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It is a beginning. A beginning of a journey. A journey with passion. With conviction too. To explore the unexplored. And further explore the explored.

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Let us navigate together.

Bal Krishna, Editor
bal@mycoordinates.org

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SCANNING TECHNOLOGY

At last! India unveils its map policy

On May 19, 2005, the Union Cabinet gave its approval to the New National Map Policy brought out by the Ministry of Science & Technology which has the potential to open a new door of opportunities for various sectors ranging from water management to development planning and infrastructure

Kapil Sibal, Minister for Science and Technology and Ocean Development

The New Policy envisages two series of maps- the Defense Series Maps (DSMs) and the Open Series Maps (OSMs). The DSMs will be for exclusive use for defense forces and authorized Government Departments. The Policy regarding the use of DSMs will be determined by the Ministry of Defense whereas the Policy on OSMs will be the responsibility of Survey of India/Department of Science and Technology.

OSMs will have a different datum, projection, content and sheet numbers. These maps will be derived from National Digital Topographical Database (NDTB) which will be created by the Survey of India. The use of OSMs will be through a process of registration for intimation. There will be a Map Information Registry Database (MIRD). 1:1 million and smaller maps do not require registration. OSMs (Digital or Analogue) can be disseminated by Survey of India through an agreement to any agency for specific end use. The user can make value addition to these maps and can share the information under initiations to the Survey of India. All serial photographs after masking of Vulnerable Areas/Vulnerable Points will be freely available for processing and project generation. Private agencies will be permitted to carry out surveys in all parts of the country using Public Domain Datum. But they should be registered and should carry the accreditation of Survey of India. Magnetic/gravity and other scientific data will be collected and disseminated as per existing instructions.

The economic benefits put together will result in a new value addition of over 20,000 crore rupees

Editor's note: We applaud this historic decision and hope it will address the myriad of needs and concerns of map users.

The New National Map Policy is the result of a conscious realization that technological upheavals taking place around the globe have rendered many features of the existing Map Policy redundant and anachronistic. Continuance of the present policy tends to impede free flow of spatial information and engenders high opportunity costs for a developing economy like India. At the same time making all spatial data available in public domain has potential security hazards. Addressing a press conference, the Minister for Science and Technology and Ocean Development, Shri Kapil Sibal described the decision as an "historic" one and "something which we had been struggling for the last 15 years". He said that a one time clearance will be taken from the Ministry of Defense subject to a timeline. He said that the new maps will provide coordinates, heights etc. This kind of data will have enabling value in implementing policy decisions in various fields which figure prominently in the National Common Minimum Programme (NCMP) such as agriculture, water resource management etc. " It will also have tremendous impact on the empowerment of the poor", Shri Sibal said. The Minister was optimistic that the market for spatial data and the economic benefits put together will result in a new value addition of over 20,000 crore rupees. He said that the new maps along with the guidelines will be issued together in a couple of months.

www.pib.nic.in

Cadastral surveys in India

A plea for centrally supported, orthophoto based, cadastral system and management of change

P MISRA

Cadastral surveys are specially designed large scale surveys, generally on 1:4000 scale which are linked to land ownership and property. In case of urban cadastral surveys, the scales may be as large as 1:500 to 1:4000. This paper is, however, emphasizing the rural and village properties. The urban cadastre, although very vital needs a separate and detailed discussion.

In practical proportion of the importance, the surveys and mapping oriented activities form only 10% of the total cadastral related work. The remaining 90% really fall in the realm of generating appropriate land records. The importance of these land records is, of course, very high because it is only through the cadastral maps and land records that the owner gets legally linked to his property. This property may be a cultivated field, house or a fishing pond. The fact of the matter is that lack of updating the maps and the land records have given rise to the innumerable court cases. The property related court cases are thriving because of the reduced importance of the cadastral surveys.

Can the modern technology of `Geomatics' (extended version of surveying and mapping) and the body of knowledge of management of change help in mitigating the major lacunae in the professional practice of cadastral surveys and land records? The answer is emphatic YES. It is with this perspective that this paper has been prepared.

Push From Politicians, Press and Parliament (PPP)

It is a common fact that the present `politics of election' is centred around the theme of `development'. If development is the `push of the politicians', the cadastral surveys (and better technology) will become most relevant and urgent. The Government can ill afford to ignore the importance of value adding / improvement in the property related surveys. The fact is that cadastral surveys are the only unique surveys of their kind, which are directly connected with the masses.

If there is development, can cadastral surveys be left behind?

Management of Technological Changes

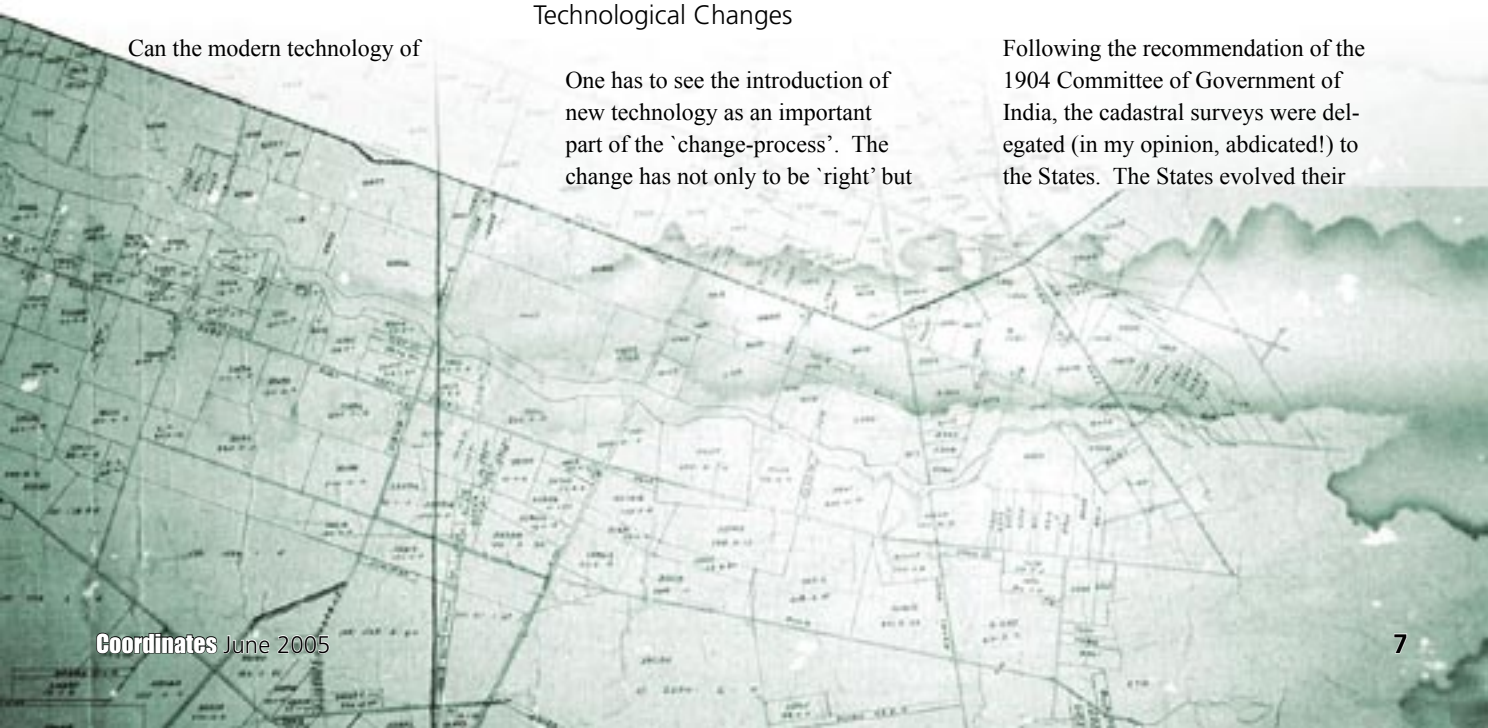
One has to see the introduction of new technology as an important part of the `change-process'. The change has not only to be `right' but should also be made more `acceptable' to all the stakeholders of the process. Special thought has, therefore, to be given for bringing lasting changes in cadastral surveys in India.

The scope of this paper is, however, limited to the surveys and mapping technology (ies). The subsequent changes in the area of generating land records is not attempted for want of space.

Historical Perspective of Cadastral Surveys in India

Revenue surveys were initiated by East India Company towards the end of 18th Century primarily to establish the `domain of their influence' through the collection of revenue from the estates. These estates were rather scattered so only village boundaries were established by the traverse method of surveying. The inside details of properties were left to local surveys. Survey of India as a Department of Government of India, established in 1767, was fully involved in the process till 1904.

Following the recommendation of the 1904 Committee of Government of India, the cadastral surveys were delegated (in my opinion, abdicated!) to the States. The States evolved their



The Management of Change

The change is bound to come due to the application of new technology whose appropriateness is to be proved through reducing cost, producing more village maps in a given time and generating more timely and reliable information. In other words, the new technology has to be:

- Professionally right i.e. follows principle of surveying
- Socially acceptable, by a vast majority of land-owners
- Economically viable i.e. the new technology should be less costly when compared to the past methodology.

Example: The new technology may bring some changes in the area of plots which may be less than what is shown on the old map or Field Measurement Book (FMB). The authorities will have to adopt acceptable approach or strategy of gradual change with adequate time interval before new measurements are adopted.

The `betterness of change' has to be proved, not through an authoritarian approach but by slow campaigns and appropriate communication strategy. Even elected representatives should be educated for the changes dictated by the technology.

In other words, the changes should not only be `right' but should also be acceptable.

own legal system of revenue surveys. The Northern States of U.P., M.P., Bengal, Rajasthan, Punjab established 'graphic output' of surveys as the legal document whereas the Southern states recognised Field Measurement Book (FMB) as the legal document. There was little input from Survey of India. In 1929, Survey of India took to first aerial survey in Malda district of Bengal which was carried out to produce revenue maps on 16 inches to 1 mile scale. But no serious attempt was made to transfer the technology to the States. Again during 1939-1945 war Survey of India adopted air-survey methods and later Photogrammetry in 1954. The situation regarding the technology in the States remained the same as was available in 1904.

Later, in 1964, the first State Cadastral Surveys conference was held in Mussoorie which was motivated by the concept that State Department of Settlement Surveys and Land Records should exchange ideas on the subject to provide technical solutions to, for example, town surveys etc. The conferences have been regularly held but the progress has been rather slow. The author, while serving Survey of India organized a Demonstration Seminar for the technology of Aerial Photography, Photogrammetry, Photo Rectification and Records Management etc in 1973. The Government of India (Ministry of Rural Development) has recently taken up computerization of records and introduction of other relevant technologies quite enthusiastically. This has been motivated, due to the success of Madhya Pradesh in utilizing the aerial photography and rectification process for substituting their plane-table (graphical records), improving their record keeping systems and making the whole system farmer – friendly. This process of technology-transfer from Indian Institute of Remote Sensing, Dehradun to the Commissioner of Land Records, Gwalior has been a successful example of the transfer of technology.

Meanwhile, new contemporary technologies namely, Global Positioning System (GPS) and Orthophoto Mapping are being harnessed for projects in India. The same technologies could prove very beneficial to the cadastral mapping.

It is suggested that Survey of India should again take the professional lead to `hold-hands' of States in so far as technological leadership and contributions are concerned.

The Proposed Technology For Cadastral surveys

A cadastral map (or for that matter any map) will generally have the following characteristics:

Geometry (Accuracy of Position) By GPS

The geometry of the map is achieved through use of appropriate instruments. The traditional technology of traversing for establishing ground stations on the periphery of the village revenue map will be replaced by GPS. GPS is very accurate and simple for establishing control points.

GPS technology in `differential mode' (DGPS) should be employed to accurately fix the `most sacred' control points i.e. `tri-junctions' (where boundaries of three or more villages meet).

The main advantage of GPS technology is that ground control stations can be provided even for isolated villages and patches of the area. The technology is not hampered by day / night or weather.

It is recommended that this project i.e. provision of field control should be provided under the supervision of State Government / Government of India in a Public-Private Participation mode. The whole process should be well documented.

Provision of Heights

In addition, height Bench-marks should be provided on the GPS stations. Presently, no heights are shown on cadastral maps. It is envisaged that heights will have good utility for irrigation projects etc. It is, therefore, recommended that suitable amendments to the present specifications should be made in the State Manuals.

Contents of Cadastral Map-use of Aerial Photography

Traditional methods of creating map-contents have been ground-based

methods of plane-tabling and / or actual measurements of the plot (followed in Field Measurement Book). These methods have their own shortcoming of inaccuracy etc. But the traditional methods need not be criticized as these have stood the test of time and courts. It is only now that newer technologies are available as replacement of the old technology.

The field methods have been replaced by the aerial photography (Photogrammetry for urban cadastre) and has been extensively used by Madhya Pradesh and some other States. A process known as `Rectification of aerial photography has been adopted by Madhya Pradesh. In this process the positional inaccuracy of land feature is removed. The condition is that the terrain has to be free from major undulations. Technically, rectification removes the distortions due to `tilt' of aerial photography.

Orthophoto Mapping

Orthophoto is an aerial image (aerial photograph) from where all the distortions, which adversely affect the geometry of the photograph, have been removed. These distortions are due to inherent `tilt' of aerial photograph and the `relief' (elevated / undulated terrain) of the objects on the ground. The process of `rectification of aerial photograph practised in Madhya Pradesh suffers because of the errors due to relief. The rectification is, therefore, not recommended for the terrain, which is highly undulated or hilly.

Thus Orthophoto technology will be an acceptable and recommended technology for future cadastral surveys.

The productivity i.e. the reduction of the cost (one third) and increase in production (2 to 3 times) will make this technology soft on budget.

Updating the Cadastral Maps

In view of the legal importance of the cadastral maps which are invariably referred to in matters of compensation for land acquisition etc, the updating is not only necessary but vital. Administratively, this process can be best performed by the persons who are already engaged in the preparation of records. If the original cadastral map has been well supported by GPS and Orthophoto technologies, the updating of the map becomes quite easy.

The above recommended technological processes lead us to reach to more intense technical discussions. These are motivated primarily due to useful satellite based technologies.

Role of High Resolution Satellite Imagery

Presently two commercial satellites with one-metre resolution are available from USA. The imagery is distributed by National Remote Sensing Agency, Hyderabad. From surveying point of view it should be noted that imagery of 1 metre resolution is able to give a Planimetric accuracy of about 3-4 metres [1] and that too when one uses the precise (costly) version of the imagery. Therefore, the imagery may not neccesarily be suitable for producing original cadastral records.

This imagery is, however, quite useful in updating 1:4000 scale cadastral records, especially those which have been based on more accurate technology of aerial photography or precise ground methods.

