POSITIO

ICC 2007 / special issue

Cartography, GI Science and GI Technology in Finland

Spatial Data *Infrastructure* in Finland Today

Antti Jakobsson
President of the Cartographic Society of Finland

This special issue of Positio magazine will give the readers an insight into the development of a spatial data infrastructure (SDI) in Finland. The first special issue of the magazine was published for the Durban conference of the International Cartographic Association (ICA) in 2003. Now in 2007 it is time for the Moscow conference. Positio is a professional magazine on geographic information technology published by the National Land Survey of Finland (NLS). It is published four times a year, usually in Finnish. Our readers are professionals in this field representing the private sector, educational institutions, the government and municipalities. A joint effort of the publishers and the Cartographic Society of Finland was to invite some public and private organizations in the field to make a contribution in the form of articles. The Cartographic Society was responsible for selecting the writers for this issue. The results will provide the readers with an overview of the measures taken after the last conference.

At present, all European countries are in the process of starting the implementation of the INSPIRE directive. This directive will have a great impact on the field of SDI. National Mapping Agencies and other producers of reference data sets are in a key position. In Finland we have a long tradition in promoting the use of geographic information. In 1985, the Ministry of Agriculture appointed the LIS (Land Information System) project to develop the joint use of geographic information. The NLS developed a metadata service for geographic information and a programme for data format transformation. At that time, Finland was one of the first countries to develop a metadata service, and for example MEGRIN (now EuroGeographics) used this solution to create the European metadata service (GDDD). This work can be considered as a basis for a national spatial data infrastructure. The purpose of promoting the joint use of geographic information was added to the tasks of the NLS by law. In 1996, the NLS published the first national map service (the Mapsite) on the Internet including topographic maps in scale 1:20 000.

Currently the Finnish National Council for Geographic Information has worked out a strategy for the SDI in Finland. Several guidelines have been prepared on how the producers of geographic information should implement ISO 19100 standards. However, the funding for the programme has been minimal and therefore actual implementation projects have not been started. In addition, too much attention has been focused on the producers or the government. Some success stories have been reported in the field. Paikkatietolainaamo (spatial lending facility) and Lounaispaikka (Regional SDI portal) are good examples thereof (cf. articles). The NLS has published a WMS service offering maps on the Mapsite for users and a new joint cadastral service with the municipalities. In the field of research, the Finnish Geodetic Institute has demonstrated the numerous usages of web-enabled services and the Technical University has actively prepared guidelines. Private organizations have published several web-enabled map services.

The main emphasis for implementing the SDI strategy in Finland is put on funding and resources. Investment in SDI would bring savings in many fields, but how to pass this message to the decision makers is a major challenge. The implementation of the INSPIRE directive might provide an opportunity for this. As mentioned above the focus should be more user-oriented and private organizations should be more involved. The articles in this issue will give the readers a better insight into the current developments in the field.

POSITIO

ICC-2007 Special Issue –
Cartography, GI Science and
GI Technology in Finland.

Editor
Kirsi Mäkinen,
tel. +358 20 541 5448
kirsi.makinen@nls.fi
Editorial assistant
Päivi Varis,
tel. +358 20 541 5039
paivi.varis@nls.fi
Layout
Kristiina Heikkinen
Publisher
National Land Survey of Finland
Joint use of geographic information
P.O.BOX 84, FI-00521 HELSINKI
telefax +358 20 541 5598
E-mail: positio@nls.fi
Internet
www.maanmittauslaitos.fi/positio/
Printed by
Edita Prima Oy
Helsinki 2007, Finland
ISSN 1236-1070
Cover
Antero Aaltonen

This issue has been made in cooperation
with the Cartographic Society of Finland.

SUOMEN KARTOGRAFINEN SEURA
CARTOGRAPHIC SOCIETY OF FINLAND

Cartographic Society of Finland
c/o Ulla-Maarit Saarinen
00022 Tilastokeskus
E-mail: sihteeri@kartogra.fi

The role and mission of the *Finnish National Council* for Geographic Information

Antti Vertanen
Senior adviser
Ministry of Agriculture and Forestry Finland
e-mail: antti.vertanen@mmm.fi

On 21 July 2001 the Finnish Government appointed a Council which, among other things, was commissioned to take steps to prepare a national geographic information (GI) strategy. The members of the Council represent the key state departments, government organisations, local administration, industry and research bodies involved in the production, use and management of the Finnish GI resources.

During the first term 2001–2004 the Council took as its strategic task to advance cross-sectoral collaboration with the aim to develop a spatial data infrastructure (SDI) which would meet both national and international needs. In 2003 the preparation of a national GI strategy was included as an objective in the Government Information Society Programme. The Finnish National Geographic Information Strategy 2005–2010 adopted in August 2004 focuses on describing the principles, objectives and measures deemed appropriate for the development of a Spatial Data Infrastructure (SDI) in Finland.

A successful implementation of the GI/SDI strategy is expected to result in more efficient and diverse use of the databases available, the emergence of new services and better access to information. It will also make a significant contribution to providing a good framework for the development of the national information society and for international cooperation.

The strategy process took into account the preparation of the Directive establishing an Infrastructure for Spatial Information in the European Community (INSPIRE, 2007/2/EC). In practice the Strategy was based on the same basic SDI model as the INSPIRE directive. Figure in previous page presents the bottom-up approach of the Finnish SDI model.

During the second term 2004–2007 the Council has been implementing the SDI strategy and indirectly participating in the European Union co-decision process of the INSPIRE Directive. The actual development work has been carried out in four working groups:

- metadata and metadata services,
- data harmonisation,
- network services and shared use, and
- research and education.

The working groups have a joint task force to coordinate the actions and to process some common strategic issues, such as data policy and the development of the national GI portal. The working groups are also registered as Spatial Data Interest Groups in the development of the European INSPIRE implementation rules (profiles).

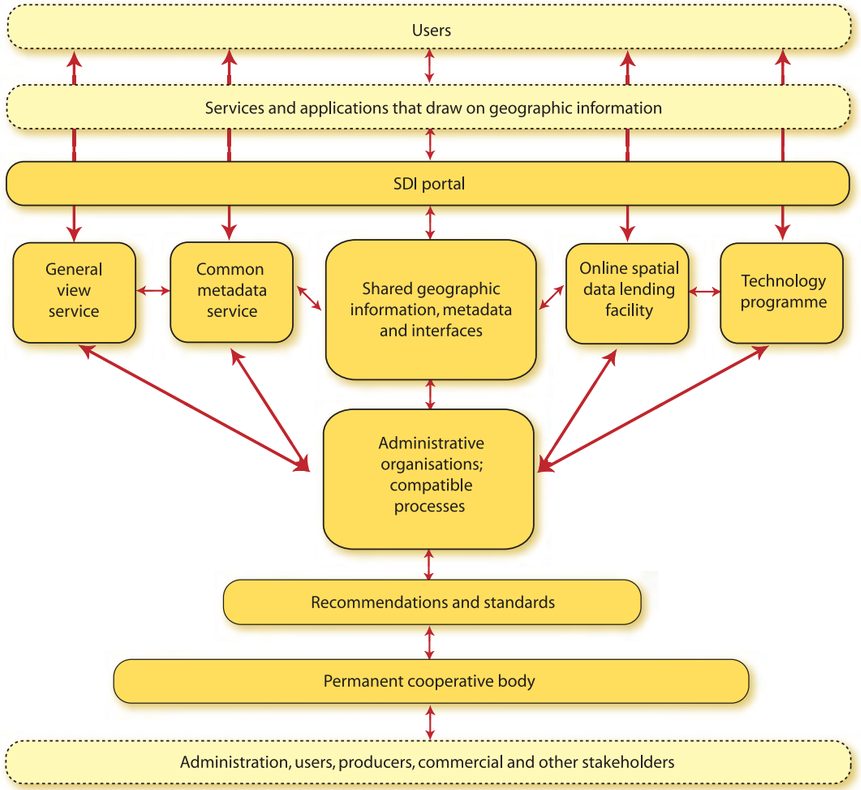
During the implementation process several national standards have been produced (metadata, data transfer, data modelling, quality management), a new metadata service has been introduced, practical guidelines for data harmonisation have been published and a prototype of a shared viewing service has been developed. The impacts of different data policy models have been analysed. A specific service to lend data sets for testing purposes has already been available for several years.

The implementation process has meant balancing between the current national needs and the expected outcomes of the INSPIRE Directive. Now that the Directive has entered into force, the implementation will have a clearer goal. The national legislation has to be amended according to the Directive by May 2009. Some updating is also needed in the national strategy based on the results of the national INSPIRE implementation process.

The role of the Council is likely to change in the future, following the requirements of the Directive:

Member States shall ensure that appropriate structures and mechanisms are designated for coordinating, across the different levels of government, the contributions of all those with an interest in their infrastructures for spatial information. These structures shall coordinate the contributions of, inter alia, users, producers, added-value service providers and coordinating bodies, concerning the identification of relevant data sets, user needs, the provision of information on existing practices and the provision of feedback on the implementation of this Directive.

The future form of the Finnish SDI and role of the Council will be decided by May 2009 as one element of the legal and operational implementation package of the INSPIRE Directive.

