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Coordinates

Volume III, Issue 6, June 2007

A MONTHLY MAGAZINE ON POSITIONING, NAVIGATION AND BEYOND

Surveying vs. GIS
A debate on the perceived rift

Also:

e-Navigation

Real definition of ITRF

National Urban Information System

A cGIT publication

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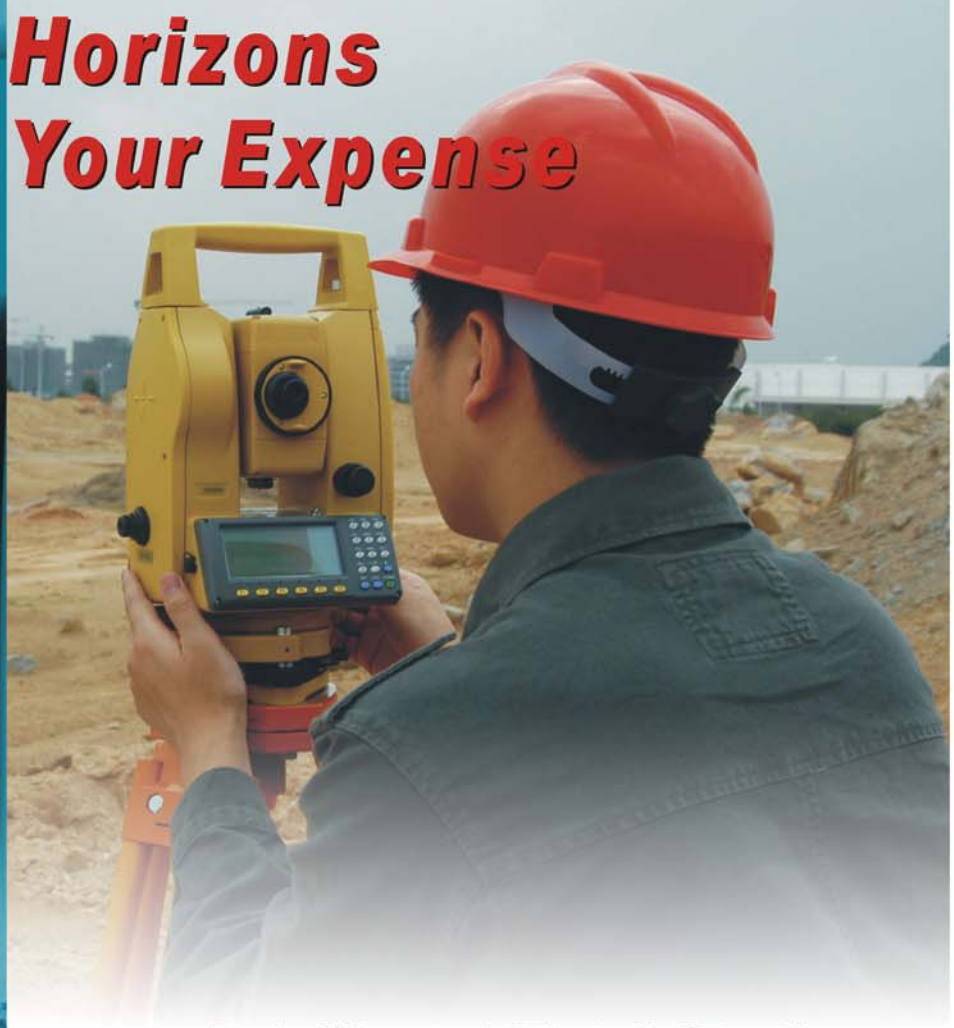

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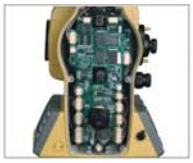

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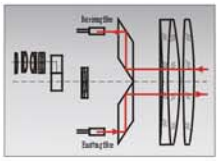

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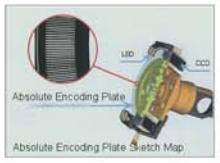

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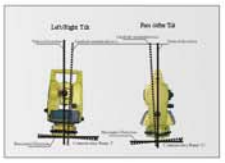

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Coordinates Volume 3, issue 6, June 2007

Articles

Columns

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Positioning, navigation and beyond

Two years ago, we had a dream.

We started on a mission.

With confidence and conviction.

Set out on a journey of positioning, navigation. And beyond…

Discussing, deliberating and debating

We navigated through technology and took a position.

This month, the 25th issue, it is time for us to think

What we have achieved… what more could have been accomplished.

It is a long road ahead.

We will continue.

Continue with passion, imagination, and a vision.

On our journey ahead on positioning, navigation…

Bal Krishna, Editor
bal@mycoordinates.org

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The "Real" Definition of "ITRF"

Since 1988, the International Earth Rotation Service (IERS) has realized 11 International Terrestrial Reference Frame (ITRF), viz., ITRF88 to ITRF05. While studying the geodetic details about the latest realization, an insight into the "real" definition of an "ITRF" was discovered.

To create no residual global rotation with regards to the crust in time evolution in orientation, IERS in the first ITRF88 retained the BIH Conventional Terrestrial System (CTS) and its Conventional Terrestrial Pole (CTP) 1984.0. Since then, it has realized the same "Pole". However, IERS changed the name "CTP" to International Reference Pole (IRP).

Muneendra Kumar, PhD
Chief Geodesist (Retired), US National Geospatial-Intelligence Agency, *munismk@yahoo.com*

Historical Start

The Earth's first Terrestrial Reference Frame (TRF) was called Conventional International Origin (CIO) 1905 where the mean orientation of the Z-axis was defined by International Latitude Service from six years of observations between 1900 to 1905 (Note: There is NO other "CIO" ever defined). The records are not clear whether ILO ever provided a specific definition for the X-axis and/or the zero meridian.

BIH Conventional Terrestrial System (CTS)

Then, Bureau International de L'Heure (BIH) provided the next most complete 3-D TRF, known as CTS, Epoch 1984.0 (Figure 1).

The full definition of CTS 84.0 is:

- Origin = Earth's Center of Mass
- Z-axis = The direction of the BIH Conventional Terrestrial Pole (CTP), Epoch 1984.0
- X-axis = Intersection of the BIH Zero Meridian and the plane containing the Earth's origin "O" and perpendicular to the Z-axis or the Equatorial plane
- Y-axis = The third axis, which is perpendicular to the Z- and X-axis, lies in the Equatorial plane, and points towards East.

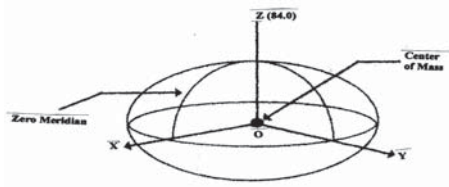

Figure 1. BIH Defined CTS 1984.0

The above three axes define a 3-D geocentric right-handed coordinate system. (In the "right-handed" system, the right thumb points towards the Pole, index finger aligns along the X-axis, and middle finger along the Y-axis or points towards East.)

International Terrestrial Reference Frame (ITRF)

The International Earth Rotation Service (IERS) succeeded BIH in 1988. It then realized the first TRF and released under the name as ITRF88 (or ITRFyy). Here, the "yy" denotes the "year" up to which the data sets have been used in the realization.

IERS released six more ITRF89, ITRF90, ITRF91, ITRF92, ITRF93, and ITRF94 over the next six years. Then, with a break for 1995, IERS released ITRF96 and ITRF97. There after, the next two are ITRF2000 and ITRF2005.

Note: IERS did not and still does not release or identify specific information about the Reference Epoch (RE)

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associated with each of its ITRF solution from 1988 to 2005.

Definition of ITRFyy

The IERS Tech Notes 21 (McCarthy, 96) states:

1. Time evolution in orientation of the reference frame will create no residual global rotation with regards to the crust
2. Z-axis = The direction of the IERS Reference Pole (IRP) corresponds to the BIH CTP, Epoch 1984.0, with an uncertainty of 0.005"
3. X-axis = IERS Reference Meridian (IRM) is coincident with the BIH Zero Meridian, Epoch 1984.0, with an uncertainty of 0.005".

Thus, the above defining specifications clearly and categorically laid down that the first seven realizations, viz., ITRF88 to ITRF94, are ONLY the IERS updated realizations of the BIH defined "CTS 1984.0".

Note: IERS retained the 3-D "ZXY" coordinate frame (Figure 1) intact and kept the "correspondence and coincidence" with the BIH CTS 84.0 for all its 11 realizations.

The Associated Reference Epoch "RE"

It was around mid-2000, information about the associated "RE" pertaining to the ITRF88 to ITRF97 was obtained for the first time from IERS (Altamimi, 00). Later on, the "RE" information for ITRF00 and ITRF05 was obtained from IERS website. The specifics are:

ITRFyy	**Associated "RE"**
ITRF88, ITRF89, ITRF90, ITRF91, ITRF92, ITRF93	1988.0
ITRF94, ITRF96	1993.0
ITRF97, ITRF00	1997.0
ITRF05	2000.0

Contribution of "RE"

For ITRF88 (88.0), IERS provides the coordinates and velocities (X, X') for the IGS stations at the RE = 88.0, which in turn enabled a user to "realize" the BIH CTS 84.0. And, the set (X, X') for ITRF89 (88.0) would be the same as of the previous year, but for a few additional stations and realized with "additional" data sets. In case of ITRF94 (93.0), the set (X, X') would be updated for 5-year time difference between the two associated "RE", viz., 88.0 and 93.0.

Similarly, the latest ITRF05 (00.0) now provides a new "updated" set of (X, X') with respect to an new "RE = 00.0" for realizing BIH CTS 84.0.

Confirmation

The transformation parameters between ITRF00 and ITRF05 (www.IERS.org) confirm that the two "TRF" have the same origin, orientation, and scale and the latest ITRF05 has successfully realized the BIH CTS 84.0.

Note: Transformation parameters between any two ITRFs have no geodetic significance for any practical and/or non-scientific application(s).

Important Clarifications

- Any ITRF does not constitute a geodetic system. It is adopted to define the system.
- ITRF is neither a horizontal nor a vertical datum.

Conclusion

All 11 realizations, viz., ITRF88 to ITRF05, provide users essentially four sets of (X, X') for four "RE", viz., 88.93.0, 97.0, and 00.0, "leading" users to the BIH CTS 84.0.

References

Altamimi, Z., 2000. "Personal e-mail exchanges".

McCarthy, D., 1996. "IERS Conventions, 1996", IERS Tech Notes 21.

Trimble launches Juno ST handheld with built-in GPS

Trimble introduced the latest addition to its Mapping and GIS product line - the Juno ST handheld. Juno is a portable, low-cost data collection solution supported by Trimble's range of field and office software. It comes standard with a built-in high-sensitivity GPS receiver, Microsoft Windows Mobile version 5.0 software, and has Wi-Fi/Bluetooth for wireless connectivity to office networks, cameras and mobile phones.

Ron Bisio, Director of Marketing, Mapping & GIS, Trimble speaking to Coordinates mentioned that the new JunoTM ST handheld, an affordable, compact Global Positioning System (GPS) receiver designed specifically with the customer's budget in mind. The new Juno ST handheld is the perfect solution for utility companies and government organizations searching for an affordable GPS receiver that enables them to deploy multiple teams of workers and manage large amounts of data on tight budgets. He explains that priced to equip an entire workforce, the Juno ST handheld is a highly productive, non-rugged GPS receiver for field data collection and mobile Geographic Information Services (GIS). Designed with a high-sensitivity GPS receiver, the Juno ST handheld works well in tough environments, such as under forest canopy and up against buildings, and provides two to five meter GPS positioning in real time or after post-processing. Small enough to fit in a shirt pocket, the Juno ST handheld is Trimble's most compact, lightweight, fully-integrated field computer." **www.trimble.com**

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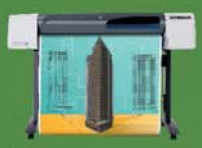

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Surveying vs. GIS [Round 1]

> A big challenge is integrating the surveying profession with the GIS profession. There's a growing tension between them. One of the bridges that I want to accomplish this year is integrating the technology so the surveyors can have tools within the GIS toolbox that allows it to create and manage surveys that can be directly used by the GIS people. The GIS datasets, in turn, can be refined based on survey information, especially transaction based survey. These two goals are separate and sometimes they run into a big conflict about who should do what. I think I would be technically directing them and say these technologies can be synergist. There is a need to search out surveyors that want to grow their activities in the GIS areas and search out GIS people who want to have a strong survey inclination.

Jack Dangermond
President, ESRI
Coordinates, Volume 3 Issue 3, March 2007

WHEN Jack gave us the above statement we found ourselves wondering what other experts, from both sides of the stated divide, felt about the matter. We set ourselves the task to find out.

Here, two issues of *Coordinates* later, we present the views of government officials, industry experts and technology users on the percieved rift between GIS users and surveyors.

The gloves are on, gentlemen, go to your corners and when the bell rings, come out boxing.

Proper synergy between the two is essential

Brig MV Bhat
President, Institution of Surveyors, India

Surveying is the basic operation of collecting information- Where, what, when and how - defining position, attribute and temporal". This information forms the basic input for the GIS operations. The Surveying fraternity should know how best the information collection can be exploited to derive results and reports needed to create and maintain the Decision Support System in day to day activities - the role of a GIS Application developer. Proper Synergy between the two is essential for a better life for the user. They cannot act in isolation and try to brow beat each other claiming supremacy.