The use of IKONOS, Digital Globe of USA and in future, Cartosat of India has to be appreciated in the light of limitations and effectiveness:

Achievable Accuracies

GPS in differential mode will generally be able to provide accuracies of less than 5 cms to the control points. This is more than adequate for cadastral surveys.

Map on 1:4000 Scale Produced by Accurate Ground Method. Considering a point of 0.2 mm on the map of 1:4000 scale, the smallest possible dimension determined on the ground will be:

$$\frac{0.2 \times 4000}{10} = 80 \text{ cms or say 1 metre}$$

Aerial Photograph on 1:20000 scale to Produce 1:4000 Scale Cadastral Map – Orthophoto (digital).

Considering accuracy of 20 microns on the negative scale of 1:20000, the smallest dimension on the ground (represented by 1:4000 map scale)

$$\frac{20}{1000} \times 20000 \times \frac{1}{10} \text{ cms} = 40 \text{ cms}$$

taking into account the other errors due to photogrammetric processes (of aerial triangulation and Digital Terrain Model), the accuracy can be taken as 60 cms.

High Resolution Satellite Imagery 3 to 4 Metres as established by research papers. See references [1].

Height Accuracy of Aerial Photo 0.1 per thousand feet of flying height; scale 1:20000

$\frac{0.1 \times 10000}{1000} = 1$ foot flying height of 10,000 ft. by using 6" focal length camera

Therefore, contours can be drawn at (1.0 x 5) 5 feet, say 2 metres contour interval.

Methodology in Brief

Based on the above discussions, the recommended methodology is given below:

Aerial Photography At 1:20000 scale; black and white

GPS Control (Differential GPS) All tri-junctions and some more identifiable points are controlled. Sketches of the points are made. GPS will provide X, Y and Z coordinates of the points in terms of WGS 84 system. The Z can be ignored as the values are not in terms of spirit levelling procedures.

Photogrammetric Process – Aerial Triangulation and Digital Terrain Model (DTM) After this operations all model / overlaps would have control points. One can resort to Photogrammetry or digital Orthophoto Mapping.

Digital Orthophoto Mapping Recognised Orthophoto Mapping software(s) can be utilized to produce images which are true substitute of maps.

Cadastral Records Not all what is shown on an image is relevant. The property / parcel numbers have to be identified on the photo / image by revenue authorities.

Cadastral Map The line-cadastral or digital cadastral map will be prepared after the properties are identified by tracing or digitising.

Ground / Field check by Revenue Officials Revenue officials will make sure that all properties are taken care of attribute information can also be verified and completed at this stage.

Optional Work

- Heights of Objects can be surveyed
- Other information about soil, vegetation etc can also be picked up from photos and verified on ground.

Cost Aspect of the Methodology

The break up of the cost is as follows:

- **Aerial Photography** The cost depends on the location of the town and its distance from Hyderabad, from where the aircraft commences the flight. As a guide, the cost at Delhi will range from Rs 40 to Rs 50 per hectare.
- **GPS control** and other field surveys e.g. levelling cost range – about Rs 60 to Rs 70 per hectare.
- **Digital Orthophoto Mapping** Range …. about Rs 100 to Rs 125 per hectare
- **Field / Ground Verification** Along without attribute data – Rs 20 to Rs 30 per hectare

Taking the overall cost, it will range from Rs 175 to Rs 200 per hectare. For comparison the cost in a case study of similar nature done in Khamam District of Andhra Pradesh came to Rs 165 per hectare in late nineties.

Recommendations

What is recommended in this paper is the technical aspect of cadastral surveys which is appropriate, modern, acceptable, practical and will provide a big push to the profession of cadastral surveys. The sound base will be given by the technology which eventually will reduce the ambiguity regarding records.

This technology can be practised in the model o f Public-Private-Participation (PPP). The State Government Departments need not spend huge money in procuring of equipment and instruments.

It is recommended that at initial stages, and in order to increase acceptability of the technology, the job should be done in some selected Taluks as Pilot Project. The technology can be transferred to States after adequate confidence is built up in State Cadastral Organizations.

The Survey of India should take a lead role in the introduction of technology, say, up to establishment of ground control by GPS. The resources generated by private sector in Geomatics can be harnessed through appropriate PPP model.

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"Awareness is the key"

Prof V S Ramamurthy, Secretary, Department of Science and Technology (DST), Government of India emphasizes on awareness to promote positioning and navigation technologies. He feels that ultimately it is the applicability of the technologies that makes a difference. Since July 1995, Prof Ramamurthy has assumed charge as Secretary to the Government of India, Department of Science and Technology, New Delhi. Recently, the Government of India awarded its prestigious 'Padma Bhusan, 2005' award to Prof Ramamurthy

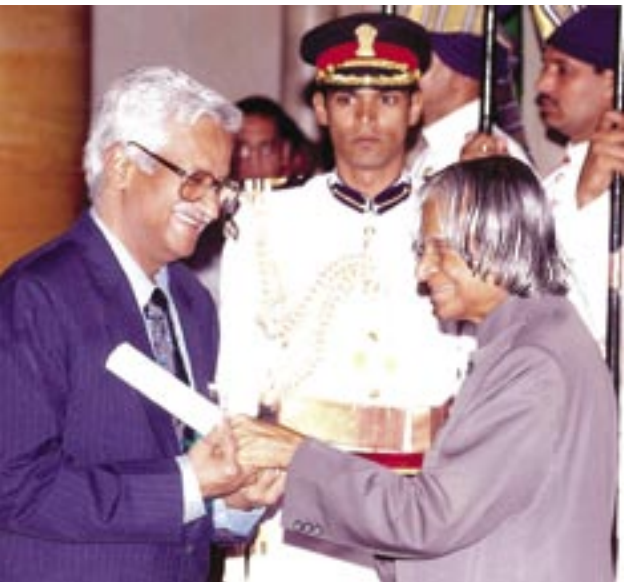
How optimistic are you about the future of positioning and navigation technologies?

Satellite based positioning and navigation technologies are finding increasing applications not only in surveying and mapping but also in various aspects of our day-to-day life like aviation, transportation, disaster management, recreation, mining, construction, seismology, etc. However, unlike developed countries like US, Europe and Japan, the technology is still in its infancy in India.

What can be done to promote these in India?

Awareness is the key. Not many are aware about the potential and wide applicability of these technologies. I must appreciate initiatives like *Coordinates* that will go a long way in this regard. However, you must understand that awareness needs to be generated not only at the level of prospective users and research institutions but also at the level of policy and decision makers too.

More importantly, people need to see the real applications of such technologies in their daily life. Something like US 911 emergency service. If people find that such services have made qualitative change in their lives, no one can stop such technologies making in roads not only in India but many other developing countries also.



Professor VS Ramamurthy (L) receives Padma Bhushan from President Kalam (R)

Do you see any policy constraints?

It was not long ago that GPS import in India was restricted. However, the new policy of allowing free import of GPS will surely boost this market. The other constraint is availability of digital maps. We are working on the new map policy, which is expected to address most of the concerns of users of digital maps. The policy will be effective very soon as it is waiting to get a nod from the government.

Please share some GPS initiatives in your department

The Department of Science and Technology had formulated a comprehensive programme on the use of GPS for earthquake hazard assessment. The programme was initiated in 1998. A number of permanent stations and semi-permanent stations at representative locations have been established throughout the country. A national GPS Data Centre has also been established at Survey of India, Dehradun for data integration, collation and dissemination.

Do you think that India should have its own satellite based position system?

Indian Space Research Organisation (ISRO) along with Airport Authority of India (AAI) has worked out a joint programme to implement the Satellite Based Augmentation System (SBAS) for the Indian region. The project called GAGAN (GPS Aided Geo Augmented Navigation) has been taken up to demonstrate the SBAS technology over the Indian region.

Talks regarding Indian Regional Navigation Satellite System" (IRNSS) are already in the air. In principle, there should be no issue on that, however, execution of such a plan will need huge investment of time and money.

Personally I feel that scientists should also keep on priority a research agenda of finding alternative ways of positioning and navigation even they have limited applications.

Tsunami shifts Bangkok southwest...

Bangkok has moved about nine centimetres (3.5 inches) horizontally southwestwards because of the December 26 earthquake that measured 9.0 on the Richter scale and sent devastating tsunamis across the Indian Ocean. The tourist island of Phuket also moved 32 centimetres (12.6 inches) southwestwards since the quake, said the Chulalongkorn University researchers, who used GPS satellites to measures the shifts during a January 20-24 survey. Researcher Itthi's survey engineering department at Chulalongkorn is collecting data from six other locations in Thailand to get a better picture of how the nation's geography has changed, the Nation newspaper reported. *http://www.channelnewsasia.com*

...and brings India and Indonesia 12cm closer

The December-26 earthquake that triggered the giant tsunami pushed India 12 cm closer to Indonesia, according to scientists of the National Geophysical Research Institute (NGRI). The findings are the result of analysis of data gathered over a month from GPS receivers at different locations by a team of NGRI scientists. These post-quake coordinates of the two land masses indicated by the GPS receivers, supplemented by data from permanent GPS stations in Indonesia and India, showed that southern India had moved 10-15 mm eastwards and Sumatra a bit less westward, bringing them 12 cm nearer to each other. *http://timesofindia.indiatimes.com*

GPS production to skyrocket to $21.5 billion in 2008

The GPS technology has contributed a great deal to the world economy over the last decade. Presently, there are more than hundreds of uses of GPS, starting from stand-alone applications to more integrated, embedded applications. In Western Europe, the vehicle navigation market is in its initial stages, but there is already a strong demand for traffic information and navigation solutions. Countries like USA, Japan, and some others have gained a cumulative shipment of 9.39 million in-vehicle navigation and traffic information units in May 2002, and still find a great demand.

Research and Markets has announced the addition of 'GPS Market Update 2004-2005' to their offering. The GPS production value globally is expected to grow to $21.5 billion in 2008, up from $13 billion in 2003, according to the Industrial Economics and Knowledge Center (IEK) of the Industrial Technology Research Institute (ITRI), Taiwan.

In the year 2003, GPS equipment sales was reported to be around US $3.5 billion worldwide, and that annual market could grow to US $10 billion after 2010, according to a report published by a market research firm.

Based on the industry trends and technological assessment, experts predict that the market is expected to grow by the next 15-20 years. The market is yet to perform as well as expected. Predictions also show strong annual growth and an expected market size of US $757 billion by 2017. *http://www.spacedaily.com*

NOAA readjusts the National Spatial Reference System

Beginning in June 2005, the US-based National Oceanic and Atmospheric Administration (NOAA) will perform a general readjustment of the horizontal position and ellipsoidal heights in the National Spatial Reference System (NSRS) using high accuracy GPS data. The NSRS is a consistent national coordinate system that specifies latitude, longitude, height, scale and gravity throughout the nation. This data provides the foundation for transportation, communication, mapping, charting and a multitude of scientific and engineering applications. Using GPS data, the readjustment will improve accuracy and consistency of the NSRS and provide a local and network accuracy measure for each coordinate. *http://spatialnews.geocomm.com*

UAE vehicles to install telematics devices

The United Arab Emirates (UAE) has hired computer giant IBM to develop a special traffic tracking system to help curb road accidents that have reached deadly proportions, a statement said. Under the four-year contract, worth up to $125m, the "telematics" devices will be installed in tens of thousands of vehicles, whose drivers are deemed among the world's worst, in pilot projects over the next four years to allow police to better manage chaotic traffic in the state.

Similar in concept to the black boxes found in aircraft, the new telematics device combines microprocessors with advanced GPS tracking and other wireless communications to capture, analyse and deliver data via a wireless network to the UAE's Ministry of Higher Education and Scientific Research.

The device is so advanced that it can monitor the speed of the moving vehicle and compare it to the defined speed limit on each street. If the car exceeds the limit, the device sends out a warning message to the driver. Trials of GPS-monitored speed sensing systems have already begun in the Netherlands. *http://www.thepeninsulaqatar.com*

Germany's SC rules GPS police searches constitutional

Germany's Supreme Court has ruled that police surveillance via the satellite-based GPS and the use of data

gained from such observations is not unconstitutional. The Court thus overruled the charge that a member of the "Anti-Imperialist Cell" had been unconstitutionally sentenced to thirteen years in prison on four counts of murder and four bombings.

In their investigations, criminal prosecutors had installed a transmitter in the suspect's vehicle, which they are allowed to do according to the Act for the Prevention of Illegal Narcotics Trading and Other Types of Organized Crime (OrgKG). After it had been detected and rendered useless, the police installed a GPS receiver in the car. By analyzing the positioning data for roughly two and a half months, the police were able to track the vehicle's trips and stops almost completely. The technology is said to have considerably helped investigators prove that the suspect committed the four bombings.

However, the suspect filed suit at the Supreme Court to have such tracking via GPS ruled an unconstitutional violation of his basic rights. He argued that GPS surveillance represents an especially severe breach of his privacy and thus requires special legal authority. Therefore, he claimed that the simultaneous surveillance of him and the others facing similar charges is unconstitutional. The data and knowledge gained in the process thus should not have been allowed in court.

However, the judges in the Second Chamber of the Supreme Court ruled that the technical surveillance of suspects does not generally constitute a breach of privacy. The court found that scope and intensity of the intervention in privacy that takes place when technical instruments are used for surveillance generally do not reach the inviolable core area of the right to lead the kind of life one wants. In addition, the legal regulations fulfill the legal requirements. However, the court called on legislators to keep a close eye on technical developments in light of the rapid changes in information technology and the risks they pose for the protection of basic rights.

India plans for regional satellite navigation system

India is planning a regional satellite navigation system, similar to the GPS of the United States. India wants to set up the "Indian Regional Navigation Satellite System" (IRNSS), that would be totally under its control.

When implemented, the IRNSS would provide positional accuracy similar to the GPS system for 1,500 km around the country, according to the Notes on Demands for Grants from the Department of Space. A configuration with eight satellites was being studied, say officials of the Indian Space Research Organisation (ISRO). In addition, ISRO and the Airports Authority of India are jointly establishing a GPS augmentation system for navigation and precision landing of aircraft over India. *http://www.hindu.com*

GAGAN to have SBAS equipment

NovAtel Inc., a precise positioning technology company, has announced that an order for additional Space Based Augmentation System (SBAS) equipment was received from Raytheon Company in support of the Indian GAGAN program.

This latest contract with Raytheon follows on from an award to Raytheon by the Indian Space Research Organization (ISRO) of a contract for the ground-based elements of the GPS and GEO (Geostationary Earth Orbit) Augmented Navigation (GAGAN) Technology Demonstration System (TDS), in November 2004. NovAtel will supply receiver elements of these ground-based elements, which will be included in eight Indian reference stations, an Indian master control center, and an Indian land uplink station.