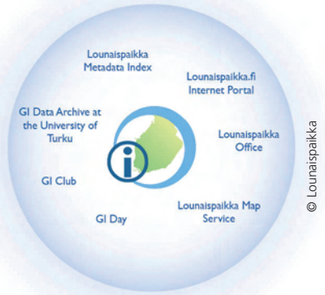


Model of the Finnish National Spatial Data Infrastructure.

Source: National Geographic Information Strategy 2005–2010, Ministry of Agriculture and Forestry, Publication 10a/2004

Lounaispaikka network, www.lounaispaikka.fi, and it's foremost activity, the map service, is a unique example of an active sub-national SDI (Spatial Data Infrastructure) in the Finnish context. Born out of professional GI cluster in the region with fiery souls, true needs of saving resources but also energetic entrepreneurship and joy of exploration as well as co-operation, Lounaispaikka is heading now, on it's 9th year, even towards a more citizen-friendly usability with top underneath technology and creative forms – not forgetting about the updating and development of the present services as well, useful above all for the semi professionals of GI.

Kristina Karppi
Coordinator of Lounaispaikka
e-mail: kristina.karppi@varsinais-suomi.fi
Lasse Nurmi
Planner / Regional Council of Southwest Finland
e-mail: lasse.nurmi@varsinais-suomi.fi



© Lounaispaikka

Lounaispaikka

a *thriving example* of a sub-national SDI in Southwest Finland

Regional & public, open & free proudly presented

A trilingual and free map service at www.lounaispaikka.fi/kartta, established co-operation forum with an intensive inner circle and a more informal outer circle of GI actors in the region, close co-operation with the national networks and several successful subprojects like a present one processing land use plans and waterworks networks for the map service – Lounaispaikka can be described as a successful pilot case of a regional, public, open and free SDI – not to say there wouldn't be a lot to develop further on as well.

Co-operation pact of the central GI actors in the region has enabled the SDI – project funding needed, too, for further development

Regional Council of Southwest Finland and especially it's unit for land use and environment, has been the host and the primary driving force for the network established officially in 2002, although active already from 1999 on. Likewise important and central is also the Dept of Geography at the University of Turku. Also the Environment Centre of Southwest Finland has been co-operating from the very beginning.

Since 2006 also all other universities and high schools in the region joined the inner circle of Lounaispaikka co-operation. Additionally Lounaispaikka activates also a wider network of GI actors in the region by for instance the informal GI club meetings. Also subprojects gather a number of relevant actors around the more specific themes of the Lounaispaikka SDI. So far the co-operation agreements have been made for 3-year periods, and they include even funding. This basic resource allows a coordinator and some elementary needs for running the network.

The rest of the updating and developing work requires varying project funding. The most important funds at the moment are those of EU structural with their strengths and weaknesses. Additionally there are different kinds of national funds, and even all other creative forms of financing are constantly reflected and applied for in order to ensure the vivid development of the Lounaispaikka SDI.

Tourism and culture will be the leading themes of the new everyman's part of the map service.

A triangle of Map Service, GI Data Archive and Metadata Index & Query

Lounaispaikka consists of three GI data services, the map service being maybe the most known and visible of them. The second part is the GI Data Archive provided by University of Turku for actual archiving and further distribution of GI data produced mainly by the fixed-period projects. The third corner of the entity is the Lounaispaikka Metadata Index and Query Service, with over 200 metadata descriptions of mainly regional GI datasets. It was established to enhance the usability regionally produced data and to rationalize data production efforts via better information of already existing and reusable datasets.

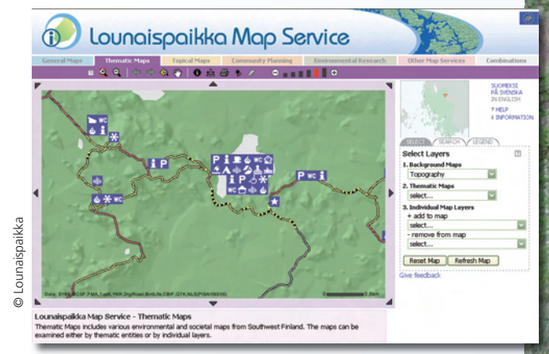
During the last years the developing of the map service has been priorised – now it's time to concentrate also on the Index and Archive as well. Thus work on combining the different forms of GI data from the metadatabase over the archive to the map service templates for the different users has begun – this amongst the first ones in Finland and inspired partly by the up-to-date EU directive INSPIRE.

Towards the citizens and culture in the future

Lounaispaikka map service will most propably be developed towards a more dual profile: besides the present entities useful above all for professionals and semi-professionals in the traditional GI fields of land use planning, environmental protection and decision-making connected, also another, a more citizen-oriented and user-friendly department will be processed along.

Tourism and culture will be the leading themes of the new everyman's part of the map service. Especially the rural areas of Southwest Finland lack a comprehensive touristy-cultural map service on the web. There are very good maps indeed, but an innumerable bunch of them and all spread across different servers ranging from the ones hosted by single municipalities to those produced by a special touristy/cultural project – and mainly only in pdf format. So there is a concrete need for a common touristy/cultural map service for the whole region – easy to use, yet rich of flexible tools and a lot of additional information as well as visually pleasant and stylish to look at. As to the bigger towns, Turku above all, the situation is better.

Yet in Lounaispaikka the aim is to develop a more delicate cultural map diving deeper into the contents. A group of geography students started to construct one out of pure eager and interest and by now it's a bright and original web map Cultu at http://paikka-maa.utu.fi/website/Cultu. It will be developed further on together with Lounaispaikka.



© Lounaispaikka

One of the newest cooperation areas, Kuhankuono hiking routes, also provides excellent possibilities to test and develop Lounaispaikka even in a mobile environment. The vast area attracts some 30 000 hikers yearly, many of them are city dwellers equipped with mobile phones or PDAs with GPS. Present Lounaispaikka team reflecting the idea on site.

Piloting techniques beneath the surface

Going popular as to the users, but heading also to technically advanced solutions beneath the surface is the course of Lounaispaikka. That is Lounaispaikka wants also to hang on to the latest trends of developing GI services co-operating closely with other actors in the field (so far mainly Finnish – but eagerly even international in the future). Lounaispaikka was for instance the first map service in Finland to utilise WMS (Web Map Service) interface of National Land Survey of Finland. Now Lounaispaikka is co-operating with a group lead by the Finnish Geodetic Institute to go forward to use even WFS (Web Feature Service) techniques.

To mention some other discussions going on in the team, also testing open source solutions in piloting projects have been thought of, suiting well to our important values of being an open and free service. Also the developing of Lounaispaikka metadata architecture advanced both in the sense of accurate informatics of GI, GML applicability and usability has already begun, also amongst the first ones in the country.


© Eero Löytönen

Paikkatietolainaamo *download facility:*

A Finnish solution to enhance the access to digital spatial data

Risto Kalliola
Professor in the department of geography of the University of Turku
e-mail: risto.kalliola@utu.fi
Tuuli Toivonen
University lecturer of geoinformatics in the department of geography of the University of Helsinki
e-mail: tuuli.k.toivonen@helsinki.fi

Part of the Finnish spatial data infrastructure, the Paikkatietolainaamo download facility has improved the access to digital spatial data by transferring data sets from their producers to users. Nearly thousand registered users regularly download data for testing and research purposes. Tens of users on a daily basis use the metadata search or map service for data comparisons. The number of data downloads and daily visitors is steadily increasing, rising the interest among both data users and producers.

The access to spatial data is an internationally common and recognized problem. Often the availability of low-priced or free-of-charge data sets is limited, and in many cases the prize of spatial data constitutes a considerable hindrance of their use. The less available are the data sets the fewer are their users. This negative feedback mechanism may hamper research, environmental management, product design and education.

The Paikkatietolainaamo download facility (Spatial Data Lending Facility) is a Finnish solution to contribute to the exchange and broader use of spatial data and information in society. Operational since the year 2003, it has launched a new period of spatial data delivery in the country. It also forms part of the Finnish strategy for spatial information.

The main innovation is in lending of spatial data from their producers to all interested users. Data downloads are made for a one-year long use period in their native GI format, and each download is registered individually to a data transfer log. The data sets may cover the entire country, the SW part of it or just some pre-defined smaller windows in the same area. The lent data may be used for research and development purposes.

This mechanism has gained considerable popularity among both spatial data users and their producers. The current number of registered users exceeds 850. Half of them represents research or education sectors of the society, and one fifth are from private enterprises from many different branches. The total number of thus far made data downloads is around 5300, and a typical download rate varies between 50 to 200 per month. The use intensity of the facility varies according to academic periods, holiday seasons and reflecting the public media's attention to the facility.

