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Coordinates

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expertspeak

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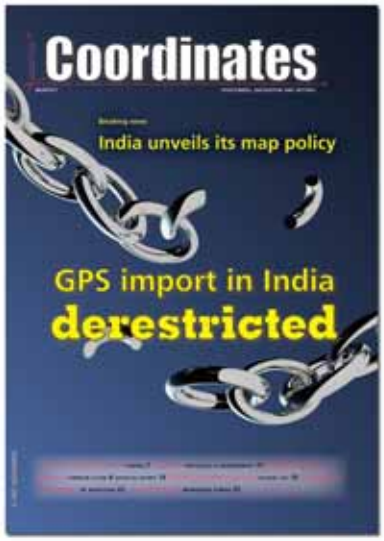
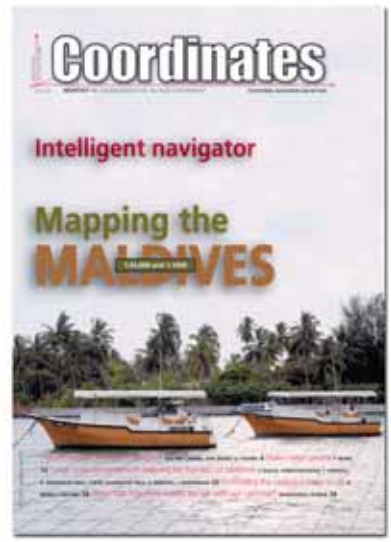
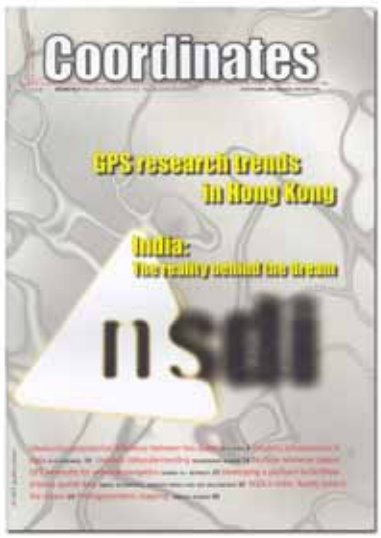
INTEGRATED RURAL DEVELOPMENT

The road ahead

A eGIF publication







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This issue of Coordinates is of 44 pages, including cover.

The interface

Seventy per cent of India lives in villages.

And villages mean not ‘big’ problems but very ‘basic’ problems.

Where the question is to fulfill the basic needs such as food and shelter.

Where access to clean water, education and health facilities itself is an issue.

Where there is a struggle for survival on a daily basis.

Where poverty glares.

Fortunately, rural development has been on the agenda of various governments since Independence.

Unfortunately, despite numerous laudable programmes and huge investments, the reality of rural livelihood is dismal, observes A K Jain, Commissioner (Planning) Delhi Development Authority *(See article on page 30).*

He emphasises the need of blending modern technologies with government developmental programmes.

For technology practitioners, it is important to understand government priorities and focus.

And explore an interface.

As we find Maj Gen M Gopal Rao, Surveyor General of India in an upbeat mood *(See interview on page 6).*

With claims and promises.

And euphoria.

Probably, there is an opportunity.

And a conducive atmosphere too.

Bal Krishna, Editor
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"Our strengths are quality and accuracy"

says Maj Gen M Gopal Rao, Surveyor General of India while discussing the vision, status and direction of Survey of India

What is your vision of Survey of India?

When Survey of India (SoI) had the basic role of meeting Defence needs of mapping, it fulfilled this national commitment with flying colours. Defence and Security agencies primarily depend on the topographical maps in every activity of planning their strategy. SoI has the vision and mandate to provide reliable and accurate geo spatial data to the stake holders, at affordable costs, keeping the national security in consideration. SoI has a very proactive role in the planned development, in building a modern India. The National Spatial Data Infrastructure (NSDI) mandates SoI to take a leadership role in providing spatial data and solutions to the stake holders and SoI is equipped to meet these challenges.

There had been discussions on Restructuring of SoI. What is the status now?

Yes. Restructuring of SoI, has been an on-going process. In a fast changing technological world, the restructuring cannot be a one time affair. The need for the spatial data and related solutions is being felt in the effective and economical developmental planning process. SoI, while meeting these demands, would also foster the growth of the geospatial industry. To achieve these objectives, SoI will have to continuously adopt change in its approach while addressing these issues. The present exercise has been done taking a holistic approach, involving adopting of new technologies, change in work process, human resource development and skill set upgradation. This is a continuous process. The immediate proposal is already in advanced stage of approval.

The idea of NSDI started in 2001. Where it is now?

We have come a long way in formulating the concept of NSDI. Considering the requirements to make it a reality, we have achieved quite a bit in a short time. Very fact that major participating stake holders have been able to sit together and discuss the issues in a common platform, is in itself a great achievement. Many government agencies have come forward and committed their resources and information, to the NSDI domain. It is the industry, which is not coming up with the anticipated response. Probably, industry finds the concept of NSDI as a danger to their individual agenda/ interest/ monopoly. However, I feel, industry has a very important role in the long term become beneficiaries of NSDI.

Department of Space was absent in Hyderabad NSDI workshop. Comment?

All have certain commitments. May be that is the reason, they could not participate in the last workshop. Space has been playing a very important role in formulation of NSDI and I am sure they will continue to do so in future also.

Are you addressing the criticisms voiced about national map policy?

Criticisms help in formulating policies and taking corrective measures as we move forward. Realising the importance of the spatial data for planning, National Map Policy (NMP), has been formulated. The role of the SoI, in development planning has been identified and acknowledged, in greater detail, in the NMP. This will certainly help in building a nationally connected common framework, which will have consistency. This is bare minimum necessity, in the context of NSDI. The SoI, as the framework spatial data provider, can facilitate, quick growth of the Geospatial industry, for value addition and providing solutions. Strength of the SoI is the faith the users repose on the quality and accuracy of the information provided by it. With the increased use of spatial data, in the day to day activities of common man, the role and importance of the SoI, will naturally be enhanced. We are quite comfortable with it and will work with greater vigor.

When will the first OSM be available to the public?

The guidelines for implementation of NMP and bringing out Open Series Maps has been just approved, and is in the official website. Data is ready for providing to the users. We are in the process of updating the framework spatial data. Already existing data in digital form is being provided to many users. Hard copy maps will be brought out shortly, may be, the maps will start rolling from the press before end of February. The first OSM has already been released last month.

Should we have a separate GPS Policy? What are the restrictions in the use of GPS?

As I understand there are more than 6 lakhs GPS of various categories available in the country. They vary in accuracy standards from millimeters to meters. At this stage, to impose restriction on their usage will not serve any purpose. However the government should monitor the various users who are procuring precise GPS receivers

that are to be used in sensitive locations/areas . To my knowledge at present there are no restrictions for usage of GPS in this country.

Wireless Advisor to the Govt of India mentioned the need of operating license for GPS*. Comments.

There is an instruction or law that a license is required for using any instrument that uses radio frequency. However, as regards GPS, we understand that for procuring GPS there is no license required. But for GPS like RTK (Real Time Kinematic) GPS which uses UHF frequency through a modem, a license is needed for its use. However in general, the law has not been enforced, though it exists on paper. *[* Coordinates, July 05]*

What is the status of Redefinition of Indian Geodetic Datum?

The present Indian Geodetic Datum, which is based on locally best fitting ellipsoid, ie., Everest, is being transformed to a geocentric reference frame, based on WGS 84 ellipsoid. There are three different ways in which you can do this:

(a) One can use the transformation parameters, ie., from Everest to WGS-84.

(b) Transformation from Ellipsoid to Ellipsoid after readjusting the Indian Datum.

(c) To come up with a newly observed coordinate system in Geocentric frame.

As regards approach (a), we have already computed the transformation parameters which we are already using for transforming existing topographical maps to Open Series Maps based on WGS-84.

India Road Atlas

Survey of India in alliance with Eicher Goodearth Ltd launched India's first comprehensive India Road Atlas and Map Plus Professional on February 10, 2006. While launching these products, Shri Kapil Sibal, Minister of Science and Technology mentioned that this product is a result of public- private partnerships. India Road Atlas is a useful guide for travellers and all kind of road users in India. There is a Free Route Planner with this book that shows all national highways and major roads with long route distances between major towns. The atlas comprises 240 pages. The digital version of the India Road Atlas is also launched embedded in Map Plus Professional. The Map Plus Professional is a stand alone Business GIS tool which leverages location information for critical business needs. The product is being launched embedded with Bangalore and Delhi City map data and Indian Road Atlas data.

Another product launched on the occasion is the Digital School Atlas developed by the Survey of India in collaboration with M/S Aastha Enterproses. The product is the digital version of the popular Survey of India School Atlas. The digital atlas is user friendly and covers major themes like relief, communication, agro related information and geology which form important part of school geography curriculum.

Maj Gen M Gopal Rao, Surveyor General of India

An engineering graduate from the Indian Institute of Technology, Madras joined the Indian Army under University Entry Scheme in 1968. After undergoing training at the Indian Military Academy, Dehra Dun he was commissioned in Corps of Engineers. After a brief stint in the Army, he joined Survey of India in 1970.

After completing his Survey Engineering Course from Survey Training Institute, Hyderabad he carried out a survey work in various terrain including control work in high hills of Ladakh. He held various appointments in Topographical Mapping directorates and also in Military Survey Units.

He specialized in Advanced Cartography and Digital Mapping and also did Post Graduate Diploma in Aerial Photography from ITC Netherlands.

As a Co-principal Investigator he was associated with the development of GIS software GRAM++ with CSRE, IIT Mumbai. He has been associated with development of NSDI in India from inception and as Chairman of Standards Working Group was responsible for developing the National Spatial Data Exchange Format. He is currently chairing the working group for development of GML standards.

Member of Institution of Military Engineers, Fellow of Surveyors and presently the President of Indian National Cartographic Association (INCA).

For approach (b) the adjustment of Geodetic network, in Everest Datum, have been completed in two dimensions. We are planning to add some more accurate GPS bases, before transforming them to Geocentric Coordinate System, something similar to Northern American Datum 27 to Northern American Datum 83 coordinate as done in the United States of America.

As regards approach (c) SoI has plans already to set up a GCP library with 300 precise control points with monuments and fencing etc, and 2200 points as secondary points. These control points will be provided in TRF reference frame, so that future satellite missions are also taken into account. However, this approach will take considerable time for adoption.

What about a fresh vertical datum definition for India?

New initiatives have been taken for redefining our vertical datum. The heights will be based on geopotential number and Helmert Orthometric Heights. The first stage includes 40 thousands linear km of fresh leveling(fore and back). The project has already begun with the first line from Kolkata to Malda leveling work already in progress. We have already procured 30 Digital levels and also plan to outsource the work to engineering students to complete the job in time. We are aiming to complete this gigantic task by Dec 2007.

Your plans for establishing Absolute Gravity Datum?

The SoI is in the process of procuring a FG5 Absolute Gravimeter for setting up absolute base stations. Five numbers of CG5 Relative Gravimeters with microgal accuracies, have been procured for densifying the gravity network. Joint projects with National Geophysical Research Institute (NGRI) have also been initiated so that the FG5 available with them can also be used immediately for observing at the gravity base stations. In addition, SoI is also on the verge of developing higher resolution gravimetric geoid model which can provide geoid undulation at +/- 10cms.

What are the latest activities in SoI you would like to share with us?

The 1:50,000 scale reference frame is being updated on priority. We are also establishing globally referenced national reference frame by densifying the ground control points to make them easily accessible. Developing a GIS based National Urban Information System is in hand which will be used for city planning. We are also helping states to develop a computer based land information system. The NUIS and ILIS projects require large scale base maps. SoI is adopting 1:10,000 scale as the basic topographical scale for the entire country to meet these new demands.

How do you see developments like Google Earth?

In this era of information technology and Internet technology, Google Earth is a thing which had to come. We will be seeing more such innovations in future. We have to be prepared to face such developments. Information cannot be denied. The winner will be the one who exploits technology and information. Let us use this opportunity to grow, by exploiting the technology and information for the benefit of the mankind.

First OSM released

Mr Kapil Sibal, Minister of Science and Technology released the first set of OSM maps in India in print and digital format at MapIndia conference, New Delhi last month. This is according to the National Map Policy that envisages Open Series of Maps for civilain uses.

Multilingual Interactive Digital Map

During its annual research symposium, TechVista 2006, Microsoft Research India demonstrated the first prototype of a multilingual interactive digital map of India. Kapil Sibal, Honorable Minister of Science and Technology of India, unveiled the research prototype. Microsoft Research India and the Department of Science and Technology began collaboration on this research project in 2005.

Microsoft collaborated with the Survey of India, part of the Department of Science and Technology, on development of this first-of-its-kind prototype, which also includes an online map of Bangalore in several Indian languages. A special feature enables users to add information relevant to their own communities tagged to specific locations on the map. This is the first public demonstration of an ongoing Microsoft Research India project that explores innovative ways to create and disseminate geo-spatial data.

The research prototype enables the addition of information such as the location of polling booths and other data that empowers citizens to create and maintain maps that are uniquely relevant to their communities. Microsoft Research India and the Department of Science and Technology plan to leverage experiences from this prototype to develop effective countrywide mechanisms for spatial data creation, collection and dissemination that can be useful in a number of ways, such as for disaster management. More information about this project can be found on Microsoft Research India's Web site at *http://research.microsoft.com/india*.

NSDI for Bharat Nirman

NSDI-V workshop, 18 - 20 December, 2005 at Ramoji Film City, Hyderabad, India

The National Spatial Data Infrastructure (NSDI-V) workshop "National Spatial Data Infrastructure for Bharat Nirman" was organized by National Informatics Centre (NIC) from 18th to 20th December, 2005 at Ramoji Film City, Hyderabad. The workshop was inaugurated by Shri Rajeev Ratna Shah, Member Secretary, Planning Commission and the concluding session was chaired by Shri V Sampat, Addl Secretary, Ministry of Urban Development. The workshop mainly stressed upon the policy and technical issues related to spatial data, standards and quality control to ensure interoperability across various sectors of planning. A number of Heads of Organization including Surveyor General of India, Director Forest Survey of India, Director General of National Informatics Centre and Members of Central Water Commission attended the workshop. Coordinates was the media partner of this conference. On the occassion, the NSDI special issue was released by Mr Rajeev Ratna Shah.