The GAGAN project is part of a worldwide movement toward space-based navigation, which has been endorsed by the International Civil Aviation Organization. *www.novatel.ca*

Offtrack

Elephants go hitech: send GPS data via SMS

As part of a campaign by NGO, Save the Elephants, pachyderms in Kenya are getting in on the action, as well. They're being fitted with specially designed GSM/GPS collars that hold what are essentially mini cellphones, which are programmed to send SMS messages to farmers' mobiles with the latest GPS positions of the animals.

The elephants can also be tracked on the web in (near) real time via Animal Tracking System software, which gathers data from the GSM/GPS tags and makes it available via standard web browsers. *http://www.engadget.com*

And the blind will see: pocketPC and GPS tools

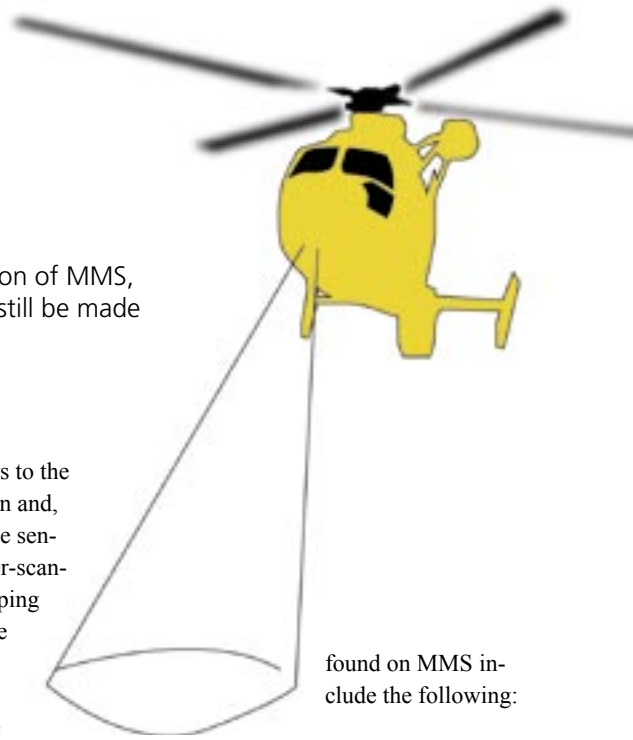
HumanWare of New Zealand is showing the first integration of Trekker, a standalone GPS orientation solution for the blind, and Maestro during the CSUN Conference on Technology and Persons with Disabilities. HumanWare is a new company created through the recent merger of VisuAide and Pulse Data, both active in the development of products for persons with disabilities. *http://www.geekzone.co.nz*

Old trees get new lease of life in China

After losing 86 old trees over a period of six years, Shenzhen has turned to the GPS to preserve the remaining old trees. From last September, Shenzhen forestry authorities began defining positions of old trees using the system and, so far, the positions of more than 400 old trees had been determined by means of the positioning system, said Chen Lizhong, an official of the municipal forestry office.

The special economic zone excluded the districts of Bao'an and Longgang and a tree older than 100 years was regarded as an old tree, he said. Chen said they would soon start recording old trees in Bao'an and Longgang. *http://english.people.com.cn*

Mobile Mapping Systems



In spite of the proven abilities and increasingly widespread adoption of MMS, there are a number of areas where significant improvements can still be made

CAMERON ELLUM AND NASER EL-SHEIMY

The past two decades have seen extraordinary growth in the demand for geo-spatial data. This demand has numerous sources and takes many forms; however, the net effect is an ever-increasing thirst for data that is more accurate, has higher density, is produced more rapidly, and is acquired less expensively. Unfortunately, traditional techniques for collecting spatial data, such as conventional surveying techniques, point-wise GPS, or aerial photogrammetry, have difficulties satisfying many of the new data collection requisites. Conventional surveying or point-wise GPS are, for instance, poorly suited for the rapid and inexpensive collection of data over large areas. Traditional aerial photogrammetry, while satisfying these needs, is disadvantaged by the requirement to establish moderately dense and expensive ground control.

An alternative to both point-wise GPS and traditional techniques of data collection is the use of multi-sensor systems that integrate various navigation and remote sensing technologies together on a mobile aerial or terrestrial platform. These Mobile Mapping Systems (MMS) capitalise on the strengths of the individual technologies in order to increase the efficiency of data collection.

Description

A succinct and task-oriented definition of a MMS is as follows: a mobile multi-sensor system used for the rapid collection of directly geo-referenced remotely-sensed data. Key to this definition is the concept of geo-referencing, which refers to the process by which the location and, optionally, attitude, of remote sensors, such as cameras or laser-scanners, is determined in a mapping co-ordinate frame. Once the sensors have been geo-referenced, additional co-ordinate information can then be extracted for features visible in the remotely sensed data. When the remote sensors are directly georeferenced, their locations are determined without reference to external control.

The above definition strongly hints at the components of a MMS. Firstly, a MMS must be mobile. This means it must be mounted on a moving platform such as an aircraft, automobile, or person. Secondly, a MMS must obviously have one or more remote sensors. Common sensors used in MMS include:

- Frame imaging sensors, both film-based and digital
- Laser scanners (LIDAR)
- Synthetic aperture RADAR (SAR)
- Line-imaging sensors
- Hyper and multi-spectral scanners
- Infrared cameras

Finally, in order for these sensors to be directly georeferenced, navigation sensors must also be installed on the platform. The data from the navigation sensors, together with the calibrated or measured positional and angular offsets to the remote sensors, is used to determine the position and attitude of the centres of the remote sensors. Like the remote sensors, the navigation sensors can vary; however, a GPS receiver is omnipresent. Other navigation sensors commonly found on MMS include the following:

- Inertial measurement units
- Tilt sensors
- Speedometers/odometers
- Magnetometers

The most important benefits of MMSs are a reduction in both the time and cost of data collection. They also have a number of additional advantages. For example, both spatial and attribute information can be determined from the remotely sensed data. Furthermore, data can be archived and revisited, permitting additional data collection without additional field campaigns.

Applications

MMS find applicability in any project where spatially referenced data is required. In particular, projects in which wide coverage and faster turnaround are important, or those in which attribute data available from the remote sensors is as important as co-ordinates. An application that shares all of these demands is GIS data acquisition. Indeed, this application was, perhaps, the primary motivator behind MMS development. Other applications where MMS have found use include asset monitoring, environmental monitoring, disaster response, and accident investigation.

Applications of MMS extend beyond strictly mapping applications. For example, because MMS can rapidly cover large areas, they greatly facilitate the generation of large-scale 3-D models. This task is made particularly efficient if the MMS combines a laser-scanner with frame imagers. Such models are useful in applications ranging from military to tourism. The georeferenced images from MMS can also be useful on their own, even without additional spatial information being extracted from them. For example, the images for Amazon.com's new block view, which lets users search for a business and then view an image of that business's building, were collected using a simple MMS.

Challenges

In spite of the proven abilities and increasingly widespread adoption of MMS, there are a number of areas where significant improvements can still be made. Foremost among these is in the automated extraction of features from the remotely sensed data. Automated feature extraction has been one of the major research areas in mobile mapping technology since its inception. However, the techniques created so far have nearly all been ad-hoc solutions that work only with data from a single remote sensor, and for a limited number of features captured in specific environments from restricted sensor geometries. The techniques also typically require a moderate level of human monitoring. More advanced techniques of feature extraction that require less user input and interaction will open up even more applications for mobile mapping technology. Many of the developments in this area will require participation from researchers in robotics, artificial intelligence and computer vision. Closer collaboration with these researchers will undoubtedly benefit both the computer science and mobile-mapping communities.

Another area in MMS where there is room for improvement is in the sharing of data between the navigation and remotely sensed data processing streams. Currently, the sharing of data during processing is done at a rather superficial level: the results from the navigation processing are used to georeference the remotely sensed data, and then the mapping information of interest is extracted from the remotely sensed data. More advanced strategies where the sharing is done at the measurement level and/or in both directions could provide improved accuracy and reliability.

An additional limitation of existing MMS is with their exclusivity. With the exception of a few aerial imaging systems, most systems have been one-off creations that are operated by the companies or institutions that created them. There exists no turnkey MMS that can be easily installed on an arbitrary platform. If an affordable consumer mobile mapping system were available, it is likely that new applications which are not yet even envisioned would be made possible. Ideally, a consumer system would be modular in nature, accepting different navigation and remote sensors according to customer requirements. This plug-and-play framework would extend to the software, which could optimally make use of the data from all available sensors. Tied to the creation of consumer systems is a reduction in system cost. There would, of course, be some reduction simply from the economies of scale in manufacturing a consumer system, but additional cost savings would have to be found through new sensor technologies.

Outlook

Compared to the intensive research period of the 1990s, during which many first-generation systems were created, MMS development is proceeding at a somewhat reduced pace. However, important advances are still being made and second-generation systems are starting to appear. These new systems benefit from advances being made in their constituent components. For example, in aerial systems, digital sensors are replacing film cameras, and in terrestrial systems, black-and-white cameras are being replaced by higher-resolution colour cameras. Advances in navigation sensor technologies, for instance, GPS modernisation, the GALILEO system, and MEMs-based inertial sensors, are also having an impact on new systems.

More advanced techniques of feature extraction that require less user input and interaction will open up even more possibilities

MMS development is ongoing because the commercial viability of companies who are providing services with MMSs has been well-demonstrated. Given the ever-increasing demand for spatial data, it is safe to conclude that both MMS and their operators will continue to be commercially successful. The future of MMSs is bright!

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Patong, Thailand gets disaster alert system

The first sites to broadcast warnings in the event of an emergency at Patong beach, Phuket will be operational this month as part of a national disaster early warning system, according to the Geo-Informatics and Space Technology Development Agency (GISTDA).

These will become the first of between 40 and 50 locations in six provinces facing the Andaman Sea with loudspeakers to broadcast information in the event of a natural disaster such as a tsunami wave. *http://www.bangkokpost.com*

South Korea to have maritime observation satellite soon

South Korea will embark on a plan this month to develop a maritime observation satellite capable of providing data on waters surrounding the Korean Peninsula, reported South Korean Yonhap News Agency. The envisioned geostationary satellite will be jointly designed and constructed by the Korea Aerospace Research Institute, the Korea Ocean Research and Development Institute and Astrium, a French satellite maker, Yonhap quoted the South Korean Ministry of Maritime Affairs and Fisheries as reporting.

The report said the satellite would be placed in a geostationary orbit over the equator. However, it did not disclose when the satellite would be completed or launched. *http://news.xinhuanet.com*

Remote sensing center put on standby in Yemen

Minister of Telecommunications Abdul-Malik Al-Moallimi has announced that a remote sensing center will be set up as soon as the legal status of the center is completely established.

The minister said that the center would play a crucial role in locating and monitoring potential natural resources and environmental conditions. "At the instructions of the cabinet, we are working together with the Ministry of Legal Affairs to set up the center using the GIS, which will serve in expanding scientific research." *http://www.yobserver.com*

Islamic satellite for moon sighting

Saudi Arabia together with some Islamic countries are working on a pioneering project to launch a satellite, which will be used for moon sighting to decide accurate dates of religious rituals and festivals in the Islamic calendar.

A 15-member panel from Saudi Arabia, Egypt, the UAE and Bahrain has already decided in consultation with the Cairo University's Space Studies Center to award the contract for manufacturing this first Islamic satellite to an Italian company at a cost of SR30 million. *http://www.arabnews.com*

Now search satellite maps in Google

Google has unveiled a new feature that will enable its users to zoom in on homes and businesses using satellite images, an advance that may raise privacy concerns as well as intensify the competitive pressures on its rivals.

The satellite technology, which Google began offering at http://maps.google.com, is part of the package that the Mountain View-based company acquired when it bought digital mapmaker Keyhole Corp. for an undisclosed amount nearly six months ago. This marks the first time since the deal closed that Google has offered free access to Keyhole's high-tech maps through its search engine. The satellite maps could unnerve some people, even as the technology impresses others. That's because the Keyhole technology is designed to provide close-up perspective of specific addresses. *http://www.detnews.com*

ISRO to set up VRCs to provide info to rural mass

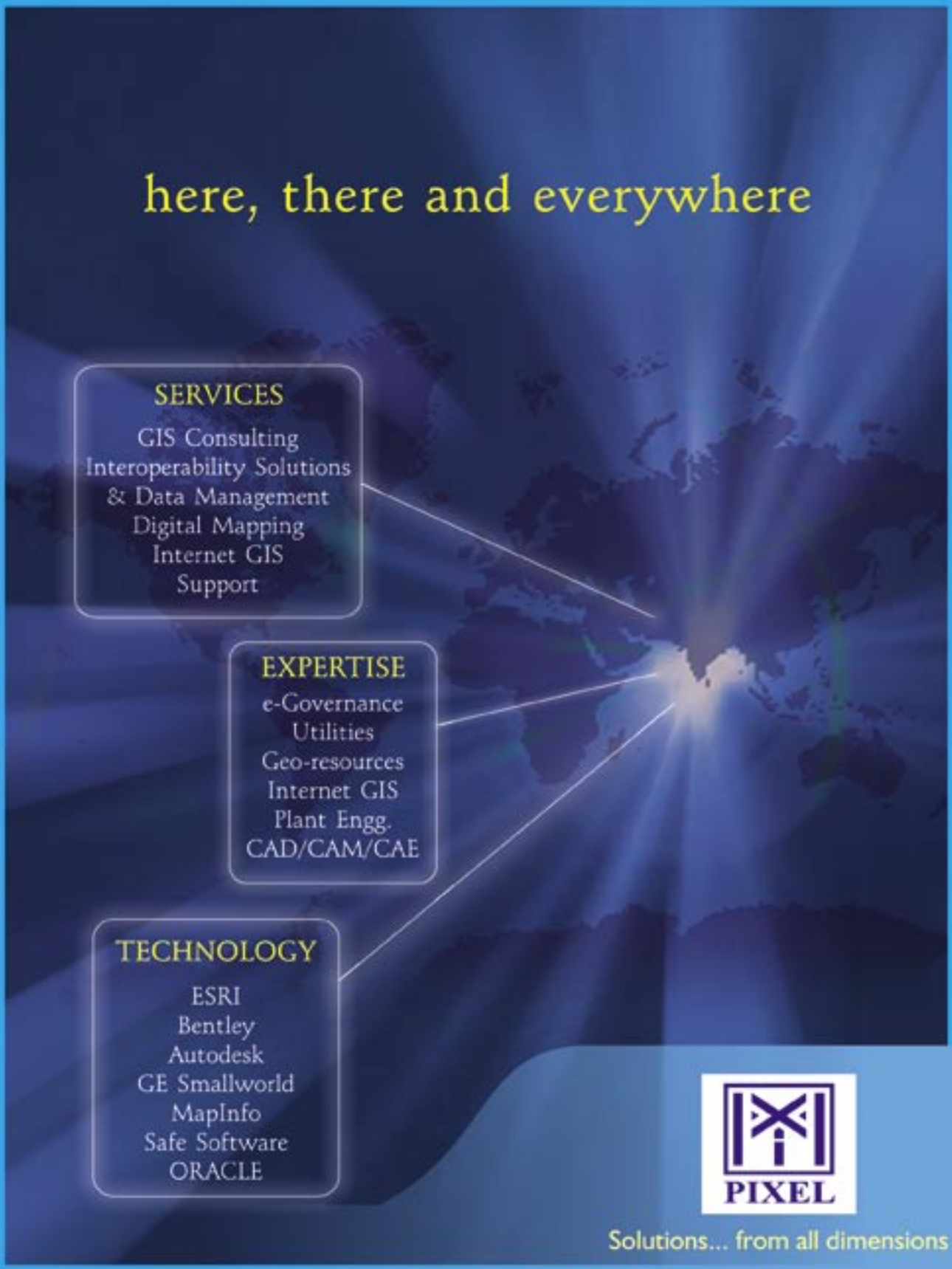
Indian Space Research Organisation would soon set up 25 Village Resource Centres across the country to provide locale-specific information to rural population through remote sensing satellites. VRCs would utilise the space system for a variety of applications to provide information on various fields such as land use, land cover, soil and ground water prospects, an ISRO report said.The facility would also enable online interaction between local farmers and agricultural scientists to discuss crop related problems and could provide critical information to fishermen such as sea state and wave heights, it said. *http://netindia123.com*

