properties and signal transmission distribution inside vehicles, buildings and premises.
- Optical and coaxial handling of GPS RF, EMP and transient protection.
- Navigation satellite simulation in GPS, Galileo and Glonass systems, simulation system hardware and software, testing methodology.
- Timing, synchronisation, and reference frequency applications using satellite systems and precision oscillators. Clock, time and synchronisation transfer using time codes, SDH/PDH links, pulses, network time protocol.

Main contracts and projects

- Design, measurement, processing and adjustment of high-accuracy static and kinematic GPS reference network positions.
- Nationwide testing differential GPS using slow mobile data (pre-GSM) .
- Testing portable medium range terrestrial HF data links.

- Feasibility study, testing and evaluation of a real time kinematic system using low speed UHF data link, using carrier locked and carrier/code assisted processing (international actor, now a commercial product).
- Development of a real-time multisensor positioning system for a network measurement vehicle.
- Vessel and vehicle attitude and direction determination using multi-antenna receiver
- Real time positioning and video image position tagging and collection on track based vehicle
- Conceptual design proposal for value assets and vehicles tracking.
- (Satellite based) timing and synchronisation solutions to numerous high-profile automation, ICT, calibration, R&D and production, and special applications.
- GPS training courses for a nationwide organisation in field conditions. Training courses for a nationwide organisation district offices.

POSITRON

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We welcome challenging tasks internationally and nationally. To utilise our expertise and products, to shorten Your product development cycle, or to improve Your cutting edge, please call or email

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Satama Interactive Plc

Satama is a leading European professional digital services company. Our mission is to help our clients to do better business via digital channels. Our services portfolio focuses on three core business areas: Marketing, Productivity and Mobility. We are based in Finland, Sweden, Germany, and the Netherlands. Satama Interactive's (SAI1V) shares are listed on the Helsinki Stock Exchange. Satama's net sales in 2005 were EUR 27.6 million. There are 350 experts in the Satama Group.

Satama's Mobility core offering

We specialize in the design, prototyping, and development of mobile services, applications, and multimedia solutions, and also provide consulting services from user, business, and technology perspectives.

Areas of expertise include user experience design & validation, mobile applications - Symbian and Java/J2ME applications installed on a phone, browser-based services and applications, portals & server-side Java development and telecommunications technologies.

The Satama Mobility business area's customers include Nokia, Siemens, Vodafone Group, Telia-Sonera, Turkcell, Wataniya, Burton, Coca Cola.

Expertise in Location Based Services

This area includes creating carrier-grade multichannel services, using service & user plane positioning technologies, integrating with several Finnish and international GIS providers with standard and proprietary interfaces, working with LBS technologies like GPS, MLP, OpenLS, and Nokia iGMLC, location-based gaming, and marketing and community concepts.

Main contracts and projects

Examples of Satama's LBS projects include various applications and services for directory services providers such as Eniro, Finnet-Media and Directa.

Eniro's service is an SMS/MMS-based service for finding and acquiring maps for a certain address or company. Directa's service is a J2ME application for finding companies, people, maps and routes, and finding nearest points of interest. Finnet-Media's NumeroNetti-service is a Symbian application for finding personal, company and map information, automatically when a call is received from an unknown number.

Consulting for operators

Creation of an LBS services business plan for Siemens's operator customer's LBS. The work included analysing the market and business environment in general, segmenting

the operators customers, analysing the technology environment, defining the operator's LBS offering, creating a mathematical model for estimating service usage and revenues and defining the implementation plan for LBS application launches.

Telco-grade LBS application development

Creating multi-channel LBS applications for operators. The work includes the concept design and technology implementations of a suite of various B2B and B2C applications for operators worldwide. Application areas include consumer community portals (e.g. dating, finding friends), locating people and resources (e.g. fleet management, governmental security systems), natural disaster warning systems and location-based marketing.

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Space Systems Finland

Space Systems Finland is a privately held company owned by its key employees and Finnish National Fund for Research and Development (Sitra).

