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THE MONTHLY MAGAZINE ON POSITIONING, NAVIGATION AND BEYOND

Spatially Enabled Government and Society

A pro-poor agenda is paramount

"Access to geospatial knowledge will grow exponentially" - *Jack Dangermond*

"UAS based surveying and mapping offers high-growth opportunities" - *Fries Porteman*

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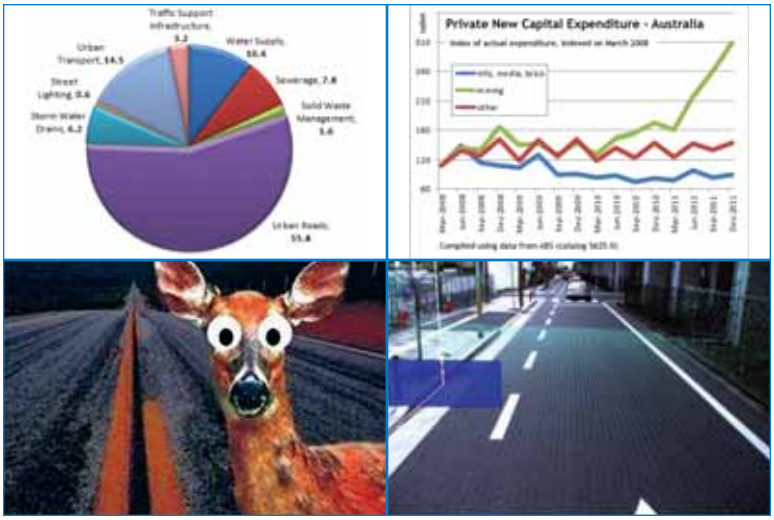

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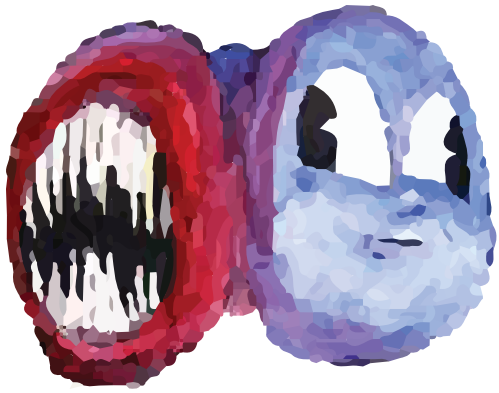

A child's play?

A drone of Homeland Security, US

'Spoofed' by Texas College Researchers

Before the officials operating it

Supposedly for a wager of just USD 1000

Demonstrates again the dangers and vulnerability of GNSS.

Though the dangers of spoofing are well understood,

And research on counter- measures are going on,

Still. scarier scenarios emerge

With the possibilities of potential misuse.

Bal Krishna, Editor
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Revolutionizing the surveying and mapping industry

An interview with Fries Porteman, marketing communications manager at Gatewing, a Trimble company, about Gatewing's Unmanned Aerial Systems

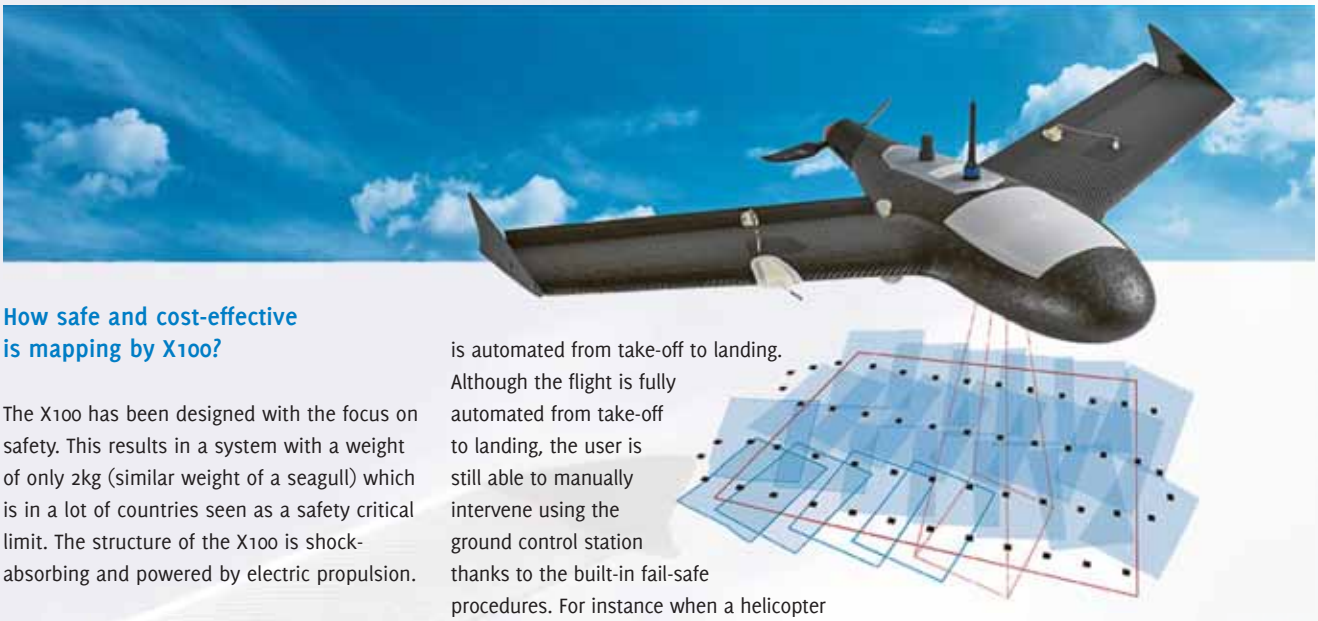
3 founders of Gatewing (MaartenVanSpeybroeck, PeterCosyn and MaartenVandenbroucke)

When and how was Gatewing started? How does name of your company go along with its activities?

The idea for designing unmanned aerial systems (UAS) for rapid mapping originated from a doctoral dissertation in aerodynamics by Peter Cosyn, one of the three founders and now Director of R&D at Gatewing. Maarten Van Speybroeck, Director of Operations and Finance, was involved with this idea as subject for a thesis. Working on the design of a lightweight UAS, Peter Cosyn soon discovered the great potential in making a fully automatic UAS for civil use. Later Peter Cosyn met Maarten Vandenbroucke, President of Gatewing, who also strongly believed in the huge potential of UAS for mapping. In the summer of 2008 they decided to start Gatewing. The name Gatewing consists of 'gate' and 'wing' whereby we refer to 'a gateway to aerial information' obtained by a fixed 'wing' system.

'Gatewing revolutionizes the surveying and mapping industry'. Please explain.

With the Gatewing X100, surveyors can now remotely and safely measure large, difficult-to-reach or dangerous areas and for photogrammetrists, smaller projects now become highly cost-effective where previously the smaller projects were simply too expensive to map with the traditional photogrammetry methods, meaning the X100 fills more or less the gap between traditional terrestrial surveying and conventional photogrammetry.



How safe and cost-effective is mapping by X100?

The X100 has been designed with the focus on safety. This results in a system with a weight of only 2kg (similar weight of a seagull) which is in a lot of countries seen as a safety critical limit. The structure of the X100 is shock-absorbing and powered by electric propulsion.

Furthermore the X100 also operates at low altitude (between 150 and 750 meter) and to avoid human errors during the flight, the mission is pre-programmed and the flight is automated from take-off to landing. Although the flight is fully automated from take-off to landing, the user is still able to manually intervene using the ground control station thanks to the built-in fail-safe procedures. For instance when a helicopter approaches the X100 flight path, the operator can override the flight path and let the X100 circle at a certain location or give a command to land the X100 immediately. Compared to traditional surveying, the operation is also much safer as the survey crew stays safely on the ground and no longer has to clamber over stockpiles or around high walls.

How easy is it to operate the flight? What are the factors that influence a successful flight?

As our main users are surveyors who have no or very little knowledge of how to control UAS, our intent was to design an UAS that is very easy-to-use and intuitive to work with. To meet these requirements we designed a highly automatic UAS whereby the user only has to prepare his mission in advance by selecting the area that needs to be covered, the overlap of images needed, the flying altitude, etc. using a straightforward software wizard. Once on site the operator simply indicates a proper take-off and landing location which is stored in the autopilot of the X100. The X100 is launched with a catapult launch, flies fully autonomous while taking pictures of the area and lands on the indicated landing spot. After the flight you can immediately start using the images for creating the end products.

For a successful flight it is important to follow a checklist that makes sure you don't overlook steps and that all parameters are set properly. However the X100 is designed to fly in very hard weather conditions such as light rain and strong wind (up to 6Bft) it is also important that there is enough light to take images. When flying in too dark conditions the shutter speed of the camera will be too slow resulting in blurry images.

How do you see the future of UAS based survey and mapping?

UAS based surveying and mapping offers high-growth opportunities. From a system sales perspective it may well grow to a market that has the same order of magnitude as the current market of high-end GNSS stations. A key enabler for adoption of the technology by the mainstream surveyor are internationally harmonized regulations, which are still on the drawing boards of the Civil Aviation Authorities. Currently, it is a market of first-movers in countries that already have a framework to get flight permission.

Tell us something about Gatewing's Stretchout™ desktop software.

The X100 mapping kit comes with Stretchout™ which allows X100 users to create a rapid orthophoto from their X100 imagery in less than 10 minutes on a regular laptop. The rapid orthophoto is only ¼ of the actual resolution and makes it possible to do a quick quality check of your flight to be sure you've covered the complete area. Stretchout™ also converts the X100 image data into the right file format for import in third party image processing software.

For X100 users needing extremely accurate results we also offer Stretchout™ Pro which we've challenged the accepted way of traditional photogrammetry by introducing highly advanced vision technology coupled with close range photogrammetric techniques that changes the way you process your images. The point cloud density and accuracy that can be obtained is comparable to LiDAR results and the orthophotos processed with Stretchout™ Pro can have a pixel resolution of 3.3 cm GSD when flying at an altitude of 100m. The software also supports the import of Ground Control Points (GCPs) which results in even higher accuracies. Using an optimized hardware setup, it takes a couple of hours to a day depending on the requested density of the grid to process a typical X100 flight. Compared to some of the other image processing software, Stretchout™ Pro is very easy to use as there is very little manual intervention needed because the software runs highly automatic.

Do you extend any support of recent technologies like cloud?

For X100 users who don't want to invest in a desktop solution we also have a cloud solution called Gatewing Cloud. It allows X100 users to upload their image data to our cloud server and after a couple of hours they can simply download their high quality orthophoto and DSM. The Gatewing Cloud has pricing based on project size and requirements. An important feature of Gatewing Cloud is that a quality report of your project can be requested before ordering the data products.

What are the different applications Gatewing X100 suitable for?

Our solution has already been deployed for more than 15 different applications so far. As we strongly focus on the surveying market, our main customer base are professional surveyors who use this tool for example in mining where it proves to be a very valuable tool because of the fast and accurate results that are obtained in a safe way. Beside volume calculation it can also be used in mining for internal progress reporting and planning. The X100 is the must have system for topographic surveying in locations that are often remote, difficult or dangerous to access. In today's ever-changing landscape, on demand rapid mapping services (orthophotos) have become an extremely valuable tool for construction partnerships, modeling and planning. Road works, bridges, ramps, canals and flooding areas can now be easily inspected from the air. Large overviews allow engineers to take the necessary precautions when building infrastructures.

Another very nice application for the X100 is vegetation monitoring. By combining visual and near infrared images you get highly accurate information, such as stress of crops due to drought or disease. This information can be used for fertilization management or targeted harvesting. Other applications are for example waste management, disaster management, asset management, safety assessment, forest monitoring, erosion monitoring, research (geology, archaeology) and many more.

X100 specifications

Weight: 2.0 kg
Wingspan: 100 cm
Cruise speed: 75 km/h
Max horizontal speed: 115km/h
Weather: up to 50 km/h wind & light rain
Endurance: 45 min
Mapping at 5 cm: 1.5 km2

What is the market expansion plan of Gatewing products and solutions?

Gatewing will serve the surveying market better by improving our product offering, mainly focusing on greater flexibility, quality and ease-of-use. At the same time we will offer in the future application specific solutions for market niches such as precision agriculture. It means that we also move to new payloads, such as hyperspectral camera's.

How do you see the potential to market Gatewing products and solutions in different parts of the world? What are the key emerging markets?

Gatewing is active worldwide but the key emerging markets are countries where the rules allow commercial operation (which excludes the US currently) and where the added value of the product is big because of lack of competitive photogrammetric services (typically big countries with low population density but important surveying projects) and/or industrial projects with a changing environment that needs continuous surveying. So, we are mainly talking about countries with big mining activities (Canada, Australia, South Africa, etc.) and construction activities (the BRIC countries and oil states in the Middle East).

Gatewing has recently been acquired by Trimble. What is the significance of this acquisition?

The acquisition is very significant for Gatewing. Trimble is a leader in high-end surveying products. Our product fits in their offering. It allows product integration that will lead to even better solutions. It also means that our products will be sold and served on the market by Trimble's large dealer network. Being part of Trimble increases our sustainability, credibility and reach.

Customers Speak

According to Steve Talbot, a surveyor with Sibelco Australia, the company typically utilises contract surveyors to ground survey and aerial survey at a number of its sites around Australia. "At times this expense can be considerable," he said. "Because of this, we were looking at finding a cheaper way to survey all our sites; The Gatewing X100 seemed to be - and has in fact turned out to be - a very good and also a safer solution for our needs. The fantastic thing about the Gatewing X100 is that you can use it whenever you want, so I can come out on any day and do an aerial survey - whereas with traditional aerial surveying, they can't fly over the area if there are clouds in the way, and they can only fly at certain times when they are in the area. That means this system is a lot more flexible; I can simply do a flyover of any site I wish to do, whenever I want," said Steve Talbot.

"In terms of safety, mine and quarry managers today are really minimising people walking around pits, around machinery and so forth. Using Gatewing minimises the danger of getting hit by a truck or falling over a face, or tripping or falling anywhere in the quarry, so it is a very safe way of surveying."

"Once we'd bought the system, I went through three to four days of training and after that I was very confident about flying the plane," he said. "And the training was great, educational and a lot of fun, hands-on as well, so you are actually getting out in the field and using the Gatewing.

Once the aerial survey has been carried out, Steve Talbot uses Gatewing's Stretchout software for in-office processing. "Using Stretchout is a very simple process," he said. "It's just a step-by-step procedure and it is very easy to use, particularly compared with a lot of other surveying software that I have used. The system gives you three options: you can process the data rapidly, which gives you a rough solution; you can do a longer version, where you leave the software running over night and which gives you a very accurate solution, or you can upload it to Gatewing for cloud processing, where you pay per project and the data is processed for you."

Steve Talbot
Surveyor at Mining and Quarrying Company Sibelco
www.sibelco.com.au

For forests managers or scientists studying forest ecosystems, data with high temporal and spacial resolution has a primary importance. Forest inventories have always been time consuming and expensive. Thanks to the X100, digital elevation model and orthomosaic of more than 100ha of forest can be produced in one single flight. The combination of these aerial informations with terrestrial information can characterize the forest in terms of structure, density, maturity and species composition.

The era of low cost aerial forest inventory has just begun. It offers great opportunities for foresters which must cope with current global changes as biodiversity loss, global warming and increasing demand for timber. The Gatewing X100 opens the door for many possibilities that are now investigated in order to improve the understanding and the description of forest stands. Nowadays, the use of drones in forestry stays a challenge requiring training, knowledge in remote sensing (especially in photogrammetry) as well as experience in forestry sciences. Nevertheless, aerial forest inventories are expected to take more and more importance due to the flexibility and efficiency of rapid terrain mapping tools as the X100 for acquiring valuable information.

Lisein Jonathan
Liège University, Departement of forest and nature management
www.fusagx.be

We have been using the X100 for one season now. This new method has opened new doors in the surveying field. As a remarkable surveying company in Finland we have to serve our customers as well as possible. The product range has to be wide and it is important for us that the customer can order the whole project from us.

The X100 brings efficiency of the projects to a totally new level. Now we are able to execute projects that have been unreachable before. For example some open pits of mines are not possible to measure by the traditional method because the risk of an accident is too high. We have done projects for mines, soil business, municipal planning and volume calculation. The X100 has been in the air almost the entire season and we expect to execute even more missions during the next season.

Mikko Ilmonen
Vice President of surveying company Mitta Oy
www.mitta.fi

SEGS: A pro-poor agenda is paramount

Experts raise issues and highlight challenges on Spatially Enabled Government and Society (SEGS) in Land and Poverty Conference organized by World Bank during April 23 – 26, 2012 in Washington DC, USA

Good land governance would remain the key challenge

Keith Clifford Bell
World Bank, Social, Environment & Rural Development, East Asia Pacific Region.