Kasturirangan selected for prestigious award

Former Indian Space Research Organisation (ISRO) Chairman and the National Institute of Advanced Studies (NIAS) Director, Dr K Kasturirangan has been selected for the prestigious Aryabhata Award-2003 in recognition of his outstanding lifetime contribution to aeronautics by the Aeronautical Society of India (ASI). *http://www.deccanherald.com*

India, Venezuela sign MOU on Space Cooperation

A Memorandum of Understanding (MOU) on cooperation in space science and technology was signed recently between the Indian Department of Space (DOS) and the Ministry of Science and Technology (MCT) of Venezuela. Mr G Madhavan Nair, Chairman, Space Commission and Secretary, Department of Space of India, and Ms Marlene Yadira Cordova, Honourable Minister for Science and Technology of Venezuela signed the MOU in the presence of Dr Manmohan Singh, Prime Minister of India and Mr Hugo Chavez, President of Venezuela. *http://www.spacedaily.com*



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Mobiles meddle in privacy

What are the objections to having location devices such as GPS? They may be misused with no protecion

GEORGE CHO

In the aftermath of the terrorist attacks on New York and Washington, finding people and bodies in the rubble was of utmost importance. This task was directed at finding location bearing devices incorporated in commonplace instruments such as mobile phones, personal digital assistants (PDAs) and electronic pagers. By polling these devices electronically using a system of triangulation points it was thought that persons and bodies could be found. Polling is simply sending electronic impulses to receivers to ascertain where these devices are located. However, and sadly, such devices have a limited range and may have no effect if buried in more than a meter of rubble. Also, some such devices incorporate global positioning systems (GPS) and these require access to the sky and to the constellation of satellites orbiting the Earth. Even the sniffer dogs gave up this mammoth task.

GPS enabled mobiles

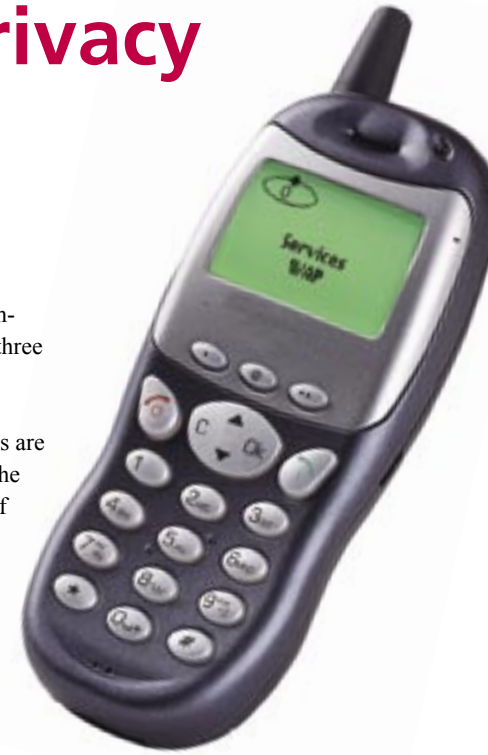
The use of tracking devices has come at a time when ironically the US government will introduce controversial GPS as a means of tracking mobile phones so that they may be located spatially. In Australia, the Communication Authority (ACA) is attempting also to track mobile phone callers more accurately. In a discussion paper it has been suggested that GPS enabled mobile phones is a possibility.

What are GPS? These are simply satellite tracking devices that help determine locations. Circulating the globe is a constellation of 24 satellites. A GPS must find at least three satellites in order to accurately determine any location and give its "x" and "y" positions. This is simply a matter of triangulating the three satellites to pinpoint a location.

But remember that these satellites are US military satellites and have the ability to mess up the accuracy of locations. On board are devices which can be turned on and off and this is termed 'selective availability' (SA). In 2000, President Clinton, in one of his last gestures of office, decreed that SA be switched off permanently. This means that we are now able to get accurate locations up to a meter. If SA was turned on you only could get accuracy between 100 to 500 meters which is useless if you wished to use this device in any practical way.

With that Executive decree it is now possible to see GPS incorporated into the mobile phone through to inboard vehicle navigation systems that emergency vehicles use – fire, ambulance, police etc. BMW has one, as has select Holden cars and the small Hyundai. It should be mandatory for sea farers especially those taking part in epic races such as the Melbourne-Hobart, Sydney-Hobart or even the round-the-world races. GPS could simply be sewn on to the life jackets and activate on hitting water just like how emergency beacons are triggered.

This reminds me of some malfeasant Boeing employees in Washington who stole a life raft from a 747. They were successful in getting it out of the plane and home. When they took it for a float on the river, they were surprised by a Coast Guard helicopter coming towards them. It seems the chopper was homing in on the emergency locator that was activated when the raft was inflated. They are no longer employed at Boeing.



Potential threats

But seriously, what are the objections to having location devices such as GPS? The devices may be misused, there may be no protection to its misuse. Civil liberties may be threatened and these have been surrendered unknowingly. Criminals may use the technology to track persons using their mobile phones. Marketers could advertise products and invade privacy. Even protective service officers could inadvertently exceed their authority as we may not know under what circumstances they can be used. The Electronic Frontiers Australia and the Australian Communication Industry Forum have discussed these issues at length in their respective websites. See www.efa.org.au and www.acif.org.au.

Prospects

Cell networks generate data by collecting information about the cell site and location of the person making or receiving a call. Location information may be captured when the phone is merely on, even if it is not handling a call. It is here that both the government and the private sector are most interested. For the government it may

seek to build added surveillance features into the network and ensure that it can be assessed giving it the increasingly detailed data the network has captured. For the private sector it may use this new information both to provide taxi services as well as to use its potential for advertising.

Location-based services (LBS) are considered by many to be a major potential revenue generator for wireless operators and service providers. Its applications in e-business are immense. Location-enabled services include so-called finder services and buddy list services that are linked to Instant Messaging (IM) to help a user find people. Also there will be premium subscriptions for services that track traffic, provide maps and directions, targeted advertising, interactive games, asset tracking, telematics, network management systems and weather reports.

Hindrances

The greatest hindrance to rapid revenue growth for location services is the lack of standards in various technologies, including basic positioning technology. Variants to the technology include AOA (angle of arrival), Cell-ID, E-OTD (enhanced observed time difference), A-GPS (assisted-GPS), D-GPS (differential-GPS), signal attenuation and TDOA (time difference of arrival). These are all related to the sending of signals from one station and a return signal bounced back from either a satellite or another station and instantaneous measurements of time and relative movements of both stations help measure distances as well as pinpoint locations. Don't be scared off of these acronyms, they become self-explanatory on reflection.

The three largest mobile phone manufacturers are setting up a forum to develop global interoperability between mobile positioning systems. Ericsson, Motorola and Nokia have founded the Location Interoperability Forum (LIF) with the goal of creating wireless location-based services worldwide that will work on all wireless networks and phones.

Privacy and legal protection

But such enhancements to law enforcement surveillance capabilities and market orientated capabilities raise serious privacy concerns. The third generation (3G) cell phones and web enables electronic devices are already available and everyone is eagerly watching for something to happen both in policy terms and in practice. The concern about further atrocities involving the use of electronic communication systems may prevail over the need for manageable e-business and personal data protection. Is the world moving towards a clamp down of human rights protection and data privacy protection? It is too early to tell.

Already plans are afoot to introduce some kind of legislation. In the US a Location Privacy Protection Act has been introduced by Senator John Edwards, a North Carolina Democrat. The Act is designed to protect the privacy of individuals that use Internet-ready devices that pinpoint the person's location. It would require companies to notify users about location data collection and prohibits the sale and use of the information without consent. *See allnetdevices.com/wireless/news/2001/07/13/location_privacy.html*

Some claim that the wireless industry cannot have m-commerce or advertising without location-based services. GPS and location based ads are probably a beautiful thing in theory. The problem is, how much can one absorb in a certain amount of time? *See www.anywhereyougo.com.*

In Australia, as elsewhere around the world, GPS enhanced mobile phone systems have found a niche in the youth market and especially the Short Message System (SMS) where texts may be sent and received on handsets. Australia's SMS portal BlueSkyFrog already has up to 2 million members signed up to receive free SMS alerts for flicks, gigs and fun. Sydney's newest FM music station Nova 96.9 uses SMS texting for promotions and competitions. Foxtel's Channel V sends fans personalised SMS alerts to let them know when their artists will next appear on TV. All these suggest that perhaps word of mouth is a more powerful media than traditional advertising, at least among the youth market.

The concern about further atrocities involving the use of electronic communication systems may prevail

As a final note for the geographically challenged, "x" refers to the latitude of your current location, "y" the longitude of that same location and "z" height above sea level datum. One may ask why teaching geography in schools has been discontinued in some parts of the world, such as in Australia? It's such a pity that such an interesting and valuable a subject is left only in the minds of people who are able to reminisce about the good old days!

George Cho is an Associate Professor in Geographic Information Systems and the Law at the University of Canberra. His recent publication is Geographical Information Science: Managing the Legal Issues (2005) published by John Wiley & Sons, Chichester, UK.
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India

FDI to accelerate mapping in India

The Indian Govt. is going to attract foreign direct investment (FDI) in the GIS and aerial mapping sectors to prepare an exhaustive database for the entire country. Union Minister of State for Science, Technology and Ocean Development, Kapil Sibal said that opening the sector for FDI would help speed up the area mapping work in the country.

"The map database, being prepared by using GIS, would help tackle future challenges more effectively and improve India's performance in areas like agriculture and infrastructure," said Sibal. *http://cities.expressindia.com*

Jammu information will be a click away

Just with the click of a mouse, information will be available to the babus to take decisions as the J-K government has signed a MoU of over Rs 7 crore with the Department of Space to start mapping of different districts of the state. Once the mapping is over, computers at the offices will reel out all information about the district. *http://www.expressindia.com*

NCMH to map health infrastructure

In effort to increase spending on public health, the Indian Government has set up a National Commission on Macroeconomics and Health (NCMH). The commission will assess the cost and means of funding a comprehensive health package, especially to provide free treatment for the poor population.

Set up on April 1, 2004, the commission has been set up in response to the Jeffrey Sachs Report submitted to WHO two years ago, which advocated an increase in the health expenditure in developing countries. A study undertaken by NCMH from June to October 2004, covering the districts of Kozhikode (Kerala), Khamam (Andhra Pradesh), Jalna (Maharasthtra), Ujjain (Madhya Pradesh, Udaipur (Rajasthan), Varanasi (Uttar Pradesh), Vaishali (Bihar) and Nadia in West Bengal, mapped the private and public health facilities in the country. The GIS design has been made by National Informatics Centre."*http://www.expresshealthcaremgmt.com*

HCL to automate biz process in Bangalore

HCL has been selected by the Bangalore Development Authority (BDA) to design, develop, implement and support an Integrated Management Information System to automate the business processes in its various departments. The project encompasses interfacing with the present IT infrastructure at Bangalore Development Authority with respect to the existing applications, which are OCMS (an Application for Online Complaint Management), IVRS (Interactive Voice Response System, an application with voice response capabilities for complaint management), GIS - Geographical Information System and e-KIOSK (an application made available to public through KIOSKS set up at various locations throughout the city) *http://economictimes.indiatimes.com*

Middle East

Doha to become hub for commercial licensing

Commercial licensing of businesses is being centralised with a single-window system being set up at the Doha Ministry of Economy and Commerce.

The new system is being installed to cut red tape and improve efficiency so that businesses are not affected due to unwanted delays. Plans are afoot to depute employees from the various ministries to man the proposed single-window commercial licensing outlet at the economy ministry. A decision is expected to be taken shortly between the civic and economy ministries. The Ministry of Municipal Affairs and Agriculture has also developed a GIS through which its concerned officials would be able to pinpoint the location of a business, which applies for a commercial licence. Renewals of these licences as well as inspection for health clearance would be conducted through the GIS system. *http://www.thepeninsulaqatar.com*

UAE's FEWA opts ArcFM UT for their enterprise GIS application

FEWA (Federal Electricity and Water Authority), UAE has decided to implement their enterprise GIS application based on AED-SICAD's ArcFM UT and ESRI's ArcGIS. The ESRI distributor and AED-SICAD business partner GISTEC will implement the network information system jointly with MAPS, which is responsible for data collection. The decision came after an extensive tendering phase, where all major network information system provider were present.

GISTEC along with its partners MAPS & AED-SICAD will provide technical consultancy to establish a strategic GIS Center for FEWA with the necessary hardware, software, data etc. The GIS center in conjunction with the current

SCADA center will help to enhance the current technical maintenance and management of FEWA's electrical and water assets and to optimize resources in terms of time, personnel and support material during its activities. *http://www10.giscafe.com*

Updated NAVTEQ maps of Middle East available

NAVTEQ, the providers of digital maps for vehicle navigation and location-based solutions of US, has added new roads and updated attributes and geometry on existing roads in its maps of the following middle eastern countries: Bahrain, Kuwait, Oman, Qatar, the United Arab Emirates and Saudi Arabia. The updated maps of Bahrain, Kuwait, Oman, Qatar and the United Arab Emirates were released in Q4 2004, and the updated map of Saudi Arabia was released in Q1 2005 to NAVTEQ's direct customers. *http://www.navteq.com*

Lebanonese municipalities introduce computerized maps

Municipalities throughout Lebanon are getting a helping hand in their fight against corruption and inefficiency from a new program that will generate computerized "maps" of information. Head of Jounieh municipality's IT department, Fawzi Baroud, said: "Think of a map of Jounieh where you can zoom in on a house and find out everything about it, from taxes owed, to its size, to number of residents and so on." He added: "It is basically the computerization of the municipalities. This is an important step towards efficienct control of municipality activities."