The workshop discussed various issues in various technical sessions:

i. Review of NSDI activities;
ii. NSDI for Urban Renewal Mission;
iii. NSDI for Bharat Nirman
iv. NSDI contents and standards
v. NSDI interoperability and OGC

The need for operationalising NSDI expeditiously has been voiced by all members. At the end of the workshop, on 20th December, 2005, all the delegates deliberated and decided to adopt the Hyderabad Communique as given hereunder :

1. NSDI-V reiterates the Lucknow resolution of quickly operationalising the NSDI through government resolutions;
2. Urges the SOI for the quick release of implementation guidelines for the National Map Policy which has already been approved by the Cabinet;
3. Further, urges Survey of India, the nodal agency for the Map Policy, to bring out technical procedures and mechanisms for the Foundation dataset and National Spatial Framework;
4. Recommends a national endeavour to generate and position a new series of 1:10,000 scale maps for the entire country - which is critical for locale specific planning and developmental activities and which will benefit at all levels from the village/ community to national level;
5. Position policies and structures for NSDI to evolve a systematic public-private partnership. The possibility of NSDI as autonomous independent agency from the government stake holder agencies which can independently evolve a business model for NSDI needs to be explored;
6. NSDI should demonstrate and show-case from conceptual level to all users and data providers by operationalizing the electronic clearing house developed with Canadian collaboration. NSDI data agencies are urged to populate sample data sets for the clearing house;.
7. Urges all agencies to quickly populate the metadata as per the established standard and operationalize it through NSDI clearing house within the next six months;
8. Develop fast track templates/ procedures for outsourcing of tasks to private industry and to provide various solutions and services;
9. Endeavour to integrate and modify the existing policies for ground survey data, aerial surveys data, satellite data, topographic/thematic/ census/cadastral maps and GIS database into a comprehensive and holistic National Spatial Information Policy which will provide a over-arching framework for generation, archiving, utilization and dissemination of all forms of spatial data in the country;
10. Recognize that the datasets generated in the private sector have got potential for many applications and thus be made part of NSDI metadata. The private industry should quickly come forward to populate the metadata as per the standard of NSDI which will reduce duplication of efforts;
11. Urges the NSDI Task Force to continue the standard definition process for NSDI and further define Standards for Content, Design, Spatial Framework, Quality, Exchange and Services etc for NSDI. Noting the importance and critical need for land records maps, the Task Force could also undertake defining standards for cadastral map and LIS. Further, the Task Force is also urged to prepare documents related to terminologies and toponymy for the NSDI. All these efforts would bring about a common understanding and further the goals of NSDI;
12. Continue the leadership in various international organizations such as the GSDI and PCGIAP;
13. Initiate action for a standardized capacity building endeavour so that the required number of professionals are available for furthering the NSDI goals;
14. Constitute a sub group under the Task Force to study/ assess the legal/policy issues of spatial data, in the context of NSDI, and come out with a comprehensive document detailing the legal, policy and IPR guidelines related to NSDI;
15. The NSDI Task Force is charged to initiate actions on the above and coordinate the progress, review and completion of the actions;

This Hyderabad Communiqué for NSDI is adopted by 120 delegates from 35 departments/agencies on 20th day of December 2005.

"Canada partners India to unleash the power of GIS"

Says Dr Irwin Itzkovitch, Assistant Deputy Minister, Earth Sciences Sector, Natural Resources Canada while discussing various aspects of Indo-Canada relationship in the field of Geomatics

What is the role of Natural Resources Canada?

Natural Resources Canada (NRCan) helps shape the important contribution of Canada's natural resources sector to our economy, society and environment. The segments on which NRCan focuses are forestry, energy, minerals and metals, and Earth sciences, including geomatics, geoscience and related industries. Canada's natural resources industries are high-tech, innovative and growing. They are global leaders in productivity and have developed innovative technologies and world-class niches in all aspects of natural resources. Although it is the provinces of Canada that own the natural resources within their borders, NRCan plays a role in areas of federal jurisdiction including fiscal policy, international trade and science and technology.

Canada is a leader in Earth Science. Comments?

We are known as a leader in Earth Sciences because of the way we manage land and natural resources and for applications of science and technology. We endeavor to ensure a better quality of life both at home and abroad and hence would like to share our experiences with other countries. We are working in partnerships with other countries for mutual benefits and growth.

Tell us about GeoConnection.

GeoConnections was established as a national partnership in 1999 involving the federal and provincial governments. The program provided $CAD60 million in federal funding towards cost-shared partnerships with governments, non-government organizations, universities and, in particular, the private sector. These partnerships developed our country's spatial data infrastructure as a collaborative endeavour - focusing on technological innovation, framework content development and the implementation of standards and policies that promote exchange of spatial information. The federal investment leveraged a total of $150 million in activity by 2005 and resulted in the backbone infrastructure that now supports a wide array of applications.

Where does India stand in your international partnership strategy?

India has been one of the first countries with which we began cultivating a partnership to share our knowledge of spatial data infrastructure. It was nearly four years ago that our Minister came to India to establish and strengthen the relationship. Since then we have come a long way. There have been several visits from our departments and there have been many discussions on the capabilities and potential of working with private sector of both countries.

We also have been involved in helping develop India's approach in building its National Spatial Data Infrastructure (NSDI). The process started in the NSDI Agra workshop, held in November 2003. Since then, the federal government, along with Canadian companies, have been working very closely with the Government of India on this issue.

In addition, we have jointly launched a study to develop an integrated disaster management system for India, again with the involvement of the private sector.

In which direction is the Indo-Canada relationship moving?

Geomatics and geospatial information are essential for development and we are collaborating on several projects and initiatives to share our experiences in this field. Let me give you some examples.

In addition to NSDI that I discussed earlier, we have recently entered into an agreement with the Punjab Government to develop its agriculture geospatial information and dissemination system. We are also discussing with the Government of Andhra Pradesh a similar project but focused more on drought conditions.

In the area of public health, we are working with the Geological Survey of India (GSI) of the Ministry of Mines in developing strategies for mitigating the health hazards posed by arsenic in drinking water. Another initiative that we have with the GSI is the development of a landslide hazard warning system for India.

What is Canada's approach and experience towards NSDI?

Canada's approach recognized the political reality of our country where the provinces and local governments hold considerable control over natural resources, public safety issues, health care delivery and decisions concerning them. As a result, much of the spatial information developed to support these decisions can be found throughout those jurisdictions. The Canadian approach - a decentralized, standards-based infrastructure that promotes the sharing of data from the closest point to source - is a direct reflection of our political situation. I believe this approach works well for any country with a decentralized administrative structure.

How do you see the developments related to NSDI in India?

India and Canada face similar data fragmentation challenges as a result of similar parliamentary systems and the division of decision-making authorities between levels of government. As a result, the approaches and expertise that our countries develop are comparable. I believe that our Indian partners can learn form our successes but also from the challenges that we have faced during the last 5 years. In that sense, I believe that we have what is needed to further our partnership and share expertise and lessons learned.

What is your opinion on data sharing vis-a-vis security concerns?

I believe that data security must be taken seriously and that spatial data infrastructures must be developed to accommodate the sharing of sensitive information but that security is not a reason in and of itself not to share valuable information. In fact, the 9/11 Task Force and others have pointed to the lack of sharing of critical information as a key impediment to meeting public safety/security goals.

As long as the concerns are fully identified, the proper network security and data encryption methods can be put in place to ensure that sensitive data is only used by authorized officials. The key is not to use security as a reason to hoard data but to embrace its challenge, fully realize the implications and address it through proper measures.

Is there anything you would like to share with our readers?

I am very pleased with the growing relationship and feel that there are many more opportunities that can be developed. There is tremendous knowledge available in this country and we can help by sharing our experience and expertise.

I also believe that this is an exciting time for India, with the development of its spatial data infrastructure and the new map policy released in May of last year, which provides improved access to geospatial information. I am pleased that Canada is partnering with India on this important journey to unleash the powers of GIS.

The key is not to use security as a reason to hoard data but to embrace its challenge and address it through proper measures

Dr Irwin Itzkovitch was appointed Assistant Deputy Minister, Earth Sciences Sector, Natural Resources Canada, on December 4, 2000. He has a distinguished record of accomplishments in both the private sector and the public sector. His work in the private sector includes serving as Noranda Inc.'s Senior Vice-President, Shared Business Services and Chief Technical Officer. His fields of expertise include the management of innovation for profit, strategic planning and policy development, marketing, corporate acquisitions, and new business development. Dr Itzkovitch also served as NRCan's Director General, Mineral Technology Branch. In that capacity, his leadership, insight and energy were vital forces in leading mining, minerals and metals technological development and transfer to the private sector. While in the private sector, Dr Itzkovitch served on two influential government S&T advisory boards. He has also served on, and presided over, numerous professional institutes and societies. Dr Itzkovitch holds a PhD in chemistry from Queen's University and also attended the Executive Management Program of the University of Western Ontario Business School.

Good Coordinates

The most important ingredient for "Preparedness"

MUNEENDRA KUMAR, PH.D.

Unless we are "fully" prepared, we cannot have good and timely response. And, to be fully prepared with good coordinates is in the hands of geodesists, surveyors, map or chart makers, and all others, who generate data. In turn, correct and accurate "Good Coordinates" and quick and timely advice will strengthen the hands of the country's leaders, civil and/or military. If anything is lacking in good coordinates, "We" would be failing with no room for any excuse(s).

In case of natural disasters, viz., earthquake, tsunami, and hurricanes or typhoons or cyclones, we may still be in need of more research to provide "Best Coordinates", but that should not be taken as an excuse for lack of preparedness. The "present" good coordinates (which we already have) are still better than no coordinates and thus to be caught unprepared.

In case of Geo-Spatial Information (GSI), we have no excuse for no-preparedness. Here, we have all the researches, techniques, and technologies to be ready and fully prepared. We have the necessary capabilities to produce correct and accurate geodetic positions, maps, and charts. But, if we search why we are not getting optimum benefits from the "Good Coordinates", which are already there or can be easily generated, we will find ourselves denying them. Here are a few reasons, which impact adversely on our preparedness and thereof on our response(s):

1. Taking no advantage from or ignoring the new research,
2. Holding on to old, outdated, and obsolete algorithms and products,
3. Not correcting and improving geodetic definitions of critically important products, even when pointed, clarified, and duly explained,
4. Not taking immediate action(s) to correct the LARGE mistakes and/or blunders,
5. Allowing tampering of database by unauthorized persons, where nobody knows who did that and when was it done,
6. Continuing to use "bad" and/or outdated software,
7. Getting software written or existing ones, which require "special" knowledge or expertise, updated by "outsiders" who do not even have basic understanding,
8. Designing and/or managing special scientific projects by those, who believe in the old routines and follow them with no innovation,
9. Assigning highly scientific projects to those who do not have the necessary and sufficient theoretical knowledge (Note: They also do not make any effort to "consult").

Now, I will list a few specific examples, which show how we are "hurting" our "Good Coordinates":

1. Aeronautical charts produced lacking the datum and ellipsoid information and have TWO grids in one color. Surprisingly, one or both the grids might be wrong. These non-usable charts, without being corrected, are openly available for use.
2. A blunder of 1 km, even when correction had been generated, was still there in the main database after 2 years.
3. In 1982, during the development of a 2 million dollar instrument, which required a gravitation model, the formula used was taken from a book entitled "Electricity and Magnetism", 1919.
4. There are no nuclear physics or cardiology book(s) for a common person. But, there is one entitled "Geodesy for Laymen".
5. In a hardbound "prestigious" volume, the geoid is defined as a "surface on which the gravity is constant".
6. To enter government jobs, a candidate, who has not studied even one course of geodesy, can get hired as a GEODESIST, keep getting promoted, and then start making decisions on highly complex geodetic issue(s).
7. It is then not surprising that one can find: (1) standard deviation computed with "n = 1", (2) "re-observation" made 3-5 meters from an already surveyed station, and (3) ZEROS added or deleted "freely" from constants or computed results, and surveyed positions.
8. Users are provided and/or algorithms are developed with zero longitude and "eastings and northings" coordinates at the Poles.
9. During 1992, in an international marine symposium, an Indonesian author stated in the morning session that his country has 13,000 islands. Later in the afternoon, another one raised the number by 35% to 17,000. There were a few lively questions and remarks, but it seems that such a critical issue, which can extend or decrease a country's boundary, is still not "defined".
10. In case of New Orleans, there was a mix up in supply of leveling data for construction of levees for flood control.

Here, a cautionary note is that the problems are deeply embedded in our products and production procedures. Strangely enough, there is also very stiff resistance to accept that the old procedures and specifications have outlived their time and then agree for change and improvement. Entering the 21st century, "patch up" updates, revisions, and/or routine solutions will only postpone our having the correct and accurate "Good Coordinates". The only "remedy" is complete and thorough update(s) using latest research, techniques, and technologies. Let us remember that for smart defense, we need today's "Smart Coordinates", which cannot be generated from old and outdated GSI.

During my entire professional life as surveyor, mapmaker, and geodesists in the pursuit of providing good coordinates, I have witnessed the above reasons and examples, which are prevalent in almost all the countries around the world. If we keep using "Outdated Coordinates", how can we be prepared to provide a good response, as and when need arises.

We need "Good Coordinates" to be ready and prepared for a good and timely response. There is no shortcut to this!

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"Security concerns about maps"

I agree with Lt Gen Ranjit Singh that "Security concerns about maps are at times overplayed" in India (Coordinates, Vol II, Issue 1 January 2006) and commend him for his candid position. But, I may add that in India this concern is put forward all the time. With experience of working with 100+ countries around the world, I never witnessed anything like India. And, taking the recent city map of Delhi as an example, which shows airport area(s) blank, I wonder what is being protected in the days of high- resolution imagery and GPS positioning. I have seen a GPS surveying report of an airport in India with station coordinates printed in arc seconds up to three decimal places. But, the degrees and minutes omitted. If this policy is for security, it would take only a few seconds with a handheld GPS receiver to get the "omitted" information.

About 20 years back, one of my ex-SOI colleagues, who was visiting USA, told me that he would like buy a 1: 24,000 map for taking to India. I said that you do not have to buy and I can provide you as many as you want as they are openly available. These days, one can download them from the website.

In the same context, I have been informed many times that India wants to retain the old 19th century Indian Datum, with obsolete definition and very poor accuracy, for security. It is surprising how SOI is overplaying the security concern and thus, trying to hide behind a "porous" geodetic legacy. This datum would only jeopardize the national interest and 21st century "Good Coordinates".

—Muneendra Kumar, Ph.D.

"The consumer market will drive the adoption of the technology"

Says Clement Woon, President of Geosystems Division, Leica while explaining the technological trends in GPS applications

What is the situation at Leica Geosystems Division?

Hexagon AB, a Swedish publicly listed company, acquired Leica Geosystems AG in October 2005. Since then we have been organized into three divisions; namely the Geosystems Division, the Measuring Tools Division and the Geospatial Imaging Division. We are now part of a larger global group focusing on measurement technologies. Hexagon's measurement technologies group aims to be the world leader in all its business segments. Leica Geosystems will keep its strong brand image and its culture within the multi-brand framework of Hexagon's measurement technologies group.

What is the focus of Geosystems Division?

As the name implies, we aim to be the leading provider of solutions that enable our customers to improve their productivity in an increasingly competitive environment, by capturing, analysing and presenting information for a wide range of application areas. This translates as state of the art integrated terrestrial and airborne solutions for our customers.

What are the key areas where your division offers solutions?

The Geosystems Division focuses on three core areas. Our Surveying & GIS area provides solutions to the surveying, cadastral, civil & structural engineering, spatial informatics and asset management application areas. This area comprises the largest of the Division's business areas.