The theme of the 2012 Annual World Bank Conference on Land and Poverty was "Land Governance in a Rapidly Changing Environment". Significantly, this was the first annual conference that dedicated a specific stream to spatial information. The full day workshop convened by the International Federation of Surveyors (FIG) and the World Bank "Spatially Enabling Government and Societies (SEGS) for Sustainable Land Administration and Management" was an excellent complement to the overall conference theme on land governance.

SEGS arguably represents the new paradigm for land sector engagement. Spatially enabling land administration and management allows land information to be more effectively used in all levels of decision making and allows land professionals to design and implement the next generation of land administration solutions that are fit-for-purpose, incrementally upgradable affordable.

All too often, government agencies refuse to share fundamental spatial information, especially maps and plan. Silos would seem to weaken SEGS initiatives and dilute the benefits of donor support and government investments. Silos may be an indicator for poor governance. Therefore the application of the Land Governance Assessment Framework (LGAF) could be very useful in SEGS.

Spatial enablement is especially important in the context of the continuum of land rights, which has developed under UN Habitat' Global Land Tools (GLTN) model. ESRI's Brent Jones has made a very good effort to further develop the land rights continuum by considering spatial, temporal and technological dimensions. Ownership is always about "Who", "Where" and "What". It is also about "When", as ownership may change over time. Of course, this continuum has not intended to expand past first registration. As such, the discussion in the SEGS workshop and indeed throughout the overall conference this session, tended to focus on the issues around first time rights issuance and not the longer term issues of subsequent transfers due to inheritance, sales, subdivisions, mortgages and even foreclosures.

A key challenge for governments, land professionals and development agencies to look at SEGS through both the glass half full optic as well as the glass half empty. As was very apparent in the SEGS workshop, the primary focus tends to be on the positive side of spatial enablement (the Potential), and with less consideration being given to discussing the downside (the Challenges). These challenges and indeed risks to SEGS include:

- Weak land governance and governance associated with geospatial information technology and spatial data infrastructure
- Spatial dependency – over-reliance on systems that are already demonstrating outages and other failures. For example GPS failures due to Ionospheric Interference satellite signals or jamming. Errors in products such as Google maps due to poor ground truthing or quality assurance
- Outages with cloud-based geospatial applications.
- Personal privacy and confidentiality are all too frequently being perceived as being breached by products such as Google earth. Web-based products in the US such as Spokeo.com and Intellius.com are combining personal information with Google StreetMap arguably in breach of personal privacy. Legal reform is urgently required.

In order for SEGS to be effective and best meeting the needs of all, for both high-end and also developing economies, it had to address the above-mentioned risks and issues. For international development agencies such as the World Bank, the pro-poor agenda was paramount. Therefore, SEGS should be more focused **on the millions just trying to make it** (i.e. indeed billions of the poor struggling to survive and have a basic quality of life and human rights) **rather than those trying to make millions** (i.e. the wealthy). Good land governance would remain one of the key challenges for SEGS.

Fit for purpose

Stig Enemark
Past FIG President 2007-2010, Professor in Land Management, Aalborg University

"The spatial framework should be developed using a flexible and *fit-for purpose* approach rather than being guided by high tech solutions and costly field survey procedures. Accuracy can then be incrementally improved over time when relevant and justified by serving the needs of citizens and society. In relation to the concept of a continuum of land rights as mentioned above such a fit-for-purpose approach could then referred to as a "continuum of accuracy".

Radically rethink LAS

Robin McLaren
Director, Know Edge Ltd

The lack of effective, affordable and scalable LAS solutions conspires to limit access to land administration services by large sections of society, especially the most vulnerable, leaving them trapped in poverty. There is a pressing need to radically rethink LAS: simplify procedures, reduce the cost of transactions and open new channels for participation. Crowdsourcing through mobile phones, for example, offers the opportunity for land professionals to form a partnership with citizens to create a far-reaching new collaborative model and generate a set of LAS services that will reach the world's poor.

Strong legal protections needed

Rachael Knight
Program Director, Community Land Protection Program, Namati: Innovations in Legal Empowerment

In the context of large-scale land concessions, strong legal protections for community lands and natural resources and the implementation of clear, simple and easy-to-follow legal processes for documentation of customary land rights are urgently necessary. In particular, efforts to protect common areas are critical, as common properties are often the first to be allocated to investors, claimed by elites, or appropriated for state development projects. Our research indicates that effective community land documentation processes may help to protect rural communities' land claims, livelihoods, and way of life; resolve local land conflicts; improve intra-community governance; promote conservation and sustainable natural resources management, and foster community development.

Need for new approaches

Christiaan Lemmen
Professor, Kadaster International, Netherlands

There is an urgent need for new approaches in Land Administration and Management. Conventional approaches, often of historical footings, proved to be inadequate in many jurisdictions. Flexibility is needed in relation to the way of recordation, the type of spatial units used, the inclusion of customary and informal rights, the data acquisition methodologies and in the accuracy of boundary delineation. It is less important to produce accurate maps. It is more important to have a complete cadastral map and to know how accurate the map is. For instance, highly rigorous and accurate methodologies as practiced by registered or licensed surveyors are not pro-poor approaches. All these have to be discussed and further communicated within the International Federation of Surveyors urgently.

Improving cadastral information gathering

Pierre Vincent
M.Sc., D.S.A. , Executive Vice-President, effigies

The recent improvements in satellite imagery in terms of information contents, precision and reliability can greatly contribute by providing the physical information needed for an integrated land information system. The use of this data source for cadastral information gathering is highly efficient and less costly than the conventional means of aerial photography or ground surveys for cadastral mapping in areas surrounding highly urbanized zones for many countries dealing with land administration problems.

Legal framework is crucial

Juerg Kaufmann
Swiss Land Management

For me two aspects were of special interest. On the one hand the importance to get reliable information not only on locations but also on contacts and concessions is an urgent need. To provide reliable information as base for sustainable land management measures to reduce poverty is one important aim of Cadastre 2014. On the other hand the development of a sound basic legal framework in an early stage of projects is crucial.

SOLA: the solution to improve governance

Neil Pullar
Coordinator SOLA Project, NRC Land Tenure, FAO

Open-source software specifically designed to meet the needs of the cadastre and land registration systems are seen as part of the solution that will make land administration automation available to all countries. The presentation on the UN FAO Solutions for Open Land Administration (SOLA) open source software was particularly timely. A complete version of the SOLA software had been released in March, pilot implementations had begun in two of the pilot countries (Nepal and Samoa) and the negotiation of the Committee on World Food Security Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security had just been completed. SOLA could be part of the solution to improve governance, it is affordable and seriously addresses the need for a sustainable solution.

Deer in-the headlights look

Dave Doyle
NGS Chief Geodetic Surveyor

The numerous excellent presentations and papers led to often intense discussions between the various disciplines represented including surveyors, land managers, lawyers, economists and representatives from NGOs.

I was very impressed that the World Bank conference staff managed to balance the presentations in such a way as to engage these different communities which far too often do not sit in the same room together. On a personal note for me it was nice to see that terms like "geodetic networks" and "consistent reference systems" could be mentioned in such a diverse crowd without the audience having that deer in-the headlights look.

Tony Burns
Managing Director, Land Equity International, Australia

The topics covered ranged from the tools and approaches to address specific land sector requirements through to broad topics such as land governance and ensuring that communities benefit from large-scale investment in agriculture. I feel that the conference again reinforced the importance of focusing on the needs of society as a whole rather than what is technically possible – what Stig Enemark called in his presentation 'fit for purpose'. This focus was evident in papers focussing on low cost technology and pro-poor approaches and I see this as very positive.

Christopher H Barlow
Director, Strategic Accounts & Marketing, Thomson Reuters

One issue addressed is how technology can support mapping and documenting land tenure and property rights. What's interesting about this conference is that it brings to the table a diverse range of practitioners including government leaders, development agency thought leaders, researchers, investors, and technologist.

There were many good presentations by governments and also technology firms on the application of technology. NGOs also shared examples of projects with community groups to educate on land rights. UN Habitat estimates that 70 percent of people in the developing countries are outside the formal registry systems. So this is an important discussion point, and there is an appreciable ground swell of ideas coupled with pragmatic application to effectively map and document land and property rights.

Push for initial title creation from aerial imagery

Ian Harper
Geodata Australia Pty Ltd

The conference saw a strong push for initial title creation from aerial imagery or rudimentary mapping, which is reasonable to generate a tangible document and a manual or digital register that provides public recognition of those rights.

Moving forward, particularly as urbanisation grows into peri-urban areas, planning and managing that growth will then benefit from an improved level of survey and spatial maturity. Surveyor's skills will then be vital to generating a pragmatic technical and economic spatial solution that generate greater security of title and lowering risk that will increase the availability and reduce the rates of funding.

The next paradigm

Teo CheeHai
President,
International
Federation of
Surveyors (FIG)

A new generation of web and mobile services, such as online maps and location based applications, are stimulating a greater interest and use of location in society today. This location revolution in our personal lives is being mirrored in our professional lives.

Information, with both geographic and temporal context, is increasingly being used, for example, to ensure emergency services arrive at incidents in time, to support the formulation of policies to mitigate the impact of climate change, to ensure that services are better targeted to citizens needs and to empower citizens and communities to manage their communities and administer their spaces more effectively. The delivery of the benefits associated with this location (spatial) revolution is dependent on the availability of spatial data that is readily accessible for re-use, has minimal restrictions, is affordable, has appropriate quality and can be easily integrated and linked into collaborative environments using common frameworks. It is therefore essential that land information managed within land administration and management solutions is also spatially enabled to ensure that such information can be combined with other socio-economic information to derive wider societal, environmental and economic benefits.

In this era of competing demands on existing resources, there is the continued need to ensure the efficient and effective deployment of solutions, approaches and tools to achieve the desired outcomes. In this instance, anything that is cost-effective and affordable is welcomed and at the conference, presenters have demonstrated not only the creative and productive capacity to develop alternative but appropriate approaches, especially in the quest to secure tenure rights for all, but also the courage to tackle a highly technical and complex component within this quest.

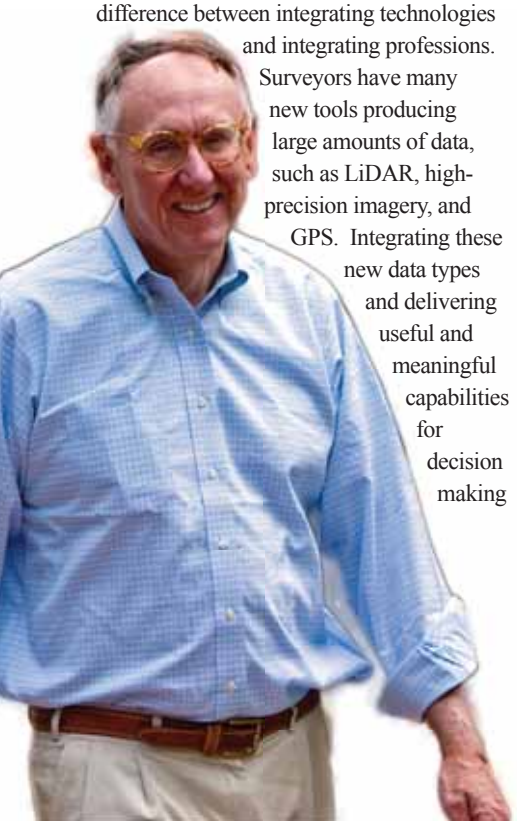
Thus, spatially enabling land administration and management will allow land information to be more effectively used in all levels of decision making and will allow Land Professionals to design and implement the next generation of land administration and management solutions that are fit-for-purpose, more affordable, are citizen centric and can be improved incrementally when appropriate. This would be of distinct advantage to the poor and disadvantaged in the context of securing tenure rights for all.

"Access to geospatial knowledge will grow exponentially"

Says Jack Dangermond, Founder and President, Environmental Systems Research Institute (Esri) in an interview with Coordinates

"A big challenge is integrating the surveying profession with the GIS profession." This statement was part of your interview with us in March 2007. Five years down the line we'd like to ask – Is the integration between Survey and GIS really necessary? Or can each domain not maintain its identity and still work 'together'?

Surveyors have a rich history and recognized longstanding contribution to societies worldwide. This will always be part of the surveyors' identity and I don't think using new technology will change that. I don't think maintaining domain identity is exclusive of integration. There is a big difference between integrating technologies and integrating professions. Surveyors have many new tools producing large amounts of data, such as LiDAR, high-precision imagery, and GPS. Integrating these new data types and delivering useful and meaningful capabilities for decision making presents challenges, but many surveyors have special skills to manage this. GIS lends capabilities to surveyors for integrating and managing these large data sets and gives them the capabilities for new types of deliverables from these new data. This is why we are continuing to see an increased use of GIS by surveyors worldwide. And for those surveyors who are not yet using GIS, technologies such as ArcGIS Online will offer new vehicles to help them integrate with GIS technology much more easily.



You have been coming to India for many years now and have seen the various phases in the understanding about GIS. However, some still feel the need of 'convincing deliverables' in the context of India. Please Comment.

In recent years, I think there has been a big change and that the masses have started to see, understand, and appreciate the capabilities of GIS. Because of this, senior people in government and industry are now able to more easily understand the significance of GIS and are actively doing something about it. The growing awareness of geodesign is also helping in this respect as it expands the vision of GIS into the design practice. All of this is driving a focus on information technology (IT), and GIS technology in particular, as the foundation for economic development and in creating the future of India. To build on this momentum and continue forward, we need to address open data policies and increased sharing of geospatial data. India has much to benefit from more liberal data policies and open geospatial data sharing. But one important thing we have to overcome in India is the perception that there are high security risks involved with maps of certain scales.

Do you think GIS will be able to maintain its identity or will it become part of a larger IT domain?

IT departments are still primarily concerned with maintaining, optimizing, and securing their organization's technology infrastructure. They are also tasked with implementing new projects and technologies to meet the needs of various operational units—and to do all of this with existing staff and static budgets. ArcGIS Online provides a way for individual operational units to reap the benefits of GIS without a heavy reliance on IT resources. The impact on IT is very minimal because they keep providing the operational data to the various units where the analysis and reporting takes place. This is what "self-service IT" is all about.

How do you see the proposed National GIS initiative by the Government of India?

GIS has proven to be absolutely critical to solving a wide range of problems that require planning, management, and other types of decision making. Multiple agencies and departments in the Indian government have been successfully using GIS in this capacity for many years. The National GIS initiative is an effort to build a platform for linkages across these agencies and departments, resulting in a powerful new infrastructure to help drive India forward.

There are several factors currently at play which will help push the expansion of this initiative in the coming years:

- Technology is becoming faster and cheaper at such a rate that it can handle the types of very large databases that are necessary for a National GIS.

- The model of distributed services that can be dynamically mashed up, applied for various kinds of applications, and deployed in the cloud has now arrived.
- There is growing acknowledgement and acceptance of the concept of a National GIS at various levels of leadership.

What's really needed to help move this vision forward now is cooperation and collaboration between the various government ministries. Distributed national agencies such as forestry, water, and planning each have large repositories of data which they create and maintain today mostly in isolation from each another. By tying all of their existing activities into a networked portal, there is an opportunity for many inefficiencies to be eliminated, and India can finally realize the vision of a national spatial data infrastructure.

But there is much more to the National GIS initiative than this. The National GIS also provides a platform for making the data available for much broader application across government, education, and business. The innovative new services delivered on the GIS platform will aid in building a safe and sustainable India.

How does one make GIS a priority with the Government?

Today, there is new talk of government being a platform for society at large. This means that government-based information and IT can be thought of as a platform much like the way we think of the internet or operating systems and other sorts of IT as platforms. By leveraging government IT correctly we can create a better business atmosphere, more prosperous economic development, consider the environment more effectively, and have open communication and citizen engagement with government agencies. We're still in the early stages of this movement, but certainly GIS will play a significant role in it as it will help facilitate the visualization and communication between government agencies and the rest of society.

Many governments are experiencing tough times due to the current economic downturn, and the easiest way to convince

> Government organizations worldwide realize a significant return on investment in GIS

them to prioritize GIS is through a clear presentation of return on investment (ROI). Government organizations worldwide realize a significant return on investment in GIS. GIS is integral to operations, decision making, and communication, and has demonstrated significant ROI over the years. Some of the important ways that GIS can increase government ROI include:

- Direct savings of money and time.
- Increased efficiency and accuracy.
- Generation of additional revenue.
- Workflow automation.
- Improved accountability and transparency.

Likes of Google and Microsoft have redefined the geo-spatial visualisation domain. Some of us have concerns that at times they overstep the 'limits'. What is your opinion on privacy issues in this context?

Esri is a GIS company with the mission to serve our users. Our business model is based on providing our users with useful technology to help them make a difference, not using them as an audience for advertising. Without passing judgment, I'll just say that these are two very different business models.

