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MAPS TODAY

Monthly Publication

CONTENT

Subscription Rates

Period	Actual Price	Speci
1 Year	Rs. 1200/-	Rs. 1
2 Years	Rs. 2200/-	Rs. 20
3 Years	Rs. 3000/-	Rs. 2
5 Years	Rs. 4700/-	Rs. 4

Editorial

Digital map combined with other technologies is rapidly embracing most of the fields of society.

GeoBuiz - 2018 (a publication of Geospatial Media and Communications) gives a very encouraging picture of its growth. Read the extracts from the report and be a part of the mission of promoting Geospatial technology bringing paradigm changes in the country and elsewhere. GeoBuiz Summit scheduled for 14-15 January 2019 at San Francisco, is a global platform of technology, business and policy leadership deliberating upon innovation, market opportunities, business models, and policy development. You can be part of this mission.

Abstract of " Web Enabled Geo-Spatial Urban Governance" by NRSC scientists (Souvenir INCA Congress 2018) demonstrate how low cost but effective monitoring systems can be developed. Question is how to make decision makers adopt these. Can readers share this with officials concerned ?

"Mohan's Musings" by Murali Mohan a distinguished Phtogrammtrist in this issue is interesting and readable. He has the art and skill to write prose like poetry. Let us look forward for more of his "pieces" in the coming issues. Dr Victor Adrov managing director of Racurs answers five questions related to Photogrammetry covering technology as well as changing scenario. Reproduced in this issue with due acknowledgement to GIM International and Dr Victor Adrov. Article on GIS trends of Jack Dangermond, President,. ESRI is equally informative and interesting.

Read about an investigative article combining open source data, Google Earth, Digital Globe satellite imagery and geospatial activity pieced together into a compelling geospatial profile that helped expose horrible human rights violation.(with due gratitude to Susan Smith of GIS Cafe)

Drone-based data capture technology is gradually emerging as an efficient and economical approach. Two articles focussing on the emerging market trends are incl;uded with due acknowledgement to the sources.

Article related to Building Information Modelling (BIM) using innovative approach is interesting.

CAD and GIS go together. Read the informative article bringing out "Difference and Similarities between GIS and CAD".

GeoMapSociety (GEMS) continues with its Map Awareness Programmes (MAP). Read a report of a programme in a school and glimpses of GeoMap Quiz Finals held on 15 Dec 2018

Though Time is continuous, for our convenience we accept end of 2018 and beginning of 2019. Changes are taking place. Some significant. But most need map to understand. Read about views of Jack Dangermond of January 2017.

A landscape architect by training, I founded Environmental Systems Research Institute (Esri) in 1969 with a vision that **computer mapping and analysis could help us design a better future.** *That vision has continued to guide Esri in creating cutting-edge GIS and GeoDesign technologies used in every industry to make a difference worldwide.*

Jack Dangermond

DigitalGlobe Spotlights Human Rights Violations with Satellite Imagery and Geoint

September 28th, 2018 by Susan Smith

https://www10.giscafe.com/blogs/gissusan/2018/09/28/digitalglobe-spotlights-human-rights-violations-with-satellite-imagery-and-geoint/#more-5656

In July 2018, a deeply disturbing and violent video began to circulate on social media. Taking place in Cameroon, it depicts two women and two young children being led at gunpoint away from a village by a group of Cameroonian soldiers. Blindfolded, the victims are forced to the ground and shot 22 times by the soldiers.

Investigation by Aliaume Leroy and Ben Strick

Produced by Daniel Adamson and Aliaume Leroy

Motion Graphics: Tom Flannery

The government of Cameroon initially dismissed the video as "fake news." But BBC Africa Eye, an investigative branch of the BBC that focuses on investigative journalism in Africa, did a thorough investigation through forensic analysis of the footage. Using satellite imagery as well as matching of landmarks and even the types of uniforms worn by the soldiers, they can prove exactly where this happened, when it happened, and who is responsible for the killings.

In a conversation with Steve Wood, senior analyst for DigitalGlobe and their Maxar News Bureau, he talked about his involvement in bringing open source and geoint to the telling of this very shocking story.

"We can now expose things that were previously difficult to get exposed," said Wood. Wood has been with DigitalGlobe for quite awhile as a career imagery analyst and has a lot of time and experience working with satellite imagery both in the government and at DigitalGlobe.

"Part of what we have been doing here at DigitalGlobe and at Maxar, our parent company, is we have a team called the news bureau and we work very closely with media organizations around the world to provide our imagery and help them tell stories like this," Wood said. We like to specialize in the more investigative aspect, although we often get caught up in the current events, whether its Hurricane Florence or a current activity that can be more visually presented using satellite imagery. We've worked with the BBC for quite a while on stories in the middle east, Africa and elsewhere."

Wood received an inquiry that came in through the team, looking for satellite imagery that was related to this Cameroonian video. "Ultimately, I got in touch with the analyst who was producing most of this, Aliaume Leroy. This analyst has been doing work like this for Bellingcat, an investigative organization that with its investigative partner The Insider – Russia have established conclusively the identity of one of the suspects in the poisoning of Sergey and Yulia Skripal, and in the homicide of British citizen Dawn Sturgess using open source geospatial intelligence."

Bellingcat pulls together open source data, Google Earth, satellite imagery and geospatial activity and pieces it together into a compelling geospatial profile.

ˊLeroy and investigator Ben Strick have done some of this type of work in the past, such as working in the Middle East, and on the story of the Malaysian airline crash.