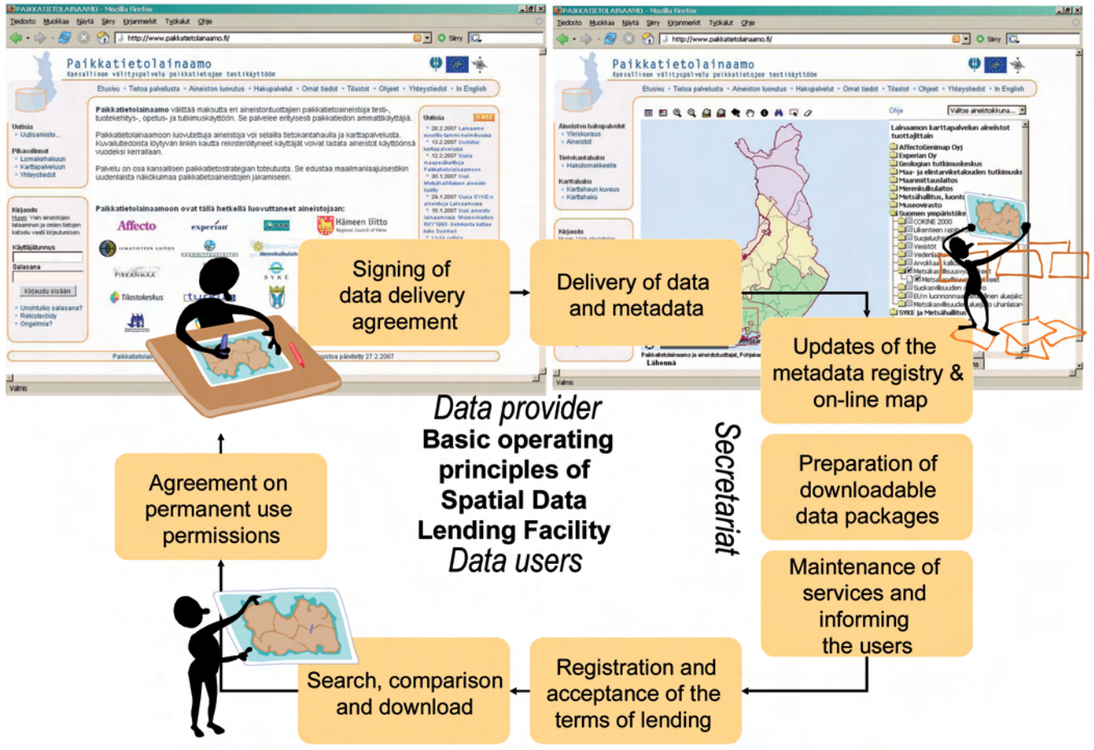
Data producer's interest to participate is rooted into many different motivations.

The current number of participating data producers is 19 and the total number of available data sets in the service is around 300. These include a good representation of all core spatial data sets mentioned in the INSPIRE directive proposal or in the Finnish National GI Strategy. The reality that data downloads are reliably registered has attracted also private data producing companies to participate, which has further enriched the selection of spatial data in the facility.

Data producer's interest to participate is rooted into many different motivations. Although some data providers may be hesitant to let others to use their data free of charge, many of them volunteer to give a piece of their data for experimental use in restricted areas. This way they can indicate their commitment to participate in the construction of a national spatial data infrastructure.

Additionally, many of the data producers consider that their participation in the Paikkatietolainaamo download facility is beneficial through having a good opportunity to promote the overall awareness of the quality and types of data that they produce. The advanced data transfer log of the facility allows data producers to identify each download of their data, which helps them to get an idea of those who are interested about their work. This option may contribute to their further product development and help them to establish new collaboration networks.

The Paikkatietolainaamo download facility has been developed in the University of Turku with support by EU's Life Environment funds. Currently the facility is run jointly with the University of Helsinki. The impetus of its further development is that data lending is one step towards more free sharing of spatial data. As INSPIRE directive talks mostly about users in the administration, the lending is free for everyone. This fact increases the number of potential data users, which will lead into an increased number of applications of spatial data. Therefore, the lending model should be integrated even in the future download services that will be established along the lines of the INSPIRE directive.



The functioning of the Paikkatietolainaamo download facility is based on mutual trust and benefit among the providers and users of geographic information. The services of the secretariat ensure the flexible data flow to users, and collection of necessary user statistics to the data providers.

For more than half a century, the NLS (National Land Survey of Finland) has independently and proudly produced, maintained and developed topographic mapping (the basic map), and since 1992, the digital NLS Topographic Database. Collaboration with other government agencies has been limited to specific areas.

Development in the *Production of Topographic Information*

Topographic database of Finland completed in 2007

NLS Topographic Database used widely

The NLS Topographic Database will cover all of Finland in 2007. Topographic information has found its way everywhere and is increasingly becoming a part of everyday life for the Finns. Nearly all public and private geographic information systems describing Finland are based on topographic data.

The accuracy of the database will be upgraded to quality level A during 2008. By then, all topographic information will be produced from aerial photographs taken using a stereoplotter. Positional accuracy is 3 metres for roads and man-made structures, 5 metres for cultivated areas and 7.5 metres for coastlines (95% reliability). Data on natural features, such as boglands and rock exposures, was digitized from topographic (basic) maps completed between 1970 and 1990. Data on waters, nomenclature, administrative boundaries and conservation areas is updated continuously. The NLS is extending the continuous updating process to contain also building information. Other topographic information is updated every 5–10 years using aerial photographs. The topographic information includes elevation data on all covered areas.

The significance of elevation data has increased. The accuracy of the current elevation model is not enough for, for example, flood mapping. The NLS has begun testing laser scanning equipment in preparation of nationwide data collection. Laser scanning provides accurate elevation data quickly and efficiently.

A vision of a new topographic database

The NLS conducted a customer survey to assess the direction in which the NLS Topographic Database should be developed. Development work was initiated based on the survey results, and the building of the new NLS Topographic Database is scheduled to begin in 2011.

The goal is to establish the new NLS Topographic Database as a solid foundation of basic data on Finland. For citizens, enterprises and administrative bodies, it is important that topographic data is in wide use, is compatible, and that savings have been achieved through planned cooperation between various government agencies and organizations.

Shared processes

The Topographic Database is becoming a joint database compatible with the materials of environmental administration, municipalities and other organizations producing geographic information. In the 2010s, the information will be produced and maintained together, and all overlap in data collection will be eliminated.

The data of the Basic Map will be collected from various sources via network interfaces, and topographic data will no longer be stored as a single physical database at the NLS. Instead of a single database, topographic information will form a logical entity comprising several databases.

The use of networks in the maintenance, collection and distribution of data will make information available to everyone and suitable for different purposes via a standard interface. This will also make the data more up-to-date.

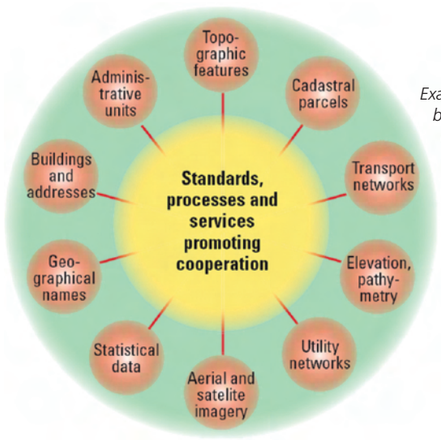
The decision to develop the Topographic Database in cooperation with other parties is necessary but not easy to make. Public administration needs to cooperate more and more also in the area of topographic data. The cooperation requires decisions on data models, data harmonization, as well as file formats and accuracy levels.

Once the data is collected in a distributed environment, it becomes important to ensure conformity with and verification and knowledge of quality processes. This in turn requires the preparation of new public administration recommendations (JHS recommendations).

The establishment of a joint topographic data service also requires legislative work, which means that it has to be well grounded and thoroughly discussed.

The NLS is responsible for the joint Topographic Database

The role of the NLS is changing increasingly from a producer of data towards an enabler of an operating environment and a supervisor of quality processes. Once the database is distributed, a single party becomes responsible for the service. This party, the NLS, is also responsible for receiving end-user feedback.



Example of a whole formed by shared geographic datasets.

Source: National Geographic Information Strategy 2005–2010, Ministry of Agriculture and Forestry, Publication 10a/2004

The topographic database is updated regularly. Even though aerial photographs are the principal source of information some field work is still needed.

Ossi Jokinen
M.Sc. (Tech), Chief Engineer
Central administration
National Land Survey of Finland
e-mail: ossi.jokinen@nls.fi
Jurkka Tuokko
M.Sc. (Tech), Chief of Cartography
North Karelia District Survey Office
National Land Survey of Finland

Top quality nautical charting

Jorma T. Mattila
Press Features Oy

Satellite positioning has enabled absolute positioning and real-time navigation, which have set totally new kind of requirements for the accuracy of nautical charts. Electronic charts have to be correct up to the last buoy, because they are part of the integrated navigation system of the vessels.

Finnish Maritime Administration has accomplished a huge work taking decades in order to make chart data correspond to new requirements of accuracy. As far as depth data is concerned there continues to be work for years to come.

In 1996 the Administration also began to develop totally new data management and production system based of geographic information. The first official Finnish electronic nautical charts were produced with the system in the end of 1999.

Later also the production of printed charts was included into the same system. It made it possible to produce electronic and printed charts from the same centrally maintained data warehouse, although they are very different as products.

According to Tiina Tuurnala, geographic information technology has brought navigation into a totally new level and increased safety of navigation considerably.

Whole system of managing chart data and producing both electronic and printed maps is based on ESRI's Geographic Information Systems (GIS) technology. New data is updated automatically to the ESRI's database from the Administration's fairway and navigational aid registers.