Google has certainly played an important role in helping us move geospatial visualization forward, but many people have serious concerns about privacy in an advertising-based business model. Esri's new ArcGIS Online platform gives you a choice: you can share your data with the entire world, or you can just share it with a group of people you define. That means, for example, local governments can spatially enable all their field workers. Sales people can access their business and sales information. Oil companies can access their natural resource information.

So our emphasis isn't on trying to sell ads to consumers. With ArcGIS Online, Esri is really building enterprise technology for use within universities, businesses, governments, and other organizations that want to maintain control over access to their data. It's a heterogeneous or hybrid approach, where your organization has some data centers with especially sensitive data that you want to keep internally, and some more general geospatial data which can be shared with the outside world in an open cloud environment. For example, a government agency may build base maps which are available to everyone, while keeping some of their sensitive operational information on their own server.

It has been over 25 years now you founded ESRI. Did you envision at that time where you see Esri today?

Our company has had a rich and diverse history supporting thousands of employees and hundreds of thousands of users around the world. As Environmental Systems Research Institute became ESRI and then Esri, our work also evolved: from performing geographic planning projects and environmental studies to developing GIS software. Some might see this shift as a marked change in our philosophy, but in fact I actually see it as a reinforcement of our philosophy. Let me explain why.

From the very beginning, Esri has been about making a difference. The shift from doing hands-on geospatial project work to building generic geoprocessing tools meant that instead of focusing on a handful of important projects where we could make a difference, we could codify and refine and grow our portfolio of geospatial tools and distribute them widely. By enabling a virtual global army of planners and scientists with these tools, we took a giant leap forward in our mission to facilitate better decisions about geography through the application of sound science. Strategic collaboration with business partners and NGOs has further leveraged our work and extended our reach to the widest possible audience.

Today, we continue to do both professional services work as well as software product

development. This mixed culture has provided many benefits to our users and Esri including ensuring that our products are practical and responsive to real production requirements. Governments, industry leaders, academics, and non-profits trust our tools to connect them with the analytical knowledge they need to make the critical decisions that shape the planet.

Over the last few decades, widespread adoption of GIS has caused a change in thinking. People can look at overlays of maps, see new relationships, see different kinds of phenomena, and it creates a new understanding. Up until recently this has largely taken place in specialized communities, or with professionals using specific applications.

Today, GIS is being deployed on a new platform—the Web and cloud computing—and we all are in the early stages of adjusting to it. The characteristics of this environment are easy-to-use technology, more pervasive access, and the ability to mash-up or integrate distributed knowledge. This means that access to geospatial knowledge will grow exponentially. Our existing users are gradually adopting this new paradigm and integrating this platform with their traditional workflows. So, in addition to running their enterprises, they are putting up public services and applications that can be accessed by anyone.

The next step in GIS evolution means that everyone will have access to the idea of map overlays and spatial analysis. While traditional GIS has brought greater understanding within organizations, this next step will mean greater understanding within society at large. It also means greater collaboration and communication across organizations. This will ultimately result in a geospatial platform that could potentially reach billions of people.

For Esri, creating GIS products and solutions is a business strategy that helps accomplish a much greater goal. We are committed to helping solve Earth's most pressing challenges and helping people take informed action based on a better understanding of our world. I am personally very appreciative of the opportunity to participate and continue to play a part in making this happen.

Galileo update

GSA begins preparations for future EGNOS services

The European GNSS Agency (GSA) has published a contract notice in the Official Journal of the European Union inviting operators to bid for the provision of EGNOS services over the 2014-2021period. This contract will consist in operating, maintaining and upgrading the EGNOS system infrastructure, and ensuring the continuous and safe provision of the three services offered by EGNOS.

The new EGNOS service provision contract is planned to be awarded in 2013 and is aimed at guaranteeing the provision of EGNOS services for 8 years starting on the 1st of January 2014, without service interruption. The future EGNOS operator shall become certified for provision of the EGNOS services according to the Single European Sky (SES) regulation. *www.gsa.europa.eu/go/home/gsa/procurement/*

Orolia atomic clocks selected for 8 New Galileo Satellites

Orolia has been selected to provide the Rubidium atomic clocks and passive hydrogen masers for eight new satellites for Galileo. "This new authorization to proceed, just a year after the signing contracts totaling nearly EUR20M for the supply of the clocks for the first 14 operational satellites for the Galileo satellite navigation system, confirms Spectratime's position as a world leading supplier of space atomic clocks," said Jean-Yves Courtois, CEO of the group. "Each satellite carries on board two rubidium atomic clocks and a passive hydrogen maser, the most stable type of atomic clock in the world. In a few years, after the execution of the contract, which will be implemented in partnership with Astrium and Selex Galileo, we will have the most currently active atomic clocks in space, including 72 for the Galileo system alone". *www.orolia.com*

GSA launches public consultation on the Galileo Commercial Service

The European GNSS Agency is working with the European Commission and the European Space Agency with the support of the EU Member States to define the final characteristics of the future Galileo Commercial Service. Input from industry as well as other actors, such as users and academia, is valuable to define the service and the rationale behind the implementation of the service. Consultation participants will be asked to provide a more general perspective about the Commercial Service, as well as validate the main aspects of a preliminary business case developed in cooperation with the EC. Respondents are welcome to propose new ideas and approaches for the service provision, as well as discuss pricing, liability, service level agreements, and required performance levels. The consultation will be open until the end of September 2012. A final decision on the Commercial Service implementation concept will be reached at the beginning of 2013.

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A case for financing the `data' as part of infrastructure

In India, data though known to be now a vital part of any setup still lacks the recognition and acceptance, which is reflected in the investments made to produce it vis-a-vis other infrastructure projects

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Infrastructure is basic physical and organizational structure needed for the operation of a society. These are a set of interconnected structural elements of services and facilities that provide framework supporting an entire structure of development necessary for an economy to function.

Infrastructure instigates development and is conventionally perceived as related to roads and railways. Gradually electricity and in recent times, different kinds of networks have come to be considered as infrastructure, be it related to water, wastewater or latest being oil, gas and telecom. All these promote growth and development by way of delivery of goods and services across various sectors of the economy.

Infrastructure in India

At the time of independence, India inherited fairly well-developed conventional infrastructure, roads and railways. The government built upon this initial set-up. Though all categories of infrastructure have expanded and modernised, the development however has not been able to meet the growing demand.

India has one of the largest road networks in the world, aggregating to 3.34 million km; per sq km of surface area in India is endowed with one km of road. Despite this there are many villages which are not connected with road network and many more do not have an all weather road access. The quality of the roads, both in terms of lanes and surface, requires up-gradation in most cases. The distribution is also dependent on terrain.

The railways which are the second largest in the world under a single organization are the backbone of country's economic and industrial development. India inherited 55,000 km of rail network at the time of independence, which has been expanded to just about 64,015 km in the last 65 years. There has been improvement in terms of electrification and speed, but much is yet to be achieved to meet international standards of comfort and safetyElectricity produced at the time of independence barely met the requirements of urban areas. Though the conditions have improved, yet the increasing demands in both urban and rural areas are not being met with. Electricity generation at the time of independence was 1,363 MW as compared to 7,88,355 MW in 2011. The per capita consumption during this period has increased from 15.55 Kwh to 778 Kwh. Though the increased per capita consumption indicates the improvement in standard of living, there was a shortfall of 8.5 per cent during the year 2011-2012 which at the time of independence was about 7 to 16 per cent. Over one third of India's rural population lacks electricity, as does 6 per cent of urban population. Of those who do have access to electricity, the supply is intermittent and unreliable.

Telecom sector has experienced advancement in leaps and bounds during the last decade. The achievements have been in increased subscriber base, lower costs as well as quality. Still, due to sheer volume of untapped sources much needs to be achieved. There also needs to be improvement in cost and call quality based on advancing technology both in traditional telephony as well as wireless services.

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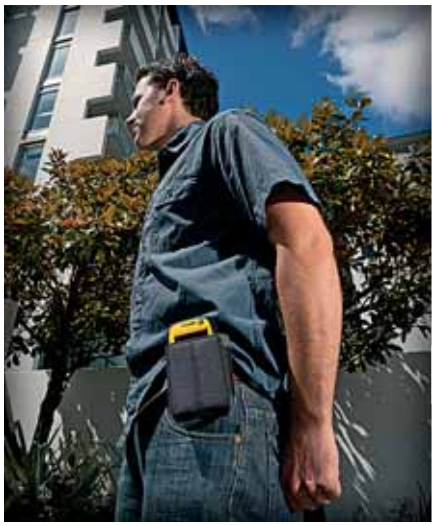

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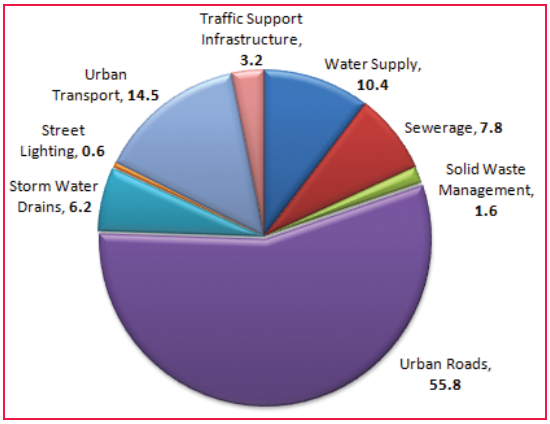

Figure 1: Share of Investment of Sectors in Urban Infrastructure (Source: Report on Indian Urban Infrastructure, 2011)

It is a universal truth that better connectivity to remote locations, either by rail, road or telecom, has resulted in enhancement of the economic activities in such regions. Provision of quality and efficient infrastructure services is essential to realize the full potential of emerging Indian economy. The challenge is in maintaining and managing high growth through investment in infrastructure sector. These challenges in infrastructure development can be speedily realised through better data management.

Infrastructure in urban sector

Urban Infrastructure is the physical and social structure present in cities and towns. It covers drinking water, sanitation, sewerage systems, electricity and gas distribution, urban transport, primary health services, education and environmental regulation.

As India's urban areas continue to swell, the challenge of improving the urban infrastructure is also getting magnified. According to the 2011 census, 31.16 per cent of the Indian population resided in urban areas compared with 27.8 per cent in 2001 and 25.5 per cent in 1991. The urban population is expected to increase to around 40 per cent by 2025 and touch 1.7 billion by 2050., further increasing the challenge of providing the urban infrastructure.

73 per cent of India's urban population has access to improved sanitation facilities. About 21 per cent of urban population lives in squatter settlements where access to the basic services is very poor or very substandard. Though approximately 80 per cent of population living in urban areas has access to safe drinking water, there are severe deficiencies in regard to equitable distribution of water. As per estimates about 46 per cent of households have water borne toilets while only 36 per cent are connected with public sewerage system. As per 2001 estimates 90 per cent of urban households had access to water supply of which 74 per cent had access to piped water. Almost half of the solid waste generated in towns & cities remains uncollected. 6 per cent of urban population has no access to electricity and the supply is also not consistent. The roads are inadequate to meet the growing traffic demand which in turn leads to traffic congestion. Problems related to infrastructure, both in terms of quantity and quality is galore.

There are not only intra-city disparities in the infrastructure but also between cities. The larger cities are better provided with infrastructure as compared to small and medium cities and towns, which is mainly attributed to better economic structures. Due to lower level of infrastructure in smaller cities and towns, these are not able to attract investments, which in turn do not enable investments to be made in the 'so called side-line activities of data development and enhancement'.

The case is very similar to the need to first provide an individual with basic needs of food, water and shelter and then with better health, education and entertainment facilities. Likewise, the infrastructure institutes and agencies with limited resources first need to meet requirement of first providing the basic infrastructure and then go in for those activities that help in better providing the infrastructure. Lack of resources becomes a limiting factor in improving the working condition, which is also the case in large cities.

It must be noted that the basis of all infrastructure and its development is data. One of the ways to improve infrastructure is to provide the status of infrastructure to data *per se*.

Financing the infrastructure

The proposed investments for the twenty year period (2012-2031) in urban infrastructure, including renewal and redevelopment of slums and capacity building is estimated to be 0.6 per cent of GDP for the year 2012-13 and is expected to increase to 1.14 per cent of the GDP by 2012-22 amounting to Rs. 1.79 lakh crore (Ahluwalia, 2011). The investment is estimated to be Rs. 3.86 lakh crore by 2031-32 with GDP growing at 8 per cent per annum.

Urban roads constitute the maximum component (56 per cent) mainly due to service backlog. The service delivery sectors like water supply, sewerage, solid waste management and storm water drains constitute 26 per cent of the total investment. It is indicated in the 'Report on Indian Urban Infrastructure and Services' that 40 per cent of the total investment (Rs. 31 lakh crore) in urban infrastructure is required to address the unmet demand of urban services. All these sectors are heavily dependent on data in the form of drawings, tables, documents and files, maps and satellite images for planning, implementation, operation and management. The fund requirement for implementation of the target for urban water supply, sewerage and sanitation, drainage and solid waste management was estimated to be around Rs. 1,29,237 crores by the Eleventh Five Year Plan. The same was estimated at Rs. 1,32,590 crores for urban transportation (FICCI, 2011). Estimates based on the CDPs prepared under the JNNURM put the requirement at Rs. 8,00,000 crores for both urban infrastructure services and urban transport.

Infrastructure for city to function

The above stated investments in the urban infrastructure are the basis for

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Data has been a vital input in planning, both in conventional format as well as the present day digital format has changed form and structure. India Infrastructure Report 2006 looks at lack of spatial data as an impediment in plan preparation

urban development. Delayed planning, multiplicity of authority and lack of coordination between agencies often results in delayed implementation. The cities and towns are economic centres. Since historic times, those urban areas have taken the lead in development which have had some kind of patronage or some financial inflow in order to become viable economic entity either at national or regional or local levels. So as to become viable, the structure of these centres needs to be strong such that it is able to sustain the influx of population. A weak physical infrastructure will not be able to support growing population of such centres. If not continuously upgraded it would lead to spread of disease, crime and in turn increased expenditure on social infrastructure. The right fix is to continuously improve the physical and supporting social infrastructure.

Urban areas in India have grown as organic structures and urbanisation has preceded infrastructure development resulting in retrofitting which has invariably not been able to meet the growing demands of urban India.

Infrastructure for city to be planned for

Planning for infrastructure, physical and social, is an important component towards city/town plans and their land use plans. For this, the 'existing scenario' or 'as is situation' is an essential input as it forms the basis for what needs to be improved upon or built further. This input has existed in the form of files and paper drawings and maps. These maps and files are the basic input infrastructure for plan preparation.

The information available on paper is liable to be torn. With technological development, these have been converted into digital form and have come to exist in the form of spatial and non-spatial data. Hence, data has been a vital input in planning, both in conventional format as well as the present day digital format has changed form and structure. India Infrastructure Report 2006 looks at lack of spatial data as an impediment in plan preparation.

Last couple of decades have seen an increase in the use of spatial and non-spatial data in planning. From being used for projects to expansion at department and organisational levels, the use of geospatial spatial technologies has seen various development phases due to incoherent data across broader frameworks. This has eventually resulted in recognition of the need for developing standards and eventually dataset-ups called Spatial Database Infrastructure (SDI) at state, regional, national, trans-national and global levels. It also exists in some sectors like urban, viz., National Urban Information Systems (NUIS) Scheme.

Spatial Data Infrastructure

The Spatial Data Infrastructure (SDI) is a data infrastructure implementing a framework of spatial data, metadata, users and tools that are interactively connected in order to use spatial and linked non-spatial data in an efficient and flexible way. It is built upon technology, policies, standards, human resources, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data.

SDIs started to exist at national and regional levels and now are found at transcontinental, global, state and local levels as well. These are also now sector focused.

(Indian) National Spatial Database Infrastructure (NSDI), Delhi State Spatial Database Infrastructure (DSSDI) in India and Infrastructure for Spatial Information for European Community (INSPIRE) and Geospatial Spatial Database Infrastructure (GSDI) at international levels are some examples.

In India, data though known to be now a vital part of any setup still lacks the recognition and acceptance, which is reflected in the investments made to produce it vis-a-vis other infrastructure projects. The ratio of investments in projects like NUIS and JnNURM is approximately 1:1000, NUIS being a data building activity and JnNURM being infrastructure, hard and soft, focused.

NSDI, a joint initiative by Department of Science and Technology and Department of Space, Government of India, addresses the critical need for acquiring, processing, storing, distribution and improving the utilization of spatial data generated by various agencies of the Government of India. NSDI though in operation since 2001 is yet to show substantial benefits after 10 years. DSSDI is a similar initiative at state level in Delhi to help the state government but focuses only in providing better disaster management and security covers of valuable infrastructure.