As part of the program, a municipal GIS will be implemented over the next two years in 20 municipalities to create computerized "mapping" of some 70 layers of physical, financial and taxpayer data. The GIS has already been implemented in Jounieh as a pilot project, where inspectors are evaluating "pending municipal transactions for citizens as well as overdue transactions." *http://www.dailystar.com.lb*

South East and Far East Asia

GIS project in southern Thailand on the verge of completion

The government's information database project, part of the peace-restoring programmes in the country's deep South, using GIS is almost complete, its project manager, Prasert Kaewpetch, said recently. The remaining 20 percent still to be collected are mainly details on the Islamic religious schools in Thailand's three southern border provinces of Yala, Pattani and Narathiwat.

Most of the existing database has been supplied by the Ministries of Education and Interior, he said. A working panel is scheduled to visit the three provinces on 21 April to collect more information for the project.

The database with information on all education-culture-religions-related activities of local people is expected to help the government deal more effectively with the violence problem in the deep South, Mr. Prasert said. *http://www.mcot.org*

FAO's Atlas on tsunami damaged areas in Asia

The Food and Agriculture Organization of the United Nations (FAO) has prepared an atlas on the areas affected by the 26 December 2004 tsunami in Southeast Asia, which has proven to be very useful to FAO teams and to Italian and other European officials and non governmental organizations working in the devastated zones. The Tsunami Atlas was prepared using images collected from FAO databases and completed by major spatial data sources on the web, which includes raw satellite images, interpreted satellite images, topographic maps, thematic maps and geo-statistics.

The Atlas will soon be distributed widely in hard copy throughout the tsunami-affected countries, including national ministries, UN agencies and non-governmental organizations. *http://biz.yahoo.com*

GfK MACON updates digital maps of Europe

GfK MACON of Germany has checked and updated the digital maps of Europe. This involves the administrative and postal maps of Germany, Austria and Switzerland. They are available in the formats of all standard GIS. The updated map reveals that in eastern Germany in particular, the number of communities has been changing constantly since reunification, but not in any uniform manner. The state of Mecklenburg-Western Pomerania alone has 128 changes to record, while Saxony-Anhalt has 94. There was a reduction of six in the number of communities in Thuringia while overall in Germany, a total of 223 communities were dissolved. Changes in the communities usually result in changes to the postcode areas. *http://www.gfk-macon.com*

Geospatial Semantic Web Interoperability

The Open Geospatial Consortium (OGC) Review Board has approved the launch of the Geospatial Semantic Web (GSW) Interoperability Experiment (IE). The Interoperability Experiment will take several important steps towards the development of the Geospatial Semantic Web, where discovery, query, and consumption of geospatial content are based on formal semantic specification. The GSW will enable the meaning of geographic queries to be easily shared among different software systems and online services.

Many pieces of the GSW puzzle have been under development in the last several years. This experiment aims to augment existing Web focused mapping specifications (OpenGIS Web Feature Service and Filter Encoding) with a semantic query capability, through the definition of an ontology (a hierarchical structuring of knowledge) for the geospatial intelligence community. The experiment will explore an appropriate distributed architecture to support specific use scenarios. *http://portal.opengeospatial.org*

Aeronautical cartography

The art of production of aeronautical charts is known as Aeronautical Cartography

BK SRIVASTAVA

The main purpose of an Aeronautical Chart is to contribute to the safety, regularity and efficiency of International Air Navigation. The increasing speed and operating altitude of modern aeroplanes, coupled with increasing congestion of air traffic necessitate availability of precise and up-to-date charts. This can be achieved by having an efficient system of Aeronautical Chart production.

Aeronautical Charts are primarily meant for the use of Civil and Defence Pilots, Airlines, Air Traffic Controllers, Planning & Engineering, Communication officials, Search & Rescue Personnel, Fire Section, Meteorological and various other organizations. International Civil Aviation Organisation (ICAO) is the prime agency for regulating the design and production of aeronautical charts and the Standards and Recommended Practices and guidelines in this regard are issued by ICAO vide Annex-4 and Doc 8697 (Aeronautical Chart Manual).

Production of charts is a complex and lengthy process, as it involves not only designing, drawing or tracing the charts, but may require the collection of basic field survey data of the area.

In India, Survey and Cartography Unit of Airports Authority of India (AAI), New Delhi has mandate to survey civil aerodromes and other areas for production of Aeronautical Charts. AAI is responsible for surveying and producing aeronautical charts for all the civil airports in the country belonging to AAI, and even for certain other airports as per requirement.

In some other countries, besides the Government Organisations, the job is also done by private agencies. For example m/s Jeppesen of Germany is producing aeronautical charts for sale to pilots and airlines. The major difference in production of charts by Jeppesen is that they do not conduct the field survey to collect the data, but gather the information from various authentic sources. On the other hand, AAI collects the field data also through its own sources.

The aeronautical charts produced by AAI are mainly based on the Standards and Recommended Practices of ICAO. However certain non-ICAO Charts are also produced to meet internal requirements. Among ICAO Charts again there are three categories i.e. Mandatory ICAO Charts, Conditionally required ICAO Charts and Non-mandatory ICAO Charts.

ICAO charts

a. ICAO Mandatory Charts

The following charts have been declared mandatory by ICAO and therefore, they are produced by AAI for publication and sale to various airlines and other agencies;

Aerodrome Obstacle Chart Type 'A' – It shows the obstacles within the approach funnel of the landing and take-off paths of airports and it provides necessary operational data. Pilots take necessary precautions to avoid those obstacles.

Precision Approach Terrain Chart – It provides detailed terrain profile information within a defined portion of final approach of the aircraft landing at an airport.

Enroute Chart – Provides information to flight crew to facilitate navigation along air traffic services routes. Thus the pilots flying on those air-routes can use the charts for a safe flight.

Instrument Approach Chart – Provides necessary information for instrument approach procedure. Thus an pilot of an aircraft landing at a particular airport is able to follow the specified proce-

dure meant for bringing the aircraft below a particular height to see the runway and land there.

Aerodrome Chart – Provides essential operational information about an aerodrome.

World Aeronautical Chart – They contain small scale maps (1:1 million) of a particular area showing various geographical features of the land, hills, roads, lakes, rivers, roads etc. and are meant for en-route flying. These maps are produced, published and sold by Survey of India.

b. ICAO Conditionally required Charts

The following charts are declared as "Conditionally required Charts" by ICAO, which means that they are required only if certain conditions/ circumstances prevail;

Aerodrome Obstacle Chart Type 'C' – is required where the obstacle data needed by the operator to develop procedures to comply with the operating limitations of Annex 6, Part I and II, Chapter 5, are not published in the AIP.

Area Chart – It gives the details of Air Traffic Services (ATS) routes and aeronautical facilities within the area control. It is to be made available where the air traffic services routes or position reporting requirements are complex and cannot be adequately shown on the Enroute Chart. Terminal Area Chart --- Similar to Area Chart and is used for Terminal Areas.

Standard Instrument Departure Chart – used by flight crew for departures. It must be produced where a standard departure route-instrument has been established and cannot be shown with sufficient clarity on the Area Chart.

Standard Arrival Chart – used by flight crew for arrivals. It is to be made available where a standard arrival route-instrument has been established and cannot be shown with sufficient clarity on the Area Chart.

Visual approach chart – Used for descent of the aircraft. It has to be made available for all aerodrome used by international civil aviation where only limited navigation facilities are available or radio communication facilities are not available or no adequate aeronautical charts of the aerodrome and its surrounding at 1:500 000 or greater scale are available, or where visual approach procedures have been established.

c. ICAO Non-Mandatory Charts

The following charts which (though not treated as mandatory by ICAO) are considered essential for safe aircraft operation and therefore they are also produced by AAI;

Aerodrome Obstacle Chart Type 'B' – The Aerodrome Obstacle Chart-ICAO Type B should only be produced in such cases where a need arises for a chart to assist in the determination of critical heights, for example, for circling procedures, or in such procedures for use in the event of an emergency during take-off or landing by the aircraft, and of obstacle clearing and marking criteria. When it is necessary to produce a chart combining the specifications of the Aerodrome Obstacle Chart-ICAO Type A and Type B, the combined chart is to be called Aerodrome Obstacle Chart-ICAO (Comprehensive).

Aerodrome Ground Movement Chart – The Aerodrome Ground Movement Chart - ICAO is a supplementary chart to be used where the detailed information needed for the ground movement of aircraft along taxiways to and from the aircraft stands and the parking and docking of aircraft, cannot be shown with sufficient clarity on the Aerodrome Chart-ICAO.

Aircraft Parking and Docking chart – Used for facilitating ground manoeuvres of an aircraft. The Aircraft Parking / Docking Chart-ICAO is also a supplementary chart which should be made available only where, due to the complexity of terminal facilities, the information on the ground movement of aircraft between the taxiways and the aircraft stands and the parking / docking of aircraft cannot be shown with sufficient clarity on the Aerodrome Chart-ICAO or on the Aerodrome Ground Movement-ICAO.

Aeronautical charts are mainly based on the Standards and Recommended Practices of International Civil Aviation Organisation

Aeronautical Chart 1:500,000 The Aeronautical Chart-ICAO 1:500 000 and the Aeronautical Navigation Chart-Small Scale should be provided only when operational requirements for visual navigation or chart production considerations indicate a need for these charts either as a substitute for or to supplement the World Aeronautical Chart-ICAO 1:1 000 000.

Plotting Chart-ICAO These charts are a useful adjunct where a need exists for a chart which will provide a means of maintaining a continuous flight record of the aircraft position by various fix-

ing methods and dead-reckoning, and maintain an intended flight path. These charts would be appropriate to major air routes over oceanic areas and sparsely settled areas flown by international commercial air transport.

Non-ICAO charts

There are many charts produced by AAI, which are very useful for specific purposes. However, these charts are normally not required to be published by ICAO and therefore, they are available for internal use only.

Brief descriptions and uses of some such charts are given below:

1. Grid Map — This chart shows the details of Operational areas of the aerodrome including runways, taxiways, apron and operational boundary, navigational aids etc. This is one of the most popular charts, that is being extensively used by Operations, Communications, Engineering, Planning, Security, Search & Rescue wings etc. of AAI and also by DGCA, IA, AI and many other organisations.

2. 30 NM Chart — This chart shows height/elevations of hills and other obstructions within the radius of 30 to 40 NM around an airport.

3. ATS route Map — It shows various ATS routes along with restricted/prohibited/Danger areas within Indian FIR.

4. Zoning map — Zoning map show details of the airport, City areas, AGA Surfaces, various height zones around an airport. Mostly used for NOC purposes.

5. Various other maps — Additionally, AAI produces a large number of miscellaneous maps required by agencies like Search & Rescue Chart, FIR map, Approach Char, Maps showing location of various aerodromes in India, Magnetic Variation Chart, mosaic map, etc.

Survey requirement

Obstacle and other survey data are required to be collected extensively during field surveys for production of Aeronautical Charts. Keeping in view the above requirement a full-fledged survey section has been functioning in AAI, which is fully equipped with most modern equipments and experienced staff specializing in aeronautical survey.

The AAI Survey Party conducts detailed topographical survey of aerodromes and their environs, and carries out detailed obstruction survey of approach paths of the aeroplanes to pin point various obstacles falling in the area. This includes survey for determining location and elevation of hills, high chimneys, tall buildings, Radio and TV Towers etc., likely to cause obstruction to air traffic and endanger the safety of aircraft operations.

Accordingly location of various objects along with their elevations (heights above mean sea level) is determined. On the basis of this information, i.e. distance, elevation and bearing with reference to a particular point (or geographical coordinates in terms of latitude, longitude and elevations), various charts are prepared.

The survey of an airport may include physical measurements (horizontal and vertical) of all the objects located inside its boundary (in x, y, and z axis) and those located in its vicinity. Further along the approach funnels all the objects of vertical significance are also required to be measured up to a distance of 15 Kms in each direction (i.e. 30 Kms in both the directions a single runway). For a large international airport like Mumbai, the Survey area may extend as much as up to 300 Sq Kms, where all the high rise buildings, structures, Radio masts, Towers, Chimneys and other objects are to be surveyed. Even for medium-sized airports like Calicut this area may be as much as 100 Sq Kms.

The survey operation can be treated as the foundation stone as well as the building block for production of the charts. If the survey is incomplete or faulty, the same defects are likely to crop up either locally or even in magnified form during the subsequent process of chart production. Due to this reason, precise and accurate observations are required to be made during survey operation and data so collected is regarded as an important asset.

In addition to the above, the data from other available sources such as Survey of India Maps, State Government, private agencies etc., is also collected and utilised for preparation of these charts.

Use of modern techniques

All possible endeavours are made to produce Aeronautical Charts of high standard that are comparable to charts produced by other advanced countries. Efforts are also made to keep pace with rapid developments in aviation by introducing modern techniques such as use of precision drawing instruments, introduction of digital and electronic survey equipments like Electronic Theodolite, long range Distomats, Geodetic dual frequency Global Positioning System (GPS) etc., and of course by the use of Computers, which are required to be used extensively for production of aeronautical charts.

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No-projection cartographic mapping

Using 3-D geocentric geodetic control and positions, as surveyed with GPS, and high-resolution imagery, the Kmap System allows us a no-projection cartographic mapping technique

MUNEENDRA KUMAR

We start with a "small" trapezoidal area, which is 99.999999% flat, and take a bird-eye picture of the round Earth to map it. This eliminates the need for projection mapping. The small trapeziums, which become triangles at the poles, are not "stretched" to rectangles but retained their true shape.

15 small trapeziums of 5'x5' area will perfectly with the neighbors to produce a 15'15' topographic map at 1:50, 000 scale.

These non-projected areas are mapped to produce Kmaps and KCharts with practically zero distortion, true North and true scale. Contouring with ellipsoidal heights will depict topographic relief on maps, while ellipsoidal depths will produce "spot" depths and bathymetric contours in ocean areas. There will be no break in position coordinates between any two maps and/or charts, adjoining or far apart. This technique will work perfectly for cadastral surveys and property plats.

Computerized version on CDs will allow a captain of a ship and/or operator of a motorized vehicle on the monitor screen to navigate on the real Earth surface.