Survey done without purpose will not serve any purpose. So, information collection should be based on the needs that information will meet. Avoid duplication of efforts in collecting information by defining who will do what and then understand what best method to adopt so that there is minimal effort required to transform the information to the computer. The GIS community also must realize that they must know in what form they want the information so that human intervention is minimum in taking the data to the computer environment such that most of the analysis is done through interaction between data sets, within the database created/generated by the surveyor. The conflict arises when one ignore the role of the other. Each must have respect towards the respective profession and understand the efforts of the other. "Collect once and use many times" is the key to reduce the conflict and define who will do what.

Surveyors, who are aware of the GIS capabilities can collect and provide information in a better manner than a person who doesn't know GIS. Similarly, a GIS professional can better exploit the spatial data if he knows how it is collected and what is the effort involved. A GIS can perform better if the information in the data used for developing the application is as discreet as possible. If a surveyor knows this, he will ensure that he collects the information to enable maximum exploitation and derive as better a report as possible. For instance, if a Cartographer knows how to survey, with an eye to the ground, then he will do his cartographic job better and try to bring out the optimum by means of depiction of information. The role of a cartographer is synonymous to that of a GIS professional.

Technology societal interface is a must

P Misra
Consultant, Land Information Technologies, India

Fragmentation of technology is not good for society. Many times latest technology is considered as a 'substitute' to the previous ones but actually they are 'add on'. Professionals should be aware of the problem-solving abilities of the technology. Just having knowledge does not help the society.

We have information and knowledge but the need is of a holistic and problem solving approach and methodology. The new generation of professionals need to be trained on various aspects of the technology. We have many institutes in India focusing on surveying, remote sensing or any other discipline. What we need is a University where not only the integration of various research disciplines in emphasized but a societal interface is also visualised.

The whole is greater than the sum of the parts

Craig Roberts
School of Surveying and Spatial Information Systems, University of New South Wales, Australia

The tension between Surveying and GIS presents a threat to the future of both professions unless it is soon recognised that the whole is greater than the sum of the parts. Recently in Australia, the issue of flagging membership of professional organisations in the surveying, mapping and spatial fields was addressed with the formation of the merger organisation called the Spatial Sciences Institute (SSI). It is not a happy merger with all manner of petty disputes limiting the potential of a united industry. Rather than focusing on the negatives, organisations need to recognise and respect their strengths and work together. No one understands measurement, datums, coordinate systems and can maintain the integrity of the cadastre like professional surveyors. Similarly, the power of the GIS database for data management, collation of spatially related information, querying, analysis and presentation of spatial products is the bastion of the GIS professional. What can we learn from each other? At the university, my students graduate with (hopefully) equal skills in both the surveying and spatial disciplines and want to combine these skills in their professional careers. Often they are faced with a choice of either becoming a surveyor or GISer; either joining the SSI or the Institution of Surveyors. They don't want either/or, they want both! With a growing skills shortage, my students need to be welcomed into a united profession and given a chance to own and grow new opportunities into their career rather than pick sides. GIS databases should be used during field capture just like survey and quality data should underpin all spatial databases. The sooner the old guard in both camps really accept this, the greater chance we have of offering a real career path for the next generation – or risk losing our talents to Engineering or IT.

An apparent convergence of GIS and surveying data is taking place

Brent A. Jones
PE, PLS, Survey/Engineering Industry Manager ESRI

It's been said that there is a growing tension between surveyors and GIS professionals. I'm not sure if the tension is growing, but a tension remains that has existed for some time. Part of the tension stems from the divergent evolutions each field has had. Although both are closely related geospatial technologies, GIS has matured through an entirely different ecosystem than surveying. Surveying is rooted deep in history (Eratosthenes of Cyrene (276-194 B.C) first calculated the diameter of the earth) while GIS emerged as part of the rapid growth high technology era. Surveying has focused on precision and accuracy, while GIS has focused on data management, spatial analysis and visualization, and less on the spatial accuracy of data. Surveying has often been performed on local or assumed coordinate systems, while GIS has used standard projections and global coordinate systems.

Recently, GIS has moved from using relatively spatially inaccurate data (at least from a surveyor's point of view) to being spatially accurate with double precision datasets, and the capability to manage and store surveyors' original records and field measurements in the GIS database. Surveying has also evolved from using only local coordinate systems with terrestrial instrumentation to global coordinate systems and GPS. This apparent convergence of GIS and surveying data is taking place automatically because of the nature of each discipline.

Is technology the cause of the tension? Technologies exist to bring these communities together, but history, traditional markets, and protectionism prevent rapid convergence. Professionals with established businesses and markets are hesitant to change too quickly for many reasons, many of which are good reasons. However, regardless of this resistance, technology is moving forward rapidly.

Jack Dangermond said that current technology development is focused on bringing survey data (both survey record and field measurements) to the GIS environment and inject the accuracy which surveys bring. An additional focus is to work with GIS professionals to use surveys and survey data in their standard GIS work environment. This will serve both the surveyor and the GIS professional by providing new and better data management and spatial analysis capabilities while improving the accuracy of GIS data.

Early adopters are already beginning to work with new compatible technologies – surveyors are using GIS technologies to better manage their daily work and provide new services, and GIS practitioners are using the new tools to incorporate the survey record to best manage base data in GIS. Listening to these pioneers and their successes, they are beginning to acknowledge the convergence and relieve any tension that may exist between them. Following these leaders will provide the mainstream GIS professional and surveyor with new avenues of growth and prosperity.

Surveyors can make unique contribution to data sets

John Hannah
Professor, School of Surveying, University of Otago, New Zealand

Is there a tension between surveying and GIS? Not that we have detected in New Zealand. Are surveyors deeply involved in the GIS business? Yes! Are other professionals involved in the GIS business? Yes!

At its most fundamental level, the GIS industry revolves around the use of spatial data sets, some of which are captured directly by the surveyor (e.g., land boundaries and local topography), and some of which are derived from other sources such local authority records (for street address data), photographs (for extensive topographic data), and satellite remote sensing (for broader environmental data sets). No one professional group is involved in the collection of all this data, nor does any one professional group have an over-riding claim to GIS-related work.

Typically, however, and in comparison to professionals from other disciplines, the surveyor will not only have better access to highly accurate and detailed local spatial data sets, but also a better understanding of the coordinate systems used to reference this data. The surveyor is therefore in a position to make a unique contribution to national and international data sets, provided the motivation and the tools are present to do so.

Should this present tension? Not at all! Indeed, it should be viewed as merely another step in the data set evolution. As the surveyor contributes to these wider data sets and embraces the tools used to create and manipulate them, so he/she will find new applications for the data and new products that arise from this data. This is not an issue that should lead to tension, but rather one that should lead to collaboration.

We need to stop turning a blind eye

Clare Hadley
Ordnance Survey, UK

Tension between 'factions' of our industry is nothing new – think of the disputes between the surveyors and cartographers 25 years ago when the term 'GI' was in its infancy. It is a constant underlying issue which we have learnt to live with over the years, rather like an irritating habit in a family member! Some would say that such tensions breed innovation in that each group is trying to get ahead of the other. What is important is whether it has an adverse impact on how we do our business – does it confuse our customers, does division of skills restrict what we can do? When the answer to this becomes 'Yes', we need to stop turning a blind eye and start doing something about it.

What binds us together? We are all concerned with spatial information – the collection, analysis and presentation of it. What separates us? The skills we need (to a certain extent) and, more importantly, the traditional views of role of 'surveyors' and other professional groupings. This does not always lead to an integrated and efficient industry.

How has the Survey/GI professional schism developed? One view, which I would put up for discussion, is that surveyors have been more successful in becoming part of a mainstream than 'GI' professionals have. Surveyors' have found their niche in the engineering and property mainstreams in a way that GI professionals have yet to do. The input of surveyors is recognised. Where are the 'GI' people with respect to larger professions? Those dealing with GIS often see themselves as dealing with a 'special' sort of information with special software and systems. Whilst I would not deny that there are aspects of the data we deal with that require expert knowledge, the systems that use it are no longer special and should be part of mainstream IT.

In the UK, the surveyors' professional organisation, the Royal Institute of Chartered Surveyors (RICS), has encouraged academics to bring the subject area of GI into more mainstream professional areas of practice rather than keep it separate as it has been in recent years, with positive results. At the same time, the number of pure 'GI' courses has fallen – is the market talking? Meanwhile there has been an upsurge in applications for RICS membership by 'GI' professionals. Could this be an example of the two 'professions' coming together in the UK? Time will tell.

Clare Hadley has a foot in both camps, being a Chartered Land Surveyor and a Chartered Geographer with an MSc in GIS.
Views expressed are those of the author alone. Thanks to James Kavanagh for input on the recent work of the RICS.

Need for integrating surveying and GIS

Stig Enemark
FIG President

Reading Jack Dangermond´s views in Coordinates on "Tension between surveying and GIS: A growing challenge" I have to say that I fully agree. We should build this bridge or, in fact, we should aim at integrating these two areas.

To some extent this integration is already the case at least in many European countries. The GIS profession in Central Europe is very much populated by surveyors working in close cooperation with geographers, architects, planners, and IT people. Visualisation creates understanding and analysing and modelling creates know knowledge. GIS this way bridge a whole range of professionals.

From FIG point of view, GIS or Spatial Information Management, is a core discipline in Surveying. Surveying and mapping are clearly technical disciplines (within natural and technical science) while cadastre, land management and spatial planning are judicial and managerial disciplines (within social science). The identity of the surveying profession and its educational base therefore should be in the management of spatial data, with links to both the technical and social science approach. The global surveying profession is truly interdisciplinary in terms of having this broad skill base. However, in some countries and regions, such as USA, the profile is more focused on land surveying and boundary determination while GIS is mainly an area for the architects.

The challenge of the future will be to implement the new IT-paradigm and introduce this new multidisciplinary approach into the traditional educational programmes in surveying and engineering. A future educational profile in surveying should come from the areas of Measurement Science and Land Management, and supported by, and embedded in a broad multidisciplinary paradigm of Spatial Information Management. FIG is strongly promoting this profile while of course recognising the diversity of the surveying profession in various countries and regions.

FIG is looking forward to work closely with ESRI and other partners in pursuing these aims.

No such tension

Jamil Ali
Surveyor General
Brunei Darussalam

In my experience, there is no tension between surveying and GIS. Surveyors need GIS and GIS need surveyors. I truly believe that it is only in the mindset of certain people that there is a tension between surveying and GIS.

Interdisciplinary knowledge is key

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Surveying to my primary impression can be conventionally defined as determination or collection of point positions and their temporal changes within a predefined reference frame. Before the advent of GIS, commission of surveying within its initial category can meet people's needs to a great extent since no extra analytical or management functions are supposed to be derived from it.

With the development of surveying approaches and increasing needs of GIS service, dynamic and complex information are expected from not only surveying, but also from other fields. At the same time, surveying itself shows the necessity of stepping forward from pure location calculation to active thinking. Surveying results are no longer expressed in form of data sets, but in carefully designed database so as to bridge required analysis and management roles, which can form an essential link for GIS to be developed based on surveyed information. Although this simple fact can help us to briefly understand the relation between surveying and GIS, the emerged gaps among varied GIS components and surveying are complex and it is hard to determine who should do what in the hybrid unit.

To further speak for this confusion, the daily developing LBS may be a good example for us to see the great challenges in which surveying, mobile computation, mobile GIS and mobile communication are involved. Perhaps the newly derived term "Geoinformatics" can give part of the answer. If so, we do hope it can develop into a practical branch to relate the tension of surveying and GIS in the near future rather than remain a nonfigurative concept that needs concrete definition.

In my view, the synergism to integrate survey and GIS should be activated by both surveyors and GIS professionals. On one hand, there are multiple ways to assimilate location data from surveying, its potential application is now extending to current data mining and as far as knowledge may discover; on other hand, it is not easy for surveyors to synthesize their data sets or database into a versatile GIS as they often need to collect specified data within appointed regions. Interdisciplinary knowledge of both and cooperation between the two form the key to dispute.

An approach to e-Navigation

A discussion on the main tasks of the maritime community for the near future in the field of E-Navigation.

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THE common objective shared by all the Member States of IMO (International Maritime Organization) is a commitment to deliver safe, secure and efficient shipping on clean oceans. The co-sponsors of this submission believe that IMO now has an opportunity to develop and map out a clear strategic vision for one common integrating and utilizing all the navigational technological tools at our disposal to secure a greater level of safety and incident prevention which will, at the same time, deliver substantial operating efficiencies with resulting commercial benefits, whilst also continuing to respect the freedom of navigation rights.

It is decide to add a new item on E-Navigation to the work programme of the IMO Sub-Committee on Safety of Navigation (NAV) and also to that on Radio-communications and Search and Rescue (COMSAR). The aim should be to develop a strategic vision for the utilization of existing and new navigational tools, in particular electronic and radiocommunication tools, in a holistic and systematic manner.

E-Navigation would help reduce navigational accidents, errors and failures by developing standards for an accurate and cost effective system that would make a major contribution to the IMO's agenda.

Scope of the Proposal

The aim is to develop an overarching accurate, secure and cost-effective system with the potential to provide global coverage for vessels of all sizes.