Delhi State Spatial Database Infrastructure (DSSDI) is a 3D GIS project to better enable the state government in disaster preparedness. Land Information System and Urban Spatial Information System are its two components. 31 `line departments' of Delhi government are its contributors and users.

Infrastructure for Spatial Information for European Community (INSPIRE) is based on the infrastructures for spatial information established and operated by the 27 Member States of the European Union. The Directive

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addresses 34 spatial data themes needed for environmental applications, with key components specified through technical implementing rules. Global Spatial Database Infrastructure is in support of local, national and international spatial data infrastructure developments that will allow nations to better address social, economic, and environmental issues of pressing importance.

National Urban Information Systems (NUIS) is a scheme that envisioned creation of a comprehensive information system in the urban local bodies for planning, management and de-centralized governance in the context of provisions of scientific planning and implementation of the 74th Constitution Amendment Act (CAA).

Data as infrastructure

The role of each of these systems is to achieve better living conditions, environmental, social, and physical for the respective areas of concern, be it sectoral, local, regional, national or global. Each of these systems considers data as a vital input to its existence and gives the status of infrastructure to data.

In some countries as in United States such setups are seen as vital infrastructure, "The dictionary definition of the word infrastructure describes the major concepts around which the NSDI is designed. Infrastructure n. 1. An underlying base or supporting structure. 2. The basic facilities, equipment, services, and installations needed for the growth and functioning of a country, community, or organization. 3. A governmental or administrative apparatus. (http://www.fgdc.gov/nsdi/library/factsheets/documents/nsdi.pdf)

The word infrastructure promotes the concept of a reliable, supporting environment, analogous to a road or telecommunications network. Like roads and wires, SDI shall facilitate the conveyance of virtually unlimited packages of geographic information.

By adding a 'delta' component of 'data infrastructure' in overall financing of infrastructure, the benefits of infrastructure development can be made more meaningful and manifold. This delta component would not be more than 1-2 per cent of the total cost of providing infrastructure

Conclusions

A very large component of infrastructure planning projects particularly related to land use and master planning consist of data creation and updation, both in terms of investment of time and finances. The role of infrastructure on economic development is inarguably essential. At the same time, infrastructure development requires huge amount of resources to implement. Today, anything that can flow is stated as infrastructure, which gives the data the required status. Giving the status of infrastructure to data is surely likely to entail investments which the field is hugely lacking. Investment is the key to building the basic data as well as needs to meet the up to date status. By adding a 'delta' component of 'data infrastructure' in overall financing of infrastructure, the benefits of infrastructure development can be made more meaningful and manifold. This delta component, in the opinion of these authors, would not be more than 1-2 per cent of the total cost of providing infrastructure.

References

Ahluwalia, I. J., "Report on Indian Urban Infrastructure and Services", Ministry of Urban Development, Government of India, 2011.

Ibraheem, Sharma, N.K. and Tiwari, Prabhakar, "Investigation and Analysis of Indian Power Grid after Regulatory Reforms and Dynamic Pricing", International Journal of Engineering Science and Technology, 2010.

India Infrastructure Report 2006 Urban Infrastructure, Oxford University Press, New Delhi

http://www.gsdi.org/ accessed on February 02, 2012

http://www.geospatialworld.net/index.php?option=com_content&view=article&id=18792&Itemid=125, accessed on February 02, 2012

http://indiafacts.in/india-census-2011/urban-rural-population-o-india/, accessed on February 01, 2012

http://www/tcpomud.gov.in, accessed on February 01, 2012

http://en.wikipedia.org/wiki/Electricity_sector_in_India, accessed on January 29, 2012

http://www.fgdc.gov/nsdi/library/factsheets/documents/nsdi.pdf, accessed on January 29, 2012

Mahavir and Ahmed, Maqbool, D., "A Tale of Two Schemes: JnNURM and NUIS", Spatio-economic Development Record, Vol. 17, No. 3, 2010

Urban Infrastructure in India, October 2011, FICCI, New Delhi

Vaidya, Chetan, "Urban Issues, Reforms and Way Forward in India", Ministry of Finance, Government of India, 2009.

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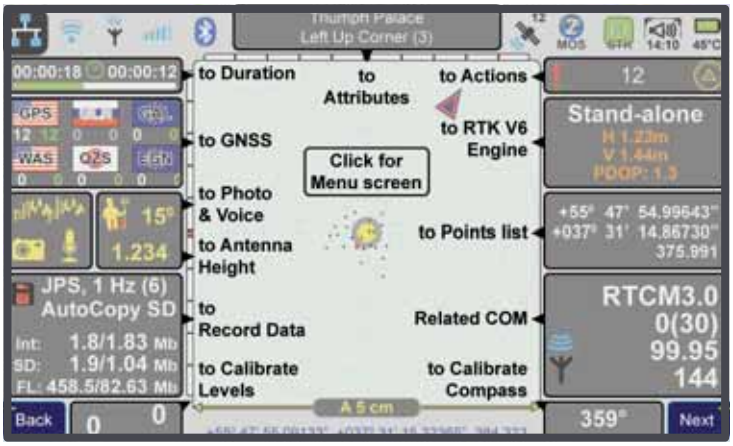
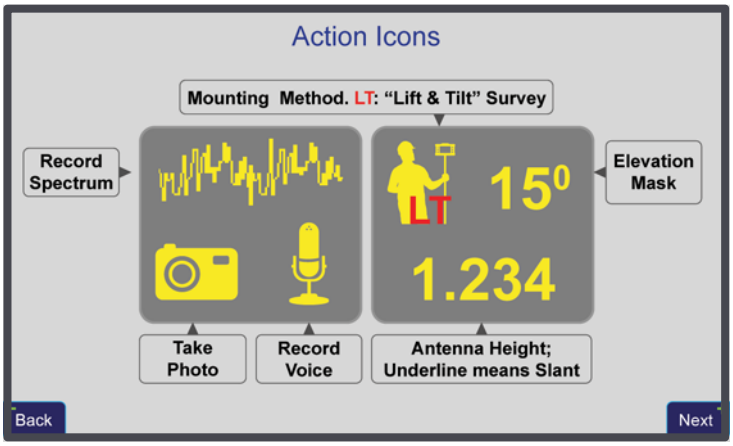
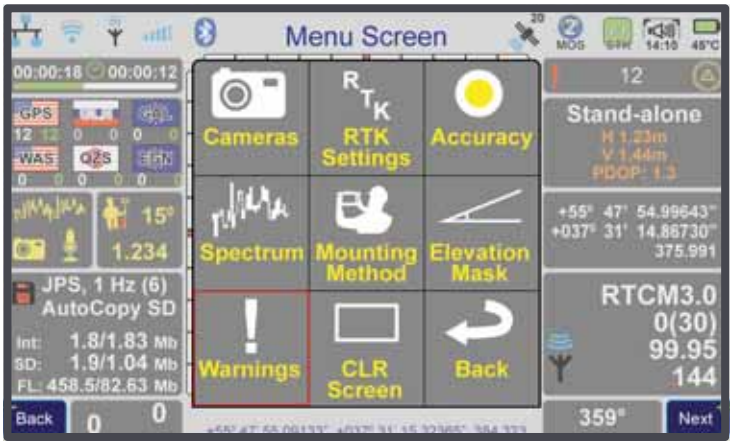


• After you define Settings and select your desired operation, click the Action button to take you to the Action screen where you can see the summary of the GNSS and communication settings and the current status of satellites and communication activities.



• In Lift & Tilt mode ("**LT**") you only need to lift the unit to near vertical on top of the survey point to start survey and then to tilt it to end the survey.



• Click the center of the Action Screen to take you to other actions with a single click.

Using Visual Stakeout

Visual Stakeout purpose

- Visual Stakeout (VSO) is a convenience extension of the regular stakeout procedure. VSO makes it easier to find the target point in the field displaying the point on a special augmented reality screen which can be accessed during a regular stakeout process.

Running Visual Stakeout

1. Start regular stakeout of some previously measured point
2. On the main stakeout Action Screen push “Fn” button to bring up secondary action screen
3. Use arrow buttons to cycle through the secondary action screen representations until the camera picture shows up
4. Note that the only way to return from the secondary action screen to the main one is pushing “Fn” again. Home button doesn’t work in secondary action screen

Visual stakeout functioning

- While at VSO screen the camera picture will always be displayed. There will also always be a virtual bubble level in the top-right corner of the screen and a green crosshair at the centre of the screen. Virtual bubble level should act just like a real one placed on top if the device, helping to hold the device horizontally. Crosshair only shows the camera optical axis. Generally VSO precision is better when the target point is close to the crosshair.

- When there is a point target point selected for the regular stakeout mode, VSO screen will try to display it over the camera picture. If the point is out of the camera's field of view, wide arrow would appear at the edge of the screen pointing the closest turning direction to bring the target point to the field of view.

- If the target point is in the front camera's field of view, it will be marked with a small green circle and a flag of variable color. The green circle is displayed right at the target point and the flag should look like a real physical flag placed at this point. Note the green circle has a constant size, the flag is always scaled so that it looks like a 1.6-meter height one. E.g. it becomes larger as you approach the point.

- Near the target point the planar distance to it is displayed. The distance is displayed in meters if it's smaller than 1 km and in kilometers otherwise.

- The flag color represents current position solution type: it can be green, yellow or red, indicating RTK Fixed, RTK Float and Stand-alone solutions.

RTK Fixed **RTK Float** **Stand-alone**

- When you come close enough to the target point the device will automatically switch view to the bottom camera.

- Displayed information remains the same as for the top camera except for the flag. The 1.6-meter height flag is replaced with a 30-cm circle for the bottom camera. The circle should look like a physically painted 30-cm circle around the target point. The circle color has the same meaning as the flag color to the top camera VSO.

- Note that the distance displayed is still a planar one. E.g. holding the device in a meter or two right over the pint will result in a zero distance.

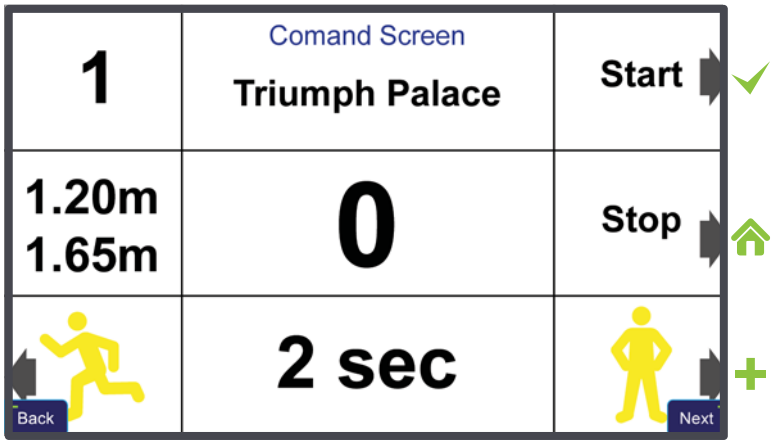
Notes

1 The VSO precision is better when you came closer to the target point and it's also better when the point is close to the crosshair. This means that the best way to get the most precise target point picture is to place the device so that the bottom camera's marking circle is right in the center of the screen and the virtual bubble level has its bubble right in the center.
Still the regular stakeout precision is a bit better. So it's recommended to use VSO as an easy and convenient way to get close to the target point, and than switch to the regular stakeout mode to perform precise measurement.

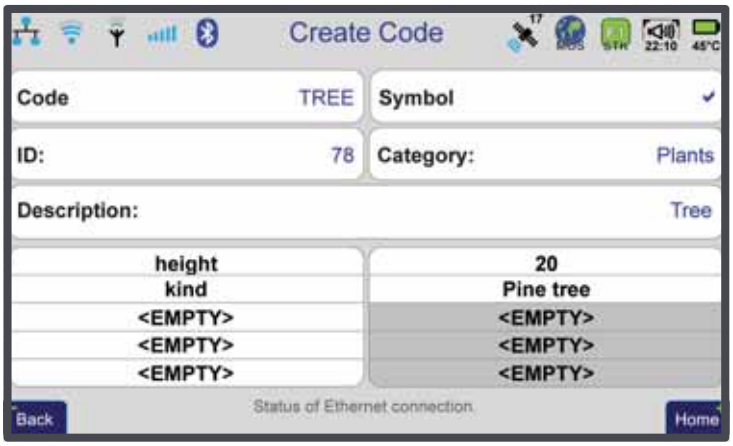
2 The VSO precision is highly depends on the levels and compass measurements. Be sure these are always accurately calibrated.

3 VSO is designed to work with the target points at the ground, not in the air. The marking flag and circle would only be painted reasonably if the target point was previously measured with a correct "Measured height" parameter.

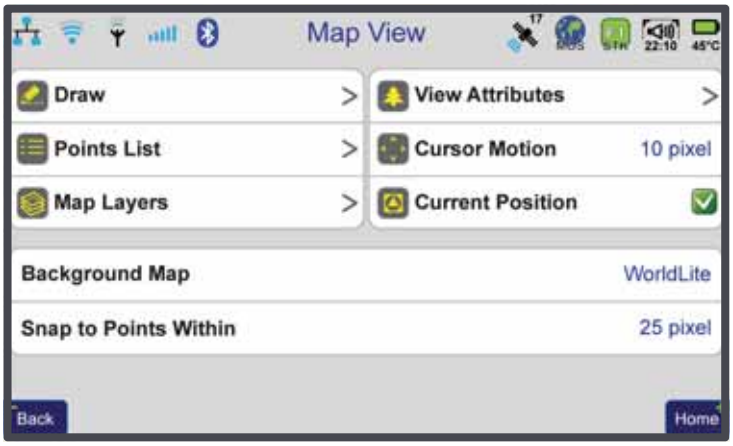
These are some examples of over 100 screens



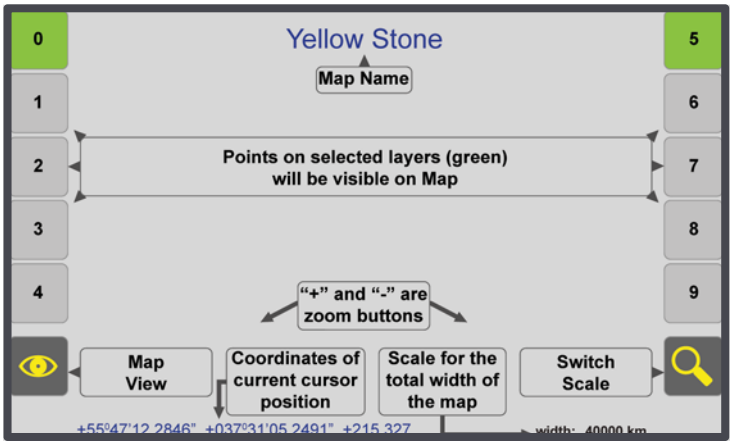
• Click Action button again to see some important items in large fonts and to start/stop and command actions (depending on the current action settings).



• Elaborate code and attribute creation feature with quick access when you need them. Each code can have up to 5 attributes.



• You can create or import maps easily via the Map icon of the Home screen.



• Points, and their attributes, are stored in the selected layers of the Current Map.

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Mobile Technology dynamics and industry economics

Ali Sarwar
School of Surveying and Spatial information Systems, University of New South Wales, Australia

Is it inevitable for the global mobile communications economy flow to shift beyond conventionally what can be called geographical and technical boundaries? Yes, carriers may only be restrained to the metaphor of transmission carriage pipes. To avoid that fate both T2 and T1 mobile carriers will need to establish their own software consortium to standardize their soft-phone digital media platforms and drive the war back to core development companies in order to not only strengthen but keep their vested interests. A classic comparison can be referred to as Mobile phone vs Skype phone which has a potential to be much more widespread than just a conventional voice connecting media. This potential technology evolution is eminent but uncertain in depth and dimension. Having said the uncertain, not tough but interesting times lay ahead for separate groups of creative and consistent mindsets working for the cause. Industry, public and private investment has remained outside the arena just playing spectators in some cases in terms of investment spending, however this need to change in the not so distant future. This account discusses the mobile phone technology evolution and market dynamics driving it towards a much significant future which is vague in terms of direction and attracting investment.