The Kmaps and KCharts can cover the Earth like a "blanket" from pole to pole and East to West around the globe.

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Alliances

Leica Geosystems GIS & Mapping invites distributors

Sales and support activities in South Asia are based out of Leica Geosystems GIS & Mapping's Singapore office. The company wants distributors within the region, specifically in Malaysia and Indonesia.

By enhancing the channel through additional partners, Leica Geosystems GIS & Mapping will be better enabled to deliver its geospatial imaging software tools to the rapidly growing South Asian market. As a result of the strong presence of Leica Geosystems GIS & Mapping in Singapore, the company and ESRI South Asia have mutually agreed to end their current relationship.

Meanwhile, Leica Geosystems has announced that it had started customer shipments of its latest flagship product, Leica SmartStation, ahead of schedule. Leica officially launched its SmartStation, the world's first high performance total station with integrated GPS, this past February 2005. *http://www.leica-geosystems.com*

Infotech Enterprises takes over Tele Atlas ops in India

Tele Atlas N.V., the providers of digital map data and other geographic content, has announced that it has entered into an agreement to transfer its Indian technical center to Infotech Enterprises, Ltd. in an all cash transaction. Tele Atlas will also take an equity interest in Infotech in the form of ownership of Infotech's publicly traded common stock. George Fink, Tele Atlas President and Chief Operating Officer, will join Infotech's board of directors. Infotech will take control of the Tele Atlas facility in Noida, India immediately, and will operate that facility in fulfilling its commitments to Tele Atlas. Tele Atlas has committed to purchase a minimum of 2.5 million hours of services over the next three years. *http://www.teleatlas.com*

PCI Geomatics renews Geomatica site license

PCI Geomatics has announced the renewal of a three-year Geomatica® educational site license with the University of Calgary's department of geography. "The University of Calgary is highly regarded in the geospatial community," says Adam Jones, educational account manager for PCI Geomatics. "We are pleased to know that our software is being used in their classrooms."

Under the renewal, the University of Calgary can use the Geomatica product suite in multiple departments across the campus. The renewal also includes technical support services and automatic software upgrades. *www.pcigeomatics.com.*

ICNET, Nucleus launch vehicle locating device

ICNET, a Chennai-based telecom and software services company, and Nucleus Group have launched a vehicle locating device product targeted at the transport and travel industries. Initially, the marketing foray will be limited to Tamil Nadu, Karnataka, Andhra Pradesh, Maharashtra and New Delhi. The other features of the product include two -way voice communication, SMS and route monitoring. *http://www.business-standard.com*

Products

BAE releases SOCET GXP™ v2.0 geospatial software

BAE Systems has released the latest version of SOCET GXP, its end-to-end image analysis software. SOCET GXP v2.0 has new features that are geared towards a non-photogrammetry audience, and offers numerous advantages over other image analysis and geospatial analysis software packages. The added functionality of SOCET GXP v2.0 streamlines workflow processes, making it easier for analysts to create and distribute critical data. *www.na.baesystems.com*

GIS Capabilities now available with TopSURV

Topcon now offers a GIS module for the latest version of TopSURV, the premier software for land surveying tasks. Operators using Topcon's survey-grade RTK GPS systems for conventional land survey tasks can now use the same equipment for GIS data collection.

The seamless interface and common database enables a smooth and easy transition between the two functions. The extra costs of maintaining a separate sub-meter antenna, rover, and field computer for GIS data collection tasks are eliminated. For surveyors and utility system engineers involved in building GIS systems, it's a solution for collecting location data on existing features and installations. *http://www10.giscafe.com*

Trimble unveils sub-foot GPS for mapping

Trimble has introduced its next generation of high-accuracy GPS receivers for GIS data collection and mapping. The GPS PathfinderProXHreceiver is an integrated GPS receiver, antenna and battery all in a compact and lightweight unit. The ProXH receiver uses Bluetooth technology for cable-free communications to a field computer and Trimble's powerful new H-Star technology to provide sub-foot (30cm) positioning accuracy.

Trimble has also announced the Trimble Site Positioning System that is said to be designed to provide contractors with a state-of-the-art construction positioning solution. The system includes a new total station, two new GPS receivers, and construction-centric software for heavy and highway construction applications. *http://www.trimble.com*

Thales launches MobileMapper Pro

Thales, GPS navigation and positioning firm, has introduced MobileMapper Pro, a GPS-based

GIS data collector with sub-meter post processing. MobileMapper Pro claims to combine sub-meter post-processing with the most cost-effective and easy-to-use GIS mapping solution on the market.

With MobileMapper Pro, workers will continue to secure 2-3 meter real-time accuracy in the field, but can now differentially correct data in the office to achieve 70 cm accuracy on baselines up to 50 km. *http://home.businesswire.com*

Blackberry 7520 to be supported by Roaming Messenger

Roaming Messenger, providers of a breakthrough mobile messaging technology have announced that the company will be supporting the new GPS-enabled BlackBerry 7520 from Research in Motion (RIM) operating on the Nextel network. The BlackBerry 7520 is representative of a new generation of GPS-enabled smart mobile devices. The BlackBerry 7520 features GPS technology with E911 support. It also incorporates Bluetooth technology for hands-free, wireless communications using Bluetooth-enabled headsets and car kits. *http://www.telephonyworld.com*

Navteq selected for ROUTE 66's Mobile 2006 Navigation Solution

Navteq, the global providers of digital maps for vehicle navigation and location-based solutions, has been chosen by ROUTE 66 to provide Navteq maps of Europe, the United States and Canada, helping bring ROUTE 66's Mobile 2006 to the European and North American markets.

The kit comes with a memory stick pre-loaded with navigation software and Navteq maps along with a Bluetooth GPS receiver. Users simply insert the memory stick into a compatible mobile phone, download the software and maps onto the phone and switch on the Bluetooth GPS receiver to transform their mobile phone into a complete navigation solution. *www.navteq.com*

Contracts

RMSI to develop model GIS-enabled city in India

The LAVASA Corporation Limited, a company established for the purpose of developing a hill station lake township near Pune in India, has commissioned RMSI to design and develop its Geo Spatial Infrastructure. Spread over 9000 acres of lush green hills, picturesque lakes and wooded forests, the development of this ultra-modern real estate is supported by GIS and other enabling technologies right from the community's earliest stages.

The first phase of GIS has to do with bringing users from varying backgrounds from site engineers, architects, urban planners, design teams, project managers, environmentalists, tourism professionals and salesmen to a common geo-spatial platform. *http://www.directionsmag.com*

Rolta bags GIS orders worth US$44 million

Rolta India announced that it has signed domestic as well as international GIS projects totalling Rs 200 crore (around $44 million).

According to a recent release issued by the company, the projects in question are for customers like the US-based People's Energy, Sacramento Municipality of the US, city public service of San Antonio, US, the military survey department of Abu Dhabi, and the digital imagery division of the Indian Ministry of Defence.

"The orders are for high-end and comprehensive GIS & imaging software applications, wide ranging services including intelligent GIS database creation and updation for planning using digital photogrammetry, and special purpose ruggedised imagery systems," the release added. *http://www.business-standard.com*

Business

Autodesk achieves $1 billion in 2004

Autodesk has announced Q4 revenues, along with year-end numbers for 2004. Net income for the quarter grew to $66 million from $58 million, a year ago. The company earned $75 million, or 30 cents per share, in Q4 (excluding a $12 million pretax restructuring charge). Sales rose 21 percent to $356 million from $295 million last year. Fourth-quarter revenue from new commercial seats increased 46 percent over the prior year.

For the full year, Autodesk reported earnings of $222 million up from $120 million, a year ago. Overall sales growth was 30% for the year. That means Autodesk hit its long standing goal of generating $1 billion. The actual figure is $1.234 billion, according to the company's SEC filings. *http://www.directionsmag.com*

SiRF Technology Holdings goes to India

SiRF Technology Holdings, Inc. of San Jose, California, announced the establishment of wholly-owned subsidiary SiRF Technology (India) Pvt. Ltd., and a new development center in Noida, India. SiRF India will focus on new product development, specifically chipsets and software that combine GPS with complementary technologies. It will also extend SiRF's reach into growing Indian and Asian markets for GPS-enabled systems, providing marketing and customer support throughout the continent.

The India center plans to work on market-specific software to optimize SiRF's location platform to address the wireless and automotive market needs in developing countries.

The center will produce technical collateral and reference designs to accelerate time to market for customers, and to fund research in location technology at Indian educational and research institutions.

GPS import in India – Derestricted

BAL KRISHNA

The order issued last year to de-restrict the import of GPS and DGPS receiver is a boon to the GPS market in India. However, some of us are unaware of this development despite the fact that the notification was issued in January 2004, and this information is available at the website of Directorate General of Foreign Trade (DGFT), Government of India.

The black

Four years ago, in 2001, while attending a conference on GPS in Delhi, I came across a debate where some participants insisted that to import GPS one needs a license as they were categorized as 'restricted'. Other disagreed, and many were unaware. In fact, those that claimed restriction were correct.

Again, in January 2005, in another conference on transport and navigation in Delhi I witnessed the same debate where some insisted on the need of licenses for GPS import. This time, they were wrong.

I took it upon myself to find out the facts. I went through a few notifications issued by DGFT.Vide notification No 27/ 2003 – Cus, dated 1 – 3- 2003, one can see that GPS and DGPS receiver are put under exim code 8526 93 00 as restricted. The GPS and DGPS receivers are under broad category 8526. Exim Code 8526 that deals with Radar apparatus, radio navigational aid apparatus and radio remote control apparatus.

If the DGFT puts any item under restricted category of import, that implies that one needs to get a license before importing the instrument. Implied also are the associated hassles of dealing time wastage, an often insensitive bureaucracy and even corruption.

The White

The change in policy came vide notification no 29/ (RE – 2004)/ 2002 – 2007, New Delhi dated 28th January, 2004, Amendments the ITC (HS) Classification of Export and Import Items 2002 – 07, the policy regarding GPS and DGPS receiver changes from *restricted* to *free*.

The Ministry of Communication, governs the policy formulation regarding GPS. It is on their recommendations that DGFT effects policy changes. This change of policy is surely a recognition by the Government of India of not only the importance and potential of GPS but its increasing usability, applicability, and demand in India.

The Grey

There is no doubt that the import of GPS and DGPS receiver are free. However, we look at the latest information available on the DGDT website (*http://dgft.delhi.nic.in)*, ITC (HS) as notified by August 31, 2004, we can see the change in the exim code for GPS itself (from 8536 93 00 in the notification issued in January 2004 to 8526 91 90 in the notification issued in August 2004 where GPS and DGPS were put under the category of 'others' other than GPS and DGPS per se as used to be earlier). I assume it is only for a more rationalized classification.

The other grey area is the use of GPS for Real Time Kinematic (RTK) Survey where one needs to operate at a particular radio frequency spectrum between the base and roving station. And it is here where Wireless Programme and Coordination (WPC), another division of Ministry of Communication has a role to play. Does it mean a tedious process of acquiring a license and associated hassles? *Coordinates* will try to contact WPC on this to find the answers.

Meanwhile, it is time to celebrate the era of de-restriction.

ITC(HS) (As Notify on 31.08.2004)

Exim code	Item description	Policy
8526	Radar apparatus, radio navigational aid aparatus and radio remote control apparatus	Restricted
8526 10 00	Radar apparatus	Restricted
8526 91	Radio navigational aid apparatus	Restricted
8526 91 10	Direction measuring equipment	Restricted
8526 91 20	Instrument landing system	Free
8526 91 30	Direction finding equipment	Restricted
8526 91 40	Non directional beacon	Restricted
8526 91 50	VHF omni range equipment	Restricted
8526 91 90	Other	Restricted*
8526 92 00	Radio remote control apparatus	Restricted

*However, import of GPS receiver and DGPS receiver is free

US Space-based Positioning, Navigation, And Timing Policy

Excerpts from the US Space-Based Positioning, Navigation, and Timing Policy (PNT) issued by President George Bush on December 15, 2004. The detailed policy can be found online at **www.technology.gov/space**

Goals and Objectives

The fundamental goal of this policy is to ensure that the United States maintains space-based positioning, navigation, and timing services, augmentation, back-up, and service denial capabilities that: (1) provide uninterrupted availability of positioning, navigation, and timing services; (2) meet growing national, homeland, economic security, and civil requirements, and scientific and commercial demands; (3) remain the pre-eminent military space-based positioning, navigation, and timing service; (4) continue to provide civil services that exceed or are competitive with foreign civil space-based positioning, navigation, and timing services and augmentation systems; (5) remain essential components of internationally accepted positioning, navigation, and timing services; and (6) promote U.S. technological leadership in applications involving space-based positioning, navigation, and timing services. To achieve this goal, the United States Government shall:

- Provide uninterrupted access to U.S. space-based global, precise positioning, navigation, and timing services for U.S. and allied national security systems and capabilities through the GPS, without being dependent on foreign positioning, navigation, and timing services;

- Provide on a continuous, worldwide basis civil space-based, positioning, navigation, and timing services free of direct user fees for civil, commercial, and scientific uses, and for homeland security through the GPS and its augmentations, and provide open, free access to information necessary to develop and build equipment to use these services;

- Improve capabilities to deny hostile use of any space-based positioning, navigation, and timing services, without unduly disrupting civil and commercial access to civil positioning, navigation, and timing services outside an area of military operations, or for homeland security purposes;

- Improve the performance of space-based positioning, navigation, and timing services, including more robust resistance to interference for, and consistent with, U.S. and allied national security purposes, homeland security, and civil, commercial, and scientific users worldwide;

- Maintain the GPS as a component of multiple sectors of the U.S. Critical Infrastructure, consistent with Homeland Security Presidential Directive-7, Critical Infrastructure Identification, Prioritization, and Protection, dated December 17, 2003

- Encourage foreign development of positioning, navigation, and timing services and systems based on the GPS. Seek to ensure that foreign space-based positioning, navigation, and timing systems are interoperable with the civil services of the GPS and its augmentations in order to benefit civil, commercial, and scientific users worldwide. At a minimum, seek to ensure that foreign systems are compatible with the GPS and its augmentations and address mutual security concerns with foreign providers to prevent hostile use of space-based positioning, navigation, and timing services; and

- Promote the use of U.S. space-based positioning, navigation, and timing services and capabilities for applications at the Federal, State, and local level, to the maximum practical extent.