"They reached out to us to see if we could get any satellite imagery of this village that they believed would likely be the location that was first seen on social media," said Wood. "They provided me with coordinates and locations, and I went into our archives and looked at imagery that correlates to the timeframe based on the video. I was able to find a number of images and began the dialog with the BBC about this. Ultimately, we collaborated – I found imagery on this, traded emails, videos, and sent images back and forth, collaborated on identifying some of the features that we believed could be seen in the video and then correlated them with satellite imagery."

The team at the BBC felt that they had the right area but then were challenged to figure out the timeframe. Correlating what was seen in DigitalGlobe imagery with the rough time frame of the scene in the video was challenging.

"We collaborated, compared thoughts and ideas such as, did you see that tree in this video, the building's roof was gone in this time frame," said Wood. "We started narrowing down based on a set of images what appeared to be the right time frame for when the video was taken. We ultimately provided imagery to them which they were then able to incorporate and put into the video itself."

The BBC team figured out the time of the season and dialed it into the actual days themselves, by comparing the lighting in the imagery and video.

The video of the execution that was being shown on social media was of grainy quality, so it was difficult to see.

"But in that video, we were able to pick out a number of buildings that were on the periphery as the soldiers are walking down the road leading the women and children to their execution," Wood pointed out. "In that video we really focused on those buildings, because we noticed on the satellite imagery, on several of the image dates, some of the buildings have rooves and on other dates, they did not. So, we were able to take that time frame of the imagery that had the roof and compare to those that didn't, to then dial in again and get tighter parameters. Then we knew when the video must have been actually taken. It was a good example of taking information that was derived from video and using the satellite imagery as a way to fact check and to correlate that provided additional information to determine when and where the execution occurred."

Africa Eye mined social media to pull the information about the weapons and the soldiers' uniforms using open source.

"This story was one of the better ones in my career, as far as being able to follow the trail and piece it together," Wood said. "One of the things we're proud about is when we can see our imagery go to benefit a story like this. It appears several of those Cameroon soldiers are awaiting trial and it sounds like finally the government has taken responsibility for it. It's rewarding to see how geoint can be brought together in this type of effort. It was obviously a tragic and terrible event, but geoint can be used to complete the story."

DigitalGlobe images around the world every day. Part of their business construct is to have a constantly refreshing map of the earth. Whether the imagery is for immediate use or use later on, it is available as the company has a rich repository dating back to almost 1999.

"We just happened to have images of that village at the right time and the right place," said Wood. "We were able to pinpoint the month and year. We've used our satellite imagery quite a bit in the last couple of years for stories of persecution such as in Myanmar for human rights groups such as Amnesty International, to show the plight of people. International organizations and open source watchdog agencies have been using geospatial information and imagery to expose these human rights violations. It is one of the real benefits to having this technology out there."

Breaking News!!!

This is to Inform You All that Our Beloved and Well Known Friend *Mr 2018* is Retiring on the 31st of this Month.

His 12 Wives, 52 Children and 365 Grand Children will be Attending the Grand Send Off on Monday, the 31st December at 23.59 Hrs.

However, His Family Members asked Me to Inform You that He is Retiring with *ALL Your Problems, Sicknesses, Disappointments, Frustrations, Untimely Death, Shame, Disgrace, Barrenness, Discouragement, Failure, and Rejection.*

Yet, His Successor - *Mr 2019 asked Me to Inform You that, He is Going to Compensate You with :- *Long Life, Good Health, Wealth, Love, Abundant Blessings, Peace, Joy, Righteousness, Promotion, Prosperity*

(provided you lead a principled Dharma life – Italics line added by Editor)

God's Blessings

Seasons Greetings

HUMOUR

Never use a GPS when going to a cemetery. Not nice to hear "You've reached your destination " 😂

Abstracts / Extracts
Drone Market

GISCafe Voice

Susan Smith

https://www10.giscafe.com/blogs/gissusan/2018/11/15/skylogics-2018-drone-market-sector-summary-report-offers-timely-research-and-analytics-on-the-industry/#

Susan Smith has worked as an editor and writer in the technology industry for over 16 years. As an editor she has been responsible for the launch of a number of technology trade publications, both in print and online. Currently, Susan is the Editor of GISCafe and AECCafe, as well as those sites' newsletters and blogs. She writes on a number of topics, including but not limited to geospatial, architecture, engineering and construction. As many technologies evolve and occasionally merge, Susan finds herself uniquely situated to be able to cover diverse topics with facility. « Less

Colin Snow of Skylogic, LLC, spoke with *GISCafe Voice* about the company's 2018 Drone Market Sector Summary Report that was recently published. This is the third annual report published by the company.

Here is an excerpt from that report:

"Our survey finds the most popular models are the Phantom 4 Series (29%) and Mavic Pro Series (26%). To put this in perspective, the combined purchases of just these two most popular DJI models constitute a 43% market share of all multirotor purchases worldwide.

Œ :Our data also shows that DJI dominates the drone aircraft add-on payload market. Their Zenmuse brand RGB camera / sensor / gimbal combinations now account for nearly a third (31%) of all purchases. This is a big increase from last year, when this brand represented only 4% of all add-on purchases. We attribute this to the increased sales of their enterprise line of aircraft, which are designed to accommodate swappable Zenmuse payloads."

The data shows 75% of respondents for the survey were from the U.S., 10% from European countries, 4% from Canada, 3% from Australia and New Zealand, and 2% from Central and South America.

> ### The survey, mapping and GIS firms use drones are still the #2 industrial users of drones

The research offers insights and analysis about:

- Who's buying what types of drones from which makers at what prices and for what uses.
- How large the drone-based service providers are, and how they position themselves to their target industries.
- Who the business users of drone-based projects are, and which industries have traction.
- How much service providers, business users, and public agencies are using flight management, mission planning, and image processing software for drone-based projects.