Implementation of this new strategic vision might require modifications to working methods and navigational tools, such as charts, integration of bridge equipment, electronic aids to navigation, communications and shore infrastructure. At this stage, it is difficult to be precise about the full extent of the changes that might be necessary to fully deliver this vision. However, there might need to be changes to a number of regulatory instruments, including the appropriate chapters in the SOLAS Convention. This would therefore entail consideration of the various strands of this policy in the Sub-Committees on Safety of Navigation (NAV) and Radiocommunications and Search and Rescue (COMSAR). This proposal is not in any way intended to conflict with the clear principle, as confirmed in the SOLAS Convention, of the master's authority for the operational safety of the vessel, and in UNCLOS, of freedom of navigation rights.

Definition

The E-Navigation Committee of IALA's proposes the following working definition of E-Navigation as a starting point: "E-Navigation is the collection, integration and display of maritime information onboard and ashore by electronic means to enhance berth-to-berth navigation and related services, safety and security at sea and protection of the marine environment."

Similar point of view is presented by others Authors. According to Basker [Basker, 2005] E-Navigation is the transmission, manipulation and display of navigational information in electronic formats to support port-to-port operations. Its main components will be:

- electronic navigation charts,
- positioning – combined use satellite and terrestrial radionavigation services,
- vessel information – route, heading, manoeuvring parameters and other status items,
- communication – ship to shore, shore to ship and ship to ship,
- integrated displays – on board ship and shore,
- information prioritization and alert capability.

An Initial Approach To E-navigation

E-Navigation is intended to make safe navigation easier and cheaper.

It is needed:

- to minimise navigational errors, incidents and accidents;
- to protect people, vessels, cargoes, marine environment and resources;
- to improve safety and security;
- to reduce costs for shipping and coastal states; and
- to deliver benefits for the commercial shipping industry;

It can be delivered:

- by using satellite positioning and radiocommunication systems;
- by introducing INS/IBS and computer technology on ships;
- by introducing common format for automatic data exchange with shore-based monitoring and intervention capability.

The aim is to develop a strategic vision for E-navigation, to integrate existing and new navigational tools, in particular electronic tools, in an all-embracing system that will contribute to enhanced navigational safety (with all the positive repercussions this will have on maritime safety overall and environmental protection) while simultaneously reducing the burden on the navigator. As the basic technology for such an innovative step is already available, the challenge lies in ensuring the availability of all the other components of the system, including electronic navigational charts, and in using it effectively in order to simplify, to the benefit of the mariner, the display of the occasional local navigational environment. E-navigation would thus incorporate new technologies in a structured way and ensure that their use is compliant with the various navigational communication technologies and services that are already available, providing an overarching, accurate, secure and cost-effective system with the potential to provide global coverage for ships of all sizes.

Human Element

Some observations were made on the human element issues that need to be addressed when developing an E-Navigation strategy:

- man/machine interface (i.e., balance between standardisation and allowing for innovation and development);
- modes of information display/portrayal;
- appropriate communication of situation awareness; and
- equipment should be designed to engage both the bridge team, pilot and VTS operator, maintaining high levels of attention and motivation without causing distraction.

Key Issues and Priorities

Considering the wide range of options and benefits that could become part of E-Navigation, the primary value of E-Navigation is to join the ship's bridge team and sea traffic monitoring teams to create a unified navigation team that would achieve safer navigation through shared information. For full implementation of such a system it would need to be mandatory for SOLAS vessels and scaleable to all users.

It was suggested that before the primary benefits and value-added services could be realised, an architecture comprising three fundamental elements should first be in place. These are:

- Electronic Navigation Chart (ENC) coverage of all navigational areas (WEND - Worldwide Electronic Navigational Chart Database);
- a robust electronic position-fixing system (EPFS), with redundancy; and
- an agreed infrastructure of communications to link ship and shore.

Specifications for these fundamental elements are contained as follow.

Hydrographic Data (ENCs)

A full coverage of ENCs for navigational waters will require considerable effort from the world's hydrographic community. It has further been noted that the existence of proprietary updating software in many ECDIS systems has become a key cost issue when implementing ENC data. It is thought that if, through IMO, an open architecture system could be agreed, this would allow a more competitive environment in the purchase, and maintenance of ECDIS systems thus reducing the overall costs of ENC's and increasing the global rate of acceptance. From the seaman's point of view there is unsolved question of responsibility for correction of information presented by ECDIS and ENC updating.

Position Fixing

Electronic position-fixing systems, which could be integrated into e-navigation, can be divided into Global Navigation Satellite Systems (GNSS), GNSS augmentations, terrestrial radio-navigation systems and non-radio positioning systems. There are two operational GNSS at present (GPS & GLONASS) and two more planned: European - GALILEO and The People's Republic of China - COMPASS. It has long been recognized that GNSS require augmentation to achieve the required integrity for safety of life applications and the accuracy needed for specialized navigation and positioning. Augmentation systems fall into two broad categories: Ground Based (GBAS) and Satellite Based (SBAS). GBAS (IALA) maritime beacon system has been the standard GNSS augmentation system for maritime applications. SBAS is based on two operational (WAAS, EGNOS) and two planned public service (MSAS, GAGAN).

There are many high accuracy, local terrestrial radio-positioning systems provided, mostly on a commercial basis, for specialized applications. However, the only terrestrial radio-navigation system with widespread, regional coverage is Loran-C. The Far East Radio-Navigation System (FERNS) is provided under an international agreement between PRC, Russia, Korea and Japan and extends from the Bering Straits to the South China Sea. Saudi Arabia also has a system, covering its own territory and the Arabian Gulf. Non-Radio Positioning Systems is the Inertial Measuring Unit

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(IMU), usually integrated with GNSS to enhance it and cope with outages.

The problem of fixing position coordinates for navigational needs considered only in terms of measurement error seems to have already been solved in a global scale. Its realization with higher or lower precision is only a function of the technical solution adopted. Therefore, other, equally important, although often omitted, exploitation parameters of navigation systems become crucial. These are: availability, integrity, continuity and also reliability.

The following is a list of key elements required for e-Navigation position fixing:

- appropriate accuracy, availability, continuity, and integrity (alert limit, time to alarm, integrity risk), already included in IMO Resolution A.915(22);
- adequate redundancy;
- compatibility between systems; and
- appropriate datums (vertical and horizontal).

There is also necessity to develop a unified theory of the some navigational criteria (availability, reliability, continuity, and integrity) under consideration and to determine the relations between them, because [Specht, 2003]:

- reliability and availability refers to different functional structures,
- definition of continuity is ambiguous,
- lack of mathematical connection between availability, reliability and continuity,
- vague procedures and methods of determining each of the criteria,
- measurement of the criteria is based only on statistic analysis of empirical measurement data.

These and others methodological problems should be solving as soon as possible, because all fixing systems characteristics have to be considerate in the same standardized way. The next important problems in implementation position systems to E-navigation are:

- identification of the service provider responsibility (especially for global and wide area positioning systems) for accidents caused by non-operation status,
- to establish international cooperation between GNSS service providers related to others than positioning services (Safety of Live, Commercial, Search and Rescue,…),
- to solve responsibility problem for core navigational system provider and augmentation signal deliverer.

Current GNSS has a common weakness in that they are all subject to accidental or intentional interference. Hence, alternative and independent position fixing capabilities need to be considered. Consideration should be given to independent non-GNSS Electronic Position Fixing System and sensors as a potential component of E-Navigation.

E-Navigation systems should enable the electronic capture of radar ranges, radar and visual bearings, etc. for position fixing.

Communications

The following is a list of key communication aspects required for e-Navigation, relating to both technical and content:

- autonomous acquisition and mode switching (i.e., minimal mariner involvement needed);
- common messaging formats;
- sufficiently robust (e.g., signal strength, resistance to interference);
- adequate security (e.g., encryption);
- sufficient bandwidth (data capacity);
- growth potential;
- automated report generation;
- global coverage (could be achieved with more than one technology); and
- the use of a single language (English), perhaps with other languages permitted as options.

The following communications issues are among those that will require resolution to achieve the above:

- it seems likely that a satellite broadband link will be required to achieve the above requirements, and consideration must be given to how this will be achieved; and
- the question of cost and who pays for the provision of a satellite broadband link must be resolved early in development of E-Navigation.

The standardization and unambiguous interpretation of information plays an essential role in the appropriate accomplishment of navigational information acquisition and exchange processes in the E-Navigation System. The definition of relevant standards will enable unequivocal interpretation of the information. Measures taken to unify the above mentioned standards are aimed at the development of the navigational information ontology. The starting point for the creation of this ontology is an analysis and classification of navigational information accounting for its kind and range. This will allow to sort out the structure of navigational information, thus the availability and exchange of information will be extended.

Need or Compelling Need

There is a clear need to equip the master of a vessel and those responsible for the safety of shipping ashore with modern proven tools to make marine navigation and communications more reliable and thereby reduce errors - especially those with a potential for loss of life, injury, environmental damage and undue commercial costs. More substantial and widespread benefits for states, shipowners and seafarers can be expected to arise from the increased safety at sea which is the core objective of E-Navigation. According to the United Kingdom's Marine Accident Investigation Branch, navigational errors and failures have been a significant element in over half of the incidents meriting a full investigation in the last four years.

There are already a great many electronic navigational and communication technologies and services available or in development - such as Automatic Identification System (AIS), Electronic Chart Display and Information Systems (ECDIS), Integrated Bridge Systems/ Integrated Navigation Systems (IBS/ INS), Automatic Radar Plotting Aids (ARPA), radio navigation, Long

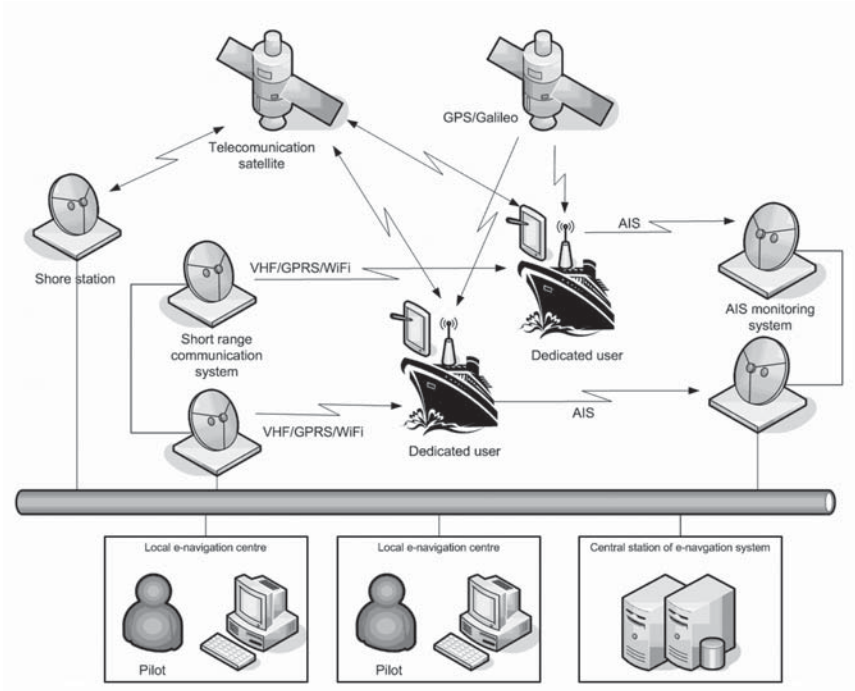

Fig 1. Final development of E-Navigation system

Range Identification and Tracking (LRIT) systems, Vessel Traffic Services (VTS) and the next modified generation of Global Maritime Distress and Safety System (GMDSS) - which can provide automatically the master and those ashore with the necessary information they require.

In addition to reducing navigational errors and failures, these technologies can deliver benefits in areas such as search and rescue, pollution incident response, security and the protection of critical marine resources, such as fishing grounds. They can also offer operational benefits by enabling the capture of advance information on cargo arrival and increased throughput capacity in congested ports, fairways, and waterways, or in poor visibility conditions.

However, if such technological advancement remains uncoordinated, there is a risk that the future development of the global shipping industry will be hampered through lack of standardization on board and on land, incompatibility between vessels, and an increased and unnecessary level of complexity.

By taking a pro-active lead through the development of a strategic vision, IMO also has the opportunity to contribute to improvements in the international organizational structure overseeing marine navigation, improve international co-operation and give guidance to other organizations involved, such as the IHO and IALA and key stakeholders such as equipment designers, suppliers, navigation practitioners, shipowners and the port industry.

Furthermore, the strategy has the potential to contribute positively to the reduction of the burden on all countries, including developing countries, in having to maintain physical aids to navigation. It should also assist separate initiatives such as those currently under consideration in the Facilitation (FAL) Committee e.g. the development of electronic means for the clearance of ships and the submission of information to a single point (the 'Single Window' concept), which are aimed at reducing the range of reporting obligations on the ship-owner and ship master.

An Integrated E-navigation Action Plan

The co-sponsors of this submission believe that the time is right to develop a coherent E-Navigation policy to embrace the ever-growing and complex set of technological aids which already exist. Delivery of this vision requires a clear, global commitment, articulated through a viable and coherent framework which sets out a migration plan (from where we are to where we want to go) for Governments and industry to achieve a common and consistent format for the use of electronic technologies.