Since its formation in 1988, SSF has been providing high-reliability software solutions for many of Europe's most ambitious space missions. SSF's main products are real time software solutions for satellites and other critical applications, as well as advanced radio navigation infrastructure. Space Systems Finland focuses on mission-critical solutions for demanding environments, such as onboard software, spacecraft autonomy, navigation, GPS/EGNOS/ Galileo, robotics, DSP, data processing facilities, and processing control systems. Spacecraft control and guidance software, known as onboard software, is responsible for all the functions critical to the success of the mission: managing spacecraft operations, thermal control, telecommunications, command operations, and attitude and orbit control.

SSF's navigation (NAVIndoor) solution extends accurate GPS positioning to places satellite signals do not reach. These environments include urban and indoor areas where consumers spend 95% of their time, as well as large industrial facilities. The NAVIndoor enables high accuracy navigation (decimetre level) and location detection solutions in warehouses, ports, urban street canyons,



public buildings etc. which have been out of reach for the GPS system so far. The NAVIndoor consists of a number of pseudolites (pseudo satellites) that provide the navigation signal, a control unit for system configuration and maintenance, and portable receivers to be used to gain the location information just as GPS receivers. There are no technological limitations for the number of receivers. The same signal generation system can easily, without any re installations, serve a scalable number of end-users. Neither are there any limitations on the number of applications using the location information. The NAVIndoor system is designed to be compatible with GPS/EGNOS. The design of the system is, however, versatile and thus will be made Galileo compatible as soon as the new service is available.



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Suunto Oy

Founded in 1936 and celebrating its 70th anniversary this year, Suunto is a leading designer and manufacturer of sports instruments for diving, mountaineering, training, hiking, skiing, sailing and golf.

The company is the world's leading manufacturer of dive computers and outdoor wristop computers. True to its roots, Suunto remains the world's largest compass manufacturer.

Prized for their design, accuracy and dependability, Suunto sports instruments combine the aesthetics and functionality of watches with sport-specific computers that help athletes at all levels analyze and improve their performance.

The success of the company is based on its high quality products and increasing investments in R&D.

Suunto's headquarters is located in Vantaa, Finland, where the company manufactures dive computers and instruments, wristop computers, field and marine compasses and precision instruments under its brand name, Suunto. The company employs more than 500 people worldwide and distributes its products to nearly 60 countries.

Suunto is part of the Amer Sports corporation, the world's leading sports equipment company, that today has five major brand: Wilson, Atomic, Suunto, Precor and Salomon. Amer Sports offers technically advanced equipment and products that improve the performance of active sports participants.

Expertise in LBS

Sports instruments utilizing GPS technology and microsensor systems.

The Suunto X9i is the world's smallest and lightest wrist-mounted GPS unit and is compatible with several digital mapping services and with the Google Earth™ mapping service.

The Suunto GPS POD tracks speed and distance across a wide variety of outdoor activities including hiking, cycling, cross-country skiing, inline skating and kayaking. It adds a new dimension to all POD- (peripheral observation devices) compatible Suunto heart rate monitors.



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WM-data Oy

A leading IT services provider in the Nordic countries. WM-data Group reported in 2005 consolidated net sales of around EUR 997 million and a staff of some 9,500 in Sweden, Finland, Denmark, Norway, Estonia and Poland. In Finland, WM-data posted net sales of approximately EUR 266 million with a staff of around 2,500 in more than 20 locations.

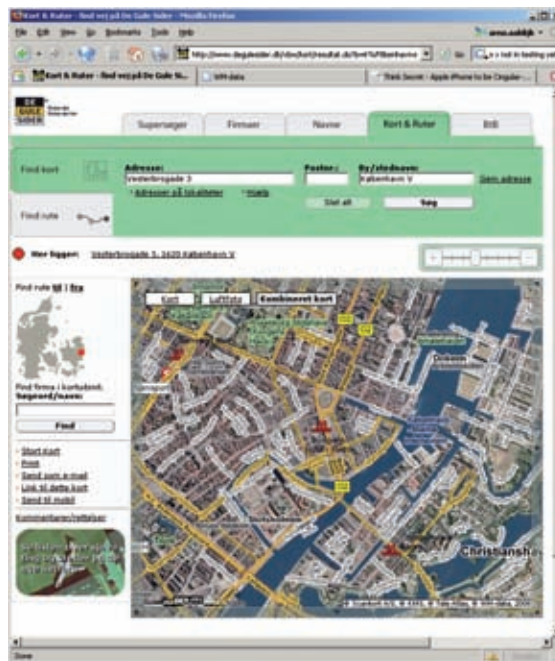
With over 10 years of experience in the field of location based solutions, WM-data provides its clients and partners with enabling solutions on a global basis. The solutions are offered as a service from WM-data's own high availability service centre, or the solutions are installed in the client's environment.