The report provides the first comprehensive view of:

- Critical industry drivers
- Vendor and service provider market shares
- Business adoption trends and issues

The report can be purchased at 2018 Drone Market Sector Report Purchase

Some excerpts from the interview

- Drones are still new. Most programs are only two – three years old, and they're relatively small, and small in the number of pilots they employ and the number of employees and managers and contractors that are involved………….. But it is growing. The growing is incremental, not hockey stick. When the drone industry arrived on the scene in 2014-2015 we'd see this huge spike in business adoption, the truth is it's been more incremental.

- On the service provider side, there seemed to be a bit of a surge when Part 107 happened. ………There already were some service providers under Section 333, maybe about 3300 to 5,000 companies that were acting as service providers. Now after Part 107 we have over 100,000 pilots. A lot of people came in new. We expected that because the barrier was lowered, the change from 333 to Part 107 the hurdle was a lot lower for people to get into the business. So all they needed was a pilot's license, a website and a drone and they'd be able to provide a service.

- The thing that hasn't changed, the survey, mapping

GeoBuiz – 2018

GeoBuiz - 2018 (a publication of Geospatial Media and Communications *) presents the geospatial industry market report and comparative* assessment of 50 countries for their geospatial readiness to the global *audience from industry, government, academia, development sector and other* stakeholders at large. *Foreword and Executive summary are informative and thought provoking. We are reproducing them with due acknowledgement and appreciation of the vision and effort in its production. The report gives a very encouraging and a realistic view of the near future of Geospatial Technologies..Readers can visit the website for details.*

Foreword

By Sanjay Kumar CEO, Geospatial Media and Communications

Geospatial Industry: Finding Mainstream in 4th Industrial Age

World economy and the markets go through fundamental changes periodically. However, they take a different course of direction each time, while aligning themselves with a revolutionary shift. Today, as global markets enter the Fourth Industrial Revolution, they are strongly driven by digitalization and interconnectivity. The geospatial industry, in a nascent stage for decades, suddenly finds itself aligning with the mainstream market, adding spatial dimension and locational context to digital infrastructure, interconnected systems and business processes. The last five years saw a paradigm shift in the geospatial market.

> *On the pathway ahead, geospatial readiness would lead to development strategies at national, regional and global levels.*

Technology innovations like Cloud, IOT, Big Data, Artificial Intelligence and Blockchain played multiplier roles in expanding the business portfolio of the geospatial industry, bringing in significant attention and investments from mainstream IT and Engineering Markets, and encouraging a host of start-up entrepreneurs. Mainstreaming of the geospatial market has created a big demand for geospatial content and solutions across governments, businesses and consumers; it has also helped scale up applications and value to much larger markets, amplifying overall impact and contribution of geospatial information in the world economy and society. Returns on investment get bigger and better with every added application and consumer. Though the geospatial industry has been growing at an average 14% CAGR, its economic impact on global GDP has been growing to the tune of 18% CAGR. Advent of a collaborative environment is giving a new paradigm to the geospatial business, opening possibilities of end-to-end solutions, system integration and platform technologies. Geospatial content, which remains at the core of collaboration, is fast becoming ultimate driver of evolution towards the solution orientation of the industry. On the pathway ahead, geospatial readiness would lead to development strategies at national, regional and global levels. Key tenets of national and global geospatial frameworks and strategies would include ICT infrastructure, policy frameworks and institutional capacity. International studies have established that geospatial readiness is a key enabler of digital innovation, contributing significantly to overall GDP directly as well as through optimizing efficiency and cost effectiveness of the fundamental pillars of the economy, namely infrastructure, energy, agriculture, financial services, retail and logistics, climate and environment, etc.

With an estimated market size approximating US$ 300 billion, the geospatial industry is likely to grow between 15 to 20% CAGR over the next few years, touching almost US$ 500 Billion by 2020. Major growth is expected from Asia, probably equal to the North American market by 2020.

As we move forward, the geospatial industry is likely to get more and more commercialized and integrated with IT processes and engineering workflows, probably redefining its scope and business models, creating a few business casualties in the short run, but offering a much broader role and relevance in the Fourth Industrial Age.

Executive Summary

GeoBuiz - 2018 presents the geospatial industry market report and comparative assessment of 50 countries for their geospatial readiness to the global audience from industry, government, academia, development sector and other stakeholders at large.

The geospatial industry market report captures the global size, growth and value impact of the global geospatial industry till year 2020, along with key insights on technology drivers, business models, top user sectors, user benefits, major adoption challenges etc., as a whole, and for its four major technology segments which are GNSS and Positioning Technologies, GIS/Spatial Analytics Technologies, Earth Observation Technologies and 3D Scanning Technologies respectively.

The report brings forth a collective and harmonised view on the geospatial industry's global market size and value impact, its distribution across markets, geographies and industry segments on the 2013-2020 timeline. The data and estimates captured are from multiple markets and impact studies, which have been published in recent times catering to specific segments and aspects of the geospatial industry at national, regional and global levels.

CGRI-18 is not a ranking exercise but a tool to assist the development of a holistic outlook for framing a national geospatial strategy in tandem with advancing digital technologies.

To provide an integrated view which can be used with ease and referred to objectively, multivariate data analysis techniques has been used to draw intelligence and inferences in a meaningful way. The analysis from these multiple reports brings to light historical growth rate of the industry at 11.5 % (year 2013-2017), with a projected growth rate of 13.6 % up to 2020 (year 2018-2020).