The challenge for IMO is to develop a framework which accommodates and builds on existing systems already furthering the concept of E-Navigation, such as the World Bank-funded Marine Electronic Highway project in the Malacca Straits and the European Union's projects:

ATOMOS IV (Advanced Technology to Optimize Maritime Operational Safety - Intelligent Vessel) and MarNIS (Maritime Navigation and Information Services). The framework must deliver improved navigational safety for maritime Authorities, coastal States and the master of a vessel, without imposing unnecessary burdens on them.

The development of E-Navigation system can include following steps:

- Identification of the system and theirs subsystems (Integrated Navigation System INS, Integrated Bridge System IBS, shore centers with their specificity), particularly:
  - identification of system architecture and their structures,
  - requirements for defined subsystems and structure,
  - defining the kind and range of navigational information and subsystems interfaces.
- Developing models of integrated navigation subsystems (INS) and alert management.
- Developing models of integrated bridge subsystem (IBS).
- Developing models of shore-based centers subsystems.
- Developing a model of automated information acquisition and exchange subsystem:
  - elaboration of the concept of automated information acquisition and exchange subsystem,
  - developing of navigational information ontology for the information acquisition and exchange in projected

E-Navigation System,
    - analysis and choice of specific formal language for navigational information ontology recording,
    - requirement specification for data security.
- Integration of modeled subsystems into E-Navigation System.

Practical Realisation of E-navigation System

The most important problem during creation of e-navigation concept is concerned with answer to following important questions:

- the communication platform and technical means used for communication, transmission protocols and data encryption;
- structure and basic equipment of shore data navigation support and data processing centre;
- technical structure of ships data exchange system and the presentation format of data within the integrated bridge system.

Due to problems of IBS definition an affords should be made to standardise and define minimal subsystems and modules of Integrated Bridge Systems and such definition will be base for further e-navigation system definition and creation. The IBS system is nowadays the integration of following subsystems: Radar/ARPA, ECDIS/ENC, VDR/S-VDR, Systems of control HAP/CSAAP, Gyrocompass, Autopilot/Trackpilot, Logs, Echosounder, GMDSS, SSAS Ship Security Alert System, External communication, AIS, DGNSS and Inertial and mooring support systems. So many integrated electronic systems and devices under one system will lead to several problems unknown yet on the base of experience with less integrated systems. The following research problems should be then resolved:

- ensuring reliable and redundant communication between marine subsystems with use of fast networks (Ethernet, RS485, CANs) with possible errors considerations;
- definition of models and algorithms of technological used by e-navigation with permission of proper level of navigational safety;
- creating the model of navigational information circulation and presentation on the integrated bridge and shore navigation support centre with use of proposed system;
- definition of model of navigation information exchange with use of satellite communication, VHF, WiFi, Internet or GPRS;
- definition of minimal information set, sufficient for reliable e-navigation system functioning;
- creation of the model of optimal information in all e-navigation subsystems;
- creation of optimal visualization model of navigational data on ship equipped with IBS and for data exchange within e-navigation;
- definition and creation of control and protection model of e-navigation system.

The prediction of possible development of e-navigation system is very difficult but it could be anticipated that the system will be developing in two main directions:

1) integrated system – where information from ships will be send to shore data processing centres and the main decisions about the ship navigation assist will be made onshore;
2) distributed system – based on development of ship intelligent self-organising systems which will be able to exchange the information between the other ships and will be able to process the information and to support the decision of navigators.

Most likely the final versions of the e-navigation system will be the combination or above solutions. In more near future the system will be most likely developed in two stages:

1) first stage which will be totally based on existing bridge and communication systems (AIS, ECDIS and voice VHF) only development of shore navigation support centres will be necessary;
2) final stage with dedicated system based on created ship e-navigation support platform where satellite communication will be applied (Fig. 1).

Analysis of the Issues Involved

The key structural components of a safe and comprehensive E-Navigation policy are:

- accurate, comprehensive and regularly up-to-dated Electronic Navigational Charts (ENCs), covering the entire geographical area of a vessel's operation;
- accurate and reliable electronic positioning signals, with "fail-safe" Performance (probably provided through multiple redundancy, e.g. GPS, Galileo, differential transmitters, Loran C and defaulting receivers or onboard inertial navigation devices);
- provision of information on vessel route, course, manoeuvring parameters and other status items (hydrographic data, ship identification data, passenger details, cargo type, security status etc), in electronic format;
- transmission of positional and navigational information: ship-to-shore, shore-to-ship (e.g. by VTS, Coastguard centres, hydrographic offices) and ship-to-ship;
- accurate, clear, integrated, user friendly display of the above information onboard and ashore (e.g. using IBS or INS);
- information prioritisation and alert capability in risk situations (collision, grounding etc), both onboard and ashore; and
- reliable transmission of distress alerts and maritime safety and security information with reduction of current GMDSS requirements by utilizing newly emerged communication technologies.

Issues to be Considered

Contemporary technologies already provide the capability to deliver much of the envisaged E-Navigation strategy. The co-sponsors of this document propose that the MSC, and its subsidiary

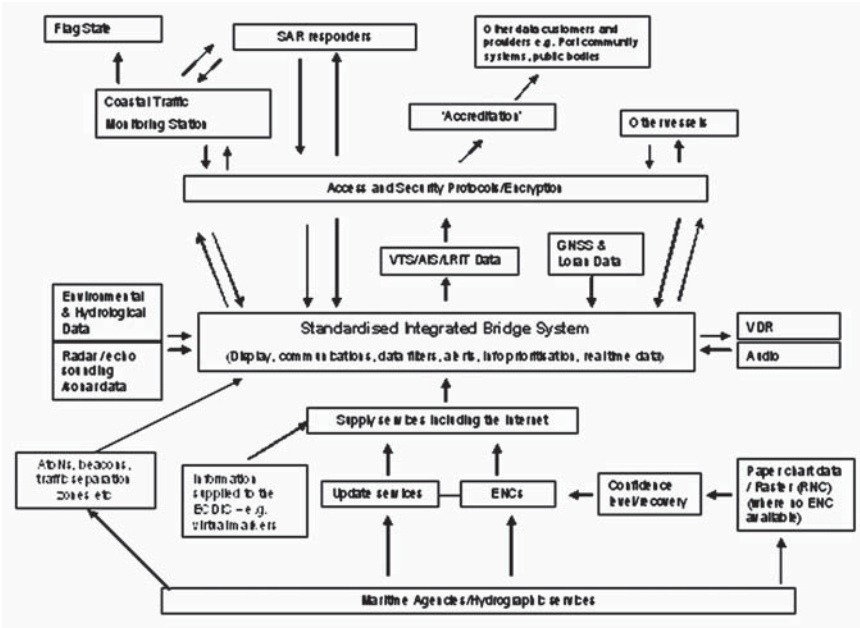

Fig.2. E-navigation system architecture [NAV 53/13/...]

bodies, should focus on creating the right environment to realize the full potential of these navigational technologies. This new work programme item will also need to tackle a wide range of issues (extending beyond what is already being done at IMO), including:

1) increasing the production, coverage and interfaces of ENCs; as well as accelerating the distribution and promotion of commercially viable and globally accepted protocols for ENC production and updating;
2) agreeing standardized controls and common performance standards of bridge E-Navigation systems (including the consideration of such issues as what information needs to be captured, how it should be displayed, how it should be laid out and what should be shared with other vessels and shore-based navigation support centres);
3) agreeing protocols to provide more information to professional and authorized users, whilst preventing unauthorized access to, dissemination of, or intervention in safety or security-critical, real-time data transmissions;
4) developing a shared understanding of the potential benefits and mechanics of shore support and oversight, leading to the design and implementation of shore-based marine E-Navigation support centres covering coastal and, potentially, international waters; and
5) setting out an orderly and safe migration plan for E-Navigation which takes into account the future role of existing navigational tools, in different locations and situations.

Do the Benefits Justify This Proposed Action?

Considerable sums of money are expended by shipowners and operators, on top of the substantial resources deployed by flag, port and coastal State regulators, in seeking to make marine navigation easier and to reduce navigational errors and failures. The E-Navigation strategy would enable the industry to benefit from reducing these costs in the long-term. The co-sponsors of this submission are convinced that if action is not taken soon, the disadvantages of pursuing uncoordinated individual technologies will outweigh the potential benefits that together they could deliver. Focusing resources on the co-ordination of improvements to navigational and communication tools will bring substantial overall safety, security, environmental protection and commercial benefits.

Full analysis of costs will be needed, if and where these occur over and above those that have already been considered by IMO for the range of existing required navigational and communication systems. The co-sponsors recognize that any such new costs may include those related to the administrative burden on contracting States as a consequence of any changes to current national regulations that may be necessary.

Coastal and port States incur substantial expenditure in providing physical aids to navigation, whether funded by the public purse or met by the shipowner through dues levied on port traffic. Although a great deal has been done by coastal and port States in reducing such costs - by automation, by the application of low-maintenance equipment and by the use of renewable energy sources - there will be continued upwards pressure on the cost of servicing aids to navigation networks, given the dependence on skilled labour and fuel. For developing countries especially, the establishment costs for physical aids to navigation or the costs to affect a transfer to the use of renewable energy sources or increased automation can be considerable. A comprehensive and integrated E-Navigation strategy would provide the opportunity for reducing overall costs whilst fully meeting obligations for the safety of navigation.

The Core Objectives Of An Integrated E-navigation System

Using electronic data capture, communication, manipulation and display, to [NAV 53/13/…, 2007]:

Using electronic data capture, communication, processing and presentation, to:

1) facilitate safe and secure navigation of vessels having regard to hydrographic and navigational information and risks (e.g. coastline, seabed topography, fixed and floating structures, meteorological conditions and vessel movements).
2) facilitate vessel traffic observation

and management from shore/coastal facilities where appropriate, for example in harbours and approaches.

3) facilitate ship to ship, ship to shore, shore to ship and shore to shore communications, including data exchange as needed to achieve (i and ii).
4) provide opportunities for improving the efficiency of transport and logistics.
5) facilitate the effective operation of distress assistance, search and rescue services and the storage and later use of data for the purposes of traffic and risk analysis and accident investigation.
6) integrate and present information onboard and ashore in a format which, when supported by appropriate training for users, maximises navigational safety benefits and minimises risks of confusion or misinterpretation.
7) facilitate global coverage, consistent standards and mutual compatibility and interoperability of equipment, fitment, systems, operational procedures and symbology, so as to avoid potential conflicts between vessels or between vessels and navigation/ traffic management agencies.
8) facilitate (subject to a local risk assessment) a phased migration to e-navigation while maintaining physical aids to navigation and systems where required to ensure continued navigational safety, and having regard to legacy systems, the varying state of development of aids to navigation and systems in different parts of the world and the likely timescales for adoption.
9) demonstrate levels of accuracy, integrity and continuity appropriate to a safety-critical system (under all operating conditions and having regard to risks of malicious or inadvertent interference).
10) be viable as a safety-critical system on a stand-alone basis having regard to both the onboard and ashore applications of e-navigation
11) integrate data and communications systems mandated for other purposes (e.g. security), as far as practicable, so as to minimise the number of 'stand-alone' systems onboard and ashore
12) be scalable, to facilitate fitment and use, by smaller vessels (e.g. fishing, leisure vessels).
13) be capable of development/adaptation to integrate other, value-added functionality, while avoiding any interference with or degradation of core safety-related functions.
14) be capable of development/adaptation to facilitate low cost generational change as new capabilities and functionality are developed.
15) facilitate effective waterway use for different classes of vessels.

Conclusions

The co-sponsors of this submission believe that the time is right to develop a coherent E-Navigation policy to embrace the ever-growing and complex set of technological aids which already exist. Delivery of this vision requires a clear, global commitment, articulated through a viable and coherent framework which sets out a migration plan (from where we are to where we want to go) for Governments and industry to achieve a common and consistent format for the use of electronic technologies.

The challenge for IMO is to develop a framework which accommodates and builds on existing systems already furthering the concept of E-Navigation, such as the World Bank-funded Marine Electronic Highway project in the Malacca Straits and the European Union's projects ATOMOS IV (Advanced Technology to Optimize Maritime Operational Safety - Intelligent Vessel) and MarNIS (Maritime Navigation and Information Services). The framework must deliver improved navigational safety for maritime Authorities, coastal States and the master of a vessel, without imposing unnecessary burdens on them.

References

Basker, S. 2005. E-Navigation: The way ahead for the maritime sector. Trinity House, London, September.

IMO MSC 81/23/10, 2005. Work Programme. Development of an e-Navigation strategy. Submitted by Japan, Marshall Islands, the Netherlands, Norway, Singapore, the United Kingdom and the United States, International Maritime Organization, London, 19 December.

IMO NAV 52/17/4, 2006. Any other business. An approach to E-Navigation, submitted by Japan. Sub-Committee on Safety of Navigation, International Maritime Organization, London, 12 May.

IMO NAV 53/13/…, 2007. Development of an E-Navigation Strategy. Report of the Correspondence Group on e-navigation. Submitted by the United Kingom. International Maritime Organization, London, 20 April.

Mitropoulos, E. 2007. E-navigation: a global resource. Seaways, The International Journal of the Nautical Institute, March.

Patraiko, D. 2007. Introducing the e-navigation revolution. Seaways, The International Journal of the Nautical Institute, March.