Secondly, the Infrastructure & Engineering area serves the requirements of larger infrastructure projects, which have to be integrated as end-to-end solutions. Many of these projects will involve significant developmental work with customers to ensure system reliability and interoperability. This business area includes monitoring and deformation analysis of buildings and dams, construction solutions, mining and exploration solutions.

Two examples of this are the monitoring of what will become the tallest building in the world, the Burj Dubai in the United Arab Emirates, and the signing of an agreement with the Dawson Mine in Australia to provide an integrated mining management system.

Our Imaging & Scanning area provides solutions to enable mass data capture. Airborne and terrestrial digital scanners represent a quantum leap in the ease of collecting and managing large datasets. We enable the migration from analogue to digital capture solutions thus facilitating a quantum leap in productivity, by improving processing workflow from capture to deliverables.

While launching a new product, what are the main factors you keep in mind?

The ability to spot and develop emerging technologies for our industry has been our heritage. Understanding better our market needs, having a close watch on how technology develops and working with customers in our development process, has brought this about. This interactive engagement with the supplier and user market has enabled us to be at the forefront of the industry.

Many of our customers share the same passion as us to continuously innovate to transform our industry. They trust us to stay committed to productive new technology and to ensure reliability, quality and precision in our solutions, so meeting end user's requirements. Once a Leica Geosystems' solution is in place it can be trusted to perform again and again to the highest standards, allowing our partners to concentrate on other aspects of their business.

How do you see the technological trends in GPS applications?

GPS, or rather GNSS technologies, will enable ubiquitous positioning. It will play a major role as position information becomes more and more important in our daily life. The discussion on Galileo has given rise to new interest in improving the GNSS infrastructure. We have seen efforts to improve the GPS constellation with L2C and L5 signals, the re-population

of the GLONASS constellation with improved satellites that will last longer, and of course the various efforts of Galileo in Europe to search for more applications in anticipation of the launch of the new constellation. In my opinion, the consumer market will drive the widespread adoption of this technology while our industry will drive the precision applications. GNSS technologies will and must become easier to use. The technology was already relevant for positioning to survey grade accuracy, machine automation, precise vehicle navigation and so on. We expect that the adoption rate of this technology in our industry will increase dramatically over the next few years.

What are your views on the developing world market? How it is different from the developed world?

Our solutions are required for development. For example, without a sound Cadastral system, we cannot assure the reliability of land titles. Without it countries will find it impossible to encourage sustainable investment towards the entrepreneurial use of land to maximize economic benefits. In developing countries, there is much to be done in infrastructure development to aid economic growth, thereby improving the well being of citizens. In the developed countries, the renewal of infrastructure to sustain living standards is driving the development of our industry. Obviously the level of sophistication in using these technologies is different in the developed and developing nations. We are committed to offer solutions that match the needs for each particular solution. We see this as our contribution towards the betterment of human kind.

How comfortable are the developing nations with technologies like GPS vis-à-vis the traditional methods of surveying?

Education is the key to adopt the new technologies. Users have to understand the GNSS systems and the specific aspects that have to be considered to get to survey grade accuracy. The tradition theodolite and chains, and more recently the totalstation resolving position via angles and electronic distance meters, are methods that are more or less entrenched in the curriculum of future surveyors. GNSS technologies have to become part of that curriculum in developing countries.

The faster the pace of economic development the faster will be the adoption as productivity improvement becomes necessary to optimise resource application. GNSS technology is a productivity enhancer compared to traditional methods. Of course there are situations where GNSS technologies will not replace traditional methods owing to the limitation of the GNSS methods.

Clement Woon started his career in 1984 as an engineer in the Ministry of Defence in Singapore. Between 1986 and 1992, he gained experience in quality and operations management in AT&T Consumer Products and Thoman Consumer Electronics. He joined Leica Instruments (Singapore) Pte Ltd in 1992 and served as Quality and Operations Manager before he was transferred to Leica Geosystems, Heerbrugg, in 1996, where he continued his career as Project Manager, Business Director and Business Area Manager. He was appointed to his current position in April 2001. Mr Woon holds a Graduate Degree in E/E Engineering (Hons), a Master of Science in Industrial Engineering from the National University of Singapore and a MBA from the Nanyang Technological University in Singapore, where he was awarded the National Science and Technology Board Gold Medal for academic performance.

Do you see any learning pattern from the developed world in developing world or there is a tendency to experiment and explore in local contexts?

There is a positive tendency to cooperate on a regional and international level with regard to positioning technologies. India's recent agreement to join in the Galileo programme together with a number of other non-European countries is a good example of this.

Whilst it is possible to develop excellent technology on a very local level, either through choice or circumstance, the huge resources needed today for international or global high technology product development tend to lead to a relatively small number of providers of positioning or measuring solutions. However, nations are interested in GNSS technologies for security or economic reasons. The returns on funding question will drive local ambition.

The cost of GPS is an issue in developing world. Please comment.

As resources are scarce, the return on an investment should be the main driver of adoption. Cost should be seen in comparison with return on investment. At Leica Geosystems we try to offer products at differing levels of complexity that will match the needs even of developing nations. We expect that the total costs of adoption will be much lower with our solutions. Considering the life cycle cost of a technology, the cost of product is perhaps the smallest part of the total costs. Our customers understand this very well.

How do you see Galileo? Will it manage to break the existing US monopoly?

The Galileo programme will broaden

the number of suppliers of GNSS from 2 to 3. However the Galileo approach has been different from its very inception. Whereas the US GPS system was originally intended as a military system and is still controlled by the US Department of Defense, Galileo was designed from the outset as a civilian programme. It has been able to leverage the experiences of the US GPS and the Russian GLONASS systems, both good and bad, to what will be a more open, integrated commercial positioning system.

The rationale behind Galileo was strategic, commercial and economic. Certainly reduced dependence on the US GPS system was a strategic goal but more importantly the European system allows greater commercialisation in terms of value adding activity and access to the massive hardware and technology possibilities, and savings in transport costs and other social benefits.

I do not believe in the concept of monopoly for GPS systems. Galileo will provide increasing reliability and availability for GNSS technologies.

You are with Leica for almost 15 years now. To what extent is Leica responsive to market needs and trends?

Leica Geosystems has an enviable record of 'first's' in our industry; first automated data logging electronic tacheometer (TC1), the first GPS system designed for surveyors (WM101), the first total station to combine automation and coaxial reflectorless measuring (TCRA1101) and most recently the first truly integrated combined GPS and TPS (Smartstation). The list goes on.

We like to think ourselves as the innovator of this industry. Other players observe us closely and try to catch up with our innovation. True innovation has to be differentiated from marketing initiatives. We are certainly proud of our achievements. The technology is only one aspect of our innovation; more importantly is the inclusion of the customer in our innovation process.

There is a perception that the focus of vendor is more on selling than educating the customer. Comment.

We are all responsible to develop the market. Educating the market to use our technologies is a key to adoption and acceptance. In my opinion, the industry tries its best to increase the adoption of new technologies. However, vendor companies have also a need to earn a "fair day's wage" for their efforts. Therefore both the customer and the vendor must believe in a relationship that is mutually beneficial.

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Driver assistance and awareness applications

This paper introduces the use of the map database as a sensor in driver assistance and awareness applications

FAROOG IBRAHIM

Driver Assistance and awareness applications such as Adaptive Cruise Control (ACC) and Forward Collision warning need to identify the primary target in the host vehicle lane, which requires accurate estimation of the geometry of the road between the host and the target vehicle. Curve Speed Warning (CSW) also requires determining the geometry of the intended driving path to warn the driver of going too fast for an upcoming curve. Predictive adaptive front lighting can use the predicted road geometry to swivel the headlamps in the road curvature direction. Route guidance can use the MLP data to warn the driver of a potential mistake in following the calculated route. Map matching can use this data to improve its performance at ambiguous branching areas where the map matching position confidence is low. The MLP is primarily determined by fusing vehicle signal data, lane marking information, and map database attributes. Real road results show an impressive benefit and performance from this approach.

Path prediction

The most likely path determination is achieved by designing a Look Ahead Module (LAM) that looks forward from the vehicle position to the look-ahead distance. The LAM determines the most probable path of the vehicle using information from vehicle positioning, lane information, lateral velocity, and vehicle signals and state. The most probable path and other possible alternate paths can be predicted using the vehicle's travel direction, the direction of the road, the vehicle lane, and the predicted directional change. This information is evaluated using a Cost Function to weight each parameter with respect to the influence that the parameter will have toward predicting the vehicle's most probable path.

The LAM also uses the look-ahead distance to assemble a candidate path subset that is projected out to a selected distance from the vehicle's current position. If only one possible candidate path exists, it will be returned with 100% confidence. Otherwise, a list of all possible candidate paths (and their associated confidence levels) within the look-ahead distance will be calculated. The most probable path, i.e. the candidate path with the highest confidence level, is passed to the application (for example: CSW algorithm).

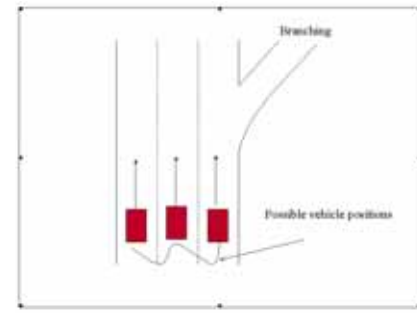

Figure 1: Road Branching Scenario

The MLP can be calculated using the map database information such as the shape point coordinates and the advisory speed or speed limit Map attributes, the lane boundary types from a vision system if available, and the yaw rate, vehicle speed, throttle, brake, turn signal from vehicle sensors.

Example: Road branching scenario

In the road scenario shown in Fig.1, if the driver initiates a right turn signal

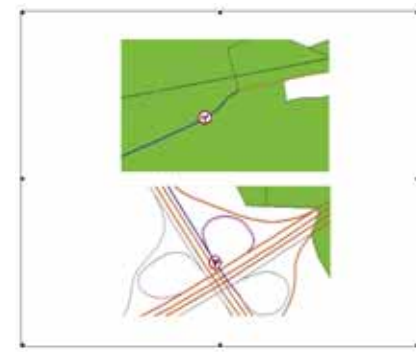

Figure 2: Upper: single road geometry, Lower: Branching road Geometry

before branching then this represents an indication that the driver intends to branch right, or to perform a lane change. If the boundary type of the driving lane indicates that the vehicle is not in the middle or left lane, then it is more probable that the driver will take the upcoming right branch. The probability of taking the branch is a function of the vehicle location from the branching point.

Driver assistance and awareness (DAA) applications

Visteon has used the GPS and map database as sensors. In the USDOT-funded Road Departure Crash Warning – Field Operational Test [1], Visteon developed Curve Speed Warning (CSW) functionality using a commercial navigation system and map database. The CSW system warns the driver when the vehicle is

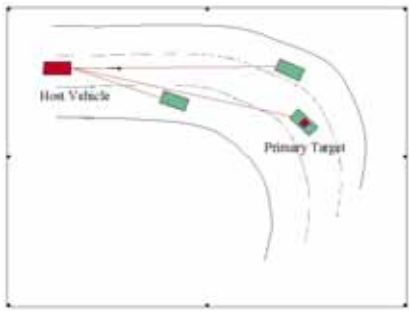

Figure 3: Primary Target Identification

traveling too fast for an upcoming curve by processing the map database geometry and attribute information. CSW uses the navigation system to

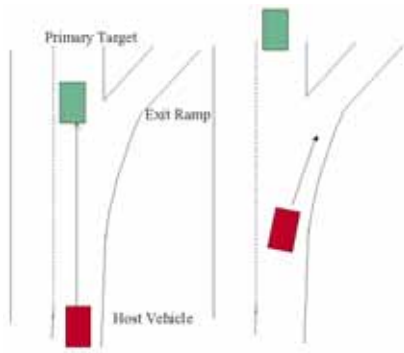

Figure 4: Using the ramp map database attribute for the ACC system

Figure 5: The headlamps beam swivels to the right to light the upcoming road.

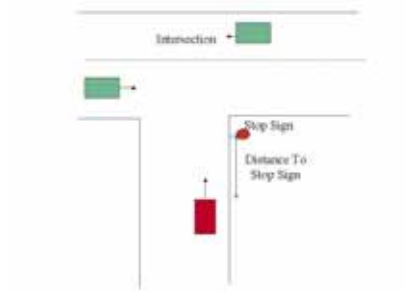

Figure 6: Stop Sign system Illustration

place the vehicle position on the map, and then, the CSW algorithm looks ahead on the map, extracts all possible driving path candidates, determines the intended driving path, performs a curvature calculation on the geometric data of this path, and finally performs a threat assessment based on the vehicle speed and road curvature ahead. Figure 2 shows both single road and branching road geometries.

Adaptive cruise control and forward collision warning systems can use the MLP calculation to determine the in lane primary target. The functionality of ACC and FCW depends solely

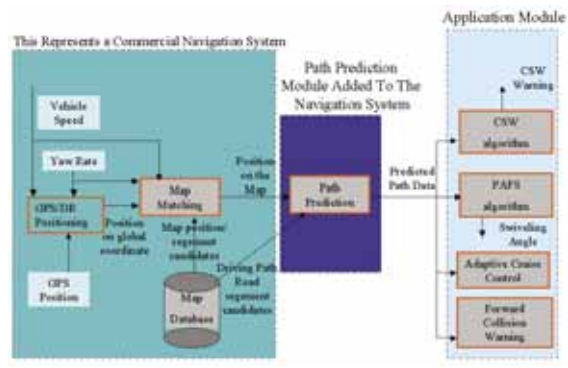

Figure 7: DAA Applications Using the Map database data

on determining the primary target in the host vehicle lane (Fig. 3). This requires accurate estimation of the road geometry between the host and the target vehicle. The host vehicle controls its speed based on the range and range rate measurements of this target. If the target becomes out of the host vehicle path, the ACC system resumes to regular speed control (cruise control). An undesired "resume" could happen in an exit ramp scenario (Fig. 4) where the host vehicle starts to accelerate to the set speed toward a low speed ramp. Such undesired ACC performance could be prevented by provided the ramp information from the map database ramp attribute.

Visteon's Predictive Adaptive Front Lighting System (PAFS) uses the MLP calculation and processing to swivel the headlamps based on the upcoming MLP calculated curvature as shown in Fig 5. Swiveling the headlamps beam toward the upcoming road increases the visibility in that road.

Another application that can use the map database information is stop sign warning (SSW). The SSW informs the driver for an upcoming stop sign at a designed "time to reach". The stop sign information is an attribute in the current commercial map database. Illustration of the system functionality is shown in Fig. 6.

Figure 7 illustrates the architecture of map database processing for the DAA applications. There are three main pieces in this architecture: first, a commercial navigation system module that provides the vehicle position on the map, second, the path prediction module that selects the MLP and performs a curvature calculation, and third the application module which uses the MLP information and other inputs

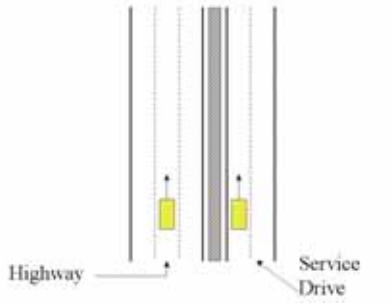

Figure 8: Highway/Service Drive Scenario

to perform its function.