Globally, the geospatial industry market is witnessing unprecedented growth in all geographies with high double-digit growth in the Asia Pacific, Middle East, Africa and South African regions, riding on demand from emerging market geographies. However, overall engine of geospatial industry growth as well as its readiness (Countries Geospatial Readiness Index -18) to meet current and future leadership remains with North America.This region will continue to maintain its market dominance riding on proactive initiatives to enhance commercialisation within the industry segments, (especially in the EO upstream value chain), and innovation led economic development model. At the same time, the growth in Asia Pacific economies is something to watch out for in comparison to European markets (in relative percentages). While the former has demographics and demand drivers favouring long-term higher growth rate to surpass European markets comfortably in the 2020-2025 scenario, the latter will remain a significant market and solutions provider at a global scale.

The key industry trends and drivers for the geospatial industry and its various segmentshave been captured from multiple focus group discussions, electronic surveys and interviews with industry leaders across industry segments, users, system integrators, solution providers in Geospatial, IT and Engineering domains. Together with the market size and growth analysis; key industry trends present a wholesome perspective on geospatial industry and its value proposition to the global audience.

The second part of the report, i.e., Countries Geospatial Readiness Index (CGRI)-2018 presents the assessment of select 50 countries for their geospatial readiness, (current as well as future). The appraisal framework uses five assessment pillars: (i) Geospatial data infrastructure; (ii) Geospatial and enabling policy facilitation; (iii) Geospatial domain education and research institution capacity; (iv) User adoption levels at organization levels; and, (v) Geospatial industry capacity, i.e., industry strengths, representation and venture creation support eco-systems. The comprehensive framework has evolved on the first assessment exercise last year, i.e., CGRI-2017.

Data collection, analysis and an assessment framework with relative weightages has been made more comprehensive and refined for accuracy in capturing the comparative strengths and weaknesses at the national level.

The purpose and approach of CGRI-18 is to enable decision makers (both public and industry stakeholders) with actionable insights to (a) develop an integrated approach on advancing geospatial technology eco-systems crucial to maintaining competitive advantages globally and; (b) deliver better geo-enabled services to citizen-consumers.

CGRI-18 is not a ranking exercise but a tool to assist the development of a holistic outlook for framing a national geospatial strategy in tandem with advancing digital technologies. To help easy understanding, countries have been grouped as 'Leaders', 'Challengers' and Aspirers' in each of the evaluation index pillars with comparative insights, highlights accompanied with market geography-wise infographics.

On CGRI-18, the United States of America (USA) stands on top as the most geospatial ready country in the world leading in all five pillars of the evaluation framework. While developed economies in general lead on geospatial readiness, it is the group of emerging economies under 'Challengers' which hold the promise for 'future market growth'commensurate with the extent to which geospatial industry solutions will be strategically deployed to address the socio-economic development challenges in these countries.

Geospatial being the only technology capable of establishing interactions and inter-linkages between Bio-Physical, (i.e., geography and natural resources), and social elements (human civilization), over time and space, holds the key to efficient delivery of socio-economic benefits, taking governance to the last man across national economies. The effective use of its transformational potential rests on a proactive and integrated approach at individual nation levels.

GeoMap Quiz 2018

Maps have become mainstream means of our lives. GeoMap Society(GEMS) a regd society of Hyderabad is organising Map related programmes including annual GeoMap Quiz for students since 1990.

Several organisations like Survey of India,NRSC,iNCOIS ...professional Bodies, Acadenia and private Companies have been supporting these programmes.

This year Prelims of annual GeoMap Quiz for students in 3 categories were conducted in 3 rd week November 2018 coinciding with World GIS Day and out-door finals were held on 15 Dec 2018. Sub junior -Classes 5 & 6; Juniors -Classes 7 & 8 and Seniors -Classes 9 & 10.

In Finals held on 15 Dec 2018 at Indira Park, Hyderabad there were 3 modules:

Map Fun- Image map of the Park is supplied to the participating teams. 10 points, different for three categories are to be visited by the teams and answer what the feature is. Participants keep the map and return only the answer sheet. This module familiarises them with image, map and ground correlation.

Map Planning- A large scale map of the city with Assembly electoral constituencies was displayed and participating teams had to make analytical comments on specific aspects. In this module they understand importance of spatial relationships inplanning

Skill Test – In this module, the participating teams have to judge/estimate length, height, area, volume and direction.

Prizes were given to five top teams in each category.

Maj. Dr. G.Shiva Kiran,Secretary,GEMS and convenor of the programme, conducted the 3-module quiz with efficient announcements and arrangements. Dr V.Raghav Swamy, Dy. Director (retd) NRSC, guest of honour and vice-president of GEMS interacted with students and motivated them about learning more about maps. Mr. GS Kumar, President GEMS appreciated the interest of schools in participating in this educational programme. He also highlighted how this quiz benefits students particularly in their future careers considering growing applications of maps. Mr. Kushalwant retd Chief Engineer, who attended the programme as a special guest with his wife and grand daughter appreciated the educational values of this Quiz.

Rakesh Bhatnagar, Jt Secretary GEMS and other members particularly – Kathi Raju, Amresh, Arjun extended valuable help in the conduct of this programme.