Navici – Location Service Concept

While our customers focus on their core businesses, providing services to their customers, we attend to ours - providing easy to use location information services that form their basis.

Navici Trip Planner

Navici Trip Planner (NTP) is a powerful multi-modal and multi-media trip planner solution that combines WM-data's state-of-the-art routing algorithm with proven media solutions including web, Interactive Voice Response (IVR), and kiosk. NTP is a commercial off-the-shelf product that has been designed using the latest in web and open system standards. NTP integrates easily with existing schedule and geographic data sources and includes flexible web-based configuration and reporting utilities. The system provides uptime of 99.99% or better and is scalable to handle any volume of trip requests.



EDSA-directory companies De Gule Sider in Denmark, Localdelen in Sweden and Fonecta in Finland are heavy Navici-users.



NTP is the market leader in Finland and widely used in the US.

Merlot Server

Merlot Server is a software product for mobile tracking and communicating. It combines positioning techniques, geographic information systems (GIS), Internet, wireless communications, mobile terminals, and modern information technology

to an integrated system for automatic vehicle location (AVL), job dispatching, and remote monitoring and alarming with two-way on-line data messaging.

Merlot Office

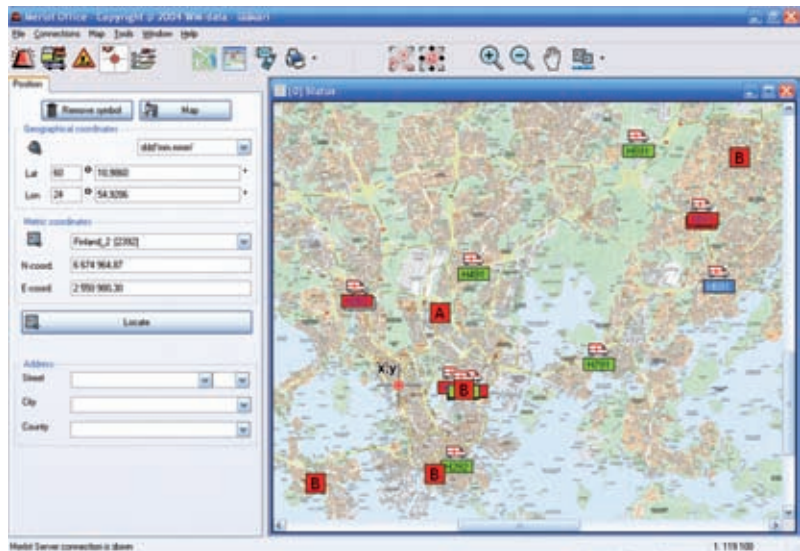
Merlot Office is software product for control room and command center use. It provides comprehensive view of ongoing field action in fire and rescue services. The main purpose of Merlot Office is to monitor a fleet of vehicles and ongoing emergency responses. Merlot office uses TETRA or other radio networks for receiving and sending messages. The application has a map display, on which the position and status of individual units can be shown, as well as the locations of emergencies.

Merlot Mobile

The Merlot Mobile software runs on a laptop computer that is mounted in the vehicle and connected to the vehicle's TETRA-radio and a GPS receiver. The main function of the application is to receive alarms and guide teams in the field to the place of the emergency. The application receives its information through either TETRA or another compatible communications network, and displays the location of the target, as well as the own location on a map.

Merlot Medi

Merlot Medi is an electronic management and reporting system for emergency medical care. It improves the management, monitoring, quality, and transparency of emergency medical care. This system transfers medical care information from the accident site and during transportation between the ambulance and the control centre, hospitals and other units. The system will support emergency medical care for treatment of single or multiple patients and in major accident situations.