Land vehicle navigation (LVN) applications

Route guidance is an essential feature in current land navigation systems. In this navigation feature, the driver feeds the navigation system with the desired trip destination. The route guidance algorithm calculates the route for the driver to follow. The driver may make mistakes in following the intended (calculated route), and the route guidance system will have to adjust its instruction to correct this mistake. This corrective instruction will result in the driver having to spend extra time and the vehicle to consume more fuel to perform this correction. In addition this instruction may confuse the driver and cause hazard situation. A predictability feature can be added to the route guidance algorithm if the instantaneous MLP (IMLP) is calculated using the MLP algorithm. If the IMLP doest not match the pre-calculated route, the route guidance system may advise the driver of potential mistake in following the pre-determined route.

Map matching can also use the MLP information in an ambiguous road geometry scenario where the combined GPS/Map accuracy is not adequate to place the vehicle on the right road with a high confidence. The MLP information provides the map matching algorithm with the expected position after the branching. This information can either increase the history weight (MLP matches the expectation that the vehicle will continue on the same road), or reduce the history weight (MLP indicates that the driver will take the branch).

The Service drive/Highway road scenario shown in Fig. 8 presents a difficult challenge for map matching due to the lack of map matching excitation. Both roads are parallel and close to each other. The heading angle/yaw rate information is not helpful, and the combined GPS/Map accuracy is not adequate to place the vehicle on the right road with a high confidence. A combination of the vehicle speed and the posted/advisory speed map database attribute can help in resolving such ambiguity.

Map database requirement as a sensor

Current commercial map databases are designed for navigation purposes. The accuracy of a commercial map is investigated in [2]. The accuracy of these maps is sufficient for the navigation application in a large variety of road scenarios. However, they sometime fail in road scenarios like service drive/highway, highway/exit ramp, fork, complex overpasses, and mountain area/single road. All of these scenarios could lead to placing the vehicle on the wrong road or off the road. The absolute and relative accuracies have been improved by the continuing replacement of the old map database shape points with ADAS quality shape points. However, the accuracy of the ADAS map is still inadequate in many of the branching scenarios and scenarios

Figure 9: Path Set Data Example

where the 3D information is required.

For the path prediction algorithm, placing the vehicle on the wrong road segment results in incorrect set of the road candidates, which leads to an incorrect MLP. In cases with correct vehicle position, the relative accuracy is the determining factor in path prediction. An accurate relative placement of the shape points along the MLP means an accurate curvature distribution along this path. The rules and method of creating the map database (ADAS or older) can lead to very low relative accuracy in some road scenarios. An example of this is the connectivity rule, which requires of adding extra shape points solely for connectivity purposes. These added shape points are not part of the road geometry and can lead to wrong curvature values along the path. Other rules like the merging rule in connecting divided roads to undivided roads or vice versa, or connecting an on ramp with a main road can also lead to wrong representations of the path geometry.

Considering the map as a sensor

Figure 10: CSW Example

requires, as with any other sensor, having its error sources defined and modeled. It is also required to have corrective/updating capability. Furthermore, information such as height and super elevation are required to extend the usage of the map for other automotive applications.

Sample navigation system interface/results

The sensing capability of the map provides detailed information of the instantaneous road segment and the road segments ahead. An example of that is shown in Fig. 9. In this figure a vehicle (red arrow inside the circle) is approaching an exit ramp branching. The blue road is path 1 which consists of two segments: the segment that the vehicle is currently on (segment before branching), and the straight (highway) segment after branching. The blue road segment followed by a magenta segment is path 2, which consists also of two segments: the segment that the vehicle is currently on (segment before branching), and the curved (ramp) segment after branching.

The path set in Fig. 9 is an example of how the navigation unit may output the map sensor data. The path data could be described by a number of curvature points along a look-ahead travel distance of the corresponding path. Each curvature point can be described by global latitude and longitude coordinates, vehicle centered true north/east coordinates, curvature value, confidence value, number of lanes, and travel distance from the vehicle location.

Figure 10 shows application specific path data. In this scenario, the path prediction algorithm senses that the driver is most probably taking the exit ramp to the right. The curvature data and other data of the MLP are sent to the CSW threat assessment algorithm, which may initiate a CSW warning at some distance before branching.

Conclusions

The Map database can provide detailed information about the road segment at the vehicle position and the road segments ahead of the vehicle. This information, when processed, can be used for driver assistance and awareness applications such as ACC, FCW, CSW, PAFS, and SSW. In order to optimally use the map database, its error sources should be defined and modeled. In addition, it requires map corrective/updating capability due to the changing nature of the roads. Furthermore, information such as height or elevation and super elevation are required to extend the usage of the map for other automotive applications. From a commercialization perspective, a standardized navigation system interface is recommended.

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Leica Geosystems launches Britain's RTK network

Great Britain will have the first commercially available broadcast RTK network, Leica SmartNet , 24 hours a day, 7 days a week. It is based on raw data from the Ordnance Survey network of GPS base stations. This network, known as OS Net, comprises around 90 permanent nationally deployed GPS reference stations, however OS Net is commercially available only via partners. This service is live since Jan'06 and is available as a broadcast correction service to subscribers via GSM or GPRS technology. *www.leica-geosystems.com*

NovAtel Inc. announces GPS+GLONASS Capability

NovAtel Inc announced that its new line of OEMV GPS receivers will also be capable of tracking satellites from the growing GLONASS constellation. Initial releases of the OEMV-2 and OEMV-3 models are expected to be available to customers by the end of March and will include dual-frequency GLONASS measurements as an option. Future releases will include full position and Real-time Kinematic (RTK) options as well as a GLONASS enabled, single-frequency OEMV-1 model. *www.novatel.com*

SiRF unveils first multifunction platform

SiRF Technology Holdings, introduced SiRFLink, its first multifunction architecture, and SiRFLinkI a corresponding product line that utilizes the synergies between GPS and Bluetooth for the benefit of key customer applications in a range of consumer platforms and accessories. In parallel SiRF also announced that it has acquired Impulsesoft, an innovator in Bluetooth stereo and embedded software solutions, whose expertise provides some of the key differentiation capabilities that enhance the user experience for products incorporating SiRFLink

Topcon introduces GPT-8203M total station

The GPT-8203M is a new addition to Topcon's 8200 series of long-range reflectorless total stations. This precision instrument is specially designed to expedite layout of formwork, structural components, anchor bolts, as well as all other construction elements that require accurate positioning.

Onboard software and a servo-drive work together to automate point stakeout. All its models feature advanced EDM, enabling reflectorless measurements up to 1,200 meters. With a standard prism, the measurement range is extended to 7,000 meters - almost 23,000 feet.

Trimble unveils its autopilot systems

Trimble introduced its new AgGPS® FieldManager™ display, a next-generation user interface for the AgGPS Autopilot™ systems providing automated steering and other precision agricultural functions. "The FieldManager display offers virtually every feature an automated guidance user-from entry level to the technically advanced-could want," said Erik Arvesen, general manager of Trimble's Agricultural Division. "The display is intuitive and easy-to-use; no operator manual is needed." *www.trimble.com*

NZAM Ltd purchases ALTM 3100EA

Optech Incorporated, has announced the sale of its first ALTM 3100EA Airborne Laser Terrain Mapper to New Zealand Aerial Mapping (NZAM) Limited, oldest operating aerial survey company in the world.

The ALTM configuration selected by NZAM is the most advanced and comprehensive system delivered to date. *www.optech.ca*

Contex unveils new family of 3D Printers

Contex unveiled its first line of 3D printers, enabling organizations to quickly and affordably create physical 3D models in office environments. Just as conventional desktop printers emit hard copies of documents, 3D Printers build physical models of real-world objects, such as engine parts, buildings, and landscapes. Engineers use these physical representations of electronic design concepts to communicate more effectively with customers, partners, and suppliers. 3D printing is widely used in engineering markets including computer-aided design (CAD); GIS and architecture, engineering and construction (AEC). *www.contex.com*

Garmin's iQue 3000: GPS Power in the Palm of Your Hand

Garmin International Inc., a unit of Garmin Ltdintroduced the iQue 3000, a newly-styled, entry-level Palm Powered personal digital assistant (PDA) that offers fully integrated GPS technology. The iQue 3000 expands Garmin's iQue Palm OS PDA product line, which currently includes the iQue 3200 and iQue 3600. The iQue 3000 welcomes users with Garmin's easy-to-use "where to" or "view maps" interface. *www.directionsmag.com*

MapKing Malaysia Peninsular Launched

MapAsia.com launched "MapKing3D GPS Navigation" in Kuala Lumpur, Malaysia. "MapKing3D GPS Navigation" is the flagship consumer line product of MapAsia.com. "Intelligent Traffic Infrastructure provides up-to-date, higher efficiency and safe traffic services in some modern countries and GPS Navigation is an important component in the infrastructure. In Malaysia, for providing joyful driving experiences, or at least alleviating the hardship in finding destinations, driving at night, recording your driving track or Point of Interests, MapKing GPS Navigation will bring a new era of driving experience to millions of drivers, Pocket PC users and field workers." Stanley Ng, CEO, MapKing said. *www.directionsmag.com*

Business

TatukGIS DK used for homeland security

The TatukGIS Developer Kernel (DK) product has been used by the Israeli company IDAN Computers Ltd for the GIS and graphics rendering functionality in its popular IMPS Mission Planning System and Oblivision image handling and analysis technology. These products are used for mission planning and situational awareness management by military, homeland security, law-enforcement, emergency rescue, fire response, municipal *http://locationintelligence.net*

Microsoft Corporation acquires GeoTango

MSN has announced that it has acquired Toronto-based GeoTango International Corp. The acquisition furthers MSN's rapid push into creating an immersive mapping and local search framework that enables users to easily find, explore, discover and share information and content for anywhere on earth. *www.directionsmag.com*

ESRI forms strategy with Beijing Capital Company, Ltd.

ESRI announced that it has signed an agreement with Beijing Capital Company, Ltd., to form a strategic relationship to implement ESRI's ArcGIS enterprise software solution for water development projects in China. Beijing Capital Company, Ltd., is a listed company in China, and its primary business is the investment and management of public infrastructure. The company's focus on the Chinese water market includes the urban water supply and wastewater treatment sectors. *www.esri.com*

ORBIMAGE completes acquisition of Space Imaging

ORBIMAGE Holdings Inc has finalized the acquisition of substantially all of Denver-based Space Imaging's assets. The combined company will now do business under the brand name GeoEye. GeoEye is the world's largest commercial satellite imagery company with a pro forma combined revenue for 2005 of approximately $160 million. The purchase price was approximately $58.5 million less amounts which were paid by Space Imaging on its existing debt as well as certain other adjustments. *http://spatialnews.geocomm.com*

CSI's Hemisphere GPS acquires aerial guidance competitor

CSI Wireless Inc announced that its Hemisphere GPS division is acquiring Del Norte Technology Inc. of Euless, Texas, for US$940,000. The transaction is effective January 1, 2006, and is expected to close prior to January 31, 2006. Hemisphere GPS will purchase the Del Norte business and assets including working capital of approximately US$250,000 -- for US$940,000 in cash. Canada NewsWire

Autodesk to promote Carl Bass to President and CEO

Autodesk, Inc. (Nasdaq: ADSK) announced that Carl Bass, the company's chief perating officer, has been named president and chief executive officer, effective May 1, 2006. Bass also has been appointed to the company's expanded Board of Directors, effective immediately. Carol Bartz, who has served as CEO since April 1992, will become the company's first Executive Chairman of the Board. *http://usa.autodesk.com*

Lockheed Martin GPS updates enhance system accuracy

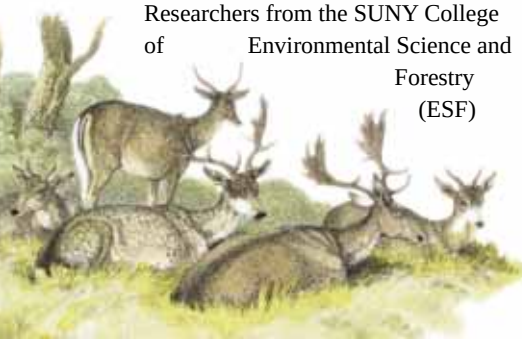
Lockheed Martin has upgraded the software processing and modeling for the Air Force's Global Positioning System (GPS), enhancing the Air Force's ability to monitor GPS satellites and improve system accuracy 10-15 percent for users worldwide. The recently completed update, named the Legacy Accuracy Improvement Initiative (L-AII), doubles the amount of navigation data collected and provided to Air Force operators.

Proposed rules for livestock, growers

The U.S. Department of Agriculture plans to make every owner of even one horse, cow, pig, goat, sheep, chicken or pigeon register in a government database and subject their property and animals to constant federal and state government surveillance. Under the present USDA plan, as of Jan. 1, 2008: Every homeowner with any animals must obtain a seven-digit USDA ID number keyed to GPS satellite surveillance coordinates, with all the property and owner's information permanently stored in a USDA database. *www.lacrossetribune.com*

Tracking deer around the clock for one year

Scores of deer in Central New York will be tracked by satellite around the clock for a year in an effort to discover more about their habits and, in turn, learn more about the potential spread of chronic wasting disease, a highly contagious and unavoidably fatal neurological disorder. Researchers from the SUNY College of Environmental Science and Forestry (ESF) will fit the deer with collars that use a high-tech GPS to mark their locations every five hours for one year. *www.esf.edu*



Proficio Devices Software for BPO Security

The GIS-GPS-SMS solution PRO-TMS addresses the issue of security for the BPO employees in India and provides an end-to-end security for them. Addressing to the need of the BPO sector in India, Bangalore-based Proficio GeoTechnologies has come out with a software to tackle the problems related to security in transportation in the BPO companies. To do away with the long manhours required for transportation planning, Proficio has designed a complete management solution that integrates the functioning of Geographical Information System (GIS), Global Positioning System (GPS) and Short Messaging Service (SMS). *www.efytimes.com*

Local Hajis offer feedback on conduct of Pilgrimage

As the Haj came to a close, pilgrims returning here offered their opinions that provide insight into improvement that could be made to the conduct of the annual pilgrimage. Security has been a dominant concern during this year's Haj, with the Saudi authorities spending over SR25 million on security. The arrangements went high-tech this year when they signed up a Saudi company for fitting their vehicles with GPS capability to expedite emergency response. *www.arabnews.com*

Russia accomplished 45 per cent of world space shots

In 2005 Russia launched more spacecrafts than the US and Europe together. The Russian federation accomplished 45 per cent of the world space shots. According to Roskosmos data, in 2005 Russia launched 24 rocket vehicles. It set off 20 space vehicles, while the US and Europe launched 12 and 5 accordingly. New domestic satellite system GLONASS will be worked out in 2006. *www.inform.kz*

To curb sex crimes, consider GPS on offenders

The cruel slayings of elementary school girls in Hiroshima and Tochigi Prefecture last year brought home the need to establish stronger measures to prevent sex crime offenders from becoming repeat offenders. In November, France enacted a recidivism law that requires violent and other serious sex crime offenders to wear bracelets equipped with a GPS. Recidivism not only gives rise to new victims but also delays the rehabilitation of sex crime offenders. In order to prevent offenders from repeating their crimes, Japan will also introduce the GPS to track these criminals. *www.asahi.com*

USGS announces that Augustine Volcano in Alaska has erupted

The U.S. Geological Survey (USGS) is currently monitoring the eruption of Augustine Volcano in Alaska that began with two explosions at the summit of the volcano. The alert level is classified at red, the highest level of concern. The volcano is located in Cook Inlet, about 180 miles southwest of Anchorage. USGS detected a small uplift of the volcano using GPS instruments permanently installed on the mountain. *www.webwire.com*

Fishing boats to go high-tech with GPS

THIS monsoon, Bengal's fishermen will be sailing to the Bay of Bengal with a new gadget in their otherwise modest boats. The GPS devices, will be included under a collaboration between the State Government and the UNICEF under the knowledge-exchange programme of Community-Based Disaster Preparedness (CBDP). The fishermen are being trained to use the device in the Sunderbans *http://cities.expressindia.com*

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GLONASS 14

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Digital Thailand to launch mapping service

A system has been developed to conduct satellite mapping specifically for Thailand. Starting in February, Digital Thailand plans to begin distributing satellite maps on compact discs to interested public and students. Digital Thailand's online map service, also being launched in February, also will be made available to the public.