GS Oberoi Inspired Map Awareness Programmes (MAPs)

Mr. GS Oberoi announced a donation of Rs one lakh to GEMS group for Map Awareness Prorammes (MAPs) in December 2016. Special series of MAPs are being organised regularly and reports shared on Facebook and through this journal. Report no. 12, 13 & 14 are included in this issue

M A P No 12/ Nishulk Nov s2018

(Conducted by Sri GS Kumar, Geomap Society with help of Mr. KarunakarReddy, HM)

Venue: Nishulk Prabhat High School, Hyderabad

Participants: 15 students of Class 7 Nishulk Prabhat High School, , Hyderabad

Date : Nov 2018

Assignment : Preparation of map to a scale with symbols, land marks etc around the school area

Prizes: Winners: N.Latha, K.Varhita and K.Pooja

Comments/Observations: (1) Three attempts were made by participants to improve map drawing and features (2) Requires more sessions to improve their concepts about Scale, Symbology, Cartography, terrain analysis, adding names etc (3) Those reading this report are requested to select a school nearby or convenient and hold regular map-related discussion to create awareness about importance of maps. A good topo map for GeomapQuiz specially designed conforming to security norms is available for supply to those who wish to conduct MAPs.(email: geomapsociety@gmail.com)

GS Oberoi Inspired Map Awareness Programmes (MAPs)

M A P No 13/ Nishulk November 2018

Prepared by GS Kumar, GeoMap Society

This MAP is in continuation of the class held at Nishulk Prabhat High School, Khairatabad, Hyderabad earlier

Five students of class 7 were selected based on neighbourhood maps prepared by them. Prizes were given to them on 14 Nov 2018, Children Day.

GS Oberoi Inspired Map Awareness Programmes (MAPs)

M A P No. 14 /Gun Rock dated 13 December 2018

Organised by GeoMap Society,Begumpet, Hyderabad 500016.

Conducted by : Brig JS Ahuja & Mr**.** GS Kumar, Retd Dirs, Survey of India assisted by Ms. Archana Reddy, Principal and staff

Date & Time: 13 Dec 2018 15:00 hrs

Prizes Following 8 students of classes 8 & 9 were given prizes

1. Muzaffar 2. Lohit Reddy 3. Shazia

4. Durga Rama Laxmi (Class 9)

5. T.Pooja 6. Ruheena 7. Arun

8.Kumar Naik (Class 8)

Evaluation was based on maps of the area around their school on scale 1:5000 showing:

Title; North; Scale;Ground Features ; Important land marks

Communications; Names; Water bodies; Others of their choice

Comments/Observations:

Participants appreciated the skills of mapping and importance of Spatial relationships. Learnt value of scale and features of map. Principal Ms.Archana Reddy took keen interest in motivating participants.

ISRO's heaviest satellite GSAT-11 successfully launched from French Guiana

ET ONLINE | DEC 5, 2018,

India's heaviest satellite GSAT-11, that would boost broadband services in the country, was successfully launched by an Arianespace rocket from the French Guiana in the early hours of Wednesday, the Indian Space Research Organisation (ISRO) said. Blasting off from the Ariane Launch Complex at Kourou, a French territory located along the northeastern coast of South America at 02:07 am (IST), the Ariane-5 vehicle injected GSAT-11 into the orbit in a flawless flight lasting about 33 minutes.

ISRO's HySIS satellite sends first image covering parts of Lakhpat area in Gujarat

Sources in Indian Space Research Organisation (ISRO) said the agency was satisfied with the quality of the image sent by HySIS.

The country's latest earth observation satellite HySIS, launched by the ISRO on November 29, has sent its first image, covering parts of Lakhpat area in Gujarat.

The image from Hyperspectral imaging satellite (HySIS), which can be used in wide-ranging areas including agriculture, soil survey and environmental monitoring, was acquired at the National Remote Sensing Centre, the ISRO said.

The satellite, along with 30 other international co-passenger spacecraft, was injected into the orbit by the PSLV-C43 rocket from the Satish Dhawan Space Centre in Sriharikota on November 29.

The 380-kg HySIS is meant to study the earth's surface in the visible, near infrared and shortwave infrared regions of the electromagnetic spectrum.

Land Title

Copy of email sent in November first week from GeoMap Society is reproduced below. Response is awaited. Readers with knowledge about the Land Titling Bill 2011 may please share with others by sending mail to mapstodaygis@gmail.con

To: Under Secretary (Admn.) (email)

(with copy to Secretary; secylr@nic.in ; Madhu Thota . PS to Secy

Madhu.thota@nic.in ; Kashmiri Lal PS to secy, Kashmiri.lal@nic.in

Sub: The Draft Land Titling Bill, 2011

Dear sir,

Extract from the website is:

The Department of Land Resources in the Ministry of Rural Development has released a draft version of The Land Titling Bill, 2011 on its website. This draft is a major revision of the original draft Bill released in 2010. Public comments on this draft are invited before June 24, 2011. A copy of the draft can be found here.

I request you to inform us the status of the Bill

HUMOUR

Every problem has a solution

Mohan's Musings

When **Maps Today** offered me an opportunity to write a column regularly and gave all the freedom to define it, I was obviously elated and troubled. Elated by the great opportunity and troubled by the thought of churning out stuff which is worthy enough for the said offer. The second thing that lingered is what to call the piece – and how to maintain it as a regular. One thing to force it to happen as desired is to tag the column with my name.

If the page makes an interesting read (or otherwise - in all probability), you know who to credit for. If the page is missing, you also know who blame it on. So tagline is decided and implicitly ego part is taken care of. Then about the title. As I consider myself a photogrammetrist, shall I call it, *Photogrammetry by Mohan* ? Then I quickly retreated from the idea. Everytime I muttered this word *Photogrammetry*, it required to emphasise on the repeating *m*. As tiring as saying –*commando*, *communication*, *immunity*, *psychoneuroimmunology*, *counterrecommendation* ...Hence, decided to land on a much simpler one and you know by now what it is!

Writing an article describing a technique or an algorithm involves presenting the work pursued over a period by an individual or a team. The complexity lies in keeping it simple and precise. Simplicity is lent when the core concepts which form technique are addressed. And the necessity to be precise is pertinent for there are a multitude of technologies and approaches which exist in this ever expanding realm.