"The system as a whole is world class. It has been awarded, among other things, at ESRI'n international user conference as an innovative solution", tells Mrs. Tiina Tuurnala, Director of Hydrographic Department at the Finnish Maritime Administration.

Quality standard has been rising

In the solution all chart data, including attributes, has been stored in one centralized data warehouse. On electronic chart users can get additional information about the features onto the screen, but attribute information has also helped to automate the making of printed charts.

Earlier a cartographer for example wrote a name of a navigational aid into the digitised chart and draw its light sectors. Now, using attributes, the system automatically makes the light sectors to the chart and writes for example the name of a light house or an island using the right font.

"Surely some minor cartographic editing has to be done, but very little. Most of the work is done by the system", says Tuurnala.

When making a new printed chart the system shows what information has been changed in the data warehouse. The cartographer cannot even by mistake remove from the chart any information that belongs there.

According to Tuurnala, common production system also guarantees that there will not be any inconsistencies between electronic and printed charts. Such inconsistencies could be fatal, when for example the Vessel Traffic Service would be using an electronic chart and the vessel a printed chart.

Without GIS solution and its centralized data warehouse data for electronic and printed charts would be updated and maintained separately, which would increase the amount of work considerably, according to Tuurnala.

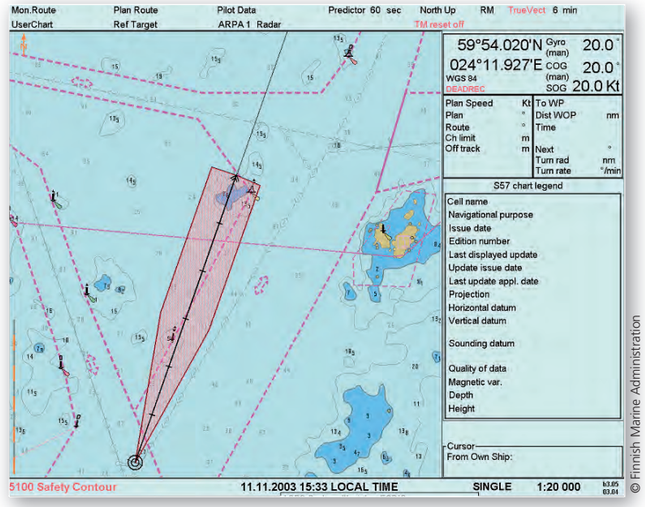
Accurate information about the chart objects

The centralized data warehouse of the system includes attrubute information about the sea area's each and every object relevant to navigation, such as depth, location of the fairway, spar buoys, buoys and light houses.

In addition to the information about the chart objects, electronic chart also tell, for example, at what point at the sea the vessel has report to the traffic control and how it has to be done. When approaching the harbour, the chart offers information about wharfs, and it may even have guiding pictures as attachments.

So, electronic nautical charts have much more information compared to printed charts. According to Tuurnala, for example the Finnish List of Lights with detailed information about every single navigational aid is not necessary for navigators anymore, because all the information can be found from electronic charts.

"Quality information is also very important. From electronic charts users get information for example about reliability of the depth data of any given area. It pretty much tells you, does the vessel dare to deviate at all from the fairway."



ECDIS alarms, if the vessel is approaching dangerous shoal. In the electronic nautical chart produced with ESRI GIS the black circle shows the location of the vessel, and the red cone depicts the area from where the system is looking for dangerous objects based on geographical information.

Navigation is now based on geographical information

The use of internationally standardized official Electronic Navigational Charts (ENC) has become general in Finland rapidly. In 2005 the sales of them increased 300 per cent, and last year the growth continued with same speed. In the end of 2006 already 270 vessels were using Finnish ENC charts.

Users don't need to buy charts of different countries separately anymore.

In practice almost all big Finnish cargo vessels and tankers use official Electronic Chart Display and Information System (ECDIS).

ECDIS makes it possible, among other things, to update nautical charts via satellites. Finland has together with Norway and few other European countries a distribution centre for electronic charts, from where one can get updates for charts once a week via satellites or on CD. The centre distributes electronic charts from dozens of different countries.

"On its route a vessel might pass territorial waters of ten different countries. Users don't need to buy charts of different countries separately anymore. Instead they can inform the centre about their route, and the centre will send the necessary charts and updates for them once a week."

Navigation of well-equipped commercial vessels is nowadays based totally on geographic information, since the electronic charts form the nucleus of navigation system. GPS positioning, log, radar and automatic identification system of other vessels are linked into the navigation system.

"When navigating one is nowadays mostly staring at the computer screen, and the computer is calculating the location and the route of the vessel all the time. It tells about the great importance of the validity of electronic chart information. Computers trust that the information is correct, when they for example calculate changes in course."

Since the electronic chart is made of vector formed data, it's also possible, according to Tuurnala, to create automatic safety mechanisms into the chart, which can for example give alarms about a shoal along the course.

"According to studies huge amount of accidents would have been avoided, if the vessels had been using standardized electronic chart display and information system and official vector formed chart in it", she says.

GAIA
the *Multipurpose*
World Atlas Database

Erkki-Sakari Harju Affecto Finland Oy
Surveying Counsellor, Chief Cartographer
at Karttakeskus, Map Center
Cartography Department of Affecto Finland Oy
Karttakeskus, Map Center
e-mail: erkki-sakari.harju@karttakeskus.fi

Karttakeskus, Map Center, former Genimap Ltd. prepared in 2003–2004 the Comprehensive World Atlas GAIA. Three years has passed from that moment. Now it is a proper time to see how that huge map database has been used.

© Karttakeskus

Extract from the Wall map of Europe. Scale 1:5 mill.

© Printel

Cover of the Digital School Atlas Skaala

© Karttakeskus

School Wall Map of the Nordic and the Baltic Countries, Swedish edition. Scale 1:1,65 mill.

© Karttakeskus

Diary atlases are made to Norway, Denmark, Sweden, England and Germany

Creating the Database

In 2003–2004 Karttakeskus, former known as Genimap Ltd. prepared a comprehensive world atlas database, which covered the whole globe. This database was used to make the GAIA Wold Atlas, which was ordered by Weilin+Göös Publishing Company. Until now this same data has been used in the production of numerous different world atlases. Already in the beginning of the database production it was clear that it would be used in addition to printed atlases also in the production of other cartographic products. Now, when 3 years has passed from the date when the original database was made, we may study the topic from this point of view.

What kind of derived products were made?

The next step in the use of world map database was the production of derived cartographic products. Some of these were already in the publishing program of the company, but now it came possible to replace the old data with a new and cartographically more versatile data. These derived products were among others school wall maps, diary maps, school atlases and ordinary wall maps. Concerning all these maps either a political or a physical version was available.

The new data made it also possible to produce a totally new product for educational purposes, a fully digital interactive school atlas. We named it Skaala. Traditional geographical maps were divided into layers and complemented by matching thematic maps. The Skaala-product is especially suitable for digital teaching applications as the SMART Board™ interactive whiteboard family.

Some comments of different products

The digital map databases of the world atlas were directly suitable for a part of derived products. These were among others small scale geographical and political maps of the world, continents and states, which were used to produce atlases for diaries and school wall maps. The problem with diaries is their large number of different sizes as each publisher has its own diary types including the binding. For example the pages showing the Nordic countries and Europe are cut according to the customer's specifications from the updated European continent database. In national diaries, which show individual countries, the two or four first pages normally show the country in question. These maps are made from 1:3,5 mill. or 1:5 mill. scale data.

The advantage of basic databases is that their data contents or considerably larger than needed on final maps. The needed generalization is made either by automated processes or manually by the operator. Another modification which is made to the maps concerns the colors and fonts. Normally these are tailored according to the customer's specifications to give an individual appearance to the maps.

The maps in textbooks as well as the school wall maps are a special group in the family of derived maps. The contents of these maps must match the different educational levels and the corresponding textbooks. Therefore the planning of the contents of these maps is made in co-operation with textbook publishers and educational authorities.

The database of the small scale world map contains among others the following levels:

- Coastlines as well as the largest rivers and lakes
- Populated places including their classification
- Transportation networks including their classification
- Topographic main features of the terrain by hypsometric colours or shading
- Boundary information of the highest level administrative classes
- Names for the above mentioned features

The preparation of derived cartographic products from above mentioned databases is mainly selection according to the final scale, this concerns especially the names and populated places. On school wall maps the amount of names is small and the names must be made so that the names and map symbols are readable from a distance. On the contrary the amount of names on an ordinary wall map is quite high and the text size is small.

The softwares to produce the original world map database were Microstation and MapInfo. The derived cartographic products are finalized by Freehand or Illustrator softwares and depending on the customer either in PC or Mac environment.