The map distribution project resulted from collaboration between Chulalongkorn University and the Office of Space Technology Development and Geographical Information Technology, which supplied the digital maps. The Digital Thailand mapping is similar to Google Earth, except that the maps are more customized to meet the needs of local consumers. *http://news.monstersandcritics.com*

Disaster risk profile for Maldives

UNDP and RMSI initiated a study to address the high level of disaster vulnerability of the Maldives. Using GIS and Remote Sensing, RMSI's team of risk modeling experts developed catastrophe risk models to assess various hazards in terms of their probable maximum impact using scientific principles, probabilistic methods, and global best practices. Furthermore, RMSI also developed a GIS base map of Maldives, which is the first in the country. *www.rmsi.com*

The Sustainable Land Management Project in Bhutan

The World Bank's Board of Directors approved a US$7.6 million grant from the Global Environment Facility (GEF) to strengthen institutional and community capacity for anticipating and managing land degradation in Bhutan. The project will provide approaches, tools, and interventions to reverse damage to land due to weak policies, overgrazing, forest degradation, and unsustainable agricultural practices of the past. The effort will also help support decentralized decision making on land management issues and help broaden the sources of livelihood and well being of selected local communities in Bhutan. *http://web.worldbank.org*

China Geospatial Information Fundamental Framework

China has achieved an important breakthrough in building Digital China Geospatial Information Fundamental Framework, as the building of the geographic information system of "four databases and one archive" has taken an initial shape. This was learned from the State Bureau of Surveying and Mapping of China in Beijing, reports the overseas edition of People's Daily recently. Source: By People's Daily Online

LeadDog releases GIS street maps for 10 Moroccan cities

LeadDog Consulting, announced the release of geographic databases of city streets for the Moroccan cities: Agadir, Casablanca.Fes, Marrakech, Meknes, Mohammadia, Oudja, Rabat, Tanger and Taza to support asset-tracking, government, and commercial GIS applications.Designed to help companies track their assets and provide accurate base level mapping. Morocco City Streets are available in all major GIS formats.A Morocco Major Roads product is available at a 1:250,000 scale. LeadDog Consulting, LLC is a leading global provider of GIS street maps for Iraq, Middle East, Mexico, Latin America, and Africa. *http://www.directionsmag.com*

Carbon Project Joins ESRI's Business Partner Program

The Carbon Project, the world leader in Open-Geospatial .NET technology, announces that it has joined ESRI's Business Partner Program. The Carbon Project will develop interoperability extensions for ESRI's ArcGIS software to support the rapidly expanding GeoWeb of open-geospatial services that describe our planet. The Carbon Project has developed an interoperability extension platform for ESRI's ArcGIS, CarbonArc, to enable seamless access and use of Open Geospatial Consortium, Inc. (OGC) services in ArcGIS. *http://locationintelligence.net*

IOC starts GIS mapping of its pipelines in Bengal and Orissa

Indian Oil Corporation has started GIS mapping of its pipelines in Bengal and Orissa so that a site could be easily detected in case of accident or terrorist attacks. Indian Oil officials told UNI today that the new satellite-based GIS (Geographical Information System) technology would enable the company to get a picture of the whole area through which the pipelines passes. *http://news.webindia123.com/*

BMC to invest Rs 100 crore on e-governance next fiscal

The BrihanMumbai Municipal Corporation (BMC) has stepped up efforts to go in for large scale e-governance with a total investment of Rs 100 crore during next fiscal. Under the plan, Geographical Information System, Global Positioning System, Voice Over Internet Protocol, web-enabled em-ail system, ERP solutions, Biometric Access Control System (BACS) will soon be a part of e-governance. *www.financialexpress.com*

TSP offers solution for Bangalore traffic turmoil

The US-based Technology Solution Provider is all set to help Bangalore improve the quality of infrastructure and transportation management. The company has set up a shop in Bangalore and has decided to help improve the quality of infrastructure and transportation management. TSP will be offering a range of software products which will aid in trip planning, travel tracker, electronic fare payment, automatic passenger counters, and customer assistance system besides tracking of vehicles. *www.efytimes.com*

250 village resources centres by March end

As many as 250 Village Resource Centres (VRCs), aimed at providing locale-specific information to rural population by effectively using satellite techonology, will be set up in the country by March end this year, Indian Space Research Organisation (ISRO) chairman G Madhavan Nair said. *www.newkerala.com*

Indian Remote Sensing Satellite, IRS-1C, completes ten years

The Indian Remote Sensing satellite, IRS-1C, launched on December 28, 1995, has completed ten years of operation. It carried a unique combination of three state-of-the-art cameras - a Panchromatic Camera with a spatial resolution of 5.8 metre, a Linear Imaging Self Scanner-3 with a resolution of 23 metre and a Wide Field Sensor with a resolution of 188 metre. When it was launched, IRS-1C was the most advanced civilian remote sensing satellite. This satellite was launched into a polar sun-synchronous orbit of 817 km by the Russian Molniya Launch Vehicle. *www.spaceref.com*

Thai firm to launch online satellite maps

A system similar to Google Earth has been developed to conduct satellite mapping for Thailand. Beginning next month, Digital Thailand would begin distributing satellite maps in the form of CDs on request, said Paisal Santithammanont, of Chulalongkorn University's Faculty of Engineering. The on-line version of the map would also be made available to the various organisations. Both services would be free of charge for maps taken of the general terrains, he said. *www.bangkokpost.com*

Japan's ALOS in orbit: ESA will deliver data to Europe

ALOS, Japan's latest Earth Observation satellite, was successfully launched at 02:33 CET (10:33 Japan time) on 24 January. Environmental data and imagery from ALOS will be provided to European and African users through a cooperative agreement between ESA and the Japan Aerospace Exploration Agency (JAXA).

The Advanced Land Observing Satellite (ALOS) is a four-tonne satellite dedicated to land-based Earth Observation. It was lifted-off from the Tanegashima Space Centre on an H-IIA launch vehicle, which will deliver ALOS into a 700-km polar orbit. *www.noticias.info*

Alcatel Alenia Space delivers data acquisition systems

Alcatel Alenia Space announced the delivery of Earth observation data acquisition systems to the China State Radio Monitoring Center (CSRMC), the national Chinese network of Earth observation stations. This equipment will be located in three satellite data reception stations operated by the CSRMC. *www.webwire.com*

Pilotless remote sensing aircraft developed in China

China's first 50kg-class pilotless remote sensing system TJ-1, an important fruit of the 863 Program, was successfully developed in Qingdao. The TJ-1 pilotless aircraft is 2.4 meters long and 0.9 meters high with wingspan of 4.2 meters. With ceiling of 3,000 meters and controlled radius of 100 km, the aircraft can fly at 100 km per hour for four hours continuously. *http://english.people.com.cn*

Satellite images reveal threats from deforestation

The mountains of Asia, including the Himalaya, are facing accelerating threats from a rapid rise in roads, settlements, overgrazing and deforestation that could worsen the impact of climate change and threaten water supply in China, Southeast Asia and northern India. The report, The Fall of Water, was published by the IUCN and UNEP with support from the Kathmandu-based International Centre for Integrated Mountain Development (ICIMOD) and the Chinese Academy of Sciences. *www.nepalitimes.com*

Sri Lanka uses satellites for disaster management

Geo-Informatic Society of Sri Lanka of the Post Graduate Institute of Agriculture University of Peradeniya has forwarded a project report to Scientific Affairs Minister Professor Tissa Vitharana for the establishment of a Remote Sensing Technology Centre with the view to utilise Satellite Technology for disaster management. *www.sundayobserver.lk*

Vietnam's first satellite photo receiver to be built

Vietnam will build its first satellite photo receiving station in Hanoi in early 2006. The station will initially provide satellite photos free of charge, and will be managed by the Remote Sensing Centre as part of a system supervising natural resources and environment.

Le Minh, Director of the Centre, said that construction would be complete this year, for experimental operational by mid-2007. It is funded by the European Space Committee in France, and will save Vietnam millions of dollars annually on buying satellite photos.*http://english.vietnamnet.vn*

SPOT Image awarded USGS Contract

SPOT Image Corporation has been awarded a contract by the US Geological Survey (USGS) for the purchase of satellite imagery products and services. The SPOT satellite constellation collects imagery ranging from 2.5m to 20m, from any location on Earth.

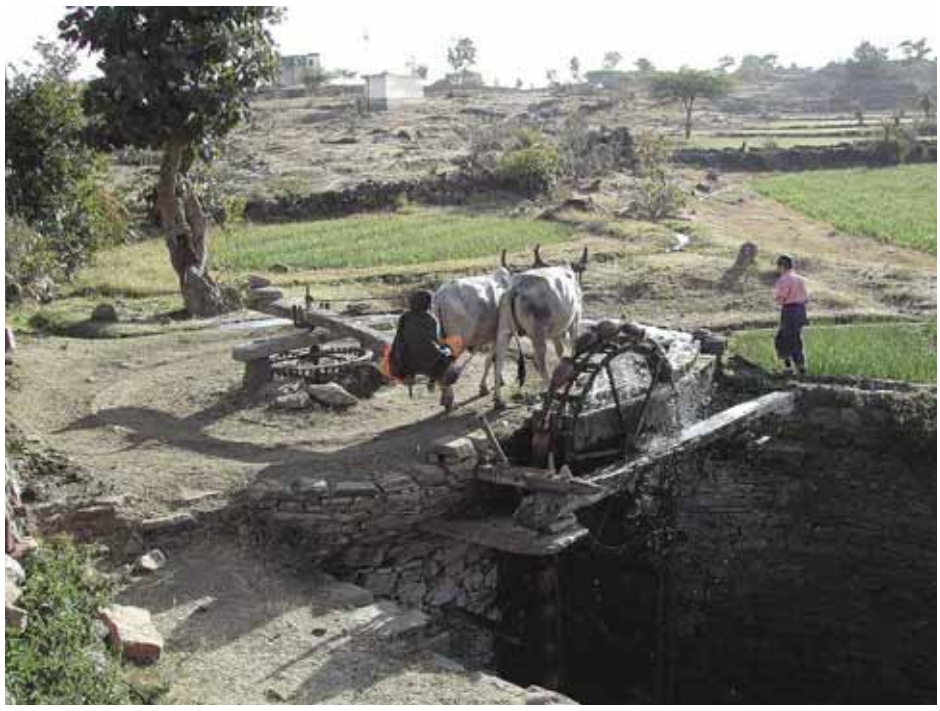
SPOT imagery applications include map updating, creation of 3D terrain models, land-use and environmental analyses, and disaster response. *http://locationintelligence.net*

A Roadmap for Integrated Rural Development

Modern technologies should appropriately be blended with government developmental programmes

A K JAIN

India is an agrarian country with about 72 per cent (about 80 Crores) of its population in about 5,75,936 villages, the villages are inhibited by the rural poor with agriculture as their predominant occupation. They are largely small and marginal farmers, agricultural labourers, artisans and scheduled castes and scheduled tribes. A large number of rural people (about 30 crore) are still living below the poverty line and often face the basic problem of survival, viz., jobs, poverty, hunger, shelter, ill-health and disease. By the year 2015, India's population may surpass that of China. Dr MS Swaminathan, credited with the 'Green Revolution' has warned of a coming famine. The increasing unemployment in the rural sector is likely to have serious ramifications on India's socio-economic and political balance. Today, we often witness serious contradictions – an aeroplane, a sign of progress and power and a bullock cart dragging in a slushy and deeply rutted kaccha road. We can not afford to lose the focus of rural areas and make them subsevient to the urban life. The hi-tech should be blended with indigenous practices in a manner that it eradicates poverty, disease, inequality and provides basic human needs such as, water, roads, medical care and literacy. Value addition to agro-products is very crucial in this respect. The planned development of rural areas should envisage provision of 'urban' facilities and services, including work centers, agro-industry, hospitals, schools, piped water supply, sanitation, housing, recreational facilities etc., which can be clustered into viable units or 'cities in the field'. These can also be the centers of learning of new technologies of computer, space, telecommunication etc. From the pre-independence era of Mahatama Gandhi, every government after the Independence of the country in 1947, has committed itself to rural development. The latest being the UPA Government at the centre, which announced a Common Minimum Progress (CMP). According to the Common Minimum Programme of the Government of India (2004), the following are the commitments in respect of rural development:



***Panchayati Raj*:** "It will be ensured that all funds given to states for implementation of poverty alleviation and rural development schemes by panchayats are neither delayed nor diverted. Monitoring will be strict. In addition, after consultations with states, the UPA government will consider crediting elected panchayats with such funds directly. Devolution of funds will be accompanied by similar devolution of functions and functionaries as well. Regular elections to panchayat bodies will be ensured and the amended Act in respect of the Fifth and Sixth Schedule Areas will be implemented. The UPA government will ensure that the gram sabha is empowered to emerge as the foundation of panchayati raj."

Women and Children: "It will be ensured that at least one-thirds of all funds flowing into panchayats are earmarked for programmes for the development of women and children. Village women and their associations will be encouraged to assume responsibility for all development schemes relating to drinking water, sanitation, primary education, health and nutrition."

Infrastructure: "The highest priority is attached to the development and expansion of physical infrastructure like roads, highways, ports, power, railways, water supply, sewage treatment and sanitation.

Drinking Water: "Providing drinking water to all sections in urban and rural areas and augmenting availability of drinking water sources is an issue of the topmost priority. Harvesting rainwater, desilting existing ponds and other innovative mechanisms will be adopted."