Writing a quasi-technical work is something like a biography – though the content is based on the facts/ findings and the garnishing makes it interesting to read. Perhaps, musings do not subscribe to any of the above. We can talk of the technology without really feeling so. Hence on this page, we will discuss concepts, techniques, technologies that help us to make measurements that ultimately transform into maps.

And having spent more than 3 decades dedicatedly - practising, developing and teaching geomatics (the term was not yet coined when I entered it), it gives me immense pleasure to share the snippets of this fascinating field of measurements – how to do and more importantly what not to.

Let us identify a topic to start with to see on this page for the next editiion:

Concept and applications of scale

Graphical representations: representative fractions – hardcopy and digital data

Imaging: scale variations – madir looking and tilted sensor – plain and hilly terrain

Satellite imagery: scale computation,

Some scale numbers in Indian context – cadastral map, parcel map, topographic mapping, engineering surveys, marine chart

Modes of indicating scale: number, bar, navigation apps

Uncertainity associated with scale: thickness of croquil, weight of the line

Scale error versus mapping error

And also, I welcome from you readers the topics of your interesst or queries and suggestions pertinent to this descipline. Reach me at photogrammetry@rediffmail.com !

GIS and CAD

Difference and Similarities between GIS and CAD

https://grindgis.com/software/difference-and-similarities-between-gis-and-cad

http://4.bp.blogspot.com/-6PqDDBDkxr4/UKOLi74OA1I/AAAAAAAAPQ/eZzu5-7xmkE/s1600/cad_o_gis.png

Are you torn between choosing ArcGIS and AutoCAD Map? This guide will give you a comprehensive analysis of CAD vs GIS so you can determine the most appropriate system for you.

Definition of terms

GIS means Geographic Information System which is a system that facilitates interoperability between mobile and desktop applications, server components, developer tools, and users in the collection, analysis, storage, sharing, and representation of spatial data in digital media. The platform may be deployed in the cloud - Azure and Amazon - or on-premise with the help of ArcGIS Enterprise or ArcGIS Online. Basically, the system has numerous components that communicate through common file formats and the ArcGIS REST API. It is important for users to understand the components of the system so they can create successful applications.

On the other side, CAD or Computer Aided Design uses a system of software and hardware to create objects. CAD technology can automate almost all methods used in organizing, drafting, and automating map data. It emphasizes on interactive graphics and their functions.

The AutoCAD Map software offers access to mapping and GIS data to support data management, planning, and design. CAD tools and intelligent models allow users to apply regional-specific standards. Note that the CAD technology can be integrated into GIS to boost productivity, asset management, and overall quality.

The two applications are deployed in industries where information about an area is required.

Why integrate CAD and GIS?

Apparently, major investments have been made on both database systems. While most people use the GIS mechanism, there is a need to create interfaces between CAD and GIS. The AutoCAD Map 3D is a perfect example if an integrated system where the components of computer-aided design technology work with the GIS database. The structure of the CAD system is interoperable with GIS files e.g. SHP. Raster/GIS data from satellite imagery such as DEM files are used in the creation of realistic terrain for CAD designs. The Esri's AutoCAD plug-in allows AutoCAD users to directly access GIS files without necessarily leaving the CAD system.

As you can see, the CAD and GIS integration increases the interoperability between the software. Suppose you want to create a crane that is located in an unstable terrain that might interfere with the GIS information. That information should be sent and represented effortlessly by the user. Thanks to the Semantic Web interoperability, it is possible to increase interoperability through WOL - Web Ontology Language or RDL - Resource Definition Language. This is accomplished with tasks that are subdivided into sub-tasks. These tasks are then mapped to CAD and13 GIS operations. The workflow allows the software to detect each other's services, making operations look more seamless. In case of such issues as data formatting, format tools like FME facilitates the auto-conversion and preservation of the required data while eliminating unnecessary information. That way, objects in one platform can be utilized easily on the other platform without editing manually. These are some of the tools that have been facilitating easier operations between CAD and GIS over the last few years. They bridge the gap that has existed for long between CAD and GIS.

Image source: http://www.gisblog.com/wp-content/uploads/2014/09/cad_and_gis_love.jpg

Comparing the two systems

The greatest difference between GIS and CAD is how data is collected and utilized. The CAD technology designs elements that will be produced while GIS represent information of an area as it appears.

- GIS is basically used to establish relationships between geographical objects and data. It captures analyzes, stores, and presents geographical information in a way that people can interpret easily. GIS makes use of spatial data while CAD is all about drawing of models using coordinates relative to the objects.

- CAD designs products in 2D or 3D diagrams which may be viewed at different angles. This allows the

designer to know how a building will be constructed. Note that CAD models don't exist until they are designed.

The tools used in the two systems vary significantly. To create dimensions and layers of buildings and objects, CAD requires text, circles, and lines. Designers and architects can, therefore, create any diagram of the structure they want to produce. The scale is not a problem in this case since the real measurements are added during the last stage to give the designer a clear idea of the necessary supplies. When it comes to GIS, spatial data is used in conjunction with rasters and vectors to create maps that show roads, states, and towns. It is mostly applied to relate the distance between objects. The information obtained through GIS is represented in a visual format, making it easier to create maps. The data is manipulated and interpreted better that when graphs or charts are used in a spreadsheet.

Mostly, one application is enough since most people need to create either objects or maps. But there are a few instances when both applications are necessary for example when a big facility requires expansion. In such a situation CAD may be used to develop a building plan while GIS would come in handy to establish ground maps. With real-life geographical data, a developer can determine the amount of space that is available for a project.