Specht, C. 2003. Availability, Reliability and Continuity Model of Differential GPS Transmission, Annual of Navigation No 5.

Weintrit, A. 2006. Navitronics and Nautomatics - New Challenges for Navigation27. . Proceedings (Vol.1) of IAIN/GNSS 2006, 12th International Association of Institutes of Navigation (IAIN) World Congress "Navigation in IT Era", and 2006 International Symposium on GPS/ GNSS, organised by Korean Institute of Navigation, ICC Jeju, Jeju, Korea.

Weintrit, A. & Wawruch, R. 2006. Future of Maritime Navigation, E-Navigation Concept. Proceedings of 10th International Conference "Computer Systems Aided Science, Industry and Transport" TRANSCOMP'2006, Zakopane, Poland, 4-7 December.

Urban Information Systems for Planning

The National Urban Information System (NUIS) Scheme of India aims to develop GIS databases for 137 towns/cities in the country in two scales i.e., 1:10000 and 1:2000

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STATE of the art global communication technologies and thriving economy is facilitating Indian cities to compete in the global environment. The constant transformation of urban areas into complex entities has brought forth new challenges and opportunities for Planners to design and implement a variety of activities in spatial terms. There is need to tread common ground so as to address problems and issues in the right perspective to assist cities in coping with economic realities and thereby produce high quality responsive environment and demonstrate successful urban solutions.

As per 2001 Census, India has 4378 Urban Agglomerations comprising of 5161 towns and cities. The number of Urban Agglomerations has grown from 3697 in 1991. These are confronted with problems of diffused and disorderly growth, inefficient public transportation systems, the conversion of agricultural areas into urban uses, governance etc. Above all, only about a third of the towns and cities have Statutory Development Plans and many of them require revision. Moreover, Planning activities involving spatial databases are not correlated with the sectoral/ departmental data generated and as a result, the data generated at various levels for urban planning and management remains uncoordinated and redundant to support decision-making. Thus, in order to address these issues in a holistic manner, Ministry of Urban Development has launched the National Urban Information System (NUIS) Scheme, on a pilot basis, during the Tenth Five Year Plan to develop GIS databases for 137 towns/cities in the country in two scales i.e., 1:10000 and 1:2000. In addition, utility mapping on 1:1000 scale will also be undertaken for 24 towns. The spatial and attribute database thus generated will be useful for preparation of Master/ Development Plans, detailed Town Planning Schemes and serve as decision-support.

The National Urban Information System (NUIS) has a total outlay of Rs. 66.28 Crore. This Scheme has taken all the States on board and 75% of the cost is borne by Government of India and remaining 25% is State matching contribution. NUIS Scheme consists of two components dealing with Spatial and Attribute data i.e. Urban Spatial Information System (USIS) and National Urban Data Bank and Indicators (NUDB&I) under a common umbrella.

Urban Spatial Information System (USIS) has the major objective to meet the requirements of urban planning in the existing organizational set up under the State Town and Country Planning Departments (State Nodal Agencies). The basic spatial data such as base map, land use map and thematic maps generated may be used by various city governance/ management departments as well as for further generation of derivative themes/ sector specific information e.g. utilities, infrastructure etc. Some of the main sources of spatial data for base maps and land use maps would be from remotely sensed sources such as CARTOSAT- I and aerial photographs, which would be used for integration with conventional maps. A National Urban Databank and Indicators (NUDB&I is to be set up within each State Town and Country Planning Department (SNA), which would develop town level urban database in general and databases for NUIS Scheme towns (ULBs) in particular. The focus of the database would be primarily to address the urban planning and management functions of the various departments. The data would be collated from the respective Urban Local Bodies and Statistical departments etc.

In the first instance, on pilot basis, 137 towns/cities (Figure 1) have been identified in consultation with respective State Governments for generation of spatial and attribute databases. The main thrust of the Scheme is to use modern data sources such as Satellite and Aerial platforms to generate a comprehensive 3-tier GIS database in the scales of 1:10000 for Master Plan preparation, 1:2000 for detailed town planning schemes and 1:1000 for Utility Mapping. Utility Mapping, especially for water supply and sewerage, will be captured by using Ground Profiling/ Penetrating Radar (GPR) technology.

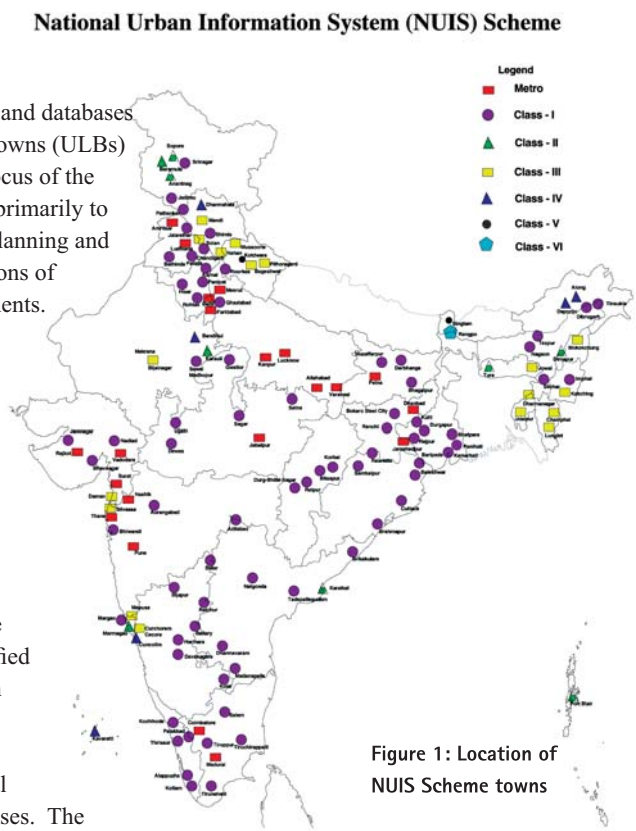


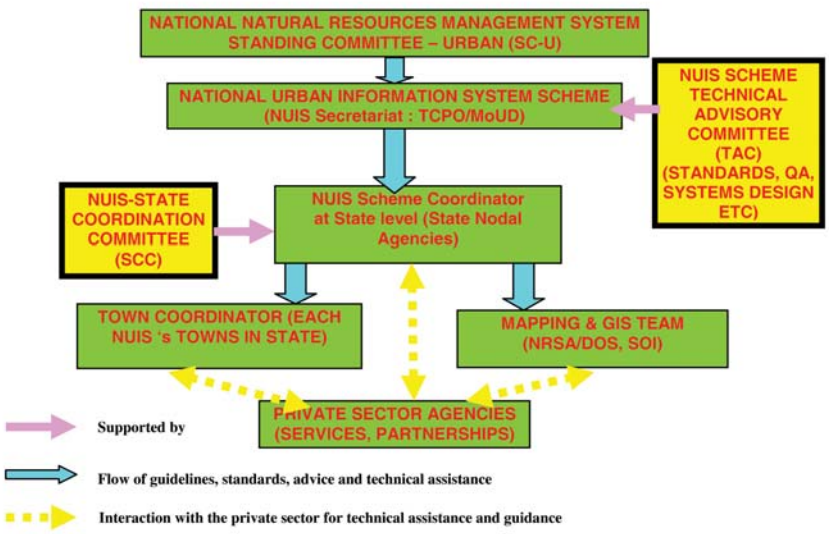
Figure 1: Location of NUIS Scheme towns

High-resolution, multi-spectral satellite images (mono & stereo) will form the core of the 1:10000 scale mapping and Aerial photographs and Ground Survey (Total Station) for towns with area below 25 Sq. Kms. will be the main source for 1:2000 scale mapping. Ground Penetrating Radar (GPR) will form the input for mapping underground utilities. The GPR survey will be carried out in selected towns for the core areas.

The images for mapping will be corrected/ registered using Global Positioning System (GPS), or in other words, Ground Control Points Library (GCPL), and used for geometric correction of the images. For this, SOI is permanently constructing at least five Ground Control Points in each of the 137 NUIS towns.

Geographical Information System (GIS) will form the core of NUIS Scheme and will be used to prepare digital databases.

Figure 2: NUIS Scheme Implemetation



The GIS application will be used to develop customized packages to generate outputs required for urban planning and management along with standardized GIS-based application packages that will allow users in Towns/States to extract specific inputs for planning.

Attribute databases under NUDB&I components are also in sync with USIS. The NUDB&I databases for each town to support planning and management in relation to actual departmental functions, as identified in Design and Standards document, will be generated/ compiled by the ULB to be linked to the spatial database. The data so generated will be processed to derive indicators. Indicators extracted will be aggregated at the national level to support country level urban indices, in turn, to be transmitted to UNCHS.

Capacity building/training has also been inbuilt in the Scheme with the view to expose decision makers, supervisory staff and operators to the whole range of issues dealing with spatial and attribute data. The underlying notion is that planning and decision support is required to be based on accurate database with provision for periodic updating.

As part of the Capacity Building/ Training schedule, TCPO envisages organizing about 30 training programmes and train about 600 administrators/ planners/planning personnel over a 2-year period. As this is the Knowledge Age, the main aim of the NUIS capacity building programme is to develop skills of town planning personnel to tackle the real world problems.

The main players in project implementation are TCPO under the Ministry of Urban Development, State Town and Country Planning Departments, Local Urban Bodies, Survey of India and National Remote Sensing Agency. The Mission Directorate is in TCPO, the nodal agencies are the State Town & Country Planning Departments. The Scheme management structure comprises of Technical Advisory Committee, NUIS Scheme Secretariat in TCPO, NUIS Scheme Technical/Standards Committee, NUIS Scheme Project Director at each State and NUIS Scheme project team at each Urban Local Bodies (Figure 2).

In later phases, the Scheme will be scaled up to cover all 5161 towns/ cities. TCPO is the nodal agency for appraising the progress and status of the Scheme from time to time for which a Technical Advisory Committee comprising of representatives of State Governments, NIC, ISRO, NRSA, and SOI has been constituted.

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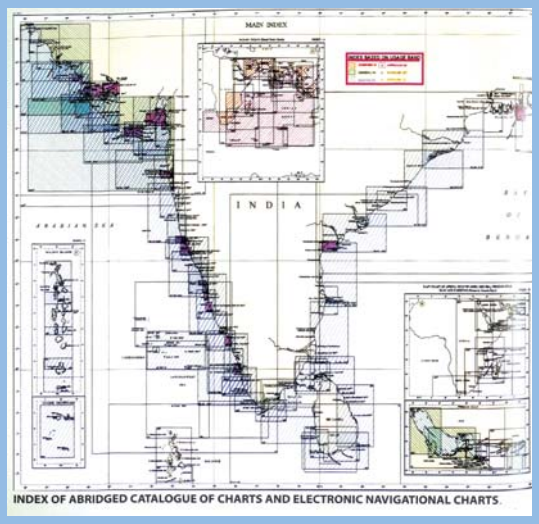
World Hydrographic Day



INDEX OF ABRIDGED CATALOGUE OF CHARTS AND ELECTRONIC NAVIGATIONAL CHARTS

Rear Admiral K.R.Srinivasan
AVSM, IN (Retd) is a Hydrographic and Oceanographic Expert and was the Chief Hydrographer to the Government of India from August 1994 to June 2004.

HYDROGRAPHY is that branch of applied sciences that deals with the measurement and description of the features of the seas and coastal areas for all marine purposes and activities, including the protection of the Marine Environment.

World Hydrographic Day is being celebrated on the 21st June every year to commemorate the establishment of the International Hydrographic Bureau by 19 member states in 1921 at the Principality of Monaco at the invitation of HSH Prince Albert I, a noted marine scientist and oceanographer, who had graciously offered the requisite space and facilities free of cost. In 1970, it was renamed as the International Hydrographic Organisation (IHO) and has presently 80 Member States, covering the vast majority of Ocean States. IHO plays a very useful role in Standardisation, International Charts, Capacity Building and Technical Cooperation, Education and Training, Hydrographic Surveying, Charts (paper and digital), Regional Hydrographic Commissions, Cooperation with other International Organisations, Tsunami Information, and nautical Publications.

From the Cartographic Perspectives, Hydrographic Surveying and Charting is essential for the safety of navigation under the UN/IMO/IHO conventions. On 29th June 2005, the UN adopted a resolution by which 21st June each year is to be celebrated as the World Hydrographic Day. The UN has also urged all states to work with IHO to promote safety of International Navigation, Maritime Development and Protection of vulnerable Marine Areas.

India has a long association with the IHO and is represented at the IHO by the Chief Hydrographer to the Government of India. The Indian National Hydrographic Dept (INHD) with Headquarters at Dehradun is a leading National Hydrographic Office. The Dept celebrated the twin occasion of 300 years of Hydrography in Indian waters and the Golden Jubilee of the National Hydrographic Office, Dehradun, on 1st June 2004 with the President of India as the Chief Guest.

Why is Hydrography important for a Maritime Nation like India? A modernized efficient hydrographic service has crucial role to play in the safe and efficient operation of maritime traffic control, coastal zone management, sustainable exploration and exploitation of marine resources, marine environmental protection and maritime defence. The directions to the contracting governments is amply set out in chapter V regulation 9 of the Safety Of Life At Sea(SOLAS) under the IMO which mandates the collection,

compilation and dissemination of all nautical information for the safety of navigation and ensure that hydrographic surveys are carried out adequate to the requirements of safety. It also mandates the preparation and issue of nautical charts and publications worldwide, manage the data/information and achieve greatest possible uniformity and standards in the provision of Hydrographic Services. Article 21 of the UNGA Resolution A/53/32 invites all States to cooperate in carrying out adequate hydrographic surveys and providing nautical information worldwide.