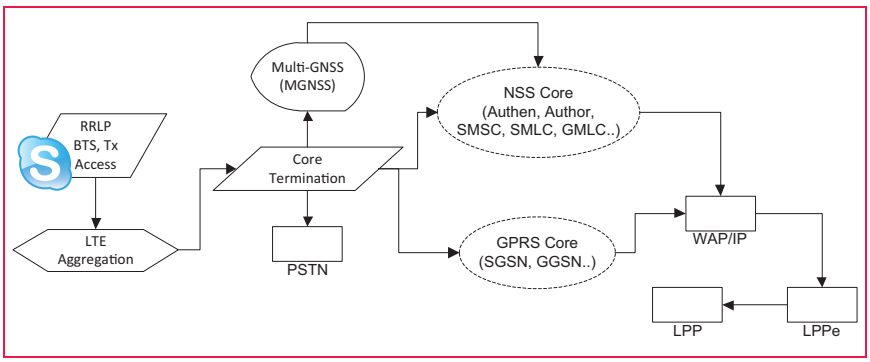

Figure 1: Mobile and GNSS architecture evolution

Technology

Predominantly, two references bind the subscriber to the carrier for identification, authentication and authorization i.e. Subscriber Identity Module (SIM) card and billing number. Near future could see mobile stores selling mobile phones without SIM cards. Inbuilt system-on-chip may require the subscriber to sign-in using their apple or Google accounts to access email, Skype and so forth. Inherent hardware capabilities of WiFi, WiMax and Assisted GNSS may choose the cost-effective and speed-efficient mobile or satellite network automatically without the consumer having to care about manually choosing a carrier which will be automatically selected according to customized user preferences based on cost-efficiency, coverage footprint and Quality of Service (QoS).

Figure 1 proposes the architecture of an evolved mobile phone technology of the future. Voice and video calls will evidently be the primary services facing merger with intelligent location based technologies e.g. LTE positioning protocol extension (LPPe) may be augmented in the mobile platform end-server to render service equivalent location based processing and acquisition assistance (Sarwar et al. 2012). This may be achieved through introduction of external open source GNSS IP servers or a new hybrid network integrated with Serving Mobile Location Centre (SMLC) and Gateway Mobile Location Centre (GMLC).

Such integration may not happen overnight rather progressively over the next few years. It will obviously be not something carriers would welcome as it may limit their operations to just a backhaul pipe

and not the prime revenue makers more so which they'll try to resist. However if one carrier starts the process willingly or unwillingly by falling prey, for the rest will just be either be an arbitrary or cascaded demolition e.g. how iPhone took the smartphone and digital market over. The benefits of a non-carrier provided service set for the subscriber are obviously compelling as to ease of keeping multiple numbers, inexpensive video calls and wider coverage.

Market Economics

As the market economics and dynamics grow and change for both software platform owners and mobile operators may see their profits shifting with change in investment strategies in network modernization. Platform owners on the contrary might gain enough revenues to support their investment in the network upgrade sector and thus support their new business model of end-end service ownership e.g. from Skype to a user handset.

Some experts predict that mobile operators will lose business to mobile platforms in their bid to establish the supremacy of software on hardware interface with the end user (Ilja Laurs, 2011). To some this may well be a medicine dispensing opportunity snatched away from traditionally expert doctors and handed to online nurses to change the mobile communications and services game for time to come.

Some experts predict that mobile operators will lose business to mobile platforms in their bid to establish the supremacy of software on hardware interface with the end user

To make space for possibly the inevitable, companies like SingTel Optus (Australia's T2) is taking steps to restructure its business (A. Colley, 2012) and take the war back to players like Google and Facebook to tap into their world of mobile communications and digital advertising market share. As an example here Telstra (Australia's T1) has decided to work with Australia Post to establish and market a digital mailbox based on its e-cloud with bank level security. This may not only be used for communication but also for bill payments and other miscellaneous postal services which have experiences a decline in last generation

Not that they haven't been trying to achieve so for the last few years but obviously with the fate much eminent, efforts have been sped with much seriousness. This saw the company laying off 1000 people in FY12 alone (costing $37m) to save OPEX ($100m) and share network infrastructure development costs ($400m) sharing BTS with T3 carrier VHA (Joint Venture of Vodafone and Hutchison which took place in 2010 in Australia which downsized the competition base from 4 to 3 Carriers).

A question might arise as to what has been the historical growth trend and how we envisage it to grow in the future in the mobile market. Today we have more mobiles in a household (6.6 billion) generating $1.5 trillion in revenues last year alone as opposed to toothbrushes (4 billion) (M. Bingemann, 2012). This entails the importance of mobile communications business for telecommunications companies who don't generate much revenue anymore from the decaying business portfolio of hard copper lines potentially to be swapped with high speed fiber.

While there are indications following the economic downturn, second dip recession and emergence of multi-speed economies in the traditionally prosperous West, to some there's an increased need to spend more CAPEX on IT&T today than ever before due to glooming returns from mining, building and construction sectors due to higher taxes, rentals, leasing and lower gross gains despite high spending (Figure 2).

Even though the IT&T spending has risen between March-Dec2011, it's actually fallen 16% since March 2008 impeding the growth in the sector. Simultaneously, lack of public sector interest due to resources export being the prime focus for the moment has worsened the growth prospects. A future which is eminently both dynamic and arbitrary, a sense of direction needs to be devised and standardized by public and private sector.

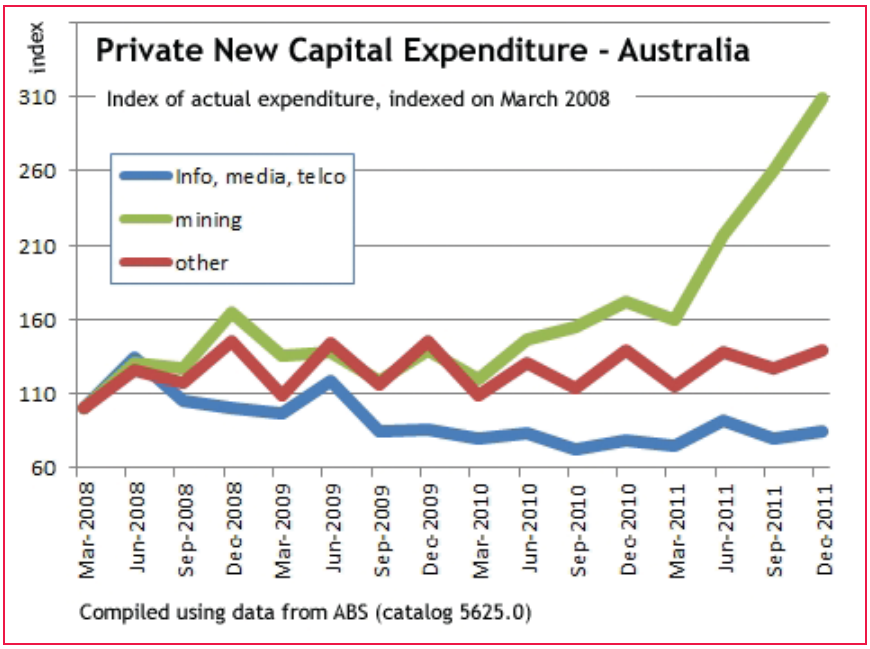

Figure 2. Mobile and IT CAPEX Outlook in Australia (Phil Dobbie, 2012)

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Accuracy maintenance method for mobile mapping system data at GPS invisible area

In this paper accuracy investigation of MMS vehicle position correction process using GCP and development of accuracy maintenance method for MMS data at GPS Invisible Area are discussed. Readers may recall that we published the first part of the paper in June 2012 issue. We present here the concluding part

Akihisa Imanishi
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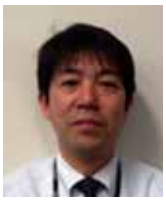

Kikuo Tachibana
Research and Development Center of PASCO CORP, Japan

Koichi Tsukahara
Technical advisor, PASCO CORP, Japan

Accuracy investigation of LMU at GPS invisible period

Objective of accuracy investigation

In this study, accuracy investigation of the corrected MMS measurement data by LMU and the mapping data derived from these corrected data were carried out to establish the most appropriate land mark point asignment (position interval etc.) method at GPS invisible period. The target mapping scale is 1/500 and required accuracy is 25cm RMS for both horizontal and vertical.

Overview of accuracy investigation

Test field

The accuracy investigation observation was carried out at TOYONAKA CITY in OSAKA prefecture.In Fig7. test route are displayed. One straight road is selected as standard test route. In addition, two other routes which includes ell-curve and inflection point of longitudinal slope were selected to check the influence of MMS vehicle motion (heading and pitching) in GPS invisible area.

Figure 7: Accuracy investigation route

Used MMS measurement data

Details of MMS data used in accuracy investigation are shown in Table2.
In order to verify the influence of interval of land mark point and change of the MMS orientation (heading / pitch) reproduced data set of each routes where GPS positioning data was rejected manually and purely depending on the inertial positioning by using IMU and odometer only was used.

Adoption of land mark

LMU corrects vehicle position using position correction vector which created from coordinates of land mark in the original MMS measurement data and its ground surveying data (control point coordinate value).Therefore selected land marks must be able to identify clearly in the imagery captured by MMS and the objects must be represented by laser point cloud absolutely.

The objects selected as land mark are corner of the parcel line, manhole and corner of the gutter.

Ground coordinates observation of land mark

Ground coordinates of land mark was observed by network RTK-GPS (FKP method) and TS. 3D coordinates were observed. The accuracy level of land mark coordinates refer to the 4th order control point survey standard of Japan. In addition,

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Table 2: Details of MMS mission

Test Field	Measurement Date	Route	Measurement Time	Estimated Posteriori Error (EPE)
Toyonaka City	18.Dec.2009	straight section	13:07:47~ 13:08:23	1.718m
		ell-curve section	12:50:02~ 12:51:15	1.710m
		longitudinal slope section	10:35:58~ 10:37:32	2.390m

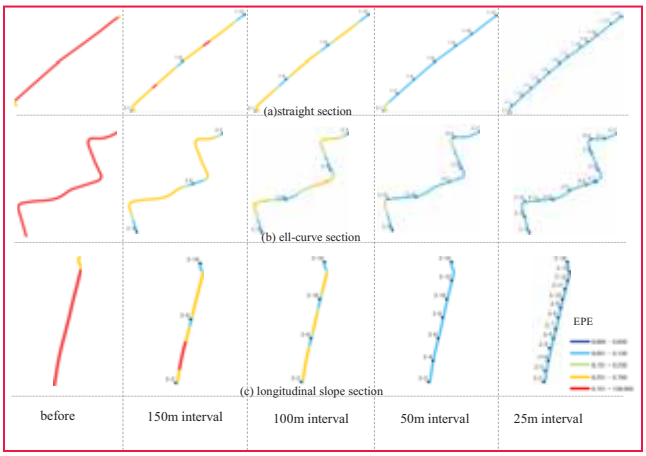

Figure 8: Distribution of EPE for each interval distance

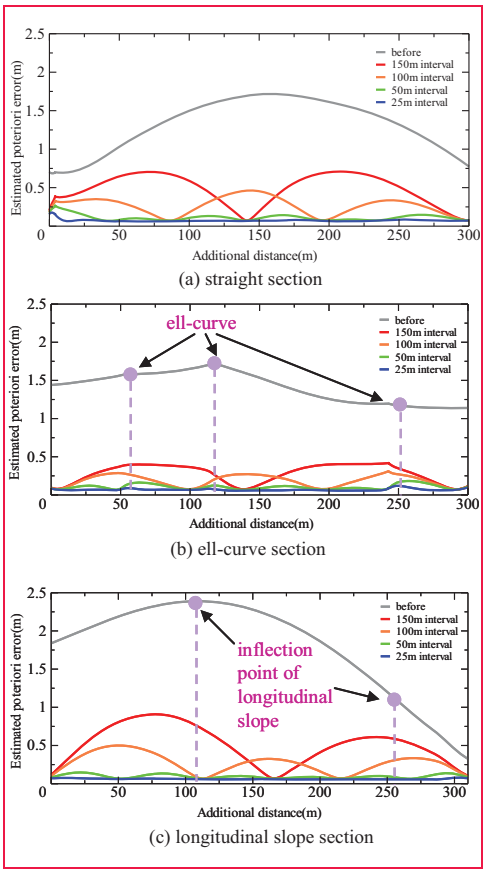

Figure 9: Transition of EPE for each interval distance

some extra objects were also observed as check point to confirm accuracy of corrected MMS measurement data by LMU and mapping data derived from it.

Accuracy investigation of LMU

Interval of land mark point

MMS vehicle position is calculated by GPS/IMU/Odometer data integrated adjustment. In this process smoothing between GPS observed point is carried out and precise vehicle position is calculated. Vehicle position correction by LMU is needed due to lack of GPS satellite during MMS mission. Therefore interval distance between virtual GPS observation points derived from LMU should be considered to keep precise vehicle position comparable to state when sufficient GPS satellites are available.To confirm it vehicle position correction by LMU with 4 different setting where interval distance of 150m, 100m, 50m and 25m was carried out and its results was compared amd analyzed. Original data set without correction was also processed to provide data for comparison. MMS data were captured at standard mission velocity of 40km/h therefore 150m corresponds to 14sec and 100m corresponds to 9sec respectively.

Investigation of EPE

Depending on the result of vehicle position correction by LMU confirmation and investigation of EPE was carried out. The results of vehicle position correction by LMU with each interval distance are shown in Fig.8. It is confirmed that MMS vehicle position correctionis activated by LMU and its accuracy is improved compared to the uncorrected case. Especially improvement of vehicle position at neighborhood area of land mark position is prominent. It means that the GPS/IMU/Odometer data integrated adjustment was carried out depending on the virtual GPS observation data and observation data close to the land mark points was corrected. In case of long interval distance, however, vehicle position correction could not be completed due to the error accumulated over time.

Fig.9 shows transition of EPE for each land mark interval setting. Vertical axis is EPE and horizontal axis is additional distance respectively. As shown in fig9. each EPE after correction undergo a transition nearly constant intervals. The position where EPE is converged is the point where land mark is placed. The maximum EPE appears at midpoint of each land mark point. This is why that smoothing process of GPS/IMU/ Odometer integration adjustment was done by both forward and reverse direction. Therefore most effective land mark point location is the point where EPE shows maximum value.

The influence of vehicle motion (heading and pitching) to the vehicle position estimation was also analyzed. In Fig8. (b) distribution of EPE at ell-curve is displayed. The ell-curves are correspond to the position at additional distance of 50m, 120m and 250m points. In case of 100m interval distance of land mark accuracy of vehicle position at just before and after ell-curves is degraded. In the mean time in case of 50m interval degradation happens only at ell-curves section. Fig9.(b) shows transition of EPE at ell-curve section. 50m interval case (plotted green line) also shows drastic change of transition at ell-curve. Thus motion of vehicle (heading)

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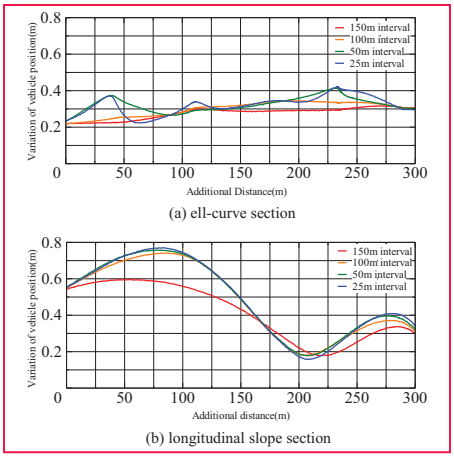

Figure 10: Variation of vehicle position

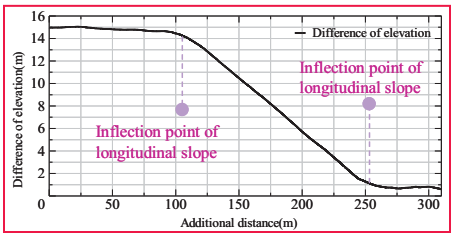

Figure 11: Vertical profile based on the minimum height

Table 3: 3D residuals of laser point

Route	Check Point	Before	150m interval	100m interval	50m interval	25m interval
straight section	1-1	0.391m	0.197m	0.167m	0.099m	0.030m
	1-2	0.300m	0.129m	0.077m	0.018m	0.003m
	1-3	0.243m	0.109m	0.057m	0.029m	0.007m
	1-5	0.215m	0.070m	0.029m	0.028m	0.024m
	1-6	0.209m	0.015m	0.064m	0.005m	0.008m
	1-7	0.308m	0.046m	0.073m	0.032m	0.032m
	1-9	0.577m	0.067m	0.003m	0.010m	0.006m
	1-10	0.679m	0.074m	0.006m	0.013m	0.025m
	1-11	0.656m	0.075m	0.044m	0.055m	0.042m
ell-curve section	2-3	0.297m	0.113m	0.097m	0.113m	0.012m
	2-4	0.241m	0.189m	0.179m	0.046m	0.021m
	2-5	0.061m	0.115m	0.079m	0.097m	0.074m
	2-7	0.178m	0.094m	0.056m	0.077m	0.023m
	2-8	0.166m	0.082m	0.099m	0.071m	0.051m
	2-9	0.181m	0.095m	0.038m	0.040m	0.014m
	2-11	0.305m	0.054m	0.046m	0.050m	0.017m
	2-12	0.494m	0.168m	0.155m	0.007m	0.059m
	2-13	0.518m	0.073m	0.079m	0.040m	0.022m
longitudinal slope section	3-3	0.628m	0.054m	0.014m	0.030m	0.031m
	3-4	0.756m	0.162m	0.041m	0.041m	0.007m
	3-5	0.787m	0.209m	0.039m	0.026m	0.030m
	3-7	0.568m	0.101m	0.025m	0.027m	0.020m
	3-8	0.363m	0.077m	0.038m	0.027m	0.047m
	3-9	0.189m	0.070m	0.041m	0.031m	0.076m
	3-11	0.289m	0.176m	0.124m	0.075m	0.040m
	3-12	0.390m	0.140m	0.087m	0.036m	0.025m
	3-13	0.395m	0.066m	0.039m	0.057m	0.048m

have much effect on the vehicle position accuracy. Additionally the relative vehicle position variation was also checked. Fig.10(a) shows variation of vehicle position at ell-curve section. Vertical axis is variation of vehicle position based on the original uncorrected position and horizontal axis is additional distance respectively. In case of 50m and 25m interval distance where land mark point was located around ell-curve the variation of position is significantly increased. Thus it supposed that land mark which located near ell-curve also has effect on the vehicle position correction.