Both CAD and GIS help in the development of the management system of any facility since the mapping aspect determines the square footage of an area and how it can be used. The CAD features represent how new structures can affect the existing ones. Since the two applications use layers to design models, the CAD database may be linked to GIS to give the best of both worlds. However, the user needs to customize the software so it can match their specific needs.

The CAD developers are gradually adding more features meaning that the differences between the two applications will start to diminish. That's why it is imperative to stay updated with the latest technologies by outsourcing services from top drafting firms in the industry. Experts can help your organization avoid the expenses related to new in-house software.

Image source: http://blog.spatialbiz.com/wp-content/ uploads/2018/02/Image-2.jpg

Benefits of CAD over GIS in mapmaking

Architects and surveyors regularly use both GIS and CAD
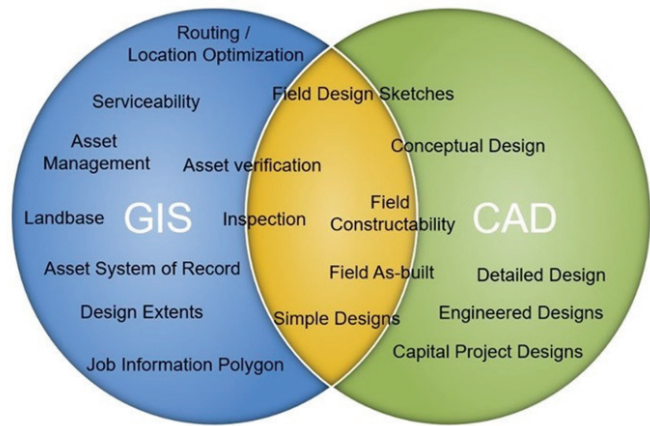
to create maps. The main advantage of using CAD to draw a site, map, or profile is a high level of accuracy. CAD packages facilitate drawing with coordinates or distance in a variety of units. CAD drawing can be used to calibrate the data needed for construction by civil engineers e.g. the quantity of material. They also ensure that the models meet the design standards. Precise CAD models can easily be integrated into drawings. To create a map, for instance, the best option is to use a CAD. GIS may not provide accurate drawing as required by engineers. Creating a line of work in GIS is time-consuming and awkward.

Benefits of GIS over CAD

GIS outweighs CAD in that it allows users to attach data to the lines, polygons, and lines in a map. This makes GIS the best method for visualizing and analyzing information through maps. For instance, engineers use GIS to produce a map that shows all the roads labeled according to the condition rating of the pavement. This would take decades to accomplish using CAD because the CAD drawing lacks data. However, handling such information makes GIS seem a bit slower. So, the best solution is to combine both worlds. That is why the AutoCAD Map is highly recommended. Whether you want to combine the two systems depends on your needs. If you are going to plan the design of your house, you may use a CAD. But to design a base map of a city, GIS would be more appropriate. Before you make a final decision always keep in mind that a CAD is for objects while GIS is for maps.

A summary of the differences between GIS and CAD

The differences can be wrapped up as follows:

- GIS requires a geographical reference while a CAD can do without it

- A GIS is the actual representation of an area while a CAD represents non-existent or existing structures

- GIS is can manage databases more effectively but it's not as strong as CAD

- Multiple files are used to store data in GIS while a single file is sufficient to store CAD data

- A change in scale is very simple in GIS but the same can be a big issue in CAD

- GIS apps use common terminologies like QGIS, ArcGIS, Envi, and Erdas while CAD terms can be very complex. For instance, the AutoCAD refers to a layer while the MicroStation is a level

- Analysis dominates in GIS while precision and detail matter the most in a CAD

- In GIS, polygons and lines represent their associated spatial information while in a CAD, they may represent a plane

- Unlike CAD, GIS can detect networks such as the lines used in describing streets. It also understands the conductivity, connectivity, and associations that enable spatial analysis

- GIS has topography but CAD lacks it. Topography brings together the objects to create real-world models thus allowing spatial analysis. In a CAD, the objects don't relate in any way

- GIS systems are disk-based and can model bigger areas whereas CAD systems are memory-based so they carry smaller files

- As far as the representation goes, the GIS 2D while the CAD uses 3D

- The GIS takes long to collect and maintain data whereas CAD works on a recent project basis

  What are the best GIS apps?

- **QGIS**

  QGIS consumes just any type of data. It is versatile and cutting-edge when it comes to the consumption of data. To write and read GIS formats, QGIS uses GDAL library and more than 70 vector formats can be supported. The app was designed to work in conjunction with PostGIS and has the largest community of users. There are numerous tutorials on the platform with sample data that provide hands-on experience. Rather than pounding pavements to load NetCDF files, the QGIS consumes it. And for24 hours

a day, its interface allows you to roll it so you don't need to waste time adding space-delimited files.

- **ArcGIS**

  The ArcGIS extension is specialty software that brings out the real beauty in map making. This Add Data button is so powerful and it simplifies everything since it understands all GIS formats. It helps a lot when you want to add a raster or spreadsheet. All you need to do is hit the Add Data option.

  These applications facilitate easy management of vector, raster, and GIS data. They provide a basic preview of the functions but focus mainly on the access and organization of data. The available search and filter options act as search engines. Besides managing data, they also create metadata. Metadata has evolved over the years into various formats like INSPIRE, NAP, FGDC, and ISO. With a QGIS browser, you can navigate a system of files and manage geographical information with ease. Both QGIS and ArcGIS handle CRS in a user-friendly manner.

  and GIS firms have been adopting drones and using them in their toolkits with pretty good regularity. We see them as the leading industry after aerial photography and video. That's been true in every study we've done. The survey, mapping and GIS firms use drones are still the #2 industrial users of drones

- There is some concern that the scanning wouldn't be as good as from ground scanning or from Total Stations. For the most part, that was true in the beginning. However, now camera resolutions have improved and there are better accuracy capabilities such as data collection capabilities on drones. We see companies like Leica putting together their own special custom drone that collects very accurate data. Or someone like AirGon, they've done testing with the Septentrio board that allows for better accuracy in tagging the images. You now just have better accuracy from open sensor and GNSS devices that are onboard the drones.