MOD-Production

A Map on Demand- production (MOD) is a quickly expanding area of digital cartographic production. The digital databases from image processing softwares are directly suitable for digital multicolour plotters. This gives several advantages for the printing:

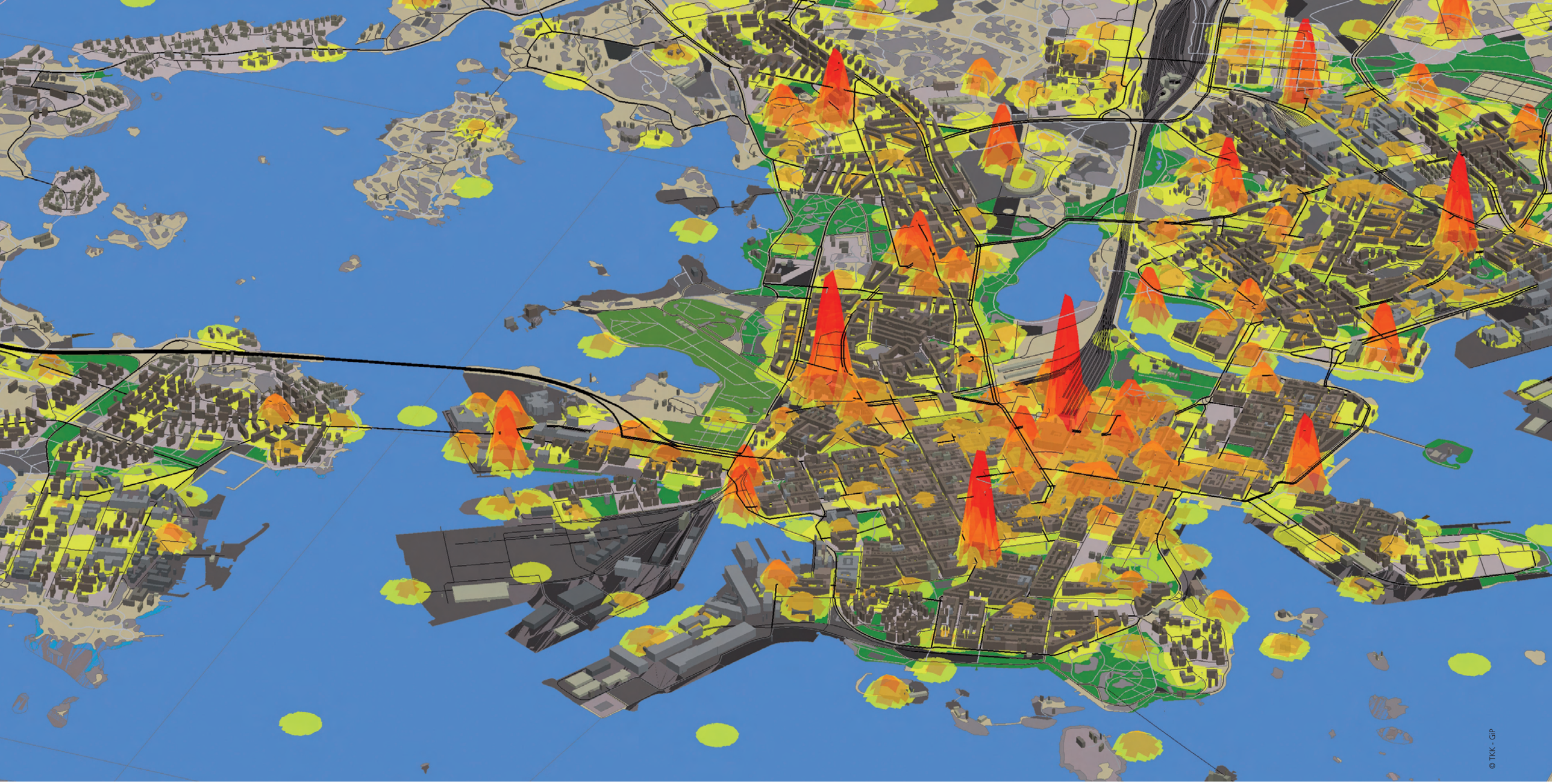
- Maps are made only according to orders; the maps do not rest in the stock.
- It is possible to cut just such a piece of the database, which the customer needs.
- The data contents and even the cartography of the map can be made according to the needs of the customer.
- The printing of the map can be made on such a base the customer wants.

The same map databases, which have been made to produce wall and school wall maps are directly suitable for the MOD-production. For example the special prints of the World Map with the customer's own symbols and information are very popular in business world.

Conclusions

The GAIA database has made it possible for us to expand considerably the selection of national, continental and global maps. This concerns both the works to order and our own publications. Karttakeskus is heading to foreign markets with different cartographic solutions. This effort is now possible with proper digital data.

GAIA was the first comprehensive world atlas made in Finland in Finnish language and according to the national approach. We have found that the consumers adopted it very well. We feel that we have really managed to create a multipurpose world map database.



A screenshot from a three-dimensional visualization environment shows the fire and rescue service incident densities in the centre area of Helsinki. The kernel density calculations are based on geocoded fire and rescue service incident missions in 2003.

Research on visualisation *for rescue services* and crisis management

When the visual representation of spatial knowledge succeeds in providing valid information and be intuitively interpretable, it is a valuable tool in communication and cooperation for experts from different disciplines.

Paula Ahonen-Rainio, Jukka Krisp, Salla Multimäki and Jari Korpi
Helsinki University of Technology
Laboratory of Geoinformation and Positioning Technology
e-mail: firstname.lastname@tkk.fi

At the Helsinki University of Technology, the Laboratory of Geoinformation and Positioning Technology makes research on cartography combined with geoinformatics. Ongoing work is focusing on the modelling of processes that derive valid information from raw data as well as from tacit knowledge and provide it to decision makers in an efficient form. Work is carried out in close cooperation with those responsible for fire and rescue services and crisis management.

Extracted information for decision makers

Different domain experts with various scientific backgrounds and interests have specific knowledge. Within the spatial modelling processes the different actors have to find ways to integrate the knowledge from experts into spatial models. This requires interaction, and maps may have a crucial role in creating an understanding between the actors.

In problem-specific spatial modelling processes domain experts are the most important information source. Therefore, one research aim is to find out how to bring the expert knowledge into problem-specific spatial models, and finally, to problem-specific maps that assist in planning and decision-making those actors that lack domain expertise. For example, interpretation of abstract phenomena may require expertise that cannot be expected from decision makers.

In planning, decision makers may not be motivated to explore the situation at the background but are rather more interested in hearing reasoning for proposed actions. Geoscientists, in close cooperation

with domain experts, can provide planning tools (for example maps) in order to support planners and decision makers to decide on the proper actions. Maps in these kinds of cases shall present only variables that are meaningful to decision makers. An example of problem-specific maps is the 3-D visualization of fire and rescue service incident densities shown in the figure.

Problem-specific variables are derived from raw data and need to be validated with regard to their value for the specific decision. The modelling process joins and aggregates the selected significant variables. This means extensive consultation with domain experts and may result in several alternative problem-specific models. These alternatives can be visualized and used as the basis for a decision. The raw data may lose its primary accuracy during this process, but its relevance for a particular decision may remain high. It is important that the essence of the data remains intact.

Situation picture provides on overview for crises management

One of the research projects is studying the visual presentation of information in a situation picture of international crisis management. The situation picture is a map-based presentation composed on-demand from the information in a crisis management system. As a graphic presentation, the situation picture should provide an overall awareness of the situation to actors coming from different organisations. These may be, for example, local rescue services, military, Red Cross, Doctors without Borders, and various volunteer organisations.

In the situation picture, the information is presented with pictorial symbols of framed pictograms. There are over 30 different pictograms that may appear in various nominal categories of incidents and alerts, operations, units of actors, and infrastructural elements. The nominal categories are presented by double visual encoding: the shape of the frame and the hue within the frame. The pictorial symbols refer to point locations, to linear features, or to areas. The information in the crisis management system originates from data sources of varying reliability, varies in spatial accuracy, and has a varying relevance in temporal dimension. These aspects of information need to be displayed as subordinate variables of the pictorial symbols.

Usability and effectiveness are core issues in visualization

Some elements of the visual presentation of the situation picture were tested with potential users in spring 2007. The test was accessible in the Internet, and 61 users in seven countries in Europe and North America made the test. They were the representatives of the participants in the SHIFT project. At the moment of writing this, the test results are in analysis.

The test focused on the interpretation of the pictorial symbols and use of dimensions of colour in the visualization of uncertainty. The pictorial symbols were tested both as plain symbols without a background map and on a map as a real-like situation picture. The interpretation of uncertainty information was tested with dummy pictorial symbols on a map. The test proceeds from cases of one uncertainty variable to cases of two and three variables.

The results will be analysed with respect to user profiles. The user profiles are composed of professional background, education, age and nationality as well as a test of colour impairment.

The preliminary results from the test indicate that the interpretation of uncertainty is very difficult when more than one variable of uncertainty are displayed. It also seems that the visual variables, such as transparency, do not work when displayed randomly on a map. The results also seem to suggest that those pictograms that may appear in different frames with different meanings can be better interpreted with one of the frames than with another one. This may result not only from the visual display of the symbol but the conceptual association of the pictogram. It should change according to the frame even if the pictogram remains the same; for example, the health pictogram in the frame of an incident means a negative problem whereas in the frame of an actor it means positive help. These results relate to a wider frame of visualization of multivariable information.

The results of the test are expected to add understanding about how much complexity can be included in the symbols when displayed on a map that cannot be specifically designed for the purpose, as is often the case in crisis management. The information should be interpretable intuitively and correctly. This kind of a situation picture map would be a daily tool for actors in crisis management to grasp an overall awareness of the situation that then leads to an interactive visual analysis of further information in the crisis management system before actions are taken.