Merlot is in daily use in most of the Rescue Districts in Finland.



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VTI Technologies Oy

VTI in brief

VTI Technologies is a global market leader of low-g acceleration sensors for automotive industry applications and Cardiac Rhythm Management (CRM). Application areas for the company's motion and pressure sensors include the automotive industry, Sports & Wellness, Medical & Instruments as well as hand-held terminals.

VTI develops and produces silicon-based capacitive sensors using its proprietary 3D-MEMS (Micro-ElectroMechanical System) technology, with application areas in acceleration, inclination, shock, vibration, angular rate and pressure measurement.

VTI is owned by EQT III private equity fund. VTI's net sales in 2005 totalled EUR 74.7 million and the company has approx. 700 employees. Along with the head office in Finland and the global partner network, VTI's international sales and marketing network includes offices in Germany, USA, Japan and China. Besides Finland, VTI also has manufacturing operations in Mexico.



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Finnish Maritime Administration

The Finnish Maritime Administration (FMA) is a government agency providing safe and smooth merchant shipping for society's and customers' need. The operational conditions for merchant shipping and other waterborne traffic are developed taking into account

- safety aspects
- economic aspects
- environmental consequences

FMA's services include

- maritime safety
- fairway maintenance
- winter traffic assistance
- archipelago ferry services
- hydrography
- marine traffic management
- authority duties in pilotage.

The FMA issues decisions within its scope of authority, and participates in the drafting of maritime legislation. It also cooperates with the Ministry of Transport and Communications in the implementation of international agreements and EU legislation on the national level. Other duties of the FMA are the maintenance of shipping registers and statistics.

The FMA also promotes yachting and boating safety, and maintains and develops radio navigation systems for shipping purposes. Hydrographic data The FMA is responsible for hydrographic charting in Finland. Finnish waters are among the most difficult to navigate in the world, and this presents hydrographic surveys and charts with many challenges. The modern technology used in hydrographic surveys provides detailed and precise information of seabed topography.



Shallow water swath survey systems used by FMA provides full coverage seabed topography and detection of navigational hazards.

The Finnish Maritime Administration uses the survey material and other hydrographic information that it maintains to produce conventional printed nautical charts, chart series and digital products – Electronic Nautical Charts.

Example of a new "blue" navigational chart.



Finnish Maritime Administration

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www.fma.fi

National Land Survey of Finland

National Land Survey of Finland produces and provides information on and services for real estate, topography and the environment for the needs of citizens, other customers and the community at large. The National Land Survey (NLS) is responsible for Finland's cadastral system and general mapping assignments. It also promotes the shared use of geographic information. The NLS consists of 13 District Survey Offices, six national operational units and the small central administration. The NLS has staff of 1800. Over 80% of them are employed in the District Survey Offices. The NLS is a governmental agency subordinate to the Ministry of Agriculture and Forestry.

Digital data producer

The NLS's digital material has been created either by means of computer-aided topographic data production or by using existing elements in printed maps. Topographic Database The Topographic Database of the NLS is Finland's most detailed set of data describing the country's topography. It can be used as background information for various plans, or for other organisations' own information or cartographic products. The Topographic Database contains the key topographic elements, such as waterways, fields, swamps, rocks, roads, buildings, electrical lines and contours, plus administrative boundaries and place names. The road network data in the Topographic Database is updated annually. The other data is updated approximately every five years. The material is available in both vector and raster format.

The Land Information System

A new land information system (the LIS) was launched in Finland on



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Topographic Database and cadastral boundaries 1:10 000.

June 1, 2005 as a result of collaboration between 86 municipalities and the National Land Survey of Finland (the NLS). The NLS is responsible for maintaining the register-keeping application of the LIS. A maintenance application is used for recording any changes in the cadastral data that have resulted from cadastral surveys carried out, and related decisions made, throughout Finland. The municipalities are able to transfer data from their own systems to the register-keeping application via an XML interface for use as initial data.

The system provides data services in different ways: various customer service points and authorities have access to a web application with a map interface; municipalities are able to update the data in their own systems through a data service application which supplies revised cadas-



Basic map on palmtop.

tral data; the cadastral data in the LIS is accessible to external systems through a software interface; and this data can still be supplied on different media (CD/DVD).