Fig8.(c) and Fig9.(c) shows EPE and transition of EPE at inflection point of longitudinal slope respectively. In Fig11.vertical profile based on the minimum height around inflection point of longitudinal slope section is displayed. As shown the inflection point of longitudinal slope is position at 100m of additional distance. From this point it goes down about 15m and then inflection point appears again at 250m of additional distance. It is expected that this change also have some influence to the position accuracy. However there are influences of land mark point interval but any clear influence of vehicle vertical motion (pitch). Same as before the relative vehicle position variation was also checked. Fig.10(b) shows variation of vehicle position at inflection point of longitudinal slope. Vertical axis is variation of vehicle position based on the original uncorrected position and horizontal axis is additional distance respectively. In case of 100m, 50m and 25m interval distance where land mark point was located around inflection point the variation of position is significantly increased. Thus it supposed that land mark which located at inflection point also has effect on the vehicle position correction.

As mentioned before investigation of EPE was carried out. It is confirmed that shorter interval of land mark improve vehicle position accuracy. It is also suspected that the vehicle motion at ell-curve (heading) also have influence to the vehicle position accuracy. Moreover it is expected that set up of land mark at inflection point of vehicle orientation (Heading,Pitch) has effect to the correction of vehicle position. However the effect of vehicle position correction is not yet confirmed at this stage. Therefore accuracy investigation of laser point cloud data which corrected by LMU was carried out by comparing to the ground survey data (check point).

Accuracy investigation of laser point cloud

Following the investigation of EPE accuracy of laser point cloud corrected by LMU was also evaluated. The check point residuals for each rand mark interval are shown in Table3.The check point residual is discrepancy between check point coordinate observed by network RTK-GPS and TS and the coordinate observed on the point cloud. Fig12. shows distribution of residuals for each check point depending on the Table3. Each check point was located at midpoint between land mark point where EPE indicated maximum value. The example of check point is displayed in Fig13.

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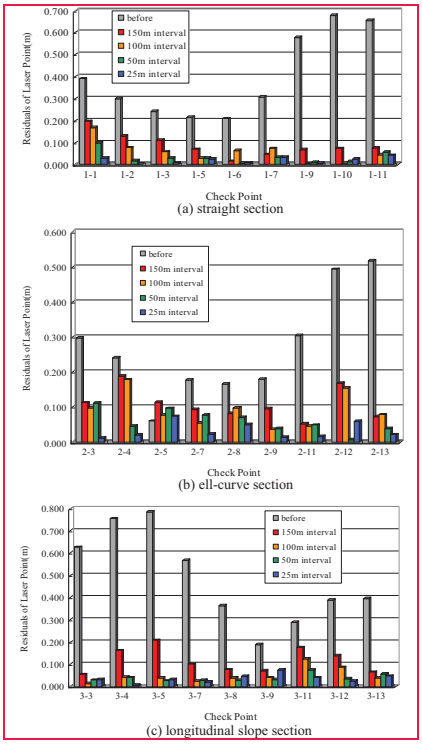

Figure 12: Distribution of 3D residuals of laser point

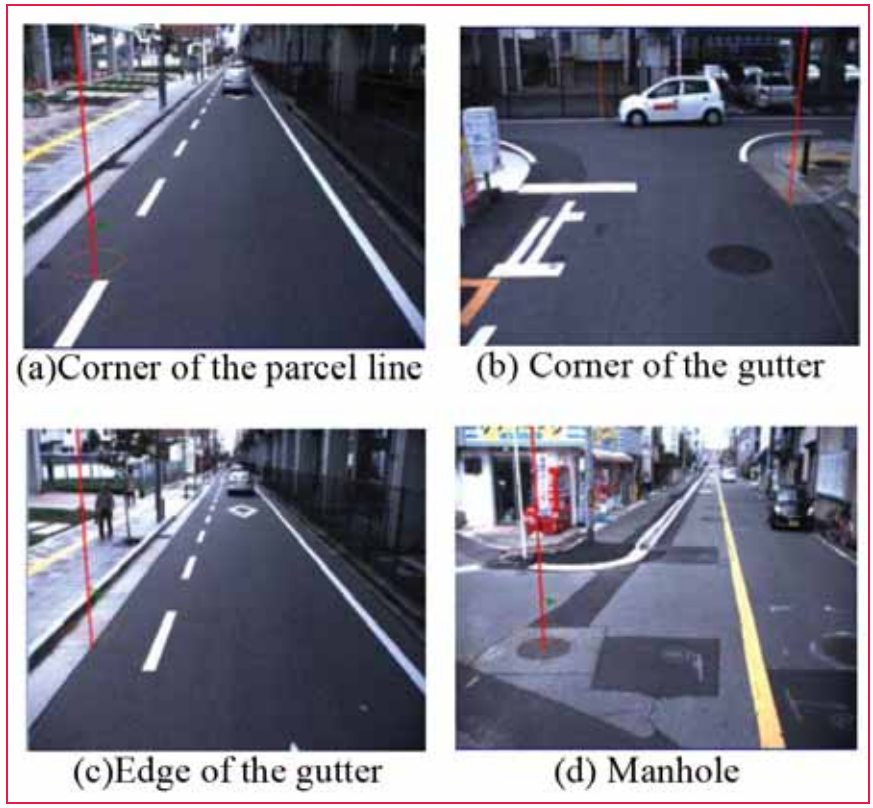

Figure 13: Check point for laser point checking

Fig12.(a) is distribution of check point residuals at straight road. Almost uniform effect of LMU is confirmed on all check point residuals after correction (150m to 25m). Check point 1-1 is close to intersection and expected that vehicle motion (heading) had some influence. There for it was excluded and rest check point 1-2 to 1-11 was evaluated as standard straight road data. To evaluate accuracy of laser point cloud reference value is needed. In this study value of 0.15m was selected as this reference value depending on the Japanese mapping standard.

In case of 150m interval residuals of check point 1-2 and 1-3 exceeded 0.1m. Therefore 150m of land mark interval is not sufficient to keep stable accuracy level of 0.15m which required for laser point cloud accuracy. On the other hand in case of 100m, 50m and 25m interval all of the check point residuals achieved better than 0.1m (maximum 0.077m). Even there are 2-3 cm deviations between each interval setting it can be evaluated as keeping a similar accuracy level. Thus at straight road 100m interval should be considered as standard.

Fig12.(b) is distribution of check point residuals at ell-curve section. In case of 150m interval residuals of check point 2-3, 2-4, 2-5 and 2-12 exceeded 0.1m. In especial check point residuals of 2-4 and 2-12 exceeded 0.15m. Therefore as same as before 150m of land mark interval is not sufficient to keep stable accuracy level of 0.15m. In case of 100m interval check point residuals of 2-4 and 2-12 still exceeded 0.15m while rest points achieved better result of less than 0.1m (maximum 0.099m). Check point 2-4 and 2-12 is close to ell-curve. It is confirmed that vehicle motion (heading) has a influence to the position accuracy and it is one of the factor of accuracy degradation.

Continuously 50m and 25m interval cases were also evaluated. In this case it is confirmed that the check point residuals of 2-4 and 2-12 were highly improved. As shown in Fig.8(b) land mark points were located near ell-curve. It is expected that these point assignment

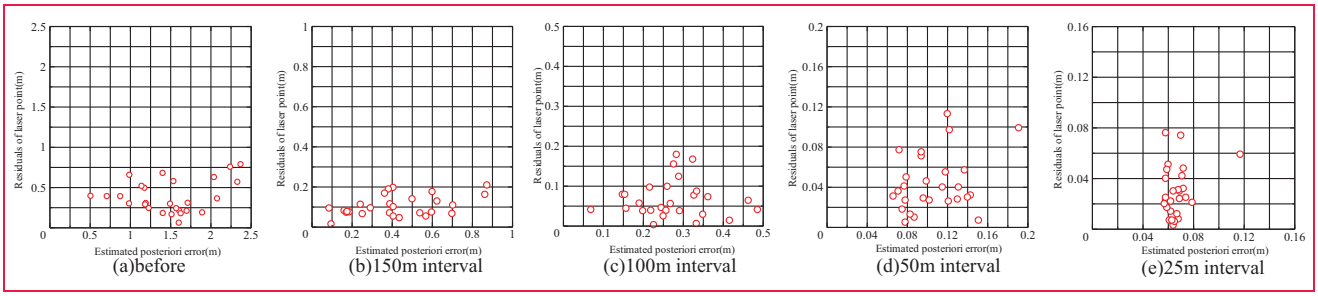

Figure 14: The relationship between EPE and check point residuals of laser point cloud

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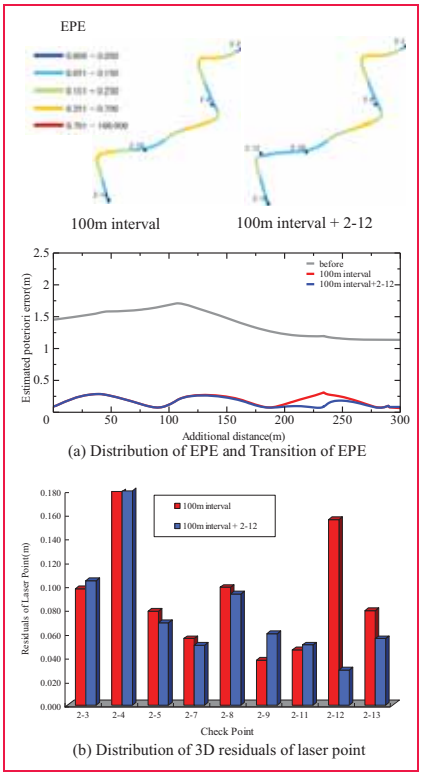

Figure 15: Result at ell-curve section

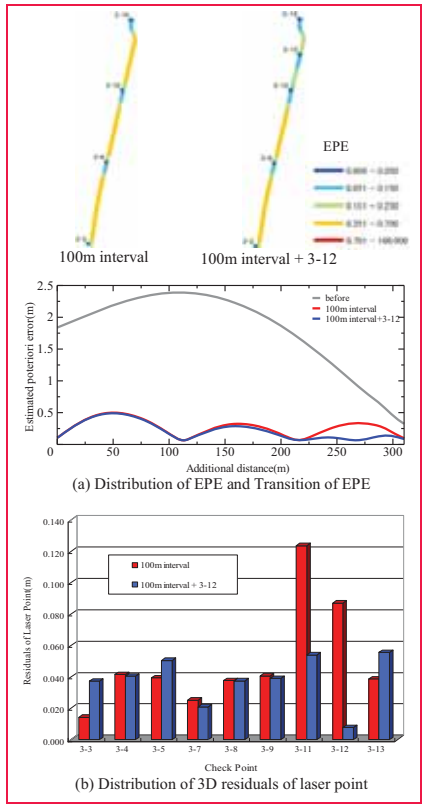

Figure 16: Result at inflection point of longitudinal slope

effected on the accuracy improvement.

Fig12.(c) is distribution of check point residuals at inflection point of longitudinal slope. In case of 150m interval residuals of check point 3-4, 3-5, 3-7, 3-11 and 3-12 exceeded 0.1m. 150m interval is again not sufficient. In case of 100m interval check point residuals form 3-3 to 3-9 indicated keeping stable accuracy. However 3-11 and 3-12 indicated large residuals comparing to the other points. Check point 3-11 and 3-12 is located at 250m additional distance point and here is inflection point of longitudinal slope where it is changed from down slope to flat. From this result it is also confirmed that vehicle motion (pitch) has a influence to the position accuracy and it is one of the factor of accuracy degradation.

In case of 50m and 25m interval check point residuals of both 3-11 and 3-12 was improved about 5cm. In this case land mark point is located near inflection point of as shown in Fig11. It is also expected that these point assignment effected on the accuracy improvement at inflection point.

In conclusion it is confirmed that LMU has effective correction capability by selecting appropriate location. In the area where vehicle motion is relatively small 0.15m of criteria can be achieved by adopting 100m land mark interval. Based on this result and taking into account of efficiency of production work 100m is defined as standard land mark interval. On the other hand the area where some vehicle motion is supposed 100m interval is not sufficient. In this case additional land mark point should be located at these points. The result of empirical accuracy investigation under defined land mark point assignment is mentioned in the next chapter.

Furthermore from result of this study there were a quite number of sections where laser point cloud had a precise accuracy even EPE indicated lower accuracy. Fig.14 shows the relationship between EPE and check point residuals of laser point cloud for each case i.e. uncorrected original, LMU with 150m, 100m, 50m and 25m interval distance. As shown in Fig.14 EPE always tends to indicate a value greater than the actual error. The relationship and correlation should be clarified though more research projects in the future.

Table 4: Optimal assignment

Route	Optimal Assignment Method of Land Mark Point
straight section	100m interval
ell-curve section	100m interval and additional point at inflection point
longitudinal slope section	100m interval and additional point at inflection point

Optimal assignment of land mark point

to establish optimal land mark point assignment method empirical accuracy investigation under defined land mark point assignment which descrived in last capture was carried out.

Result of accuracy investigation at ell-curve section

Land mark point was assigned with 100m interval and also added at near ell-curve (check point2-12, at 250m of additional distance.) In Fig15.(a) the result of correction by LMU, EPE and its transition are displayed. As shown in Fig15.(a) the accuracy of vehicle position around check point 2-12 where land mark point was added was improved.

Consecutively accuracy investigation of laser point cloud corrected by LMU was carried out.

In Fig15.(b) distribution of Check point residuals are displayed. Check point 2-4 which is laid near ell-curve shows large residuals. However this point was eliminated from evaluation of this study since there was no land mark points added around it. As shown in Fig15.(b) the accuracy of laser point cloud near check point 2-12 where land mark point was added is improved and it is confirmed that it fully fulfils criteria of check point residuals (equal less than 0.15m). From these result defined optimal land mark point assignment method is effective and then accuracy maintenance method at ell-curve section was established.

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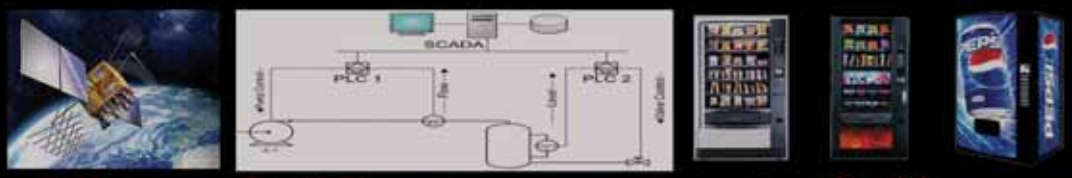

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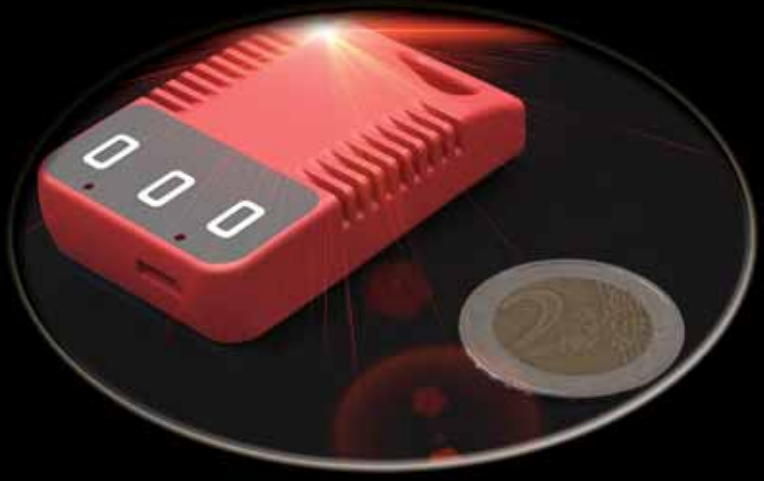

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Table 5: Residuals of mapping point

	Res_XR	es_Y	Planimetric
RMS0	0.074m	0.070m	0.102m
MAX	0.217m	-0.242m	0.242m
Reference Value			0.250m

Figure 17: PADMS-Solid

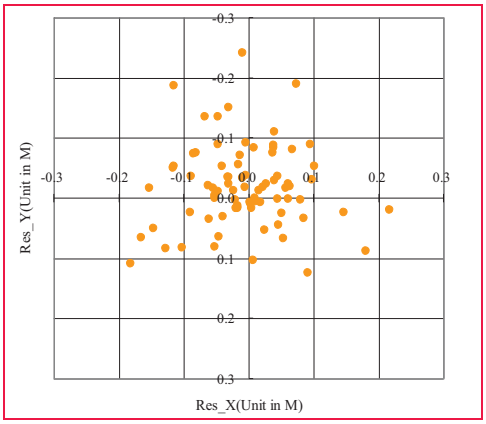

Figure 18: Distribution of mapping point residuals

Result of accuracy investigation at inflection point of longitudinal slope

Land mark point was assigned with 100m interval and also added at near inflection point of longitudinal slope (check point3-12, at 250m of additional distance.) In Fig16. (a) the result of correction by LMU, EPE and its transition are displayed. As shown in Fig16.(a) the accuracy of vehicle position around check point 3-12 where land mark point was added was improved.