The Central Government has recently announced a new Twenty Point Programme (TPP-2004), which overlaps the provisions of rural amenities and services. The salient programmes of the Central Government under each head are given below:

Agriculture

Intensive Agriculture District Programme

- Launched in 1960-61, intensive agriculture district programme (IADP) was started to expand food production based on a package of irrigation, seeds, pesticides, credit and technical assistance.
- Comprehensive Crop Insurance to farmers against calamity and loss of crop.
- *Kisan* Credit Card and Life Insurance Cover to Kisan Credit Card holders.
- *Kisan* Mitra (Twenty Point Programme-2004)
- *Kisan* Credit Cards
- Agriculture Insurance – Crops and livestock
- Agro Clinic (*Kisan* Call Centre)
- Water shed development and Rain water harvesting
- Dry land farming
- Promotion of horticulture, floriculture, aquaculture and dairying
- Marketing and infrastructural support to farmers
- Irrigation facilities (Including minor and micro irrigation)
- National Programme for Desert areas and Drought Prone Area
- Land Reforms
  - Distribution of surplus land to landless SC/ST families
  - Compilation and computerization of land records
- Waste Land Development Programme
- Debt relief and clearance of dues to farmers
- Promotion of Commercial Agriculture
- Effective functioning of agricultural cooperatives

Land

- Integrated Rural Development Programme (IRDP): The sector-wise rural development programmes were sought to be integrated in a package through the Integrated Rural Development Programme (IRDP) launched in 1976-77, which directed at formulation of District Development Plan. Basic criteria for identifying the districts were economic backwardness, development potential, acute unemployment, presence of basic infrastructure and scientific and technical institutions extension services.
- Tribal Area Development Programme (TAD)
- Border Area Development Programme (BADP)
- MP Area Development Scheme
- Prime Minister *Gramodya Yojana* (2000)
- Nationwide programme to computerize land records.
- *Kshetriya Vikas* (TPP-2004) With a view to redress regional imbalances through fiscal, administrative, investment and other means, the programme titled *Kshetriya Vikas* has been launched in 2004, which covers various aspects, such as:
- Surplus Land Distribution (TPP-1986)
- Flood Control
- Prevention of erosion
- Creation of productive assets
- Financing

AK Jain Commissioner (Planning), Delhi Development Authority

His works cover the Master Plan for Delhi 2021, planning of transport, infrastructure services, development controls, capacity building, heritage conservation rehabilitation etc. including design of a million-city project (Dwarka). He has won several awards including Outstanding Man of 20th Century, and IBC Medal and Commendation for his paper. He is also teaching at Delhi School of Planning and Architecture and has written number of books and articles His books include-'Ecology and Natural Resource Management for Sustainable Development', 'The Making of Metropolis-Planning and Growth of Delhi', 'Building Systems for Low Income Housing', 'Cities of Delhi', 'The Indian Megacity and Economic Reforms' and 'School Buildings – Planning, Design and Management'. akjain@del3.vsnl.net.in

Irrigation and Water Management

- New Watershed Development Projects taken up to develop 62 lakh hectares of wasteland/ degraded lands.
- Pumpset Energisation Scheme (TPP-1986)
- Desert Development, Drought Prone/Arid Prone Watershed/ Wasteland Development Programme (1999)

Social Forestry

- Tree Plantation Programme (TPP-1986)
- *Paryavaran Sanrakshan evam Van Vridhi* (Twenty Point Programme – 2004)

This covers plantation and conservation of forests, identification of air and water pollution, pollution of rivers and their prevention.

Small Scale/Village/ Cottage Industries

- *Deendayal Hathkargha Protsahan Yojana* (TPP – 2004)
- *Babasahib Ambedkar Hastshilpa Vikas Yojana* (TPP – 2004)
- Modernisation of Village Industries (TPP-2004) : (i) Khadi Village and Cottage Industries, (ii) Small Scale Industries, (iii) Handicrafts, (iv)Sericulture, (v) Handloom, (vi) Coir and Jute, (vii) Rubber, (viii) Cashew, (ix) Food processing, (x) Leather, and (xi) Pottery

Rural Housing

- Shelter for all by 2007 – Construction of 25 lakh houses per year in rural areas.
- *Apna Ghar* (Twenty Point Programme – 2004) : *Apna Ghar* covers Rural Housing, Indira *Awaas Yojana* and *Valmiki Ambedkar Awaas Yojana*.
- *Basti Sudhar* (TPP – 2004) : With a view to paying particular attention to the needs of slum dwellers the programme of *Basti Sudhar* would cover seven basic amenities and housing for slum dwellers.

Drinking Water

- Safe Drinking Water by 2004 for all villages. 87.9% villages fully covered and 10.9% partially covered so far. Sector Reforms in 62 pilot districts with an outlay of Rs.1800 crore is under implementation.
- *Shudh Peya Jal* (Twenty Point Programme – 2004) : Providing drinking water to all and augmenting availability of drinking water sources is an issue of the topmost priority. Harvesting rain water, desilting existing ponds and other innovative mechanisms are to be taken up and monitored.

Rural Roads

- *Pradhan Mantri Gram Sadak Yojana* providing on all weather road to all rural Habitations with a population of 500 by 2007. 21,000 projects already taken up.
- Rural Infrastructure Development fund (RIDF) corpus with NABARD for creating infrastructure in rural areas increased to Rs.5000 crores.

Rural Electrification and Non-Conventional Energy Sources

- Bio-Gas Plants (TPP-1986)
- Village Electrification Scheme (TPP-1986)
- *Awasthapna Vikas* (TPP-2004) The *Awasthapna Vikas* (Infrastructure Development) envisages giving the highest priority to the development and expansion of physical infrastructure, like Power, Coal, Steel, Railways, Ports, Shipping and Telecommunication, Cement, Fertilizer, Petroleum & Natural Gas, Civil Aviation, Rural and Urban Roads, Electrification, Solar Energy, Integrated Rural Energy Programme, Water Supply, Sewage Treatment, Sanitation, Interlinking of rivers, and irrigation.
- Accelerated Rural Electrification Programme covering the following:
  - Electrification of Villages
  - Electrification of Hamlets
  - Electrification of Dalit Bastis
  - Electrification of Households
  - Bio-gas Plant
  - Solar Energy: (i) Water heating, (ii) Solar cooking and (iii) Air heating
  - Integrated Rural Energy Programme

Poverty Alleviation

- *Jawahar Gram Smridhi Yojana* (GSY-2002)
- *Sampoorna Grameen Rozgar Yojana* – outlay of Rs.10,000 crore per annum – provides 100 crore mandays of employment with food security. 50% of funds earmarked direct to Panchayats.
- *Swarnjayanti Gram Swarozgar Yojana* providing sustainable income to rural poor through Self-Help Groups. 14 lakh Self – help groups, one in each habitation.
- Massive Food for Work Programme introduced in calamity affected States. 25.13 lakh tons of food grains valued at Rs.2353 crores released.
- Employment Assurance Scheme (2002)
- *Antyodya Ann Yojana* (2000)
- Employment and Food Bank
- *Garibi Unmoolan* (Twenty Point Programme – 2004)
- The National Common Minimum Programme (NCMP) lays down that a National Employment Guarantee Act will be enacted to provide a legal guarantee for at least 100 days of employment to begin with on asset-creating public works programmes every year at minimum wages for at least one able-bodies person in every household, which include:
  (a) *Kisan Mitra*
  (b) *Shramik Kalyan* : With a view to ensure the welfare and well being of all workers, particularly those in unorganized sector, including the Social Security for Agricultural and Unorganised Labour, Minimum Wages Enforcement (including Farm Labour), Prevention of Child Labour and Women Labour.
- Prime Minister *Rojgar Yojana* (TPP-2004) Increasing employment potential in service industries viz. (i) Information Technology enabled services, (ii) Trade, (iii) Transport, (iv) Tele-communications, (v) Finance and (vi) Tourism.

Education

- *Vidyadeep* (Twenty Point Programme 2004) : The *Vidyadeep* Programme includes *Sarv Shiksha Abhiyan*, education guarantee scheme and non formal education, Mid Day Meal Scheme, Literacy rate, and financial assistance to poor students for professional education.

Cultural Activities

- Community Development Programme (CDP) was launched in 1952 to establish an appropriate

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data base for village development plans and programmes to improve village community life.

Health Family Welfare and Sanitation

- Immunisation of Children (TPP – 1986)
- Total Sanitation campaign launched in 200 districts. Project cost Rs.1195 crores.
- Asistance of Rs.10,000/- to the family of deceased bread earner under National Family Benefit Scheme.
- *Jan-Jan Ka Swasthya* (TPP-2004) : *Jan-Jan Ka Swasthya* Programme envisages Health Care for the Poor (Sub Centres/ Primary Health Centres/ Community Health Centres), Immunisation of Children, Disease Prevention (Blindness, Leprosy, Malaria, TB, AIDS and Goitre), National Scheme for Health Insurance for the poor, and Sanitation Programme.
- *Chhota Pariwar* (TPP-2004) : The Government has targeted high fertility districts (150) for population control programme, which includes the following:
  - Child survival and safe motherhood programme
  - Supplementary nutrition (Mother and Children)
  - Universalization of ICDS Scheme
  - Functional Anganwadis in every settlement

Women and Child Development, Social Welfare

- *Bhagyashree* Child Welfare Policy for girl child, *Rajrajeshwari Mahila Kalyan Bima Yojana* for women, *Janashree Bima Yojana* for Labour in Unorganised Sector, *Khetihar Mazdoor Bima Yojana* for agricultural labours & *Shiksha Sahyog Yojana* for education allowance to poor children.
- Decentralisation and devolution of powers, funds and functions to the Panchayati Raj Institutions with mandatory reservation for women.
- *Balika Smridhi Yojana*
- National Maternity Benefit Scheme
- *Stree Shakti* (TPP – 2004) : The programme launched in 2004, covers micro financing. *Rashtriya Mahila Kosh*, *Balika Samridhi Yojana*, *Kishori Shakti Yojana* and Women Participation in Panchayats, municipalities, state legislatures and Parliament.

Social Welfare of Weaker Sections/SC/ST/Youth

- National Old Age Pension Scheme provides social security to 44 lakh destitute persons above 65 years. 10 Kg. Free foodgrains per month to identified poor under Annapurna Scheme. Under National Maternity Benefit Scheme Rs.500/- to women below poverty line during maternity.
- Social Security Scheme
- *Anusuchit Jaati, Jan Jaati, evam Alpsankhyak Shashaktikaran* (Twenty Point Programme – 2004) : This covers the issues of reservation quotas assistance to primitive tribal sub-groups, ownership rights to tribals, and promoting modern and technical education among all minorities.
- *Yuva Shakti* (TPP-2004) : The *Yuva Shakti* programme covers the items like National Service Volunteer Scheme, National Service Scheme, National Cadet Corps, Nehru Yuva Kendra, Youths – sports and cultural development.
- *Samajik Suraksha* (TPP-2004) : To provide social security to the weaker sections of society, this programme aims at rehabilitation of the handicapped, National Policy on older persons for providing health and shelter, vocational training, reforming social/juvenile delinquents, alcoholics and drug addicts.

Public Distribution System

***Upbhokta Jaagran* (TPP-2004) :** To make the consumer more aware, to ensure food and nutrition security, and to bring about improvements in the food storage facilities, the Upbhokta Jaagran programme, which includes the following, has been launched in 2004:

- Consumer court cases
- *Jagriti Shivir Yojana*
- Strategy for food and nutritional security: (i) Nutrition Programme for mother and children (boys/ girls), (ii) Targeted Public Distribution system, (iii) *Anthodhya Anna Yojana*, (iv) *Annapoorna* Scheme, (v) Construction of additional storage facilities, (vi) Establishing Grain banks in cronically food scared area, (vii) New Strategy for food and nutritional security and (viii) New Ration Card issue BPL Families/others

Panchayati Raj

- Conducting of timely Panchayat Election
- Devolution of funds and functions
- Transfer of functionaries to Panchayats for local administration
- *Kriyasheel Prashaasan* (TPP-2004) : The programme – *Kriyasheel Prashaasan* aims at improving governance and responsiveness of the public administration, covering items like simplification of procedure, delegation of authority, enforcement of accountability, Redressal of Public Grievances, and Transparency in decision making, Development of Technology for e-Governance, versatile on-line information system for citizens, civic administration and municipal corporation, Development and upgradation of website of Ministries and State Governments.
- *Sheeghra Nyay Prakriya* (TPP-2004) : To expedite disposal of court cases the *Sheeghra Nyay Pakriya* programme has been launched for monitoring the pendency of court cases and expansion of legal aid services.

The Reality

In spite of numerous laudable programmes and huge investments, the reality of rural livelihood is rather dismal. There is a continuous distress migration to the cities and most of the villages lack the basic amenities and services, like a *pucca* road, transport, communications, drinking water supply, power, sanitation, health center, irrigation facility and jobs for survival and sustenance. The power is concentrated in the hands of few and the village administration is by and large urban-centred. The concepts of citizen empowerment, participatory governance and decentralization are often confined to the seminars and papers. The decision-making is often piecemeal, disjointed, ad-hoc, motivated and lacks an overall perspective. A lion's share of subsidies is eaten up by the administration/establishment structure and their salaries. The programmes are too many, so are the departments involved in each one of them. There is often overlapping and lack of clarity about the organizations and their accountability. The programmes too often exceed the time and financial allocations and the facilities including housing built up by the government bodies have often remain unoccupied. This leads us to identification of the pertinent issues involved in rural development, as given below:

Issues

- Lack of clear goals, objectives and targets
- Lack of benchmark and quantifiable standards
- Abstract and disjointed programmes without a coordinated spatial dimension
- Lack of strategic interventions and time frame
- Gap between plans/programmes and implementation
- Urban Centred, Multi-layered and multi-tiered rural administration and lack of accountability
- Complex procedures and obsolete legal frame
- Lack of funds, bulk of expenditure booked for establishment and salaries

The Approach

- Evolving Smart Targets (Specific, Measureable, Action-oriented, Realistic and Timely)
- Setting up the Benchmarks for amenities and services
- Preparation of the development plans at policy, strategic and operational levels, and exploring a need based approach for clustered hierarchy of facilities
- Strategic planning for priority projects, areas and sectors in a timeframe
- Action Planning and participatory management
- Institutional/organization framework/Governance
- Legal framework and procedural reforms
- Financial Planning and harnessing the potential of private and community sectors

Planning of the Rural Areas is essentially comprised the following levels:

1. Policy Goals
2. Strategic objectives
3. Action Plans
4. Projects

So that all these fit into a comprehensive frame-work, a matrix structure can be developed relating the above with the following:

(a) Focus Areas/Priority Sector, based on the characteristics and potential of a particular region/district/village.
(b) Benchmarking of standards, levels and norms
(c) Time Frame for achieving the targets/accomplishing the activity
(d) Key organization/ departments responsible
(e) Financial resources
(f) Monitoring and Feedback system

Towards a need based approach

Participatory learning with the target groups provides useful clues towards adopting a 'needs based approach'. The needs of the rural population can be categorized in the following priorities:

1. Survival: Freedom from hunger and malnutrition, food security, agriculture and employment, credit facility
2. Supportive: Shelter, drinking water supply, power, transport, sanitation etc.
3. Transformational: Education, literacy, skill development, environmental upgradation and access to information.
4. Empowerment: Equal access to resources, including land, finance and services, justice, participation in decision making, etc.