Management

This policy establishes a permanent National Space-Based Positioning, Navigation, and Timing Executive Committee. The Executive Committee will be co-chaired by the Deputy Secretaries of the Department of Defense and the Department of Transportation or by their designated representatives. Its members will include representatives at the equivalent level from the Departments of State, Commerce, and Homeland Security, the Joint Chiefs of Staff, the National Aeronautics and Space Administration, and from other Departments and Agencies as required. Components of the Executive Office of the President, including the Office of Management and Budget, the National Security Council staff, the Homeland Security Council staff, the Office of Science and Technology Policy, and the National Economic Council staff, shall participate as observers to the Executive Committee The Chairman of the Federal Communications Commission shall be invited to participate on the Executive Committee as a Liaison. The Executive Committee shall meet at least twice each year. The Secretaries of Defense and Transportation shall develop the procedures by which the Committee shall operate.

The Executive Committee shall make recommendations to its member Departments and Agencies, and to the President through the representatives of the Executive Office of the President. In addition, the Executive

Committee will advise and coordinate with and among the Departments and Agencies responsible for the strategic decisions regarding policies, architectures, requirements, and resource allocation for maintaining and improving U.S. spacebased positioning, navigation, and timing infrastructures, including the GPS, its augmentations, security for these services, and relationships with foreign positioning, navigation, and timing services.

The Executive Committee shall advise and coordinate the interdepartmental resource allocation for the GPS and it augmentations on an annual basis. The Secretary of Defense shall have primary responsibility for providing resources for development, acquisition, operation, sustainment, and modernization of the GPS. The Secretary of Transportation shall provide resources to the Secretary of Defense for assessment, development, acquisition, implementation, operation, and sustainment of additional designated GPS civil capabilities beyond the second and third civil signals already contained in the current GPS program. GPS civil signal performance monitoring, augmentations, and other unique positioning, navigation, and timing capabilities will be funded by the agency or agencies requiring those services or capabilities, including out-year procurement and operations costs. Any new technical features proposed and funded by the civil agencies shall not degrade or displace existing or planned national security functions of the system. If the Executive Committee recommends that the availability of GPS capabilities should be accelerated, the Executive Committee will make recommendations regarding the resources required to accelerate those capabilities. Resource issues will be resolved during the regular budget process.

Foreign Access

Any exports of U.S. positioning, navigation, and timing capabilities covered by the United States Munitions List or the Commerce Control List will continue to be licensed pursuant to the International Traffic in Arms Regulations or the Export Administration Regulations, as appropriate, and in accordance with all existing laws and regulations.

As a general guideline, export of civil or other non-United States Munitions List space-based positioning, navigation and timing capabilities that are currently available or are planned to be available in the global marketplace will continue to be considered favorably. Exports of sensitive or advanced positioning, navigation, and timing information, systems, technologies, and components will be considered on a case-by-case basis in accordance with existing laws and regulations, as well as relevant national security and foreign policy goals and considerations. In support of such reviews, the Secretary of State, in consultation with the Secretaries of Defense, Commerce, and Energy, the Administrator of the National Aeronautics and Space Administration, and the Director of Central Intelligence, shall modify and maintain the Sensitive Technology List directed in U.S. Commercial Remote Sensing Space Policy, dated April 25, 2003, including those technology items or areas deemed sensitive for positioning, navigation and timing applications. The Secretaries of State and Commerce shall use the list in the evaluation of requests for exports.

Roles and Responsibilities

The Secretary of Defense shall:

- Have responsibility for development, acquisition, operation, security, and continued modernization of the GPS, while facilitating appropriate civil and homeland security Department and Agency representation and participation in these activities, and any decisions that affect civil and homeland security equities;

- Develop, acquire, operate, realistically test, evaluate, and maintain navigation warfare capabilities and other capabilities required to:
  - Effectively utilize the GPS services in the event of adversary jamming or other interference;
  - Deny to adversaries position, navigation, and timing services from the GPS, its augmentations, and/or any other space-based position, navigation, and timing systems without unduly disrupting civil, commercial, and scientific uses of these services outside an area of military operations, or for homeland security purposes; and

- Identify, locate and mitigate, in coordination with Departments and Agencies, as appropriate, any interference on a global basis that adversely affects use of the GPS for military operations;

- Ensure the earliest operational availability for modernized military and navigation warfare capabilities;

- Train, equip, test, and exercise U.S. military forces and national security capabilities in operationally realistic conditions that include denial of the GPS. In cooperation with the Secretaries of Transportation and Homeland Security, and as appropriate, with the Secretary of State, develop guidelines that facilitate these activities and Navigation Warfare training, testing, demonstrations, and exercises without unduly disrupting or degrading homeland security and civil services and operations, either internationally or domestically;

- Promote use of GPS national security services to allied military forces to facilitate interoperability between U.S. and allied forces and capabilities, and to maintain their use as the preeminent military space-based positioning, navigation, and timing capability;

- Maintain the commitment to discontinue the use of the feature known as Selective Availability designed to degrade globally the Standard

Positioning Service of the GPS;

- Facilitate access to appropriate levels of national security services and user equipment at the Federal level to meet critical requirements for emergency response and other homeland security purposes, and, on an exceptional basis, for civil purposes, including state or local emergency response

- Develop improved, dedicated national security positioning, navigation, and timing capabilities, including but not limited to more diverse, flexible, and capable signals and services;

- Maintain lead responsibility for negotiating with foreign defense organizations any cooperation regarding access to or information about GPS military services; and

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The Secretary of Transportation shall:

- Have lead responsibility for the development of requirments for civil applications from all United States Government civil Departments and Agencies;

- Ensure, in cooperation with the Secretary of Defense and the Secretary of Homeland Security, the performance monitoring of U.S. civil space-based positioning, navigation, and timing services;

- Consistent with the guidance in Section V of this policy, and in coordination with the Secretary of Commerce and the Secretary of State, facilitate: (1) foreign development of civil positioning, navigation, and timing services and systems based on the GPS; and (2) international participation in the development of civil applications for U.S. space-based positioning, navigation, and timing services;

- Ensure, in coordination with the Secretary of Defense, that space-based positioning, navigation, and timing public safety services meet or exceed international performance standards, including but not limited to those used for these services in aviation and/or maritime applications;

- In cooperation with other Departments and Agencies, promote the use of U.S. civil space-based positioning, navigation, and timing services and capabilities for transportation safety;

The Secretary of Commerce shall:

- Represent U.S. commercial interests with other Departments and Agencies in the requirements review of the GPS and related space-based augmentations;

- In coordination with the Secretaries of State, Defense, and Transportation and the National Aeronautics and Space Administration, seek to protect the radio frequency spectrum used by the GPS and its augmentations through appropriate domestic and international spectrum management and regulatory practices;

- In coordination with the Secretaries of Defense and Transportation, and the Administrator of the National Aeronautics and Space Administration, facilitate cooperation between the United States Government and U.S. industry as appropriate to identify mutually acceptable solutions that will preserve existing and evolving uses of space-based positioning, navigation, and timing services, while allowing for the development of other technologies and services that depend on use of the radio frequency spectrum;

The Secretary of State shall:

- In cooperation with the Secretary of Defense, the Secretary of Transportation, and other Departments and Agencies promote the use of civil aspects of the GPS and its augmentation services and standards with foreign governments and other international organizations;

- Take the lead for negotiating with foreign governments and international organizations regarding civil and, as appropriate and in coordination with the Secretary of Defense, military positioning, navigation, and timing matters, including but not limited to coordinating interagency review of:
  - Instructions to U.S. delegations for bilateral and multilateral consultations relating to the planning, management, and use of the GPS and related augmentation systems; and
  - International agreements with foreign governments and international organizations regarding the planning, operation, management, and/or use of the GPS and its augmentations; and

- Modify and maintain, in coodination with the Secretaries of Defense, Commerce, and Energy, the Director of Central Intelligence, and the Administrator of the National Aeronautics and Space Administration, the Sensitive Technology List created by U.S. Commercial Remote Sensing Space Policy, dated April 25, 2003. In particular, include sensitive technology items and/or information related to positioning, navigation, and timing applications.

The Secretary of Homeland Security shall

- Identify space-based positioning, navigation, and timing requirements for homeland security purposes to the Secretary of Transportation, and coordinate the use of positioning, navigation, and timing capabilities and backup systems for homeland security purposes by Federal, State, and local governments and authorities;

- In coordination with the Secretary of Transportation, and with other Departments and Agencies, promote the use of the GPS positioning and timing standards for use by Federal agencies, and by State and local authorities responsible for public safety and emergency response;

Galileo update

Galileo – the European Programme for Global Navigation Services for civil purposes is an initiative led by European Union. We will provide regular updates to our readers on the Galileo programme. Just as South Korea plans to join Galileo, so do some companies from China and Israel

South Korea to join Galileo

Science and Technology Minister Oh Myung approved a plan to join a satellite-based navigation system project led by the European Union, in a bid to reduce its reliance on the United States' GPS. The 3.4 billion euro Galileo project is expected to rival the GPS navigation system. South Korea will likely pay at least 5 million euros, or about 6.7 billion won, to participate in the project, the ministry said. If all goes as scheduled, a formal agreement will be sealed within this year. Joining the Galileo project is also expected to help South Korea widen its political, economic and scientific ties with the European Union, the ministry said. *http://english.yna.co.kr*

Israel companies expected to pass Galileo

A bid by Israeli companies to join the European Union's Galileo space program is expected to pass. The decision to propose the companies, including the Defense Ministry's Rafael Armament Development Authority, the state-owned Israel Aircraft Industries, Orbit, and Rokar International, for participation in the Galileo project was made at a meeting between Israeli and European officials in Tel Aviv. If the companies are approved, Israel will invest at least $20 million over five years, and an equal sum will be provided by the Europeans for equipment and technology orders from the Israeli companies. *http://feeds.bignewsnetwork.com*

Chinese company joins Galileo project

China Galileo Industries Ltd., a state company owned by China Aerospace Science and Technology Corporation, China Electronics Technology Group Corporation, China Satcom and China Academy of Space Technology, is authorized by the National Remote Sensing Center of China (NRSCC), the European Union-designated Chinese partner on the Galileo Project, to develop Galileo's satellite and remote sensing technologies and application systems. According to a cooperation agreement signed by the NRSCC and the Galileo Joint Undertaking in last October, China pledged to invest in research and development on space technologies, ground equipment and application systems for the Galileo Project. *http://news.xinhuanet.com*

EU announces winner of Galileo GPS network

Organizers of Europe's new satellite-based European navigation system Galileo have announced their race to win the 20-year concession, a contract worth an estimated three billion euros (3.97 billion dollars) between Eurely, comprising Alcatel, Finmeccanica and Vinci, and the iNavsat group, made up of Thales, EADS and Inmarsat. The Galileo system, which should start operations in 2008, will complement the US Global Position System. *http://www.spacemart.com*

- In coordination with the Secretary of Defense, and in cooperation with the Secretaries of Transportation and Commerce, ensure:
  - Mechanisms are in place to identify, understand, and disseminate timely information regarding threats associated with the potential hostile use of space-based positioning, navigation, and timing services within the United States; and
  - Procedures are developed, implemented, and routinely exercised to request assistance from the Secretary of Defense should it become necessary to deny hostile use of space-based position, navigation and timing services within the United States;

Departments and Agencies detecting interference, or receiving reports of domestic or international interference adversely affecting the performance of U.S. space-based positioning, navigation, and timing services shall provide timely reports to the Secretary of Homeland Security, the Secretary of Defense, and the Director of Central Intelligence.

Upon notification by the Secretary of Homeland Security:

- The Secretary of Commerce, in cooperation with other Departments and Agencies, and with the Chairman of the Federal Communications Commission shall take appropriate and legally permissible actions required to mitigate interference to U.S. space-based positioning, navigation, and timing services within the United States; and

- The Secretary of State shall, as appropriate, notify and/or coordinate the notification of foreign governments and international organizations in cases of interference with U.S. spacebased positioning, navigation, and timing services caused by foreign government or commercial activities.

"An extraordinary event in an extraordinary country"

Says Professor Holger Magel, President, FIG at the FIG Working Week 2005 and GSDI-8 in Cairo, Egypt

The FIG Working Week 2005 was organised in Cairo, Egypt from 16-21 April, 2005. This was the first time that the annual FIG Working Week was organised with another international organisation. The FIG Council and the local organisers – the Egyptian Committee for Surveying and Mapping (ECSM) and the Egyptian Survey Authority (ESA), decided to organise the conference jointly with the Global Spatial Data Infrastructure (GSDI). So the joint conference "From Pharaohs to Geoinformatics" combined elements both from the FIG Working Week and the GSDI conference (this time GSDI-8).

The conference turned out to be the biggest ever FIG annual conference outside the quadrennial congresses. It attracted more than 900 participants from about 80 countries. The attendees got an excellent opportunity to familiarize themselves with the history, trends in surveying and SDIs for the future. In the technical programme more than 400 papers, presentations and posters were made.

At the opening ceremony the keynote address from the Government of Egypt was made by HE Dr. Mahmoud Abu Zeid, Minister of Water Resources and Irrigation. The conference was held under the patronage of the Government of Egypt and Prime Minister, Dr. Ahmed Nazif, who unfortunately was unable to attend. The Prime Minister's greeting was given by Dr. Abu Zeid. The greeting from Dr. Tarek Kamel, Minister of Communication and Information Technology was presented by Dr. Hora Baraka. The welcome address from the organising committee was given by Dr. Eng. Ahmed Fouad El-Sheikh, Chair of the Organising Committee and President of the Egyptian Committee on Surveying and Mapping (ECSM). The GSDI presentation was given by Dr. Mukund Rao, President of GSDI. The keynote opening address was about the conference title "From Pharaohs to Geoinformatics – Shaping the Change" presented by Prof. Holger Magel, President of FIG, who also formally opened the conference.

The professional quality of the plenary sessions attracted many positive comments. Especially the first plenary session, in which the presentations were made by Dr. Ismail Serageldin, CEO of the Alexandria Library and Mr. Jack Dangermond, President and Founder of ESRI and Mrs. Preetha Pulusani, President of Intergraph Mapping and Geospatial Solutions was highly praised. At the other two plenary sessions the topics were Land Management and SDIs (with Dr. Paul Munro-Faure (FAO), Dr. Clarissa Augustinus (UN-Habitat), Ms. Dorine A. J. Burmanje, Chair of the Board of Dutch Cadastre and Eng. Mohamed Mosaad Ibrahim, Ex-Chairman, The Egyptian Survey Authority, ESA as speakers) and on the Future of the SDI / Surveying Communities (with Prof. Ian Dowman, President of ISPRS, Prof. Hans Sünkel, Rector of the University of Graz and Dr. Hisham El Sherif, Chairman of IT Investments Group, Egypt as speakers).

The technical programme was fully integrated so there were no separate programmes for GSDI or FIG delegates, neither separation in the registrations etc. This allowed more interesting and broader discussions at the technical sessions than normally possible.