Map data

NLS offers also map material on various scales. Basic map 1:20 000 and topographic map 1:50 000 covers the whole of Finland as well as the map material in scales 1:250 000 and 1:500 000. Digital elevation model The Basic Map contour lines and shorelines have been used to make a national raster format elevation model with a pixel size of 25 and 200 metres. The next time the Topographic Database is updated, a more precise 10 metre elevation model will be made, and this will be available for most parts of Finland.



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VTT Technical Research Centre of Finland

VTT Technical Research Centre of Finland is the biggest contract research organisation in Northern Europe. VTT provides high-end technology solutions and innovation services. From its wide knowledge base, VTT can combine different technologies, create new innovations and a substantial range of world class technologies and applied research services. Through its international scientific and technology network, VTT can produce information, upgrade technology knowledge, and create business intelligence and value added to its stakeholders.

VTT produces research services that enhance the international competitiveness of companies, society and other customers at all stages of their innovation process. VTT thereby creates the prerequisites for growth, employment and wellbeing.

Turnover: 225 M

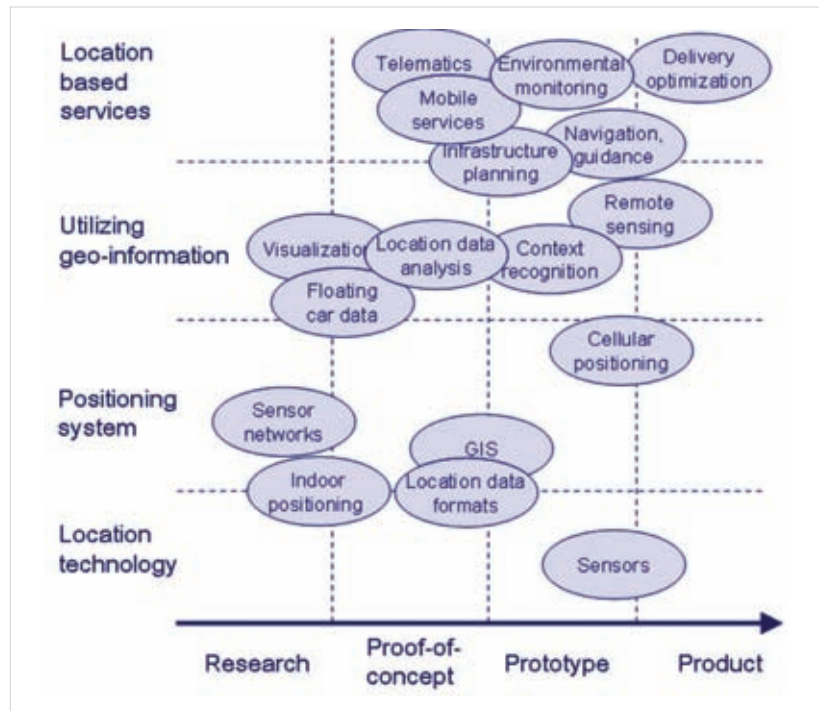
Personnel: 2 720

Expertise in Location-Based Services

VTT's location-related technology scope ranges from location technologies and algorithms to complete location-based services and applications and usability, and from basic research to marketable products.

Our location-based expertise includes the following topics:

- Location technologies for indoor and outdoor applications
- Location-based service architectures
- Mobile and context-aware service platforms and mobility management
- Geographic Information Systems applications
- Applications for location-aware infrastructure planning
- Transport and traffic telematics



Summary of VTT's expertise in location-based services.

- Information and navigation services for drivers, passengers and cargo
- Fleet management and value added services for logistics.
- Remote sensing and environment monitoring
- Innovative context-aware user interfaces with high visibility and augmented reality
- Tools, methods and processes for service implementation and production
- User studies
- Usability design and evaluation.

Intended location application users may come from business and industry, or be private consumers (e.g., special groups such as the disabled etc.). For VTT's current and recent public research and development projects and publications, please see our Web pages.



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Academy of Finland

The Academy of Finland is an expert organisation for research funding within the administrative sector of the Ministry of Education. The Academy has a board and four research councils, as well as an Administrative Office. The research councils are the Research Council for Biosciences and Environment, the Research Council for Culture and Society, the Research Council for Natural Sciences and Engineering, and the Research Council for Health.