Pictorial symbols are designed and tested for a situation picture of international crisis management as a part of the SHIFT project (Shared Information Frame and Technology) in the context of Multinational Experiment 5 for development of procedures and tools for international crisis management.

Tapani Sarjakoski and L. Tiina Sarjakoski
Department of Geoinformatics and Cartography
Finnish Geodetic Institute
e-mail: firstname.lastname@fgi.fi

Towards ubiquitous *geospatial services*

- Nuuksio National Park as a test environment

A near-future vision is that hikers will be tracked by sensors hidden in the forest to guide their way and when help or additional information is needed, such as what is the less difficult route to choose, or whether there is water damage on the track.

Ubiquitous computing in the background

Ubiquitous computing is seen as one of the big trends in computing. It deals with distributed and mobile computer systems, which make the computer to disappear – through a range of new devices and interaction possibilities. In 1991 Mark Weiser envisioned that in the near future, a great number of computers in a ubiquitous network would be present in our everyday life. The devices themselves are often embedded in clothing or footwear, for example. Consequently, ubiquitous geospatial services can be understood as services that are available everywhere and at all times, and attached to geospatial information. Taking the ubiquitous computing in perspective, the services utilise the ability of devices to communicate wirelessly with each other.

How do these visions relate to research and development of geospatial information technology and cartography, then? Existing multimedia phones provided with built-in GPS, high-speed mobile network support, high-quality screen with 3D graphics, and a personal navigation application seem to be a dream come true. Still, many fundamental issues remain, such as the usability of the devices and services. Small screens are not so easy to read on the move, especially in direct sunlight; the devices are only partly weather-resistant, batteries may run out in a critical situation, GPS-coverage and accuracy can cause surprises, as can the coverage of the mobile telecommunication network. These are examples of issues that have already been identified. At the same time, users' needs and desires concerning the services are evolving, sometimes towards directions that are hard to predict.

© Jaakko Kähkönen, Ulla Pyysalo, Tiina Sarjakoski, Petteri Torvinen

Various forms of geospatial information and sensors will be integrated in the test environment for ubiquitous applications, covering the Nuuksio national park and its surroundings.

Test environment for ubiquitous applications

In order to investigate these topics and to move research towards even more advanced ubiquitous services, the Finnish Geodetic Institute (FGI) has started to set up a test environment. In this initiative, the focus is on outdoors activities. Located only less than one hour driving from down town Helsinki and 15 km from the FGI office building in Kirkkonummi, the Nuuksio national park area was a rather natural choice as a basis for the development. The Nuuksio national park, providing possibilities to escape the busy capital city and to experience nature provides an environment challenging enough for testing ubiquitous services for people love the outdoors.

The databases containing geospatial information on the Nuuksio area constitute the most central element of the test environment. Taking the existing databases as a starting point, the area currently is completely covered by the Topographic Database of the National Land Survey of Finland (NLS). This 2D-database has a nominal scale of about 1:10,000. The existing digital elevation has 25 m grid resolution, the vertical accuracy being about 1.5 m. To complement these with more accurate data, the FGI has started to compile various more accurate and novel data sets for the area. Airborne laser-scanning data with a point density of more than one observation per square metre already covers nearly half of the 250 km2, the measurement of the second half being currently under way. High-resolution digital colour and infrared imagery with 20 cm ground resolution will be available soon.

Users are getting more and more used to 3D-representations in different kind of applications.

3D information as a geospatial reference frame

The laser scanning data makes it possible to create a high-resolution digital elevation model of the area, and to extract 3D-shapes of features such as trees and buildings. Even now it can be seen that users are getting more and more used to 3D-representations in different kind of applications, such as video games, Google Earth, as well as public 3D-visualisation of road and building plans. Therefore, the Nuuksio test environment will also contain 3D-models of buildings with photography-based textures on the facades. 3D-models have also been created of some of the interiors.

The creation and requirements for the geospatial 3D model of the Nuuksio test environment constitute an interesting research topic of its own. However, this 3D-model serves 'only' as a reference frame to which other information elements are linked, forming together the basis of the users' virtual experience of the environment. At the FGI we are working particularly on the integration into the same environment of various multimedia components, including those created by various community groups.

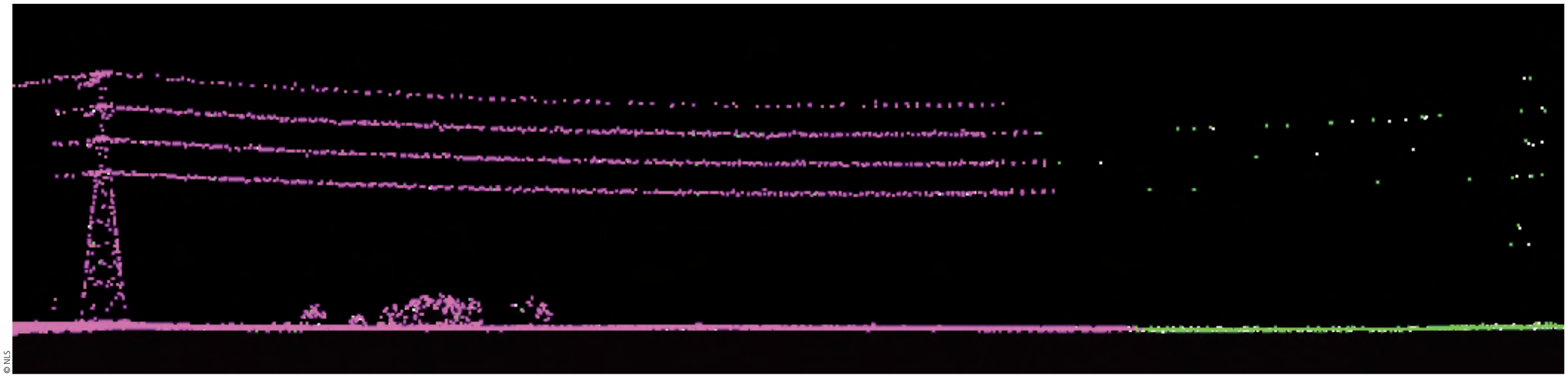
Technology for ubiquitous geospatial services

In the Nuuksio test environment, our aim is to test ubiquitous geospatial services especially in outdoors situations. It is apparent that in the near future such services are strongly dependent on the usage of multimedia phones. Their fundamental strength is based on the existing and evolving communication infrastructure. In future, various permanent environmental sensors, such as visitor counters, weather stations and outdoors cameras, will be linked to the services to provide richer, real-time content to the users. The usage of RFID (Radio Frequency Identifier) technology is another plausible direction for development. The usage of RFID-tags as 'digital lighthouses' for identifying places and objects is one possibility. Alternatively, the tags could be used to track marked animals, or even visitors in the Nuuksio national park. However, even the technology must be understood in its role as an enabler of exciting and interesting user applications.

Test assignment:

Providing a *national digital* terrain model using laser scanning

Juha Vilhomaa
M.Sc (Eng), Director, Aerial Image Centre
National Land Survey of Finland
e-mail: juha.vilhomaa@nls.fi



Laser points (lilac) of the flightline flown at an altitude of 500 metres and laser points (green) of the line flown at an altitude of 2000 metres.

The production of a new and more accurate national digital terrain model is about to start in Finland. The idea is to employ laser scanning as the production technique. The preparative work include a test assignment, in which the accuracy of altimetry measurement of the terrain, the expenses and the common use of the acquired laser scanning data in various applications achieved with the method are explained and the production process of the digital terrain model is planned.

Background of the test

A working group set up by the Ministry of Agriculture and Forestry published a report in March 2006, according to which the production of a new digital terrain model was started in Finland that is notably more accurate and of uniform quality than the current national terrain model. The altitude accuracy should be at least 0.5 meters. The working group considered laser scanning as the most potential method of gathering accurate altitude data.

At the same time, the National Land Survey realized that wide area laser scanning should be studied in more detail in practice and that the possibilities thereof in conditions like those in Finland should be defined. The surveys were started with a requirement development project on laser scanning (6.10.2005–30.3.2006). One who also participated in the project as an expert was professor Juha Hyyppä from the Finnish Geodetic Institute, and during the project several experts of companies working within the field were consulted. Documented experiences of use were acquired from the Bavarian state mapping agency in Germany and from Swisstopo in Switzerland. The members of this project also studied research reports made in Finland on the accuracy of laser scanning and on how various parameters affect the accuracy.

What was also discussed in the requirement development project was the possible versatility of laser scanning data to be used in forestry application in addition to the digital terrain model production. In this regard the chances were promising. What still remained unclear was whether the time of scanning (leaves or no leaves on the trees) was relevant in respect of the forestry applications.

The requirement development project confirmed our conception of laser scanning enabling to provide the new digital terrain model that meets the requirements with reasonable costs per unit. The area of Finland is wide and therefore the cost per unit is significant as to the prerequisite of the operation. Based on the results acquired from the requirement development project a decision was made to carry out a test project, in which the method could be tested in practice and more information could be obtained in order to start planning the production process of the actual digital terrain model.