There was high-level participation from professionals. Presidents of the following associations attended the conference: ISPRS (Prof, Ian Dowman), IAG (Prof. Gerhard Beutler), ICA (Prof. Milan Konecny), IHO (Vice Admiral Alexandros Marathos) and ISM (Prof. Yu Changxing, immediate past President). In addition, International Federation of Hydrographic Societies was presented by John McCarthy with whom FIG signed an Memorandum of Understanding in Cairo. The International Steering Committee for Global Mapping (ISCGM) had their annual meeting in Cairo and had, in addition, two sessions in the technical programme, chaired by Prof. Fraser Taylor, President of ISCGM.

The technical exhibition was bigger than has been the case during the last years at the FIG events. More than 40 booths were booked and the list of exhibitors included a good selection of international, regional and local exhibitors.

www.fig.net

MARK YOUR CALENDAR

June 2005

31st International Symposium on Remote Sensing of Environment
20 – 24 June, Saint Petersburg, Russia
31_ISRSE@niersc.spb.ru
http://www.niersc.spb.ru/isrse

8th United Nations Regional Cartographic Conference for the Americas
27 June – 01 July New York, USA,
laaribi@un.org
http://unstats.un.org

AOGS 2005
20 - 24 June, Singapore
kch@meetmatt.net

ION 61st Annual Meeting
27 – 29 June, Cambridge, United States
http://www.ion.org

Canadian Institute of Geomatics 2005 Conference
13 - 15 June, Ottawa , Canada
admincig@magma.ca
http://www.cig-acsg.ca/

Sixth International Conference on Military Geology and Geography
19 - 22 June, Nottingham U.K.
milgeo2005@nottingham.ac.uk
http://www.geog.nottingham.ac.uk/

Geoinformation Forum Japan 2005 and Exhibition
22 - 24 June, Tokyo, Japan
geoforum@jsurvey.jp
http://www.jsurvey.jp/geoinfo/geoinfo.htm

GPS Surveying
June, IIT Roorkee, India
gjkumfce@iitr.ernet.in

July 2005

25th Annual ESRI International User Conference
25 - 29 July, San Diego, USA
dsosa@esri.com
http://www.esri.com

CC:The Exchange Ordnance Survey
3 - 6 July, Southampton UK
nmonetwork@ordnancesurvey.co.uk
http://www.ordnancesurvey.co.uk

Remote Sensing & GIS Applications in Water Resource Management
4 - 8 July, Roorkee , India
hsieirlc@datainfosys.net
http://www.ieindia.org

International Cartographic Conference
11 - 16 July, A Coruña , Spain
macarena@marva.org
http://www.icc2005.org

European Navigation Conference 2005
19-22 July, Munich, Germany
http://www.enc-gnss2005.com/

ESRI Survey/GSI Summit
July 23 - 26, San Diego, USA
http://www.esri.com/events/survey/

August 2005

IAG/IAPSO/IABO 2005
22 – 26 August, Cairns, Australia
http://www.dynamicplanet2005.com

GITA Annual Conference 2005;
15-17 August, Melbourne, Australia
imsevent@bigpond.net.au
www.gita.org.au

Map Asia 2005
22 - 25 August, Jakarta Indonesia
info@mapasia.org
http://www.mapasia.org

September 2005

The 6th Arab Map conference
12 - 13 September, Cairo Egypt
arabmap2@iti-idsc.net.eg
http://www.ngisc.gov.eg

International Symposium on Landslide Hazard in Orogenic Zone
25 - 26 September, Kathmandu Nepal
symposium@nels.org.np
http://www.nels.org.np/symposium2005.htm

Navtech Seminars
12 - 13 September, Long Beach, United States
http://www.gpsetc.com

50th Photogrammetric Week
5 - 9 September 2005, Stuttgart, Germany
info@ifp.uni-stuttgart.de
http://www.ifp.uni-stuttgart.de

ION GNSS 2005
13 - 16 September, Long Beach, USA
http://www.ion.org

GeoSolutions 2005
28 - 29 September, Birmingham, UK
sthomas@cmpinformation.com
http://www.geosolutions-expo.com

Kuwait First Remote Sensing Conference & Exhibition
26-28 September, Kuwait
info@promedia-international.com
http://www.kuwaitremotesensing.com/

October 2005

Trimble Dimensions 2005 User Conference
23 - 26 October, Las Vegas, USA
rhonda_heninger@trimble.com
http://www.trimbleevents.com

URISA's 43rd Annual Conference
9 - 12 October, Kansas City, USA
info@urisa.org
http://www.urisa.org/annual.htm

Asia and Pacific Region Socet Set Users Conference; BaE Systems
24-26 October, Cairns; Australia
rob.coorey@baesystems.com.

XXVIII General Assembly of the International Union of Radio Science (URSI)
23 – 29 October, New Delhi, India
http://www.ursiga2005.org

Intergeo 2005
4 - 6 October, Dusseldorf, Germany
ofreier@hinte-messe.de
http://www.intergeo2005.de

November 2005

AfricaGIS 2005
30 Oct - 4 Nov, Pretoria, South Africa
fduplessis@openspatial.co.za
http://www.africagis2005.org.za

GEOINT 2005
30 Oct - Nov 2, San Antonio, USA
http://www.geoint2004.com

12th world congress of the Intelligent Transportation Society - 2005
6 - 10 Nov, San Francisco, USA
http://www.itsworldcongress.org

South East Asian Survey Congress
21 - 25 Nov , Brunei
secretarygeneral@seasc2005.org.bn
http://www.seasc2005.org.bn/congven.html

ACRS 2005
7- 11 Nov, Vietnam, Hanoi
eisa.ig@fpt.vn
http://www.acrs2005.ac.vn

Qatar GIS Conference & Exhibition 2005
14 -16 Nov, Qatar, Doha
info@gisqatar.com
http://www.gisqatar.com

AGI 2005
1- 3 Nov, Chelsea Village, London
angela.mcmahon@agi.org.uk
http://www.agi2005.org.uk

2nd International Conference 'Earth from Space'
30 Nov - 2 Dec, Moscow, Russia
http://www.transparentworld.ru/conference/

December 2005

Gulf Traffic - GIS Zone
12 - 14 December, Dubai UAE
davyd.farrell@iirme.com
http://www.gulftraffic.com

First International Symposium on Health GIS
1 - 2 Dec, Bangkok, Thailand
healthgis@gmail.com

GNSS 2005
8 – 10 Dec, Hong Kong, China
lswuchen@polyu.edu.hk
http://www.lsgi.polyu.edu.hk/GNSS2005

Another milestone in space sciences

Cartosat 1 launched

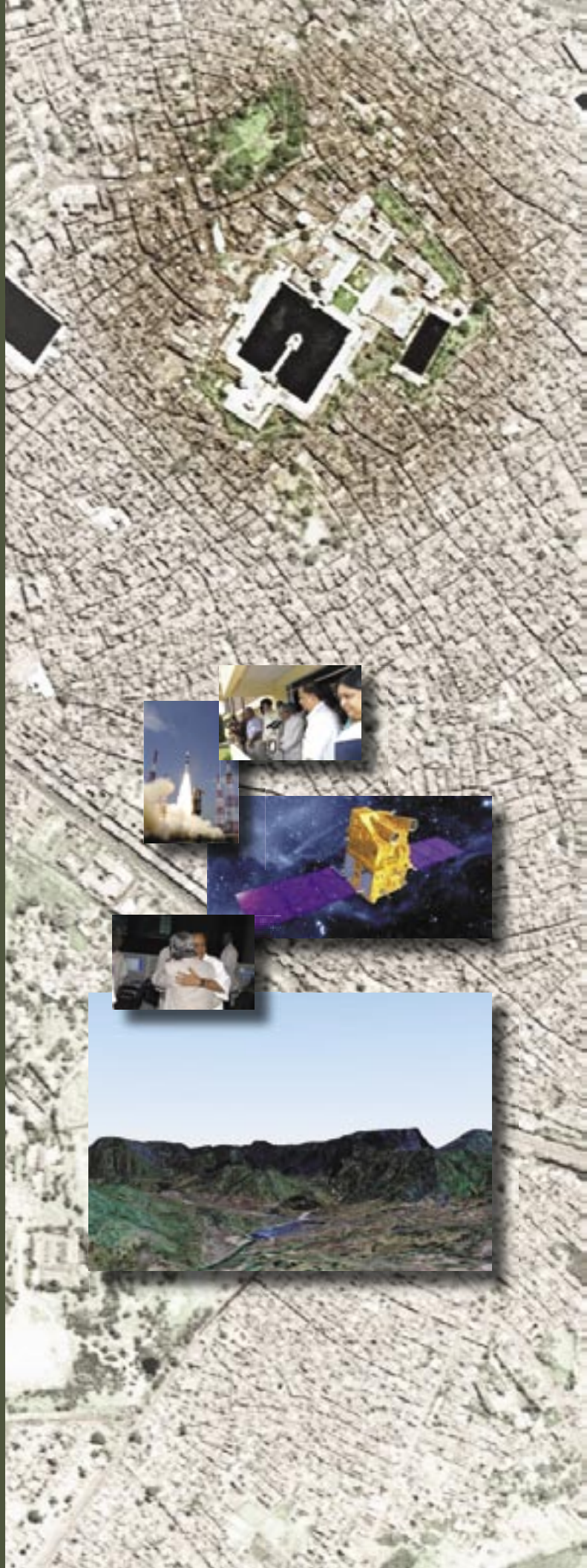
May 5th 2005 became a historic day in the field of Remote Sensing and Space Technology when in its ninth flight conducted from Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota, ISRO's Polar Satellite Launch Vehicle, PSLV-C6, successfully launched the 1560 kg Indian Remote Sensing satellite, CARTOSAT – 1. "Excellent Performance" was the reaction of the Honourable President of India, Dr A P J Abdul Kalam, who along with other noted scientists and Chairman of ISRO witnessed the launch.

The two panchromatic cameras on board, have been tested by switching them on through a series of programmed commands sent from Spacecraft Control Centre of ISRO Telemetry, Tracking and Command Network (ISTRAC) at Bangalore. Imageries from both the cameras were received at National Remote Sensing Agency's Data Reception Station at Shadnagar, near Hyderabad. Detailed analysis confirms the excellent performance of the cameras.

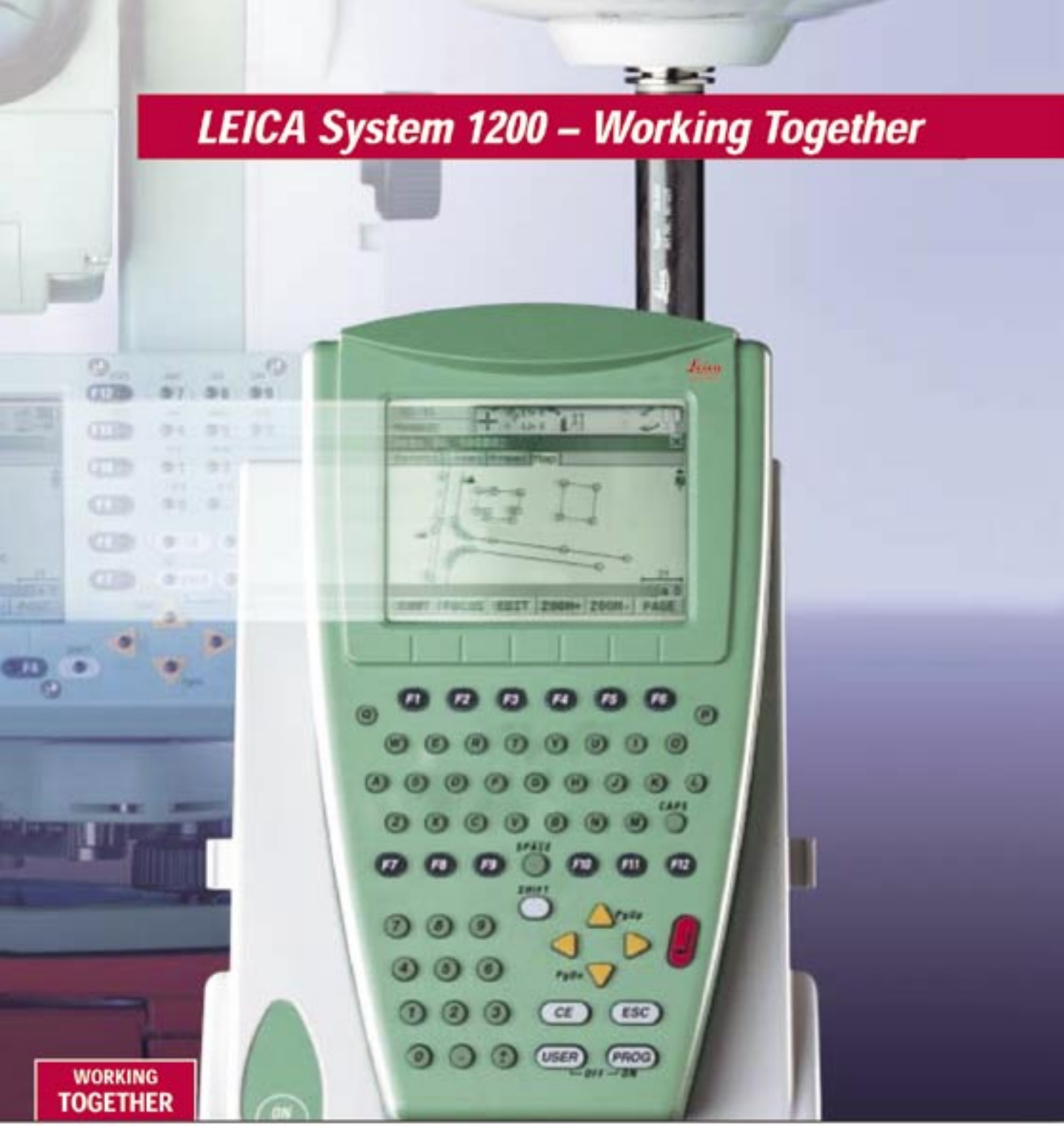
The CARTOSAT – 1 mission is intended to fill the gap for geo-engineering and advanced mapping applications. IRS-P5 data products will be used for cartographic applications, cadastral mapping and updating, terrain visualisation, generation of National topographic database, utilities planning and other GIS applications. The satellite will provide cadastral level information upto 1:5000 scale and will be useful for making 2-5m contour maps. Chairman Nair said "CARTOSAT would take at least a year to cover the whole of India. After validation and mapping of India, it could be offered for commercial use to other countries."

Chairman, ISRO, Shri G Madhavan Nair and a team of senior scientists presented the Prime Minister with the first imageries from CARTOSAT-1 on May 13, 2005 at Parliament House. See background image to the right; Highlighted are the Golden Temple Complex and Jalianwala Bagh in Amritsar. Also see 3D imagery of Khedbrahma, Gujarat.

Images www.isro.gov.in



LEICA System 1200 – Working Together



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