The Academy's function is to improve the quality and prestige of Finnish basic research through selective, long-term funding based on competition, systematic evaluation, and relevant science policy. The Academy's development initiatives

focus on developing professional researcher careers and promoting creative research environments. The various forms of support for research, such as research posts, research projects, and research grants, provide opportunities for versatile funding of research in different disciplines. The research funding of the Academy of Finland amounted to 218 million Euro in 2005, of which about 18 million Euro was spent on fields supporting information and communication technology (i.e. computer science, electrical engineering). In 2006, a special call in remote sensing and geoinformatics was carried out, and a total funding of 1,9 million euros was granted.



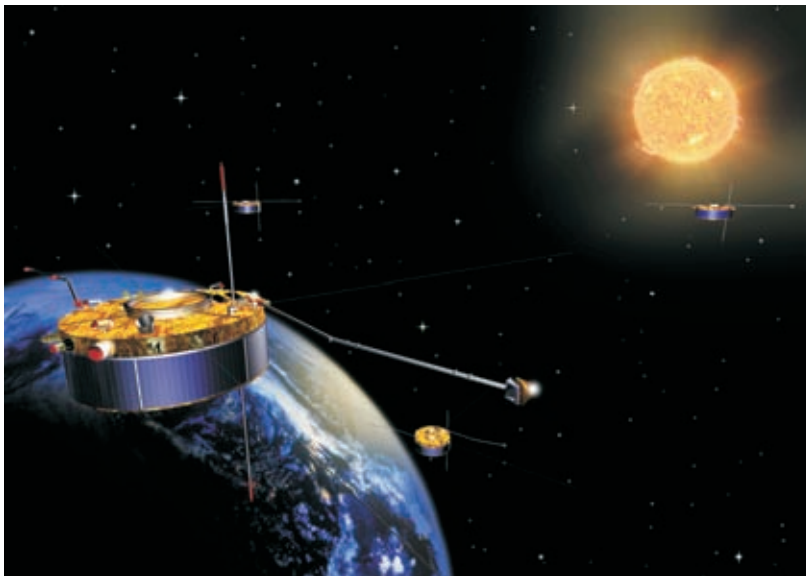
ACADEMY OF FINLAND

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Source: ESA

The four Cluster satellites measuring the energy flow from solar wind to Earth's magnetosphere. Finnish groups participate in analysis of particles and fields data and provide a large-scale context to point measurements through ground-based instrument networks.

Tekes, the Finnish Funding Agency for Technology and Innovation

Tekes, the Finnish Funding Agency for Technology and Innovation (established in 1983) is the main financing organisation for applied and industrial R&D in Finland. The funds for financing are awarded from state budget. Tekes offers channels for cooperation with Finnish companies, universities and research institutes.

Tekes primary objective is to promote the competitiveness of Finnish industry and the service sector by technological means. Activities aim to diversify production structures, increase production and exports, and create a foundation for employment and societal well-being.

Tekes coordinates and offers financial support for participation in international technology initiatives, including EU research programmes, EUREKA, research activities of OECD's energy organisation IEA (International Energy Agency), European Cooperation in Scientific and Technical research (COST), European Space Agency (ESA) and Nordic cooperation. Tekes has a network of experienced technology experts that serves both Finnish and overseas companies and research organisations, particularly in catalysing R&D cooperation within Tekes technology programmes.

Tekes overseas offices are located in Beijing, Brussels, San Jose California, Shanghai, Tokyo and Washington.

Technology programmes aim at gaining new technology expertise and product development options in



Source: Tekes

the important business areas of the future. Technology programmes are used to promote development in specific sectors of technology or industry, and to pass on results of the research work to business in an efficient way.

Programmes have proved to be an effective form of cooperation and networking for companies and the research sector. The programmes also offer good frameworks for international R&D cooperation. During 2006, 19 national technology programmes were under way. In 2005 Tekes total financing of national and international R&D programmes was 430 million euros. From this figure, 19 million euros was provided for space activities (ESA, national and bilateral).



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