It is observed that with a little external support, the rural poor are often capable of meeting their survival needs. The organized sector has a vital role in helping the rural poor in meeting these needs. The experience indicates that the supportive needs

really help the rural poor in climbing up the economic ladder. The provision of basic services and facilities in the rural context is a major concern. As such the rural amenities and services be grouped under the above heads and the priorities of planning, development and investments can be worked out. Based on participatory rural learning, the viable distances for these amenities and facilities can also be worked out (which will vary according to public transport facility, topography and characteristics of potential areas). This leads us to a system of clustering of the facilities into a conceptual hierarchy of rural settlements (such as 'cities in green field', rurban centers, growth centers etc.) which can be developed according to the potential of either the existing settlement or as the new areas.

The Process

Keeping in view the above approach, the following steps are necessary in the process of rural planning:

1. Mission Statement and Objectives (mainly derived from 11th schedule, Article 243 G and 20 Point Programme-2004)
2. Translating the above into regionwise SMART Goals and Targets (specific, measureable, Action-oriented, Realistic and Timely).
3. Baseline Information and participatory learning at District, Taluk and village settlement levels
4. Identifying the issues and Key Action Areas
5. Conceptual Framework with respect to Policy Option, Strategic planning, Benchmarks and Standards
6. Evaluation of planning options, by SWOT Analysis, financial implications, cost benefit analysis, feasibility and viability assessment.
7. Development of Plans at District, Taluk and settlement levels, strategies of development, disaggregated into sectoral plans for various amenities & services.
8. Resource Planning and Governance:
   - Shared Governance and Decentralisation
   - Identifying key issues vis-à-vis Resource assessment
   - Empowerment of the community.
   - Participatory Action Planning Implementation Planning
   - Matrix structure for integrated implementation
   - GIS/MIS, computerisation, information sharing and participatory monitoring
   - Capacity building and networking
   - Legal, institutional and financial framework.

The entire superstructure of rural planning and development rests on the three pillars of-

- Organisation/ institutional structure
- Finance
- Legal Frame

No plan, however good, can be implemented unless it is supported by the people and stakeholders, who have to participate at all levels of decision making and implementation.

Conclusion

The Government with its avowed commitment to rural development has resorted to the conventional "programme" approach, which has serious shortcomings in achieving its objectives and has the danger of reducing the laudable mandate into mere exhortations. It is time that a more professional, participatory planning approach is evolved, which should be accompanied by supportive governance, organization/administrative structure, fiscal and legal/procedural reforms to induce a holistic approach towards the development of the rural areas.

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Joint Australian engineering satellite (JAESat)

JAESat is an Australian joint micro-satellite project between Queensland University of Technology, Australian Space Research Institute and other national and international partners, i.e. Australian Cooperative Research Centre for Satellite Systems, Kayser-Threde GmbH, Aerospace Concepts, Auspace to name some of them

Werner Enderle, Jan A King, Cameron Boyd

The JAESat mission will ultimately comprise two micro-satellites called Master and Slave (see Figure 1) which will fly in a formation. JAESat Master and Slave will be separated in space, after the release of JAESat from the launcher. The mission is designed to conduct a variety of experiments based on the mode of interoperation between the payloads on-board the two satellites. A RF Inter-Satellite Link (ISL) for communication between the two satellites will be established. JAESat will be launched in 2007. The final orbit depends on the launch opportunity. It will have a circular, nearly polar orbit with an orbit height between 600 km and 800 km. The operational life time of JAESat is expected to be between 12 and 15 months. After the separation of the slave from the master satellite the two satellites will drift away from each other with a low drift rate. JAESat is designed to have a high degree of on-board autonomy. The operations will be conducted via a ground station located at the Queensland University of Technology in Brisbane, Australia.

Figure 1: JAESat master and slave satellite concept before and after splitting in space

JAESat mission concept

The JAESat micro-satellite project is an educational and GNSS technology demonstration mission, which will also generate data for scientific use. JAESat's high level mission objectives are:

- design, develop, manufacture, test, launch and operate the educational/ research micro-satellite JAESat
- develop payloads with a technological and scientific relevance
- use JAESat as a sensor in space and GNSS technology demonstrator mission

The education and training aspects play an important role in the JAESat mission. The GNSS mission objectives are driven by the SPARx (SPace Applications GPS Receiver), a development from the Cooperative Research Centre for Satellite Systems at the Queensland University of Technology. Functions and performance of SPARx will be tested and validated in space within the JAESat mission. A key element of the GNSS activities will be the testing of a new sensor concept for attitude determination, based on Star Sensor and GPS based attitude information. In JAESat mission the master satellite will be a cube with a side length of 390mm. The slave satellite will have the following dimensions 390mm x 390mm x 195mm. The JAESat master satellite will be 3-axis stabilized, whereas the JAESat slave satellite will be gravity gradient stabilized. The mass of the slave satellite will be around 10kg, and the mass of the master will be around 30 kg, so that the total mass of JAESat will be around 40 kg. The orbit of JAESat will be a Low Earth Orbit (LEO) with an altitude between 600 km and 800 km and an orbit inclination of around 90 deg. The ground track and the orbit in 3D space are outlined in Figure 2.

JAESat – Satellite system

The JAESat structure concept is based on a tray design. JAESat will have a total of eight trays. The separation between master and slave will be based on a spring release mechanism.

The JAESat power system will consist of batteries and solar cells. The

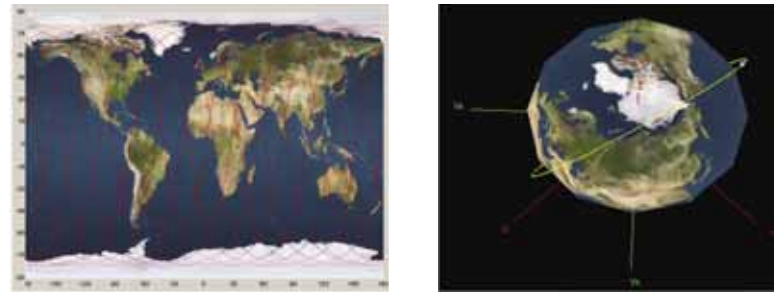

Figure 2: Ground track of JAESat and JAESat Orbit in 3D (seen from an inertial position above the North Pole of the Earth)

Figure 3: JAESat Communications Concept

master satellite will have five sides covered with solar cells, whereas the slave will have only one side covered with solar cells. The slave will have a peak power of around 10 Watts. The available power at the master satellite will be around 25 Watts.

The JAESat on-board flight computer will be an Intrinsyc CerfBoard.

The JAESat communication concept is outlined in Figure 3. The transmitter module for the master communications system has been selected to be the Hamtronics TA451, operating at 400.400MHz. The modem is the Kantronics KPC-9612+. The receiver is the Hamtronics R451. It is a crystal based receiver operating at approximately 430MHz. The JAESat Attitude Control System (ACS) concept cannot be seen as one concept. The master satellite will be 3-axis stabilized by using magnet torquers (air coils). The slave satellite will be gravity gradient stabilized without using a boom. Instead the moments of inertia will be designed so that a gravity gradient stabilization will be the result. After separation from the launcher, the JAESat master and slave will still be attached to each other. JAESat master ACS will then reduce the rotation rates around each axis and finally orient the satellite in such an orientation that the slave will be in its gravity gradient orientation and then JAESat will split into two satellites. The ACS of the master will be used for controlling the orientation and changing of rotation rates, necessary for testing of the new integrated Star Sensor GPS attitude sensor concept. Only one requirement for the attitude accuracy of the master has been derived, resulting from the need to have an Inter Satellite Link established. The master attitude accuracy requirement is in the order of 5 deg.

JAESat – Payloads

The JAESat payloads concept is driven by simplicity. The payloads itself will be distributed between the JAESat master and slave satellite. One of the positive aspects of this distributed concept is that in the event of problems on one of the two satellites, or in the worst case scenario, the loss of the slave satellite, significant research can still be conducted.

The JAESat master satellite will have the following payloads on board:

- SPARx – GPS receiver capable of performing 3-axis Attitude Determination
- Star Sensor
- Specific antennas for atmospheric research

The JAESat slave satellite will have the following payloads on board:

- SPARx - GPS receiver
- Mini Video Camera (Web camera type)
- Specific antennas for atmospheric research

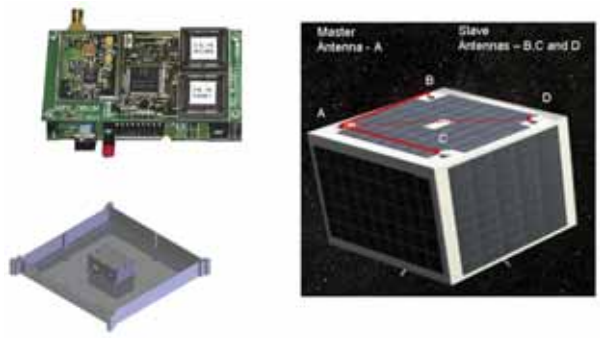

Figure 4: GPS SPARx development based on a Mitel (now Zarlink) Orion demonstrator board

GPS Receiver - SPARx

The CRCSS/QUT GPS SPARx (see Figure 4) development is based on the MITEL GP2021, GP2015 and GP2010 Chip set and is a modification of the MITEL Orion GPS receiver demonstrator. The base for the development of the source code is the MITEL GPS Architect development kit. The source code modifications are specifically targeted towards robust and accurate operation on-board a satellite. Key elements of functionality are positioning and timing for satellites. Further R&D activities are the implementation of an on-board orbit determination capability (SPARx-OD) and GPS receiver modifications for satellite attitude determination (SPARx-AD) capabilities. The JAESat master satellite will have a GPS receiver with the capability of performing attitude determination. The on-board orbit - and attitude determination calculations will be performed within the Flight Computer. The main characteristics of a GPS SPARx are given in Table 1. In addition to orbit and attitude determination, it is also intended to perform relative navigation between the JAESat master and slave satellite. Finally, SPARx will be used for collecting data from specific GPS antennas attached to the sides (looking to the horizon) of JAESat in order to perform atmospheric research.

Star Sensor – KM 1301

The Star Sensor KM-1303 is a contribution of the German Aerospace Company Kayser-Threde GmbH towards the JAESat project. This sensor is a low-cost single-package design for star tracking, star recognition, relative -and inertial attitude determination. The Star Sensor will be used for testing of a new integrated attitude determination sensor concept.

JAESat – Experiments

The JAESat main experiments can be summarized as follows:

- Testing and evaluation of CRCSS/QUT GPS SPARx,

Table 1: SPARx – Physical Characteristics of the GPS Receiver and Interface Boards

Physical Characteristic – SPARx GPS Receiver Board	
Power (Vdd into receiver board)	+5 volts DC, +/- 10%
Active- Antenna Power:	+5 volts DC available
Power Consumption (Vdd)	GPS Receiver Board only: 370mA 1.85W With Antenna: 395mA 1.98W
Size: (GPS Receiver Board only)	95mm x 50mm x 20mm
Size: (GPS Receiver Board plus Interface Board)	95mm x 50mm x 30mm
Connectors	RF: SMA socket I/O: 9-pin (1 x 9), 0.1" pitch plug

including Attitude capability
- Testing of a new integrated Star Sensor/GPS navigation sensor concept for 3-axis attitude determination
- Relative Navigation between JAESat Master and Slave satellite
- Orbit determination concepts
  - On-Ground - Precise orbit determination based on GPS Code and Carrier phase measurements
  - On-board orbit determination based on GPS receiver position solutions
- Relative Positioning between master and slave satellite
- Establishment of stable RF inter satellite links
- Atmospheric research

JAESat operations

JAESat is designed for a high degree of on-board autonomy. However, the operations of JAESat will be conducted via a ground station located at the QUT in Brisbane, Australia.

Testing and simulations environment

The core of the testing environment is the Welnavigat GPS signal simulator. The signal simulator is capable of simulating the entire GPS satellite constellation and transmitting RF signals on six channels. The GPS development platform (Architect Development Kit) is directly connected to the GPS signal generator and controlled/monitored from a notebook computer. An important feature in this context is the option to import scenario files, generated by the user.

JAESat – Simulations and results

Figure 5: JAESat Ground Station at Queensland University of Technology, Brisbane, Australia

The results shown here are related to the expected performance of the SPARx in space, the position, velocity and time solution, the capability of

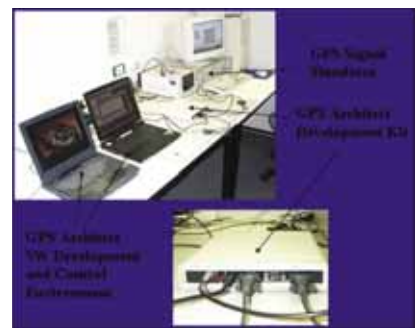

Figure 6: JAESat Testing and Simulation Environment

Orbit Determination (OD) and also the performance for the Attitude Determination (AD) based on GPS measurements. Test and simulations have been conducted with and without Hard Ware in the loop.

Results from GPS signal simulator and sparx

The main objective of these tests was to identify the GPS signal acquisition and tracking performance of SPARx. Results of tests conducted for JAESat including the GPS signal simulator and SPARx are given in Figure 7. In most cases SPARx generates a 3D position solution for more than 80% of the time per orbit. In this context it is also important to understand that the GPS signal simulator only provides a total of six simulated channels. This means that these tests can be seen as a kind of worst case scenarios.

Another test objectives was also the testing of the time synchronisation performance and the generation of a Hard Ware Pulse Per Second (PPS) output. SPARx performance for a 3D absolute position solution in space is currently better than 20 m (1 Sigma).