As same as before accuracy investigation of laser point cloud corrected by LMU was carried out. In Fig16 .(b) distribution of check point residuals are displayed. As shown in Fig16.(b) the accuracy of laser point cloud near check point 3-12 where land mark point was added is improved and it is confirmed that it fully fulfils criteria of check point residuals (equal less than 0.15m). From these result defined optimal land mark point assignment method is effective and then accuracy maintenance method at inflection point of longitudinal slope was established as well.

Optimal assignment method of land mark point

Depending on the previous investigation result optimal assignment method of land mark point was established. The definitions are shown in table.4. The standard interval distance of land mark point is 100m and additional point is allocated at inflection point. Established randmark assignmnent method is adequate for actual project since it is the result of experimantal study and based on specification of current MMS equipment.

Accuracy investigation of mapping data

mapping process was carried out by using MMS measurement data (laser point cloud and imagery) after LMU correction process. In-house software PADMS-Solid (PAsco Digital Mapping System-Solid Model) was used for mapping process. (Fig.17) PADMS-Solid is specialized system for laser point cloud mapping which designed to measure precise 3-dimentional position coordinate. It can be done by using laser point cloud superimposed on digital image and by utilizing planimetric/vertical profile derived from point cloud to confirm shape and/or edge of objects. This accuracy investigation also has done by comparing coordinates observed by ground surveying using network RTK-GPS and TS and digital mapping data. The accuracy of mapping data was evaluated using these coordinate residuals. The result is listed in Table.5 and distribution of residuals is also shown in Fig18. As shown in this table and figure it is confirmed that the mapping point accuracy efficient to meet the requirement for 1/500 map i.e. position RMS equal less than 25cm defined in Japanese mapping standard. Therefore MMS measurement data which is corrected and updated by LMU can be used for official mapping project (1/500).

Conclusion and further work

In this paper accuracy investigation of MMS vehicle position correction process using GCP and development of accuracy maintenance method for MMS data at GPS Invisible Area were discussed,

From result of study at 3 test routes where there are characteristic of horizontal and vertical alignment, we confirmed two things as follows.

- In case of standard data capture speed of 40km/h, 100m interval of land marks is sufficient.
- Additional land mark at inflection point (horizontal curve and vertical point) is very effective to improve laser point cloud accuracy.

By verifying these results it is confirmed that scale of 1/500 mapping by MMS is available even under GPS invisible area. This method is very useful and valid for tunnel mapping and/or very busy main road mapping where re-observation is difficult and it is usable to create road management map quickly and precisely.

PASCO has established [MMS operation manual] and now updating [MMS LMU manual].

In this paper optimal assignment method of land mark point based on the horizontal and vertical road profile is discussed. In order to examine more effective methods of assignment it is considered necessary to take into account of vehicle velocity and it is our future work.

References

Kajiwara, N., Hirokawa, R. and Shima, Y., (2008), Landmark Update of GPS/INS for Mobile Mapping System Using a Nearly Horizontal Single Camera and 3D Point-Cloud

Students hijack drone for $1,000 bet

On a dare, Texas college researchers hacked into and hijacked a drone of the US Homeland Security before the eyes of the officials operating it. Using a technique called 'spoofing' where a signal from hackers imitates the one sent to the drone's on-board GPS, the researchers managed to take control of a small but powerful drone in mid-air. And the hijacking was just for a $1,000 wager. The incident unnerved the Homeland security officials. The hijackers team was led by professor Todd Humphreys at Austin Radio-navigation Laboratory. "Spoofing a GPS receiver on a UAV is just another way of hijacking a plane," Humphreys said. *http://articles.timesofindia.indiatimes.com*

GNSS Market Report

According to the new GSA report, the worldwide GNSS market is growing fast and the total market size is expected to increase at an average of 13% per year until 2016. The total enabled GNSS market size is expected to stabilise in the latter half of the decade due to market saturation, price erosion and platform convergence. Global shipments of GNSS devices are lower than previously forecasted up until 2015 yet are forecasted to continue growing to over 1.1 billion units per year. http://egnos-portal.gsa.europa.eu

China to invest in a geodetic network

China will invest USD 81.24 million to build a modern national network to monitor movements in earth's crust and other earth sciences in the next four years, according to an announcement by the National Administration of Surveying, Mapping and Geoinformation. The programme will mobilise more than 3,000 technicians nationwide to build a three-dimensional and dynamic "geodetic" network with high precision. China lags far behind developed countries in terms of surveying and mapping technologies. The latest geoid determination network of the US can reach an accuracy of upto three to four centimetres, while China can only determine geoid at an accuracy of 30 cm in its eastern part and 60 cm in its western region. The national geodetic network aims to build 360 GPS reference stations, and a satellite-geodesy control network consisting of 4,500 control points. *www.chinadaily.com.cn*

5th GPS IIF satellite for US Air Force completed

Boeing completed the fifth of 12 GPS IIF satellites the company is building for the US Air Force. The spacecraft was built at the Satellite Development Center in El Segundo using the GPS IIF pulse-line manufacturing approach, which draws on commercial production line practices to build satellites faster and more efficiently. *www.defpro.com*

Earthquakes without frontiers' project gets GBP 3.5 mn fund

Natural Environment Research Council and the Economic and Social Research Council, both based in the UK, funded GBP 3.5 million to a five year project, 'Earthquakes without frontiers'. The project aims to understand, threat posed by unanticipated earthquakes in continental interiors. It will be led by the University of Cambridge. Researchers will use state-of the-art ground- and satellite-based technology to examine the link between earthquake faults and the landscape they have created. *www.cam.ac.uk*

FCC dishes on LBS in new report

The Federal Communications Commission (FCC) is out with a report on LBS that outlines government and industry efforts to address the privacy issues surrounding those very services. The FCC declined to adopt any regulations or best practices, but stated it would "continue to monitor industry compliance with applicable statutory requirements and evolving industry best practices." According to details outlined in the report, the FCC has identified key privacy issues implicated by location-based services - Notice and transparency, Meaningful consumer choice, Third party access to personal information, Data security and minimization. The FCC noted that because location-based service data is considered particularly sensitive information, heightened security requirements can be reasonably expected of the industry. The FCC also noted that as little data should be stored for a short a period as possible to lessen security breaches, although there is a tension because law enforcement would find location data valuable suggesting longer storage times would be valuable. *http://www.mobilemarketingwatch.com*

No increase of import duty on gadgets with GPS in Russia

A proposal to increase import duties to 25% on all gadgets equipped with GPS locators but lacking Russia's homegrown version, Glonass, has been rejected. The decision was apparently taken by the Eurasian Economic Commission, the regulatory body of the Russia, Kazakhstan and Belarus customs union on May 28. With nearly all modern smart phones and tablets coming equipped with just GPS, the move would have seen these gadgets jump in price across the board. The idea to raise the levy for GPS-only devices was originally proposed by Russian government officials to encourage device manufacturers to include Glonass in their gadgets. http://themoscownews.com

Market potential of Beidou

China successfully launched its 12th and 13th Beidou satellites with one rocket early this year. It is the first time that Beidou satellite navigation system adopts "one rocket with two satellites" technology and applies it in the long and medium range earth orbit' launch. It will help improve the accuracy of the Beidou navigation network and stimulate the industrial development. GPS receivers account for over 95% of the navigation terminal market, which brings increasing concern in national defense and economic security. According to CCID Consulting, the output of China's GPS industry reached RMB107.23 billion in 2011, up 25.2% year on year. According to CCID Consulting's statistics, the size of China's Beidou satellite navigation industry reached RMB 8.596 billion in 2011, up 43.2% year on year. As indicated in government plan, the size of China's satellite navigation industry is expected to hit RMB 200 billion by 2015 and double in the following five years. *http://en.ccidconsulting.com*

Ford selects Nokia Location Platform for innovation project

Ford has selected the Nokia Location Platform to leverage Nokia's global location content, including NAVTEQ Map, as well as scaleable cloud services and APIs. This complete solution offers a fast, easy and cost-effective path to create innovative and differentiated location products. The Ford EVOS concept car showcases a future in which cloud services go beyond Internet access and traffic-enabled routing. *www.press.nokia.com*

TomTom offers daily map update on all devices

TomTom enabled all of its 60 million portable navigation devices to receive free daily map changes via the TomTom Map Share community. It enables drivers to keep their maps up-to-date by making immediate changes on their device and to receive similar updates from the Map Share community around the world. *corporate.tomtom.com*

MapmyIndia eyes INR 100 crore revenue in FY13

MapmyIndia is expecting to cross INR 100-crore revenue mark in the current fiscal and plans to expand business in South Asian and African countries, according to MapmyIndia MD, Rakesh Verma. The company expects to see significant boost in revenue from sales of its Android-based navigation devices 'Car Pads' that are being sold as bundled products with cars, location tracking based services and sale of map navigation applications. "We have partnered with almost all car makers for selling Car Pads in most of the vehicles priced above INR 5 lakh. Some car companies have their own device but using our maps and application in their device," Verma said. *www.economictimes.com*

GPS/GNSS IC market to reach 1.8 bn by 2016

A new study from ABI Research demonstrated the continued expansion of the GPS/GNSS Integrated Circuit (IC) market that is forecast to reach 1.8 billion shipments by 2016, representing a market worth over USD 3.3 billion at the end of the period. *www.abiresearch.com*

Fastrax launches UC530

Fastrax unveiled Fastrax UC530 – a new edition of the OEM GPS receiver with an integrated chip antenna. It features the highest sensitivity on the market (-165 dBm in tracking) and extremely low power consumption, typically only 45 mW average power. The antenna module is easily embeddable in space-restricted environments thanks to its tiny footprint of 9.6 x 14.0 x 1.95 mm and extended input voltage range of +3.0V…+4.3V. *www.fastraxgps.com*

Toyota and NavInfo, China collaboration

Toyota Motor Corporation and NavInfo, China will cooperate to establish a joint-venture company, Telemap China Co., Ltd. for the distribution of map data to car navigation systems in China. *http://www2.toyota.co.jp/en/news/12/06/0620.html*

Google fleet management service

Google has launched a cloud-based mapping service to enhance businesses' management of mobile and field workers. The Australian-grown Maps Coordinate web service enables fleet managers to track mobile workers' movements and assign tasks to them based on location. *www.itnews.com.au*

Trimble introduces new mapping app for android tablets

Trimble has introduced Trimble Outdoors MyTopo Maps app for the Kindle Fire and other Android-powered tablets. Outdoor enthusiasts can now view detailed topo and aerial maps and plot their next outdoor adventure on large tablet screens. MyTopo Maps provides access to over 68,000 detailed topo maps in the U.S. and Canada, in addition to aerial photos, street maps, terrain maps and hybrid maps. *www.trimble.com*

MobiWork unveils smartphone and cloud based GPS tracking solution

MobiWork has launched SmartTrack, an enterprise grade smartphone and cloud based GPS tracking solution for any business with mobile workers or resources. To respect privacy concerns, SmartTrack can be configured to use geofencing to calculate the amount of time each worker spends at predetermined locations such as customer or project sites without tracking their personal or professional whereabouts and activities in between. *www.mobiwork.com*

u-blox acquires Cognovo

u-blox has announced the acquisition of UK-based Cognovo Ltd. The acquisition extends u-blox' chip design capabilities to create differentiated products for strategic markets that require 4G communications combined with global positioning. *www.u-blox.com*

Family of girl wounded in shooting sues GPS company

The mother of a young girl hit with a stray bullet fired by a juvenile offender who was under GPS tracking is seeking millions of dollars from the state vendor that provides the monitoring, claiming in a lawsuit that the company knew its product was flawed. The suit was filed in U.S. District Court this week by Danielle Brooks, whose daughter, Raven Wyatt, was 5 years old when she was struck by a bullet and suffered catastrophic injuries. The girl is now 8, and the family's attorney estimates her care could cost more than $7 million over her lifetime. The shooter, Lamont Davis, was a repeat offender who had left his home, where he was supposed to be tracked by an ankle monitoring device provided by Nebraska-based iSECUREtrac Inc in USA. His trial exposed flaws in the technology and raised questions about the reliability of the tracking information. *http://articles.baltimoresun.com*

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Global Satellite industry revenue touches 177.3 bn: SIA

The Satellite Industry Association (SIA) released its 2012 State of the Satellite Industry Report. Globally, 2011 revenues for the satellite industry totalled USD 177.3 billion, a growth of 5 percent. This is the fifteenth year that SIA has commissioned the Futron Corporation to conduct this annual survey. Futron polled over 80 satellite companies, both SIA members and non-members, to assess the performance of four satellite industry sectors: satellite services, satellite manufacturing, satellite launch industry and ground equipment. *www.sia.org*

US Senate committee votes for imagery funding

The Senate Armed Services Committee, US, voted to authorise USD 125 million in continued funding for commercial imagery purchases in fiscal year 2013, which begins in October, restoring funds cut by the Pentagon in its proposed budget. The move would maintain funding at fiscal year 2012 levels and mandates a study by the Joint Staff and the Congressional Budget Office on the requirements for commercial imagery. Both DigitalGlobe and GeoEye provide digital imagery services to US military and intelligence agencies and are working on next-generation satellites to double their capacity. *www.reuters.com*

NGA to renew DigitalGlobe's EnhancedView contract

The National Geospatial-Intelligence Agency (NGA) informed DigitalGlobe that it is planning to renew DigitalGlobe's Service Level Agreement (SLA). NGA plans to exercise DigitalGlobe's SLA for the EnhancedView contract for the entirety of option year three, which begins on September 1, 2012 and continues through August 31, 2013. *www.digitalglobe.com*

GeoEye receives cost-share payment for GeoEye 2

GeoEye, Inc. has received USD 111 million cost-share payment from the National Geospatial-Intelligence Agency (NGA). In early June, the company successfully passed a major milestone in their GeoEye-2 satellite's development as part of the NGA's EnhancedView programme, triggering this cost-share payment. When operational in 2013, GeoEye-2 will provide cost-effective, shareable imagery for the US government and its many other customers, which is particularly important during times of global crisis. *www.geoeye.com*

China launches RS satellite, Yaogan XV

China launched Yaogan XV remote-sensing satellite from the Taiyuan Satellite Launch Center in north China's Shanxi province. The satellite will be used to conduct scientific experiments, carry out land surveys, monitor crop yields and aid in reducing and preventing natural disasters. The Long March 4B carrier rocket was produced by the Shanghai Academy of Spaceflight Technology under the China Aerospace Science and Technology Corporation. *www.xinhuanet.com*

Shivakumar is satellite centre chief

Scientist and associate director of the Indian Space Research Organisation Satellite Centre (ISAC) S K Shivakumar took over as its director. ISAC is ISRO's centre for conceptualisation, design, fabrication, testing, integration and in-orbit commissioning of satellite systems involving various cutting edge technologies. Mr Shivakumar's tenure with ISAC spans two decades, between 1978 and 1998 during which he contributed immensely to the mission planning, analysis and operations of several Indian satellite missions including Bhaskara, APPLE, IRS and INSAT. Significantly, he was the project director for realising India's first indigenous Deep Space Network antenna at Byalalu, near Bangalore, used for communicating with India's first moon mission Chandrayaan-1. *http://www.thehindu.com*

Urban planning reinvented in Sweden

Gothenburg, the second largest city in Sweden, launches a unique 3D web service engaging citizens to contribute with ideas and suggestions for the development of the city. Citizens can explore the city in 3D on the web and interactively propose projects based on the latest gaming technology. Suggestions are shared on Facebook and rated by the community using common social media features. Users can easily navigate in the virtual 3D model of the city and make changes to the model with user friendly tools. Gothenburg City's "MinStad" is based on CityPlanner, a web service developed by the Swedish software company Agency9. *www.agency9.com*

Vehicle monitoring system in Nepal

Department of Revenue Investigation (DRI), Nepal has announced to introduce GPS and GIS – based vehicle monitoring system from the next fiscal year, to control the rising trend of revenue fraud. *www.thehimalayantimes.com*

Australian Navy digitizes navigational charts

Australian Navy has digitized more than 400 navigational charts. Hydrographer of Australia Commodore Rod Nairn said the creation of a new electronic mapping service called 'AusENC' had required a huge effort by a team of more than 130 Navy and civilian staff at the Australian Hydrographic Service in Wollongong. He said the new charts, which cover the waters around Australia, Papua New Guinea and parts of Antartica, would make sea travel even safer and result in fewer groundings. *www.illawarramercury.com.au*

New Zealand gets new geological map

GNS Science and Waikato University prepared and released a new geological map of the Hawke's Bay and central North Island. The map is the final in a series of updated geological maps for New Zealand. The map updated

previous geological maps that were published in the 1960s. It combines new information from fieldwork and hundreds of published and unpublished maps and scientific reports, including university thesis studies. The QMAP series of geological maps covers the whole of New Zealand. *www.gns.cri.nz*

Philippine police embraces GIS-based crime analysis tool

The La Trinidad Municipal Police Station, Philippines, received a computerized GIS-based tool which would help in crime analysis and provide better crime solutions. The tool is designed to capture, store, manipulate, analyse, manage, and present all types of geographical data. It is a tool for mapping geospatial features such as parcels of land, buildings and roads. It will then connect this data to existing databases, thus providing intelligence which will help in analysing different features. *www.pia.gov.ph*

INR 40 crore GIS project for Indian Railway

Indian Railway undertook a INR 40 crore project to create a GIS database of its assets including tracks, stations and signals. The GIS-based data system would provide information about the life-cycle of a coach, wagon, locomotive, building, signalling system and other assets. One can also track the schedule of the repair or replacement of a particular asset like the signalling system or track on a particular route. The system would also make the decision making process faster in crisis situation like accidents.