With over 90% of Indian trade moving through the national sea lanes, any laxity in this national service can spell maritime disasters. Coastal zone management is heavily dependant on Hydrographic Parameters and Data for orderly development of the coastal belt. Natural resources in the form of oil, gas, minerals, fish and energy, need accurate hydrographic data for scientific assessment and exploration. Hydrographic data of waves, tides and currents have intrinsic role in maritime natural calamities like cyclones, tsunami, etc. Protection of the marine environment under the UNEP/IMP/IHO conventions is greatly facilitated through large scale information of hydrographic data, especially since underwater topography and geomorphology are major controlling parameters in ocean dynamics.

Accurate and reliable hydrographic data/information has application in various sectors of development of a maritime nation. These include maritime transport, defence, maritime boundaries delimitation, coastal tourism, recreational sailing, offshore industries, fisheries, marine parks, marine environmental protection, real estate, inland water transport, oceanography, continental shelf claims under article 76 of the UNCLOS, ports and harbours, coastal industrial projects and maritime boundaries. These activities impinge upon at least 17 ministries, departments and agencies in the government of India.

It is estimated by the IHO that the benefit of a well established and efficient national hydrographic service in both economic and commercial terms through national programmes, can result in a cost benefit ratio of 1:10.

The INHD has in recent years established itself in the International World Hydrographic Order with one of the major surveying fleet (8 + 6 under construction) with state of the art equipment and systems, a well modernized national hydrographic office at Dehradun, an internationally acclaimed training school at Goa and a small cadre of well-trained and motivated hydrographic and marine cartographic staff. India is one of the few nations to have 229 electronic navigational charts (ENCs) to cover the entire national jurisdiction waters in a seamless database to serve the maritime interests. An Indian software firm has not only enabled this remarkable transformation, but is also assisting many other maritime nations to produce the ENCs of their national jurisdiction.

Indian hydrographers have also been surveying the waters of Antarctica as part of the national team every year.

India has been an active member of the IHO in its various committees with full professional contribution, especially in the last 12 years. These include the Strategic Planning Working Group (SPWG), Worldwide Electronic Navigational Database (WEND), capacity building, standards of competence for hydrographic surveyors, Antarctic surveys, committee on General Bathymetric Charts of the Oceans (GEBCO) and Committee on Promulgation of Navigational Warnings (CPRNW). India has consistently provided hydrographic and marine cartographic training to many personnel from the Indian Ocean Region (IOR). The INHD has assisted Littoral nations in natural calamities, (including tsunami), hydrographic surveying for ports and harbours, EEZ/CS surveys, etc. The initiative of the INHD in establishing the North Indian Ocean Hydrographic Commission (NIOHC) in 2001 has further cemented hydrographic cooperation in the region with 7 members, 4 associate members and 3 observers deliberating on common hydrographic issues for regional well being. The INHD personnel with sophisticated equipment even played useful cartographic role in the border areas in 1999-2001 after the Kargil war.

The reputation of the INHD is borne by the election of two of the former Chief Hydrographers (RAdm DC Kapoor and FL Fraser) to the Directing Committee of the IHO between 1972 and 1987. RAdm KR Srinivasan was elected Vice Chairman of the first UN Commission on limits of the continental shelf for 5 years from 1997, Chairman of the WEND committee (2001-03), member of the advisory board on the standards of competence for hydrographic surveyors (1997-2002) and member of the Strategic Planning Working Group (SPWG) (2002-2004) and Chairman of the NIOHC (2001-04), all of the IHO between 1995 and 2004. The INHD also won the "First Laureate Award" with a citation and cash award for protection of the marine environment from the World Underwater Federation in 2001 in recognition of its exemplary role.

In an increasing maritime role for India with foreign policy initiatives, the INHD under World Hydrographic Cooperation, is poised to play greater role for common good in the Indian Ocean Region. India is fully competent to become the regional ENC coordinating center for the Indian Ocean area with its technical and IT Infrastructure. It would be prudent for the Government to continue to invest in the National Hydrographic Service to meet multifarious ocean development needs. On the WHD, it is equally important that in a fast changing operational and technological scenario, the INHD must shed its old mindset, improve the performance, quality and content of its operational units and provide a cost-effective, reliable and efficient service to vast number of user agencies with less naval mindset and work towards the objectives of the IHO and national development, especially in the light of the strategic planning and the work programmes of the IHO and the restructuring of the organisation presently underway.

Other National Surveying Organisations in India (both in Public and Private sectors) would do well to adopt the standards of the IHO in their Products and Services in many of their Offshore Activities and thus bring about greater synergy and delivery.

"Market needs will decide a nation's geospatial policy"

— **Matthew O'Connell,** CEO, Director and President, GeoEye

What is the potential of high resolution imageries?

There has been a great increase in awareness about high resolution satellite and aerial imagery. The credit goes to the players like Microsoft Virtual Earth, Yahoo, and Google Earth. In many countries nowadays, even kids talk about on-line imagery and maps. It is bringing geography to life. It has been terrific in raising the global visibility of satellite imagery. That's been a terrific trend for all of us. Ten years ago we really had no notion of using the Web for geospatial applications. People now almost think of access to accurate and even timely geospatial information as a fundamental right.

Until recently, high resolution satellite imagery was used mostly in defence and intelligence. But as technology progressed, attitudes have changed. Several natural disasters helped us to see geospatial information in a new light. The Indian Ocean tsunami and later Hurricane Katrina in the U.S. made people realize that pre and post imagery of natural disasters was an enormous area of application. The online distribution of high resolution satellite imagery helped a lot in the relief effort because as soon as the tsunami hit, we and the National Geospatial-Intelligence Agency realized that the fastest way to get imagery in the hands of people who need it was online. ESRI's CEO, Jack Dangermond, is a visionary. He has a great phrase: the world's resources are finite, but our population keeps exploding; we need to know more about the world and our resources to manage it more effectively so that it can support the increasing population. I think the increasing use of high resolution satellite imagery will help us better map, manage and monitor our planet.

What potential for satellite imagery do you see in the developing world?

The economic and population growth in India has been dramatic. India is growing so fast that even as you plan urban development, more development is needed, as you plan telecom lines more are needed, as you plan new roads more are needed and as you plan energy distribution systems more are needed. Prime Minister Dr Manmohan Singh said that India must build hundreds of power plants over the next five years to end the electricity shortages that threaten economic growth. Satellite imagery can help with the site selection of such plants. The government has 14,000 kilometers of borders and thousands of kilometers of coastline to watch over. Satellites can also be extremely effective in mapping changes on the ground. For example, as India links together thousands of villages under new development initiatives, satellite based maps will be critical to ensure roads and other public right-of-ways are constructed and in an environmentally sound manner. The existing satellites from the IRS system are helpful, but they can only do so much and only have so much capacity. According to the US Department of Interior, 80% of all U.S. government information has a geospatial data component or other reference to a physical location. I imagine that the figures for India would be the same. In many countries, geospatial technologies are becoming an integral part of the backbone of government management.

By the end of the year, GeoEye will launch our next-generation imaging satellite, GeoEye-1. It will collect imagery of the Earth in the panchromatic or black and white mode at half-meter resolution and in the multispectral or color mode at 1.65-meter resolution. We will be able to pan-sharpen the imagery to create color imagery at 0.5-meter resolution and better. GeoEye-1 will be able to collect 350,000 square kilometers per day in the multispectral mode and almost double that in the black and white mode.

The mapping of earthquake prone areas would be useful in better understanding risk management. While India is already doing this, one can always do it better with higher resolution imagery. I see other uses for imagery in the areas of water management and flood controls, in agriculture and soil erosion mapping and in land use and land cover modeling. I think having half-meter resolution images available in bulk will be a terrific advantage.

What are the challenges you face in India?

We hope to strengthen our relationship with those in the Indian government, in the GIS community and in Academia who see the value of satellite imagery and open markets. We would like to build a production capability here in India and have access to India's eager and talented geospatial community. We would like access to the India market just as India has direct access to the US market.

I want to mention that we have established the GeoEye Foundation that provides satellite imagery at no cost in support of specific research projects at universities and non-governmental organizations. While the focus of the Foundation is on U.S. schools, we could consider expanding it so that students at some key universities here in India can have access to the IKONOS and Orbview-3 imagery archives. As of this month,

Mr. O'Connell is GeoEye's President and CEO. He was CEO of GeoEye's predecessor, Orbimage, beginning in 2001. In January 2006, Orbimage merged with Space Imaging to form GeoEye, the world's largest operator of commercial imagery satellites. In the fall of 2006, GeoEye became the first commercial remote sensing corporation to be traded on NASDAQ.

Mr. O'Connell has over twenty years of experience in communications management and finance.

Prior to joining GeoEye, Mr. O'Connell was a managing director at Crest Advisors, a New York-based private merchant bank that invested in and advised communications companies, and senior vice president of Legal and Business Affairs for Sony Worldwide Networks, a division of Sony Corporation specializing in radio and Internet programming.

Space News named Mr. O'Connell one of the "10 Who Made a Difference in Space in 2006."

the archive consists of some 278 million square kilometers of 1-meter resolution imagery over every country of the world.

So, finding the right people, maintaining the growth pace, and education will be tremendously helpful. Generally speaking though, I think data accessibility to high resolution imagery is in the slow lane for Indian academicians.

What about challenges at international level?

The average age of a map in the US is more than twenty years. Many parts of the Earth have never been mapped to any degree at all. Even after Hurricane Katrina, the average age of a flood plain map in the U.S. is more than ten years. If there is potential in the US, then there is even more potential in other parts of the globe.

We are also talking with friends around the world about putting together international consortia to address certain issues. For example, people are concerned about maritime security. The Italians are very concerned about it, for instance. It's very easy to get from certain countries over to Italy. The Japanese are very concerned about it because North Korea is just a boat ride away. Companies and countries can unite so that imagery from everyone's Earth imaging satellites can be pressed into service to address the maritime security issues. As we look into the future, especially in terms of defense and intelligence, I think putting together international consortia to address key issues before they becomes problems would be good for all of us.

Any regulatory/policy level issues?

Our next satellite, due to be operational early next year, will collect imagery with a ground resolution of 41-centimeters. Due to U.S. Government licensing restrictions, we must resample the imagery to half-meter resolution before making it available for sale to commercial customers. Of course, governments that have government-to-government agreements in place will be able to receive the imagery at the best resolution. So we've been asked by our friends in certain countries to see what we can do to help them get access to the best imagery. We have asked India to write a letter requesting this and we will gladly help work on the issue within the U.S. Government. I think America is coming around to the idea that they have to reduce the restrictions on American companies so that we can all share information more freely. I'd say that's the primary challenge that we face as we get this new satellite ready for launch later this year.

Digital imagery also flows easily across the Internet and the ability of a country to control this is also limited. We believe that Governments will be most effective if they work to try to harness the power and benefits of the technology rather than to block it.

How much policy control is there from the US?

We operate our satellites under a license from the US Government, specifically the National Oceanic and Atmospheric Administration or NOAA. NOAA is within our Department of Commerce. There's a list of countries to which we can't sell our imagery. For example, we can't sell imagery to North Korea or Iran or Cuba.

Both GeoEye and CARTOSAT have to distribute through NRSA. Comment.

It's sensitive. We are still in discussions with ANTRIX on this but want to do the best thing from a business sense for them and for us. ANTRIX informed us that they are not going to give us the right to distribute IRS products outside of India. You may recall that once Space Imaging, which was purchased by GeoEye in early 2006, had exclusive rights to sell imagery from the IRS satellites. That contract is no longer in place. I understand that since India now operates many Earth imaging satellites they want to sell direct and not be tied to one reseller. GeoEye would also like to sell directly to Indian markets. So our relationship in the future will be purely a commercial one with no exclusivities. If we bring them a deal, and if they like the deal, they'll probably do the deal because it makes economic sense.

We have heard from many potential customers in India that they would prefer to deal directly with us rather than placing an order with NRSA and ANTRIX, and then waiting for them to give us the order and then waiting longer for these agencies to get back to the customer.

Overall, India's markets for this technology should be open. Indo-US Cooperation in civil space dates back to the beginning of the Indian Space Program. For example, India was one of the first countries to establish a receiving station for the Landsat satellites. So India has a long tradition of utilizing remotely sensed data, but in the end market needs will play a deciding role in influencing a nation's geospatial policy.

Pitney Bowes completes ccquisition of MapInfo

Pitney Bowes Inc. announced completion of the acquisition of MapInfo Corporation. Now MapInfo will be called as PB MapInfo Corporation. The merger followed the successful completion by Magellan Acquisition Corp. of a tender offer for all outstanding shares of MapInfo at $20.25 net per share in cash. Pitney Bowes, having 87 years of technological leadership, provides the world's most comprehensive suite of mailstream software, hardware, services and solutions to help companies manage their flow of mail, documents and packages to improve communication. *www.pitneybowes.com*

Leica Geosystems Geospatial Imaging acquires ER Mapper

Leica Geosystems Geospatial Imaging announces the acquisition of all assets of Earth Resource Mapping Ltd (ER Mapper), a geospatial software company headquartered in Australia. ER Mapper is a provider of geospatial imagery processing solutions that prepare, manage, compress and deploy imagery, thus complementing Leica Geosystems' existing product portfolio. Both the companies product portfolios will be maintained and new solutions will be developed using existing technologies.