Objectives of the test

In spring 2006 the National Land Survey together with the Finnish Geodetic Institute initiated a laser test project, the purpose of which was to test in practice the production of a national digital terrain model by means of laser scanning. The idea is to test the laser scanning parameters that seem to be most suitable for Finnish conditions based on theory and experience acquired from other countries. The cost estimate of the test assignment was planned on the basis of estimates obtained from companies in the field and the mapping agencies mentioned above as well as our own work estimate, since it is an essential part of the test to determine the costs involved in the method. A decision was made to carry out as much as possible of the work ourselves, as the test was basically regarded as a learning project.

The object is to integrate the production of the new digital terrain model with the update process of topographic data with minor changes, so that laser point data automatically classified as ground surface is produced at first to form a basis for Espa work. The update process of topographic data is based on stereo models and on the software of Espa Systems, which were provided with adequate processing operations of altitude points. What remains to be done in connection with Espa work is to check the point data, to correct significant classification errors and to provide digital terrain model products (grid- and tin-models).

As to the economic efficiency of the method the object is to determine how useful the laser scanning data acquired is for other applications. For this purpose organisations operating in various fields were encouraged as associates for this project. Approximately thirty companies were interested in such a partnership. Several organisations studying forestry applications enrolled, such as Helsinki and Joensuu universities, the Finnish Forest Research Institute and the Forestry Development Centre Tapio. Another area of focus in this study is the needs associated with flood control and flood hazard mapping, which are studied for instance by the Finnish Environment Institute, the Southwest Finland Regional Environment Centre, Turku university and the city of Pori among the organisations enrolled. In addition, several companies involved with processing material and manufacturing products are involved in this project.

The parties will study how well the data is suited for their specific research projects and provide reports on the results thereof and feedback whether the scanning parameters employed are optimal or

whether they should be altered to better correspond with their specific needs.

What were decided as the most important scanning parameters regarding point density were 1 point for two square meters, flight altitude of about 2000 m, the opening angle of scanning +/- 20 degrees and the distance between flightlines 1250 m. It was also decided that some additional flightlines were to be flown at a height of 500 meters and another line at 4750 meters. The point densities of such flightlines were correspondingly approximately 10 points/m^2 and 1 point / 10 m^2. In this test it is important to gather information about whether the point density employed allows acquiring an adequate amount of last-pulse-laser observations from the surface of the ground, so that the elevation model to be provided describes the terrain in adequate detail.

Test area

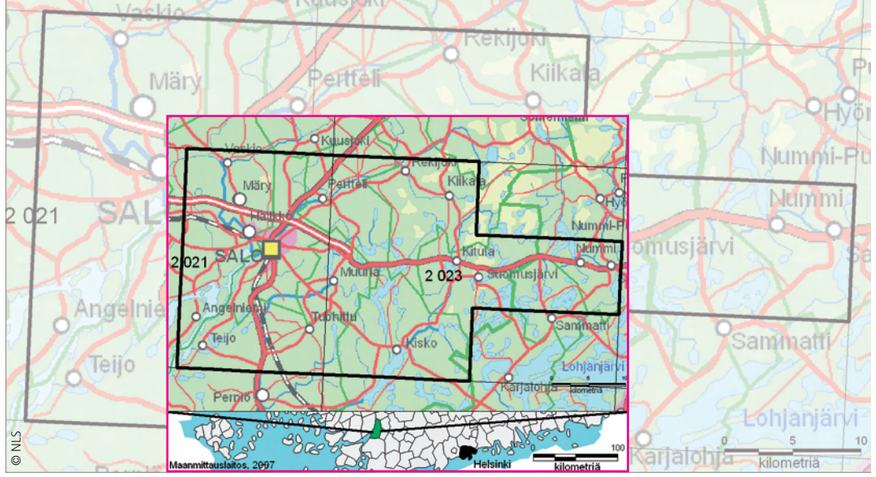
The width of the main test area is 1400 square kilometres, and it is located in the Southern part of Finland in the region of Salo and Suomusjärvi. It was agreed that the smaller research targets of the Finnish Geodetic Institute in Espoonlahti and Kalkkinen were also to be scanned during the test. The following grounds were considered to be the most important ones when the main test area was selected.

The Finnish Geodetic Institute had been testing the quality of a photogrammetric digital terrain model previously produced by the National Land Survey on the East side of the test area. At this time a digital terrain model with a grid size of 5 m had been provided from an area amounting to 150 square kilometres. This terrain model provided a good reference surface, to which the accuracy of the test data could be compared.

Since the idea of the test was to plan a process suitable for the scope of a national project, the test area had to be fairly wide. Therefore productivity was set as an objective, meaning that the idea in this test is to provide an applicable digital terrain model within a production area of the size that would conventionally be concerned.

The main test area is a built-up area (the city of Salo), with waterways, forests and arable land, and with a fair amount of differences in altitude. Thus, it is an adequately representative sample of the terrain in Finland.

Scanning was to be carried out during the season, when the trees are leafless and the undergrowth is as sparse and low as possible, in order to obtain a sufficient amount of laser observations of a bare ground surface. Then again, laser data was to be provided for the organisations studying forestry during the leafless season, since they have previously focused on using laser scanning that have been carried out during the season with leaves, in the middle of summer.



The main test area, Salo and Suomusjärvi. Area: 1400 square kilometres

Test flights

According to the test plan the test flights were to be performed as a specific assignment, and the scanner Leica ALS50 II was to be hired from Leica-Geosystems. According to our agreement the scanner was to be in use by the end of October 2006.

However, the scanner was not obtained for use, and therefore an invitation to submit tenders was published concerning the scanning. The invitation for tenders provided one realistic offer for scanning to be carried out during the autumn of the same year, and on the basis thereof a decision was made to order half of the scanning to be carried out in the main test area of Salo from SITO Oy that used the German company TopScan Gmbh as the subcontractor to conduct the scanning. TopScan successfully performed the first scanning flight on 21 December 2006, whereby the northern half of the main test area was scanned, i.e. an area of approximately 700 square kilometres, at an altitude of 2000 metres and one flightline at an altitude of 500 metres using an Optech-scanner. During the flight the terrain was completely covered with snow, but the snow cover was merely a few centimetres, and the trees were not covered with snow.

The other side of the main test area, as well as the separate smaller test areas were to be scanned according to the original plan during a specific flight with a hired scanner in spring 2007. Preparations are in progress to carry out the scanning flights in the middle of April using a Leica ALS50 II scanner hired from FM-International Oy. The scanner is to be mounted in a Cessna 401B airplane used by the National Land Survey.

Experience from the test

As a result of the scanning flight conducted in December a calibrated and an uncalibrated georeferred point cloud were obtained in the beginning of March 2007.

An efficient workstation was assembled at the National Land Survey to process the data that can be used for simultaneously processing laser point clouds with the programmes of Terrasolid and to examine a corresponding area with stereo models and perform operations associated therewith using the programmes of Espa Systems. Processing the entire area of 700 square kilometres in one go was carried out smoothly. The Terrasolid enabled us to make an automatic classification of the ground surface and to compare the visual compatibility of adjacent flightlines as well as the compatibility of flightlines flown at 2000 metres and 500 metres.

Processing the entire area of 700 square kilometres in one go was carried out smoothly.

Based on the visual examination the material acquired at an altitude of 2000 metres seems promising, and the distance of the last-pulse observations obtained from the ground surface even at places covered with a thick tree stand seems to range from a few metres to about 7 metres at the most. An ample amount of laser observations have generally been provided from such spots, from where the ground surface has not been distinguished at all with stereo image interpretation. An automatic classification of the ground surface with the programmes of Terrasolid seems to find the ground successfully.

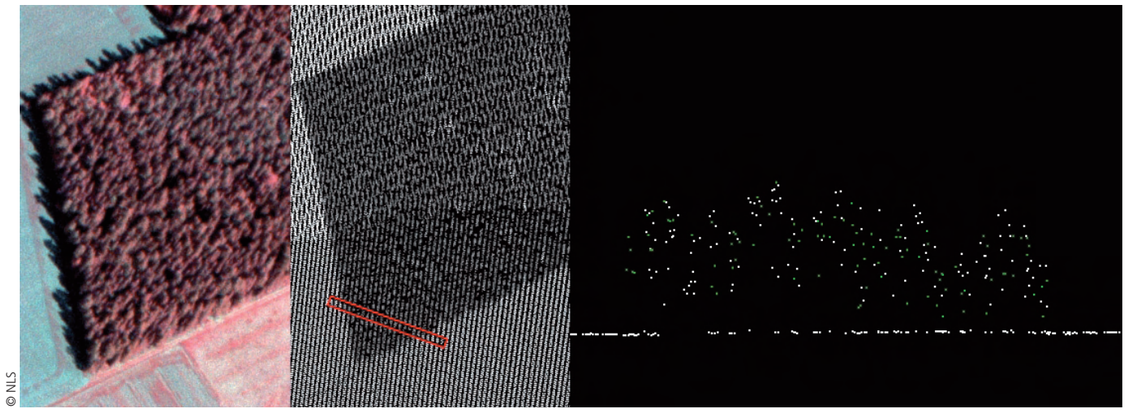
How well the automatic classification has succeeded throughout will become apparent during the coming months when the result of the classification concerning the entire scanned area will be systematically reviewed at the Varsinais-Suomi District Survey Office using the Espa stereo workstation.