Jamaica gets atlas for disaster risk assessment

The University of the West Indies (UWI) developed a tool to enhance decision-making to reduce the serious economic and social impacts caused by natural hazards in the region. The Caribbean Disaster Risk Atlas has been designed to meet the need for reliable data in the development of comprehensive risk management strategies in the Caribbean. *www.Caribbean360.com*

JAVAD GNSS Announces Visual Stakeout for Triumph-VS

With Visual Stakeout (VSO) the virtual location of the point to be staked can be seen by a "flag" shown on the Triumph-VS camera image. This visual aid helps to navigate quickly to the point and makes stakeout jobs fast and fun. The VSO precision is better when closer to the target point and also better when the point is close to the crosshair. Accordingly, the best way to get the most precise target point picture is to place the device so that the bottom camera's marking circle is right in the center of the screen and the virtual bubble level has its bubble right in the center.

Use VSO as an easy and convenient way to get close to the target point, and then switch to the regular stakeout mode to perform precise measurement. *http://javad.com*

Hemisphere GPS New A325™ GNSS Smart Antenna

Hemisphere GPS has introduced the affordable A325 GNSS Smart Antenna. This new design incorporates professional-level centimeter and sub-meter positioning accuracy powered by Hemisphere GPS' Eclipse™ receiver technology and includes L-band and Bluetooth communications support. A325 is a great fit for a variety of applications including agriculture, construction, straddle carriers, robotics, marine, survey, and GIS. *www.hemispheregps.com/precision.*

Carlson Civil 2013 & Hydrology 2013

For civil engineering work, the just released Carlson Civil 2013 provides an improved, fresh user-interface with more than a score of new and updated icons, plus an optional ribbon toolbar among its many additional improvements. It offers new lateral design elements for sewer networks, plus new pond design options. Carlson Civil and Hydrology are comprehensive, yet easy-to-master civil engineering software solutions. Both provide support for AutoCAD® 2013 and also work on AutoCAD versions 2004 and up. All Carlson 2013 office software comes with IntelliCAD® 7.2 built-in, which offers greater performance and stability, plus support for MrSid and JPG 2000 images. *www.carlsonsw.com/civil*

MobileMapper 100 a clear winner

The Latvian State Forest Service (SFS) recently evaluated four leading brands of GNSS handheld mapping devices in a head-to-head comparison that included rigorous field trials, financial cost and technical specifications. The Ashtech MobileMapper 100 achieved the best results in all comparisons, according to an SFS spokesperson. *www.ashtech.com*

NVS Firmware v0205

NVS Technologies AG has released Firmware v0205 for its NV08C-CSM and NV08C-MCM multi-GNSS Receivers. It provides, performance improvements, assures optimum operation with leap second correction and enables operation beyond 18000 metres of altitude, to the highly integrated NV08C-CSM SMT receiver module and the very compact NV08C-MCM BGA SiP receiver. *www.nvs-gnss.com/support/firmware.*

BAE Systems develops a new positioning system

BAE Systems has developed a new positioning system, Navigation via Signals of Opportunity (NAVSOP), which could complement or even replace current technologies such as GPS. It relies on the same signals used by mobile phones, TVs, radios and wi-fi rather than navigation satellites. The firm said that NAVSOP could help find victims inside buildings during a fire and locate stolen vehicles hidden in underground car parks. It could also be used in a war if the satnav system was turned off. *www.bbc.co.uk*

CHC releases LT400 submeter geospatial data collector

CHC has introduced LT400 - a compact, rugged and cost-effective handheld submeter real-time GPS receiver for GIS and mapping professionals. It is a suitable GIS hardware solution ready for use with third-party GIS software applications answering to a wide range of applications such as forestry,

utilities and agriculture. Designed for real-world field conditions, it combines 3.7" full VGA sunlight readable display, powerful 806 MHz processor, all-day battery life and a professional high-performance 12-channel GPS receiver to capture data wherever you need with consistent SBAS and DGPS submeter accuracy. *www.chcnav.com*

Astrium selects DLR for the EDRS ground network

Astrium, Europe's leading space company, continues to drive the implementation of the European Data Relay System (EDRS). It has contracted the German Aerospace Centre (DLR) to implement and operate major parts of the ground network. The agreement covers the design, implementation, delivery and operation of four ground stations: two receiving stations for the EDRS-A satellite in Weilheim, Germany and Harwell, UK, as well as a transmitting and receiving station for EDRS-C in Weilheim, Germany, and a back-up station in Redu, Belgium. *www.astrium.eads.net*

Windows embedded Handheld 6.5 by Juniper Systems

Juniper Systems has unveiled Microsoft Windows embedded Handheld 6.5 for the Mesa Rugged Notepad. This latest operating system version comprises operating system updates from Microsoft, several new features requested by customers, and other various improvements. The new operating system is available to download for all existing Mesa Rugged Notepads on the Juniper Systems website. *www.junipersys.com*

Spirent Launches New Entry-Level Multi-GNSS Simulator

Spirent Communications has launched its new GSS6300M Multi-GNSS simulator designed for integration, verification and production testing where a quick and accurate functional test is needed. The platform supports simulation of signals from individual or combined GPS/SBAS, GLONASS and Galileo constellations, with eight satellites per constellation. It supports two modes of operation - integrated into an Automated Test Equipment (ATE) environment or using Spirent's powerful SimCHAN software.

GMV success in public transport management in India

GMV Spain, in collaboration with its local partner Vayam Technologies, has designed and installed Intelligent Transportation Management System (ITMS) for Ahmedabad's Bus Rapid Transportation System (BRTS). An integral control center has been set up, formed by an advanced fleet management system and a fare collection system. The on board equipment includes advanced GPS tracking devices designed and manufactured by GMV, bus driver consoles and a loudspeaker and microphone system for passing on information to the driver and enabling two-way voice communication with the control center. *www.gmv.com*

Leica iCON CC50 controller

Leica Geosystems has added iCON CC50 to its intelligent CONstruction product portfolio. It is a handy, versatile and rugged PDA with a 3.5" color display. The unit is used to control Leica iCON sensors and to operate the software packages of the iCONstruct toolbox. It is also supported by the updated Leica iCONstruct v1.1 software that has been further enhanced. *http://www.leica-geosystems.com/icon*

Thanks to Leica GeoMoS – Rock Fall in the Swiss Canton of Ticino

During the night of 14 May 300,000 m3 of rock broke off the Valegion mountain and crashed down 1,000 m to the valley floor in the Swiss canton of Ticino, near the village of Preonzo. Thanks in part to Leica Geosystems' Deformation Monitoring solution GeoMoS local authorities were able to evacuate the valley's industrial zone and to close the A2 highway and several cantonal roads at an early stage.

The automatic monitoring system has provided continuous information about every movement in the affected zone. Two years ago a Leica TM30 Monitoring Sensor was installed on a stable pillar below the slide area and connected to the Leica GeoMoS monitoring system. Since then the sensor has monitored 15 observation points located inside and outside the danger zone every hour, 24/7. *www.leica-geosystems.com*

New Rugged Leica Zeno 5

Leica Zeno 5is an entry-level, rugged PDA for organizations that require a durable compact device with integrated modem and high-sensitive GPS. It supports field workers by combining a mobile phone with asset collection and management capabilities. *www.leica-geosystems.com/zeno5*

Alpha Micro introduces u-blox 7

Alpha Micro, an independent design-based distributor of M2M electronic components, has introduced the u-blox 7 next generation core positioning technology platform designed to support all Global Navigation Satellite Systems. *www.alphamicro.net*

Trimble CenterPoint RTX Correction Service to Farmers in Latin America

Trimble has announced that its high-accuracy, satellite-delivered CenterPoint(TM) RTX(TM) correction service is now available for farmers in Latin America. Trimble CenterPoint RTX can deliver better than 3.8 centimeter (1.5 inch) accuracies in real time without the use of traditional reference station RTK infrastructure. *www.trimble.com/agcorrectionservices*

Beijing Esky Technology Reseller of DAT/EM Systems in China

DAT/EM Systems International welcomes Beijing Esky Technology, Ltd. as its new reseller in the People's Republic of China. Beijing Esky was formed in 2012 specifically to sell DAT/EM products in China. *www.datem.com*

Trimble's Indoor Mobile Mapping Solution (TIMMS)

TIMMS is a manually operated push-cart designed to accurately model interior spaces without accessing GPS. It consists of 3 core elements: LiDAR and camera systems engineered to work indoors in

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mobile mode, computers and electronics for completing data acquisition, and data processing workflow for producing final 2D / 3D maps and models. The models are "geo-located", meaning the real world position of each area is known. *www.applanix.com*

Automatic Point Cloud Generation and 3D Modelling from Aerial Images

Tridicon® PointCloud GTA offers a new tool that produces accurate point clouds for 3D analysis as well as textured digital surface models from imagery collected in flight missions with aeroplanes, helicopters or unmanned aerial vehicles as well as satellite imagery or terrestrial photography collected with mobile mapping vehicles.

Cody Corporation partners with F4Devices

Cody Corporation, Australia has agreed to carry the F4Devices product line for the Australasian region on an exclusive basis. Cody Corp will provide all warranty and out of warranty repair services for the newly released Flint handheld as well as subsequent hardware releases from F4Devices. Flint handheld offers a unique combination of flexible GPS configurations ranging from 1-3 meter measurements to Sub-Meter accuracies. *www.f4devices.com*

Esri designs GIS platform for US housing dept

The US Department of Housing and Urban Development (HUD) Office of Community Planning and Development (CPD) released CPD Maps, a web application of HUD's enterprise GIS platform, which is built on Esri's ArcGIS system. CPD Maps is a component of HUD's eCon Planning Suite, a set of tools designed to help state and local government grantees make better decisions about affordable housing and community development. *www.esri.com*

MARK YOUR CALENDAR

August 2012

The XXII Congress of the ISPRS
25 August-1 September
Melbourne, Australia
www.isprs.org

GNSS and Positioning for the Future
Northern Jutland Peninsula
27 August - 2 September
Slettestrand, Denmark
http://gps.aau.dk/dgc/dgc_activities/gnssworkshop2012/

September 2012

ION GNSS 2012
September 17-21, 2012
Nashville, Tennessee, USA
www.ion.org

October 2012

IAIN 14th Congress & Melaha 2012 Conference
1 – 3 October
Cairo, Egypt
www.ainegypt.org

GISSA Ukubuzana 2012
2 - 4 October
Gauteng, South Africa
www.gissa.org.za

UPINLBS 2012 Conference and Exhibition
3 – 4 October
Helsinki, Finland
http://217.152.180.26/upinlbs/

INTERGEO 2012
9-11 October
Hanover, Germany
www.intergeo.de/en

XXXII INCA International Congress
11 – 13 October
Dehradun, India
sajeevnair_inca32@yahoo.com

19th ITS World Congress
22 – 26 October
Vienna, Austria
http://2012.itsworldcongress.com/content/congress

19th United Nations Regional Cartographic Conference for Asia and the Pacific
29 October - 1 November
Bangkok, Thailand
http://unstats.un.org/unsd/geoinfo/RCC/unrccap19.html

The International symposium on GPS/GNSS 2012
31 October - 2 November
Xi'an, China
www.gpsgnss2012.com

November 2012

Trimble Dimensions User Conference
November 5-7
Las Vegas, USA
http://www.trimbledimensions.com/

2012 International Conference on Indoor Positioning and Indoor Navigation (IPIN)
13-15 November
Sydney, Australia
www.surveying.unsw.edu.au/ipin2012

spatial@gov® Conference and Exhibition 2012
20 – 22 November
Canberra, Australia
www.cebit.com.au/spatial

The 33rd Asian Conference on Remote Sensing
26 - 30, November
Pattaya, Thailand
http://acrs2012.gistda.or.th

December 2012

European LiDAR Mapping Forum
4 - 5 December
Salzburg, Austria
www.lidarmap.org

NAVITEC 2012
5 - 7 December
Noordwijk, Netherlands
www.congrexprojects.com/12c13/introduction

4th Asia Oceania Regional Workshop on GNSS
9-10 December
Kuala Lumpur, Malaysia
www.multignss.asia

January 2013

ION International Technical Meeting
27 – 29 January
San Diego, California, United States
http://ion.org/meetings/

February 2013

Second High Level Forum on Global Geospatial Information Management
4-6 February
Doha, Qatar
http://ggim.un.org/

The International LiDAR Mapping Forum
11-13 February
Colorado, USA
www.lidarmap.org

The Munich Satellite Navigation Summit 2013
26 – 28 February
Munich Germany
www.munich-satellite-navigation-summit.org

April 2013

Pacific PNT
22-25 April 2013
Honolulu, Hawaii
www.ion.org

June 2013

TransNav 2013
19 - 21 June
Gdynia, Poland
http://transnav2013.am.gdynia.pl

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The SkyNav GG12W is ideally suited for integration within Technical Standard Order (TSO) Flight Management Systems (FMS), ground-based reference stations for GPS aircraft landing systems (SCAT I and LAAS) and other avionics. In addition to traditional GPS receiver design and ISO 9001 engineering practices, the SkyNav GG12W adheres to all FAA/RTCA design criteria.

RUGGED AND COMPACT GNSS SYSTEM

The HDS800 is a rugged dual board GNSS system that delivers state-of-the-art RTK accuracy, including heading and relative positioning. Designed for seamless onboard system integration, it is available in a variety of configurations. Embedded Z-Blade™ technology ensures powerful RTK performance and a patented way to use multiple GNSS constellations for high-accuracy positioning and surveying solutions.

MULTI-CONSTELLATION, MULTI-FREQUENCY BOARD

With the new MB 800 multi-constellation board, Ashtech brings to the OEM market a unique blend of technologies which increases RTK availability and data integrity. Embedded Z-Blade™ technology ensures powerful performance and a patented way to use multiple GNSS constellations for high accuracy positioning, and surveying solutions.

Z-Blade

Ashtech's Z-Blade™ Technology is a unique patented method using multiple GNSS constellations for high-accuracy positioning. Z-Blade technology secures the best possible measurements from the GPS, GLONASS and SBAS constellations and mixes multiple observables with no compromise between quality and availability. This leads to an incredibly robust and dependable measurement processing resulting in optimized productivity.

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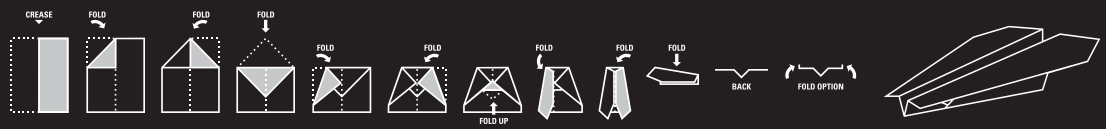

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