It also announced the Beta release of Leica TITAN and launch of the Leica TITAN Network. Its a 3D virtual globe having dynamic online solution that allows users and communities to share geospatial and location-based content in a single, secure environment.

Magellan DG14 RTK™ GPS Board is low cost with High-Precision

The DG14 RTK from Magellan is a cost-effective, sub-meter GNSS (GPS + SBAS) + Beacon receiver. "DG14 RTK represents for dozens of expanding markets the right technology and the right solutions for the right price," said Francois Erceau, general manager of Magellan Professional.

Contex's Crystal G600 wins Reader's Choice Award

Wide-Format Imaging magazine readers have voted the Contex Crystal G600 42" professional scanner the best large format scanner on the market. The magazine's second annual Reader's Choice Top Products awards recognize imaging products that have generated the most industry excitement and are making a big contribution to their customers' businesses. The scanner delivers a variety of built-in features that make high-quality large format scanning simple, fast and cost-effective.

CSI Wireless is "Hemisphere GPS" now launches LX-1 board for GPS receivers

CSI Wireless Inc. officially changed its name to "Hemisphere GPS Inc." at its annual general meeting In conjunction with this, the Company's website and email domain name has been changed to www.hemispheregps.com. The name change communicates the reemergence of a pure-play GPS company following the discontinuance of the Company's wireless businesses in 2006.

It also introduced the LX-1, a new L-Band (OmniSTAR compatible) differential GPS (DGPS) receiver board. The LX-1 improves position accuracy of Hemisphere GPS' Crescent(R) Receiver Technology to sub-meter measurement. *www.hemispheregps.com*

MAGELLAN'S BLADE™ Technology

BLADE™ technology by Magellan is a proprietary GNSS processing solution that makes possible centimeter-level accuracy for real-time and post-processing surveys and mapping operations. It combines ranging and carrier phase data from two satellite systems, GPS and SBAS, for superior satellite coverage and signal reliability to enable rapid, centimeter-level solutions. Magellan's BLADE is the first GNSS processing system that uses SBAS ranging and carrier phase measurements in the RTK data processing.

Trimble introduces modular GNSS survey system

Trimble introduced two new products as part of its Connected Site model - the Trimble R7 System with Global Navigation Satellite System (GNSS) capabilities and the Trimble MultiTrack Target for both passive and active optical targeting. *www.trimble.com*

GPS navigation software from Travroute Australia

CoPilot Live 6, from Travroute Australia is the new generation of ALK technologies GPS navigation software for windows-based mobile phones and PDAs. A phone or PDA equipped with the software 6 provides drivers with portable satellite navigation, complete with turn-by-turn voice guidance, postcode, detailed street maps etc. *www.travroute.com.au*

Black box vehicle tracking device available in India

A black box - Track Master 33, manufactured by Hitech Point Technologies for GPS based vehicle's tracking is now available in Chandigarh, India. The data is transmitted using GPRS and can give seven-second updates on the location, speed, distance travelled and stoppage details of a vehicle. *http://cities.expressindia.com*

Leica Geosystems supports AFREF project. Releases Leica fieldPro v1.4

The African Geodetic Reference Frame (AFREF) is conceived as a unified geodetic reference frame for Africa - the fundamental basis for the national and regional reference networks. In March, the first permanent GNSS reference station was launched in Kenya. Leica Geosystem supports the project with its knowledge, as well as via donation of a complete system.

With its newly launched Version 1.4, Leica fieldPro enhances the support of various sensors in a mobile CAD and all information captured is structured according to the final deliverable.

"Experience ideas before they are real"

says Mr. Rajiv Nair, Regional Director, Autodesk India & SAARC region during Autodesk Press 2008 Meet in Delhi.

The meet was organized on June 1st 2007 to outline Autodesk vision for Design Software Industry. There were interesting presentations focusing on the importance of the technology in an overall context of economic growth. The presenters aligned the technology with current needs of development and ongoing developmental schemes by the government at various levels. The contention was that with the rapid growth experienced by all the sectors of the Indian economy, Autodesk plans to empower customers in diverse industries to experience, change and improve ideas early in the design process, thereby save time and money, improve quality and increase innovation with state-of-the-art 2D and 3D technologies. The meet was addressed by Rajiv Nair, Regional Director, Manideep Saha, Head-Infrastructure Solutions - Autodesk India & SAARC region along with other business heads. Mr. Nair gave an overall economic context for the implementation and importance of the technology whereas Mr. Saha mentioned various schemes of the Government of India where this technology could effectively be applied. He also emphasized on the ATC training programs run by Autodesk and its partners to cater to the needs of training requirement. Coordinates also caught up with Mr. Nair during the meet excerpts of which are as follows

What is the mission of Autodesk?

Autodesk is on a mission to enable companies to experience ideas before they are real, with 2D and 3D design tools that help customers to fully leverage the power of design innovation. As design leaders, Autodesk is committed to support the transformation of the Indian economy and help Indian companies compete at a global level.

How do you see the opportunities vis-à-vis impediments for the growth of geo-information technologies?

I must say that opportunities are real. The strong economy and ubiquitous presence of information technology has created a very positive atmosphere of growth. The population of 'young' India is increasing and so are the standards of living. To meet their aspirations, we have to have good infrastructure to support the growing population. There are of course, a few impediments in India, as they are anywhere else, and I am sure they will be addressed to appropriately in time. It is a time of great opportunities and I believe that the best is yet to come.

Do you think that the cost of GIS software is a negative factor in adoption of GIS technology?

The cost is not a significant issue in the adoption of the GIS technology. If you look at the over all cost of the project/s where GIS software are to be utilized, the cost of GIS software is very small. What one needs to understand is the benefits of integration of technology in achieving various and multiple purposes that it enables.

Your opinion regarding adoption of the technology to the specific needs of a particular region. What about educating the market?

In Autodesk, we have what we refer to as the 'Countrification' kit. We have specifically developed packages that suits the needs of a specific country. However, we feel that in India, while the software can deliver a few things, on the other hand, the country should also work for standardization in data formats from the union level to the local level that will help in optimization of the technology. We have more than 100 training centers all across the country and the number is constantly growing. These training institutes are offering courses on GIS and the courses are not specific to Autodesk only. The best part is the participation of faculties of various universities and institutions in this process.

Leica has also introduced GMX901. It's a GPS receiver with integrated antenna and ground plane, specially developed to monitor sensitive structures such as mines, slopes, bridges, dams and buildings. It streams precise single frequency code and phase data up to 1 Hz. *www.leica-geosystems.com*

GPS module for KR1 EVDO Router

3Gstore.com announced a new way to benefit from the KR1 Router with EVDO service. It provides customers the ability to use Google Earth to do RealTime GPS Tracking, without any additional GPS tracking fees. *www.evdoinfo.com*

Institution of Surveyors, India:

Training Course on Modern Trend in Land Management
10-14 July, Shillong
21-25 August, Jammu
colbhat@yahoo.com

Spatial Data for Effective Land Management
10-12 October, Mumbai, India
colbhat@yahoo.com

Jack Dangermond, ESRI President receives honor from ASPRS

ESRI president Jack Dangermond has been awarded the American Society for Photogrammetry and Remote Sensing (ASPRS) Outstanding Service Award for 2007. Dangermond is being recognized for his endowment of the ESRI Best Scientific Paper in GIS Award. Established in 1991, the award is given each year by the ASPRS Foundation to individuals who publish papers of scientific merit that advance the knowledge of GIS.

GSI vision 2020

Geological Survey of India (GSI) established Vision 2020 as a government's policies to discover, assess and augment natural resources through intensive and extensive exploration, to monitor past, present and future demands for natural resources and reorient activities accordingly, to continuously update geological database of the land and offshore areas and so on. The main strategies focuses on Natural Resource Assessment, Environment and Earth System Studies and Information Services. It visualizes intensifying specialized thematic mapping and creation of database on natural resources. It also intends to develop comprehensive geoenvironmental database for usage in impact assessment and monitoring. *www.gsi.gov.in*

Indonesian government's Spatial Information & Mapping Centre

In February 2006, the GIS software, data, and expertise of the United Nations Information Management System (UNIMS), developed for post-tsunami emergency response in Indonesia, were successfully transitioned from UNIMS to the Indonesian government. The Indonesian government's Spatial Information & Mapping Centre (SIM-Centre) was established. The SIM-Centre is part of a temporary building and reconstruction arm of the Indonesian government in the province and oversees the work of the humanitarian agencies and ensures the needs of the local population are met. It will function until the middle of 2008, when its activities will be absorbed into the standard departments of the Indonesian government. SIM-Center's online metadata catalog is a free service available to cooperating agencies that provides information and access to necessary datasets. *sim.centre@brr.go.id. www.esri.com*

Minister Sibal lists map policy as achievement

Kapil Sibal Union Minister for Science & Technology and Earth Sciences, Government of India while listing his achievement of his three years tenure highlighted three major legislations will change the way the things are being done. These are Survey of India Bill for restructuring of the Department, Public Funded R&D Bill for Protection, Utilization & Regulation of Intellectual Property and Medical Devices Regulation Bill. He said the foundation stone for a modern India is being laid where S&T will touch the lives of common man. He also mentioned the Map Policy, NSDI and 3D GIS Chandni Chowk as some of his achievements. *http://pib.nic.in/release/release.asp?relid=28342*

ProLAND Project

The ProLAND project was launched by the Centre for Development Studies (CDS) of the University of Groningen (RUG) in the Netherlands and the China Land Survey and Planning Institute (CLSPI) of the Chinese Ministry of Land Resources (MLR). It brings together a multi-disciplinary consortium of Dutch and Chinese institutes in land planning and cadastral development. At the Dutch side, there will be RUG and the Dutch Kadaster (DK) teaming up with several Chinese counterparts: the Chinese Academy of Social Sciences (CASS); the LSPI; and the Nanjing Agricultural University. In addition, the project will also actively involve representatives of the Chinese and Dutch private sector (real estate developers) in the delegation meeting, and the international conference on land planning and cadastral development. *www.gim-international.com*

GPS navigation for athletes

eSymetric GmbH, Germany, has invented a computer program for use on mobile Pocket PC devices that offers navigation for athletes named "Run.GPS". It makes navigation possible outdoors without looking on the screen. This is accomplished by speaking all the relevant information. *www.businessportal24.com*

GPS technology for corporation vehicles

Officials of the Chennai Corporation, India, plans to use the GPS to monitor if garbage trucks, fogging machines, ladder-mounted streetlight repair vehicles and parks' watering tankers are taking the prescribed route and stopping for work at the designated points. *www.hindu.com*

GPS comes to promotion marketing

Orange has unveiled a virtual web game that uses a GPS tracking device attached to a bull in a field somewhere near Somerset. Spot The Bull exploits the mobile will fetch prizes to players if they can correctly predict the location of the creature. *www.e-consultancy.com*

BBC shows off its GPS reporting

The BBC has been trailing a citizen journalist reporting project where stories have been tagged using GPS technology in mobile phones. The stories play as multimedia slideshows synchronised with Google Maps presentations. BBC said it was likely that geo-tagging, adding location-based data, was likely to feature in news stories in the future. *www.tech.co.uk*

EU to develop traffic information service

The EU-funded Highway project developed a pioneering traffic information service by integrating smart real-time maps, modern mobile phone technology, positioning systems, 2D/3D spatial tools and speech/voice recognition interfaces. It hopes that the system will reduce the number of road accidents.*http://cordis.europa.eu*

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Galileo update

European Union to sole-fund Galileo

Financing for Europe's GNSS, Galileo, will come solely from the public sector, the European Commission declared, May 16, in Brussels. The public-private partnership (PPP) that had crippled the ambitious project was abandoned. EU Transport Commissioner Jacques Barrot said that the 27-nations bloc's biggest-ever joint technological project could only reach orbit altitude if the public sector took full financial responsibility. He made the announcement as he presented three options for the bogged-down Galileo project: a complete EU takeover, partial public financing, or total elimination.