Simulations for orbit and attitude determination based on GPS

Simulations for the Orbit -and Attitude Determination have been conducted. The results are presented in Table 2 and Figure 8. For the attitude simulations, the orientation of the antenna array was anti nadir. The baseline length was

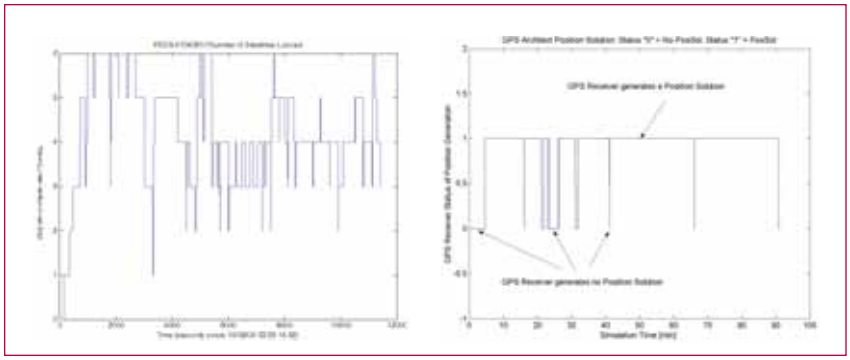

Figure 7: SPARx GPS Signal Acquisition and Tracking Behaviour for FedSat Orbit Scenarios

Table 2: Orbit Determination Solution Performance based on Simulations

Orbit Determination based on GPS Position Solution - Simulation			
True State Vector from Reference Orbit		Estimation Errors (1 Sigma)	
Position x [m]:	-3283178.224	Position Error x [m]:	2.745
Position y [m]:	-3652268.345	Position Error y [m]:	-0.534
Position z [m]:	-5251321.252	Position Error z [m]:	-7.888
Velocity x [m\s] :	2323.540285	Velocity Error x [m\s] :	-0.001747
Velocity y [m\s] :	5037.512456	Velocity Error y [m\s] :	-0.015069
Velocity z [m\s] :	-4954.785328	Velocity Error z [m\s] :	0.007054

36 cm for baseline AB, AC and 51 cm for baseline AD. The multipath error was assumed to be 3mm on the carrier Single Difference (SD). The Orbit Determination concept is based on GPS position solutions, used as observations in a batch Least Square process (Enderle et. al. 2003). A total data arc of 20 min. was used with a position solution every 10 sec and an assumed position error of 25 m (1 Sigma) for each x, y and z component of the position vector. The results in Table 2 show that a satellite on-board 3D position accuracy better than 10 m can be achieved with the proposed Orbit Determination concept.

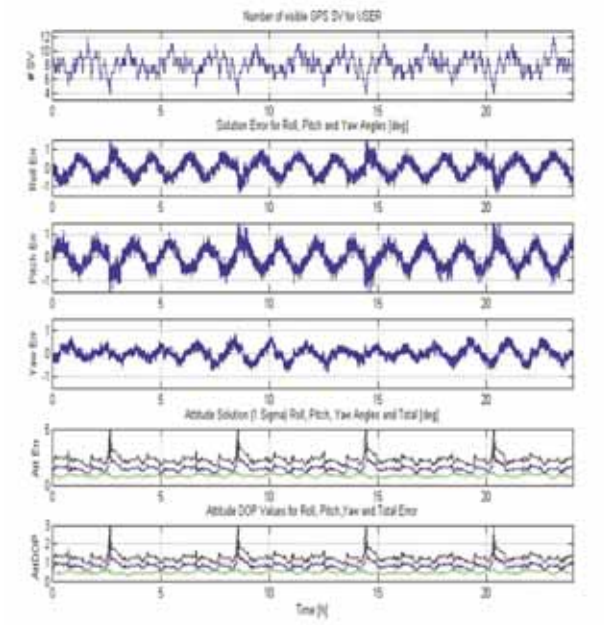

Figure 8: Attitude Determination Results for JAESat based on Simulation

The results for the JAESat Attitude Determination (AD) based on GPS, presented in Figure 8 are highlighting that GPS based AD would already by sufficient to comply with the JAESat attitude accuracy requirements. In Figure 8, it can also be clearly seen that the number of visible GPS satellites for JAESat lies between 4 SV and 12 SV with an average of 8 SV. This means a substantial higher number of visible GPS satellites for the JAESat as have been used for simulations with the GPS signal simulator.

Conclusions

The tests and simulations have clearly demonstrated the feasibility of the JAESat GNSS experiments in terms of absolute positioning, timing, on-board orbit -and attitude determination. Further development and testing will be undertaken in order to cover the relative navigation aspects. Special emphasis will be given in the near future for the testing of the integrated attitude sensor based on Star Sensor and GPS attitude information. Between 2003 and 2005 a total of 35 students have worked on the JAESat project in various areas. This means that one of the high level mission objectives is already fulfilled – the use of JAESat as an education and research platform.

Acknowledgements

This work was carried out at CRCSS/ QUT with the support of many partners. Special thanks to Kayser-Threde GmbH for the contribution of the Star Sensor, Intrinsyc for the CerfBoard, Aerospace Concepts and Cooperative Research Centre for Satellite System for the constant support and Solar Cells. Finally, I would like to mention all the QUT Aerospace Avionics Students and their valuable contributions to the JAESat project.

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MARK YOUR CALENDAR

February 2006

International GIS Conference & Exhibition
13-15 February, Kuwait
http://www.gulfgis.com/

March 2006

Second Annual Australian Chapter Geo Forum
1-3 March, Queensland, Australia
http://www.intergraph.com.au/iguc2006

GPS-Wireless 2006
2 - 3 March, San Francisco, CA
http://www.gps-wireless.com

The 6th Asia Mobile Location Services (MLS) 2006
20-31 Mar, Bangkok
enquiry@ibcasia.com.sg

April 2006

IEEE/ION PLANS 2006
25- 27 April, San Diego, CA United States
http://www.PLANS2006.org

Geo-Siberia 2006
26-28 April in Novosibirsk, Russia
http://www.sibfair.ru/en/exhibition.php?id=533

May 2006

The North American Defense Geospatial Intelligence Conference
8-10 May, USA
dgi@wbresearch.com

4th Taipei International Conference on Digital Earth
25- 26 May, Taiwan, Taipei
derc@mail.pccu.edu.tw
http://deconf.pccu.edu.tw/

June 2006

International Conference in GIS and Health
27-29 June, Hong Kong
chankw1@hkuoc.hk
http;//geog.hku.hk/HealthGIS2006

July 2006

ISPRS Commission I Symposium: "Paris 2006: From Sensors to Imagery"
03 - 06 July, Paris, France
isprs2006@colloquium.fr
www.colloquium.fr/sfpt2006

3rd Annual Meeting (AOGS 2006)
10-14 July, Singapore
http://asiaoceania-conference.org/

COAST - GIS 06
13-17 July Wollongong and Sydney, Australia
www.uow.edu.au/science/eesc/conferences/coastgis06

IGNSS 2006 Symposium on GPS/GNSS
17-21 July ,Gold Coast, Australia
http://www.ignss.org/conf2006/index.php

August 2006

International Workshop on 3D Geoinformation
7-8 August, Kuala Lumpur Malaysia
alias@fksg.utm.my
www.fksg.utm.my/3dgeoinfo2006

26th ESRI User Conference and 4th Survey and GIS Summit
07- 11 August, San Diego, CA, USA
uc@esri.com
www.esri.com

Digital Earth 2006
27-30 Aug
www.digitalearth06.org.nz
james@eventdynamics.co.nz

September 2006

17th UNRCC for Asia and the Pacific/ 12th Meeting of the PCGIAP
18-22 September, Bangkok
http://www.gsi.go.jp/PCGIAP/

October 2006

Intergeo 2006
10 -12October, Munich, Germany
ofreier@hinte-messe.de
http://www.intergeo.de

XXIII International FIG Congress Back
15-20, Germany, Munich
http://www.fig2006.de/index2.html
Office@fig2006.de

The 12th IAIN World Congress 2006
18-20 October, Jeju, Korea
http:// 203.230.240.83/

Geoinformatics 2006
20-21 October, Wuhan, China
lilyshi@lmars.whu.edu.cn

The 12th IAIN World Congress 2006
18-20 November, Korea
jkinpr@mail.hhu.ac.kr

November 2006

GSDI-9 - Geospatial Information: tool for reducing poverty
03-11 November, Santiago de Chile, Chile
gsdi9@igm.cl
http://www.igm.cl/gsdi9

Trimble Dimensions
05 - 08 November, Las Vegas NV
http://www.trimble.com

Galileo update

Galileo – the European Programme for Global Navigation Services for civil purposes is an initiative led by European Union. We provide regular updates to our readers on the Galileo programme.

GIOVE-A transmits first Galileo signals

The GIOVE-A satellite is in good health and started transmitting the first Galileo signals from medium earth orbit on 12 January.

GIOVE-A was placed in orbit (altitude 23,260 km) by a Soyuz-Fregat rocket operated by Starsem on 28 December last from the Baikonur cosmodrome. The prime contractor, Surrey Satellite Technology Limited, then successfully deployed the 7-metre solar array panels, commissioned the satellite platform and prepared the payload for tests from its Mission Control Centre. These activities on GIOVE-A drew on the joint efforts of ground stations deployed at RAL (UK), Bangalore (India) and Kuala Lumpur (Malaysia) for uploading of the onboard computer software, deployment of the two solar panels and placing of the satellite in sun-acquisition mode. All the platform systems underwent functional checks and the satellite was then put in its nominal Earth-pointing attitude and orbit control mode. This platform commissioning phase was successfully completed by 9 January. On 10 January, payload commissioning started from the SSTL Mission Control Centre with the objective of verifying that all the units in the navigation payload were functioning properly. On 12 January, the first Galileo navigation signals were transmitted by GIOVE-A. These were received and analysed by the Galileo receivers using the 25-metre diameter dish of the Chilbolton Observatory Facilities for atmospheric and Radio Research (UK) and the ESA Station in Redu (Belgium). The various Galileo signal modes will now be generated sequentially using the various GIOVE-A payload chains.

http://www.esa.int

Galileo in-orbit validation contract signed

On Thursday 19 January 2006, the European Space Agency and Galileo Industries GmbH signed a € 950 million contract for the development and construction of the first four satellites of the Galileo navigation system and their associated ground systems. The signing ceremony took place at the Federal Ministry of Transport in Berlin in the presence of the German Federal Minister of Transport, Building and Urban Affairs, Mr Wolfgang Tiefensee, ESA's Director General, Mr Jean-Jacques Dordain, and senior representatives from the project's industrial partners: Alcatel, EADS, Finmeccanica, Galileo Industries, GSS and Thales. ESA's Director General, in his address at the signing ceremony, said "With this contract, we are translating a great European project into a mini-constellation of four satellites backed by an extensive network of ground stations, providing solid grounds upon which the concessionaire will develop the full operational Galileo constellation."

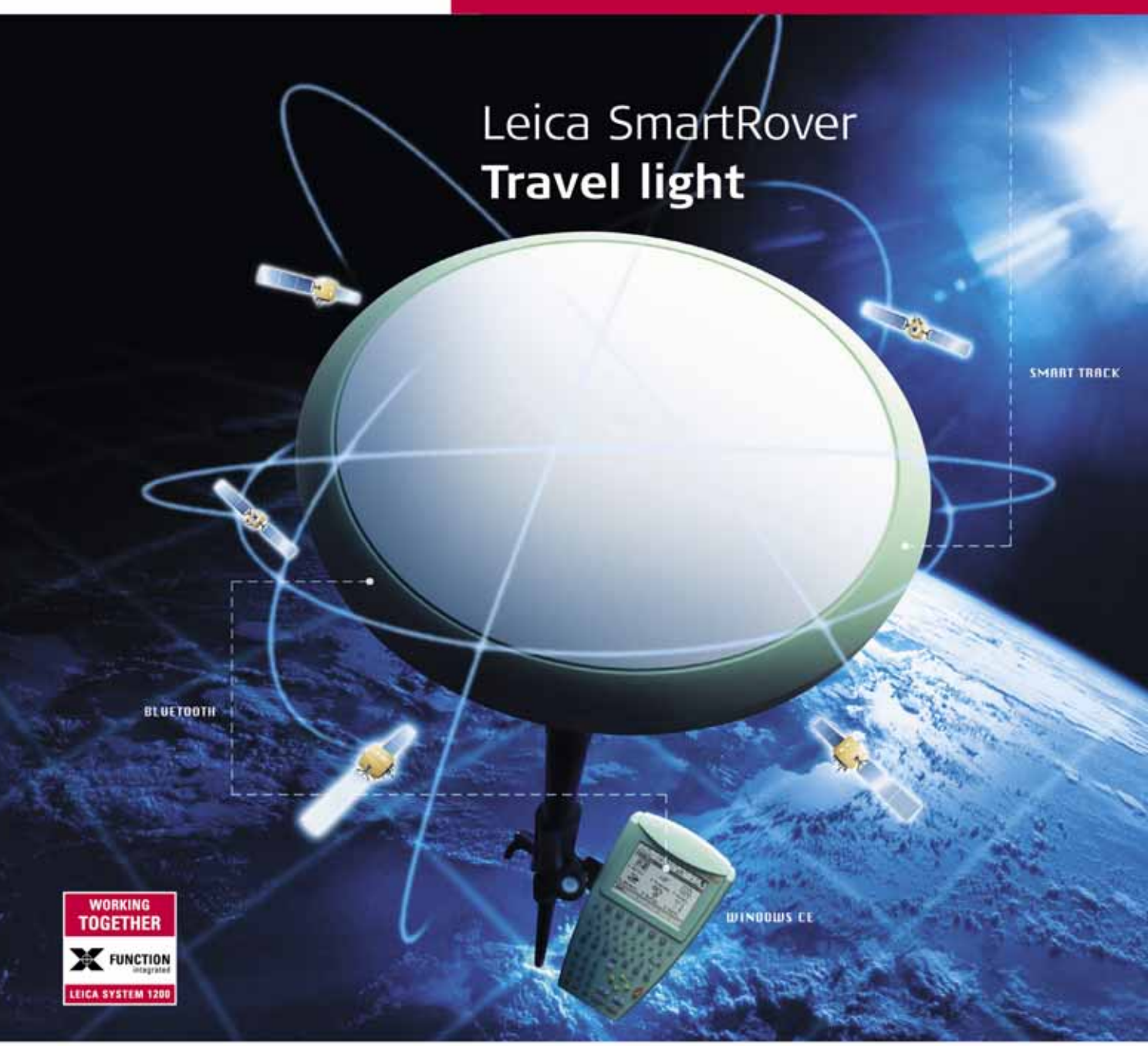
Following the preliminary authorisation to proceed with € 150 million of work, signed on 21 December 2004, it is now the overall in-orbit validation contract that is going ahead, drawing on ESA and EU funds accessible under the GalileoSat programme. The satellite launch contracts will be negotiated during the course of 2006. The in-orbit validation phase is already well under way, with GIOVE-A, the first demonstrator satellite, launched on 28 December 2005.

http://www.esa.int

EU and Korea seal their agreement

Following exchanges that lasted for six months, negotiations on the Republic of Korea's participation in Europe's satellite radionavigation programme reached approval. The agreement which paves the way for the country's active participation in the programme was initialled in Brussels by Heinz Hilbrecht, Director, representing the European Commission, and by Counsellor Choi Jong Hyun, representing the Republic of Korea. Welcoming the outcome of the negotiations, Vice-President Jacques Barrot in charge of transport declared: "After the successful launch of the first GALILEO GIOVE-A satellite, this new agreement underlines, once again, the ever growing worldwide interest for the programme". The agreement initialled provides for co-operative activities in the areas of scientific research and training, industrial cooperation, trade and market development, standards, certification and regulatory measures, regional and local augmentations, etc. The Republic of Korea, the fourth economical power in Asia, is a country mastering space technology and its applications.

http://europa.eu.int



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