In a stereo workstation the result of the classification will be compared to the stereo model and to the vectors in the topographic database of the area. The accuracy of the altimetry measurement in a stereo model interpretation is obviously not of the same quality as the laser point data, but together with the vector data of the topographic database it allows finding significant classification errors.

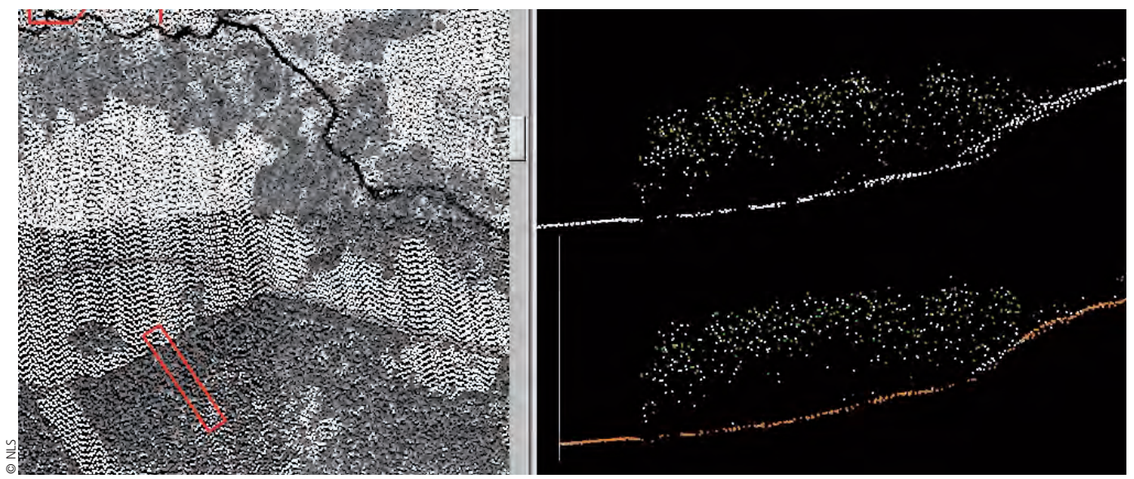
In the beginning of April 2007 the NLS started to deliver data to the other organisations involved in the test. No common schedule was set as regards the results. Instead the organisations may provide reports on the results as soon as they are completed.

When the scanning of the area scanned in December 2006 continues in April 2007, the idea is to scan also a part of the area overlapping with the one scanned in December. Thus an understanding is obtained of whether the snow cover in the terrain during the scanning in December has improved the scanning result by strengthening the intensity of the pulses obtained from the surface ground. In addition, information is acquired on the effects of the doubled point density.

At this stage of the test project it seems that the technology as such functions smoothly, and is very efficient and also allows carrying out an accurate altimetry measurement. The Finnish Geodetic Institute initiated the accuracy analyses based on the reference model described above and on terrain measurement. The preliminary accuracy results that were computed until May proved to be even better than ecpected. More deteiled results are available before September. Plenty of work remains to be done with the definition and planning of the processes in order to obtain the desired end result and to start the actual production in 2008.



The corner of arable land with a thick tree stand. Infrared air image in colour, an intensity image of laser scanning and a point cloud.



The position of cross-section on an intensity image (on the left). On the right at the top a point cloud of laser scanning from a corresponding angle, and at the bottom on the right an automatically classified ground surface (brown)

Mika Vuorio
Expert in IT and geographical information systems
WM-data, a LocigaCMG company
mika.vuorio@wmdata.fi

www.matka.fi:

Door-to-door timetables and route information for the entire Finnish public transport system, available from one place

The door-to-door timetables and route information of the Finnish public transportation system can all be found from www.matka.fi. This service, set up by the Finnish Ministry of Transport and Communications, covers the public transport information of all major Finnish cities and municipalities, VR's train timetables and Matkahuolto's local and express bus services. Flight and ferry timetable information will be entered in the system during 2007. From the beginning of this year, Destia will be responsible for the operation, development and commercialisation of the service. WM-data, a LogicaCMG company developed the technology behind the service.

WM-data is a part of LogicaCMG group, a major international force in IT and business services. The group employs around 40,000 people across 41 countries. LogicaCMG's focus is on enabling its customers to build and maintain leadership positions using LogicaCMG's deep industry knowledge and its track record for successful delivery. The company provides business consulting, systems integration and IT and business process outsourcing across diverse markets including telecoms and media, financial services, energy and utilities, industry, distribution and transport and the public sector. In the Nordic region the group employs around 9000 people and operates under the trademark "WM-data,a LogicaCMG company". More information is available at www.logicacmg.com and www.wmdata.fi

© Destia

Destia is the market leader in Finland's infrastructure sector and a leading service provider. The company plans, builds and maintains modern traffic and industrial environments, which provide value to the customer's business throughout their lifecycles. Destia serves its customers with skill and friendliness, using the newest technology and protecting the environment. With a turnover of more than EUR 474 million, Destia is the market leader in Finland's infrastructure sector and has approximately 2,500 employees. Its Traffic Information Services is the leading supplier of dynamic and real-time traffic and public transportation information. Traffic content is relayed to navigation equipment, vehicle computers, Internet services and mobile devices. These traffic information services can be tailored to meet customers' needs. www.destia.fi

Matka.fi is the largest public transit trip planner implemented so far in Finland. The service's database is 60 times larger than that of the massive public transit trip planner of the Helsinki region and includes more than 215,000 street names or stops and approximately 18.9 million addresses. Information from more than 400 traffic service providers is included.

Matka.fi is the traveller's search engine.

With Matka.fi, a traveller can use the trip planner to find the fastest and the most flexible way to travel, for example from Aleksanterikatu 2, Helsinki to Haukivuori. Then, trip planner also finds the related timetables and route.

The service is under continuous development, based on the number of users and experiences. It can be used in Finnish, Swedish, www.resa.fi, and English, www.journey.fi.

"Matka.fi is the traveller's search engine. Until now, the consumer has only received an answer to, "Where?". Matka.fi gives also answer to, "How do I get there?". In the near future Matka.fi will also tell what can be found on the way. Matka.fi is the perfect addition to Destia's traffic information services on the Internet, mobile devices and GPS navigators", says Destia's Ville Virtanen.

"The system is based on WM-data's Trip Planner, which combines timetable information for several modes of transport and finds the optimal route between places using map-based route calculation. Trip Planner is a perfect example of how IT innovations can greatly benefit the consumer", Kari Partanen, a director at WM-data, explains.

Matka.fi includes information from several information producers. Since the beginning of this year, Destia has been managing contracts between producers and users of information. WM-data is responsible for providing the technology, collecting the required content and combining them into one service.

This project was challenging due to the need to combine diverse timetable information and make it suitable for one system.

"This project was challenging due to the need to combine diverse timetable information and make it suitable for one system. For example, the management of three time zones, with timetable information covering the region between Nuorgam in Norway and Vyborg in Russia, and exceptional situations such as changing sleeping-car or transferring passengers to another train during the night, required extensive consideration, explains Partanen. In addition to the domestic market, we have sold WM-data's Trip Planner to approximately 10 locales in the US. The largest of these are Las Vegas and St. Louis", Partanen continues.

"In the future, matka.fi will cover all forms of transportation and be used not only on the Internet but with other web, search, phone, mobile and navigation services", Virtanen affirms.

Karttakeskus - Map Center

We have carried many names, like Karttakeskus, Geodata, Genimap, AffectoGenimap... Now we are Karttakeskus (Map Center) again! Karttakeskus continues to be the leading Finnish map publisher as well as retailer and distributor of both Finnish and international map products.

We supply traditional printed maps, digital maps and CD products. We use our up-to-date map data to produce various custom-made map products, like guide maps, travel maps and business gifts.

The Karttakeskus shop and the online shop at www.karttakeskus.fi are Finland's largest individual retail outlets for maps in their fields of business.

Our best-known products include Karttakeskus ® GT Road Maps, Karttakeskus ® Motorist's Road Map (AT), Karttakeskus ® Outdoor Maps and Karttakeskus ® World Maps.

Integrated expertise, reliable and rapid delivery and state-of-the-art production technology are our strengths. We are part of Affecto Plc.

www.karttakeskus.fi


Welcome to the NLS MapSite
Citizen's MapSite - National Land Survey of Finland - Microsoft Internet Explorer
Tiedosto Muokkaa Näytä Suosikit Työkalut Ohje
http://kansalaisen.karttapaikka.fi/kartanhaku/osoitehaku.htm?c=3385895&y=6675042&scale=400000&tool=simra&lang=en-GB
Siirry
Links
MAP SITE
X(N) 6675042
Y(E) 3385895
Search
Create link
Transform
Order
Settings
Feedback
Map search
Instructions
By address By place name By map sheet number By coordinates
Address:
Municipality:
Search
VANTAA
VANDA
KAUNIAINEN
GRANKULLA
HELSINKI
HELSINGFORS
10 km
Copying not authorized
© National Land Survey of Finland
MapSite © National Land Survey of Finland Terms and conditions of use
Suomeksi
På svenska
www.mapsite.fi