Barrot prefers to take over the project now, at an estimated public cost of about E2.4 billion in addition to the E1.5 billion already allocated in the 2007-2013 budget, and to issue a new tender to operate the system once it is built and in space by the end of 2012, according to recent forecasts. The European Space Agency would oversee construction and deployment of the satellites, though European aerospace companies would still supply technology, without assuming financial risk. EU Industry Commissioner Guenter Verheugen ruled out cancelling Galileo. "Galileo is from the European Commission standpoint an absolutely essential project," he stated. "We don't have an option of giving up on Galileo." *http://sidt.gpsworld.com*

NovAtel licensed to sell Galileo receivers

NovAtel Inc has received a license valid for 10 years from the European Space Agency (ESA), which allows NovAtel to sell receivers that track Galileo signals. Its EuroPak-15a production standard receiver allows customers to not only receive GPS L1/L5 signals, but to also add the additional capability for Galileo L1/E5a tracking. It received this license based on its participation in the Galileo Receiver Chain (GRC) program. *www.novatel.com*

Galileo clocks keeping good time

Signals from GIOVE-A, together with those from GPS satellites, are combined with ground-based laser ranging of GIOVE-A to determine the accuracy of the clocks allowing for delays introduced by the Earth's atmosphere and the receiving equipment.According to ESA officials, "The precision of the calculations is so great that even the tiny orbit disturbances caused by the pressure of sunlight shining on the satellites is taken into account." *www.itwire.com.au*

Galileo begins navigation transmissions

GIOVE-A, the first satellite of Galileo, has begun transmitting information about its position in space. While this is only a demonstration - information from a single satellite does not allow a receiver to fix its position - it is an important step along the path to a fully working system. *www.itwire.com.au*

Canada deploys GPS shell to Afghanistan

The Canadian military has acquired Excalibur precision-guided munitions for its artillery guns in Afghanistan, which is prepared, programmed and fired like a conventional shell and guided by GPS. *www.defensenews.com*

Handheld GPS computers for soldiers

The Indian army is set to equip soldiers with handheld multi-role computers to enable them to pinpoint their field locations in difficult-terrain tactical warfare and for counter-insurgency operations. The device is called "sathi *www.hindu.com*

Greater Noida, India to fit GPS in buses

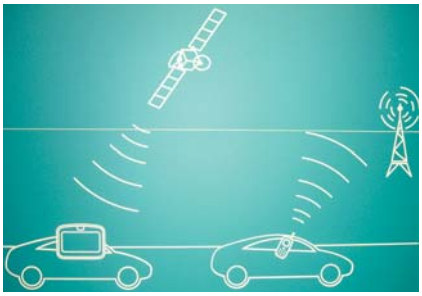
Greater Noida shall become the second city in India to install GPS and Passenger Information System in its buses and bus shelters. Greater Noida Development Authority (GNDA) will be sending teams to Indore to study the system and replicate the same in Greater Noida. *http://cities.expressindia.com*

Hi-tech system to save the lions

Endangered Asiatic lions of Gir forest, India shall be tracked with the help of GPS. However, forest officials are not sure whether such a hi-tech system would prove helpful in protecting the lions. *http://timesofindia.indiatimes.com*

GLONASS to become free for users

Russian President Vladimir Putin signed a decree on the GLONASS navigation system to provide the service free for customers, the Kremlin press service said. "Access to civilian navigation signals of global navigation satellite system GLONASS is provided to Russian and foreign consumers free of charge and without limitations," the presidential decree reads. *http://en.rian.ru*



Motorola RF switch enables location services

Motorola has announced several new enhancements to its RFS7000 RF Switch to support location services, management and security services including own and and third-party vendor services. *www.motorola.com*

Cisco unveils wireless location solution

Cisco has announced an integrated Wi-Fi chokepoint and telemetry services into the Cisco Location Solution. It includes the Cisco Unified Wireless Network and integrated partner applications and active/passive tag offerings, It is designed to mobilize assets across an enterprise environment. *www.cisco.com*

DigitalGlobe satellite imagery for mobile navigation

LocatioNet Systems Ltd and DigitalGlobe have announced a partnership that adds DigitalGlobe's global satellite imagery to the amAze mobile service. This collaboration means that voice-guided GPS navigation is enabled over high resolution satellite imagery and aerial photos with regular mass-market phones. *http://www.locationet.com*

HP adds a virtual layer to reality

HP has launched a new prototype software suite and associated website called Mscape, designed to overlay digital sight, sound and interactions using GPS-enabled mobile devices termed as 'mediascapes'. These are created using a simple web-based authoring tool on any GPS-enabled handset. When you walk pass the locations in the physical world, the mediascape will activate digital media such as images, text, audio and video. *www.itp.net*

Trakm8, Motorola join hands for GPS tracking products

Trakm8 Holdings PLC said it has integrated its GPS with Motorola's Astro radio network. The AIM-listed company, which designs and develops GPRS systems for vehicle tracking and security market, said the combined system will provide GPS positions and internet packet data via a secure communications network. *http://www.hemscott.com*

Wayfinder, MapmyIndia in cooperation for navigation

Wayfinder has signed an exclusive agreement with MapmyIndia. It will provide Wayfinder with access to its digital map data covering India. The agreement enables Wayfinder to deliver state-of-the art mobile navigation and

LBS in India. *www.wayfinder.com*

SiRF and Openwave bring location to mobile widgets

SiRF has announced a strategic relationship with Openwave Systems to bring the power of location to Web 2.0 mobile applications. Both companies plan to market the combined solution globally to wireless operators and handset and device OEMs. *www.sirf.com*

Protocol for LBS developed

T. John Kim, a professor of urban and regional planning at the University of Illinois, USA, has developed the protocol for the international standard for LBS. Kim, along with a postdoctoral fellow Sung-Gheel Jang, developed the protocol for the international standard for GIS, described by the professor as the backbone of LBS. *www.sciencedaily.com*

Pitney Bowes MapInfo dishes up Location Intelligence

Pitney Bowes MapInfo has announced that Johnny's Lunch, a 71-year old restaurant, is relying on its location intelligence solutions to guide its national franchise expansion efforts. It helps them to gain a better understanding of its loyal customers and more accurately identify and forecast the location and performance of new stores as the company expands into new markets. *http://news.pb.com*

2011 will connect 52m machines to European mobile networks

According to a new research report from the analyst firm Berg Insight, the number of machines connected to mobile networks in Europe will grow by 43.7 percent annually to reach 52.0 million by 2011. At the end of 2006 there were about 8.5 million active cellular and satellite wireless M2M connections in the EU and Western Europe. Energy meters currently constitute the largest vertical market segment in terms of deployed units, followed by motor vehicles, security alarms and POS-terminals. *www.berginsight.com*

First China mission to moon by year end

China was "losing no time" in preparing its first lunar orbiter, Chang'e I, which will most likely be launched in the second half of 2007, according to a space official. "The moon probe project is the third milestone in China's space technology after satellite and manned spacecraft projects, and a first step for us in exploring deep space," said Sun Laiyan, chief of the China National Space Administration. China's moon exploration program is divided into three phases -- "circling the moon", "landing on the moon" and "back to earth", said Sun. Xinhua News Agency

Brazil and India set up work team for space programme

Representatives of Brazil's Space Agency (AEB) and India's Space Department (ISRO) have set up a team to study cooperation in the space sectors of both countries. The two countries' team space study will be presented in September, in India, at the 58th International Space Congress sponsored by the International Space Federation.

Satellite projects, such as satellite tracking, satellite launching and development projects, are the main areas the two countries will focus on. *www.spacedaily.com*

Imagery database covering Russia

A new site has been launched as the first stage of the project to create satellite-based imagery database covering the entire Russian territory. These images can be viewed as a photographically precise and updated map with different scales: from large territories to separate streets and buildings. Moscow Regions mosaicks have already been created. In future the area cover with space images will be increased, first by including St-Petersburg and Leningrad Region, then European part of Russia and later on of the entire territory. An increased resolution up to 1m will be available to see with respect to towns (currently 6m resolution images are presented). http://new.kosmosnimki.ru/

Satellite images aid implementation of agricultural reforms

An ESA-backed project has demonstrated how Earth observation satellites can assist in the cross compliance measures - a set of standards that farmers have to respect to receive full funding from the EU - included in the 2003 reforms of the Common Agricultural Policy. Using very high resolution satellite images for monitoring whether land is safeguarded in Good Agricultural and Environmental Condition, as outlined within the cross-compliance framework, ensures subsidies are distributed in a fair and timely manner and helps farmers complete subsidy applications more accurately. *http://www.terradaily.com*

Satellite technology shows the world Darfur images

Amnesty International is using satellite technology to monitor the war-torn Sudanese region of Darfur in a bid to prevent future attacks on civilians. The watchdog's US chapter said it was the first time human rights monitors had used such technology to track possible targets of attack, prevent future atrocities and potentially save lives. *www.eyesondarfur.org.*

Chinese space agency joins the International Charter 'Space and Major Disasters'

The China National Space Administration has become the member of the International Charter 'Space and Major Disasters', a joint initiative that works to provide emergency response satellite data free of charge to those affected by disasters anywhere in the world.

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15-20 July Cambridge, UK
www.ordnancesurvey.co.uk/

August 2007

7th International Workshop of Geographical Information System
1-3 August Beijing, China
iwgis@lreis.ac.cn

XXIII International Cartographic Conference
4-10 August, Moscow, Russia
info@icc2007.com.

GIS 14 Conference
14-15 August 2007
Vietnam

2nd Indonesian Geospatial Technology Exhibition
29 August - 1 September,
Bakosurtanal; Jakarta
http://www.geospatial-exh.com/

September 2007

51st Photogrammetric Week
3-7 September
Stuttgart, Germany
martina.kroma@ifp.uni-stuttgart.de
http://www.ifp.uni-stuttgart.de/favicon.ico

INTERGEO 2007
25-27 September
Leipzig, Germany
info@hinte-messe.de
http://www.intergeo.de/

ION GNSS 2007
September 25-28, 2007, Ft. Worth, TX
www.ion.org

October 2007

9th South-East Asian Survey Congress
28 October - 2 November
Christchurch, New Zealand
http://www.conference.co.nz/index.cfm/surveyors2007/

Nav 07 The Navigation Conference & Exhibition
30 Oct 2007 -01 Nov 2007
www.rin.org.uk
conference@rin.org.uk

November 2007

International Symposium on GPS/GNSS
05 - 07 Nov 2007, Johar Bahru, Malaysia

Trimble Dimensions 2007
November 5-7, Las Vegas
www.trimbleevents.com

ISG/GNSS 2007
6-8 November, Kuala Lumpur, Malaysia
md.nor@fksg.utm.my

4th International Symposium on LBS and TeleCartography
8-10 November, Hong Kong, SAR, China
http://www.lsgi.polyu.edu.hk/LBS2007/

ACRS2007
November 12-16, 2007, Kuala Lumpur, Malaysia
http://www.macres.gov.my/acrs2007

"We have a unique style, pallette and typography"

Says Fran Marshall, President, NG Maps on National Geographic mandates and activities

Mission of National Geographic?

The mission on National Geographic is "the increase and diffusion of geographic knowledge" taken more broadly it also entails inspiring people to care about the planet.

What kinds of maps are prepared? What's so unique about them?

We create a variety of political, thematic, physical, and topographic maps. With few exceptions we produce all our maps. We do have a couple of products where we've licensed map data from MapQuest or Collins Bartholomew but the vast majority is NG data and NG created.NG began making maps for the Magazine in 1917. Since then we've continued to provide maps that tell of current events, give special glimpses into historical events, and inform the reader about the world and environment. We have the largest collection of thematic maps in addition to our political, physical and topographic maps. Over this course of time, NG has been the world's most widely respected and best know cartographic institution covering the world from the summit of Mt. Everest to the depths of the oceans. We have a unique style, pallette and typography. In addition have been a cartographic authority for decades.

Are they of educational purposes?

Our maps serve multiple markets and consumers but a definitely used by both educators, students and a wide range of professionals. Much of this map content is viewable on our mapmachine website but to use it requires a purchase or license.

How affordable are these maps?

We think our maps are very affordable and are subject to the economic pressures of the market. The quality and uniqueness does afford us the greater ability to maintain current prices.

The challenges you face in producing maps?

Probably the two biggest challenges we face in producing maps relates to starting with good base data depending on the intended scale of the map, secondly is gaining broader distribution digitally and in retail.

GoogleEarth vis-a-vis NatGeo?

GoogleEarth is a great combination of search and visualization. National Geographic is much more about the authority of its content, depth/breath of experience, and the ability to do spatial storytelling. In fact we feel we are a nice complement to GoogleEarth and have programs in place to display geo-referenced content on their platform.

ION GNSS 2007

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Co-sponsored FOUO Sessions by JSDE and AFRL: Sept. 25

★ Early Registration & Advance Hotel Reservation Deadline: Sept. 3

★ Exhibit Space Going Fast!

Session Topics

- ★ Multipath
- ★ GNSS-INS
- ★ Algorithms for Multi-sensor Fusion
- ★ Military Aviation Systems
- ★ Galileo System Design & Services
- ★ Multi-Sensor Navigation, Guidance & Control Systems
- ★ Remote Sensing With GPS & Integrated Sensors
- ★ Military Applications
- ★ GNSS Civil Interference & Spectrum Aspects
- ★ Surveying & Geodesy
- ★ Network-Based RTK
- ★ Modeling & Simulation
- ★ Alternatives & Backups to GNSS
- ★ Novel Applications
- ★ Galileo Integrity, Multi-constellation RAIM
- ★ Galileo & GPS/Galileo Reference & User Receivers
- ★ GNSS Ground-Based Augmentation Systems
- ★ Indoor Positioning
- ★ GLONASS Modernization, QZSS, & Other GNSS
- ★ GNSS Receiver Algorithms
- ★ GNSS Antenna & Radio Technology
- ★ Atmospheric Effects on GNSS
- ★ Software Receivers
- ★ Land Applications
- ★ Marine Applications
- ★ Aviation Applications
- ★ GNSS Space-Based Augmentation Systems
- ★ Space & Satellite Applications
- ★ Galileo Signal Structure, GPS/Galileo Interoperability
- ★ Modeling & Simulation
- ★ Timing & Scientific Applications
- ★ GPS Modernization/GPS III
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