- Our report includes a summary of who is buying drones. Most people are aerial photographers and videographers and the next largest group are surveying mapping people, then asset, infrastructure, facility inspection after that.

Five GIS Trends

Changing the World according to Jack Dangermond, President of Esri

By **Jack Dangermond** -

January 1, 2017

http://geoawesomeness.com/five-gis-trends-changing-world-according-jack-dangermond-president-esri/

Maps are a simple and efficient way to understand and communicate rapidly. Looking at a spreadsheet, we see rows and columns of data. Using charts and graphs, that data can be seen as a pattern. But when that same data is presented on a map, we suddenly have context for the information. Because most of us are already familiar with geography, when we see data as a map it is usually understood much faster. We are now at a stage where we can display 3D imagery and information on the web very easily. Web-based 3D visualizations are everywhere, and maps are among the most common manifestations of this.

At Esri, we are investing in things our users want at scale, while still keeping abreast of the cutting edge. The geospatial industry is quickly evolving because the capabilities of digital connectedness and collaboration are moving ahead exponentially. In fact, the five biggest trends in the area of geographic information system (GIS) technology are centered on making data more accessible and creating context to visualize this data in an age when fast, easy access to information is taken for granted.

1. Location as a Service

There was a time when GIS use was limited to the niche market of government, telecommunications, utilities, and oil and gas sectors. That market has grown substantially, as large retailers and tech startups have seen the benefits of understanding data geospatially. The fundamentals of GIS and what it can do have also evolved dramatically. We are entering an era of services-based GIS. This means the GIS professional connects with consumers directly through web-based applications that provide easy-to-access visualizations. GIS also has huge implications for the enterprise user at a business or a city organization, where departments have enormous amounts of geographic data. Performing spatial analysis on the web and having access to distributed servers where different layers of data exist allow users to bring this data together, fuse it, and analyze it across the network.

2. Advanced Analytics

Spatial analysis is important to any business that values location as a variable to success. Site selection is a crucial function that is dependent on geospatial analysis. A retailer that wants to set up new stores needs to understand where there are existing successes for similar ventures as well as hospitable demographics. All this data can be overlaid onto a map to perform statistical analysis in order to make a decision about the location of a new store. Maps communicate this information well, and in a web services environment, professionals will be able to make maps, graphs, and charts and perform analytics easily. Accessible from an organization's cloud, the power of GIS and mapping is opened up across the enterprise.

3. Big Data Analytics

The ability to access the vast amounts of data that provide us with insight into the environment and human behavior has changed the way all organizations function. That capability has also evolved to include the integration of big data operations into spatial analysis. Today, anyone in the enterprise can access billions of environmental observations or tens of thousands of raster images from spacecraft and analyze them easily. This will greatly expand what traditional GIS has done. Enterprise users can now build their own imagery and raster analytics workflows for fast, multi-CPU, parallel processing of massive imagery collections.

4. Real-Time GIS

The world of citizens and consumers is already interconnected digitally—people are connected with each other and with their governments and businesses. Leveraging this vast network of devices and sensors is perhaps the latest trend and the number one priority for organizations that want to remain ahead in terms of having a comprehensive enterprise GIS for the future. Everything from smartphones to crowdsourced social media feeds is being used to integrate real-time data from the Internet of Things (IoT) directly into a GIS layer stack, where the data is analyzed, visualized, and reintegrated into online applications for use by either professionals within the enterprise or by consumers and citizens.

5. Mobility

Another way GIS is breaking out of its traditional space is by becoming more consumer-friendly. Just as data from

mobile devices is liberating professionals and consumers who've been accessing GIS online and from the desktop, this same data is being used to power a new generation of easily accessible applications that tap into the rich science and analytics that only GIS can deliver. A much simpler user experience is now possible for GIS users with the creation of a suite of apps and app builders. iPhones or Android devices can be used to collect geospatial data or explore it visually, anywhere and at any time. Professionals in the field can use these apps for data collection or as observational data, which they can then bring directly into an enterprise services environment in the cloud. Field information is immediately input and analyzed.

Creating Big Understanding from Big Data

The last leap in computing was the shift from the server to the cloud. Software as a service (SaaS) opened up a world of opportunities for GIS, as shared map services like the *World Imagery Basemap* are no longer separate from the unique services offered to users. GIS users can share data, collaborate, make mashup maps in the server, then connect to the cloud.

The next leap in GIS technology and computing is connecting to the vast network of devices providing data in real time. It is the most revolutionary change we have seen since Esri began and brings great opportunity. The more accessible data is, the more important it will be to understand it. And maps are the visual language for understanding the context of data.

HUMOUR

India was the First to Start Selling Fruits & Vegetables ONLINE. 😂

GIS Mission

You can/should be part of this

GS Kumar, Editor, MAPS TODAY, Former Director, Survey of India

In 1963, when China attacked India, India was a loser. One of the major causes was non-availability of up-to-date maps. Same year Survey of India's expansion took place. In 1990 we decided to take up Map Awarenes Programmes in an organised manner. GeoMap Society (GEMS) was formed, followed by GIS India, a monthly journal. For nearly 25 years map awareness remained low in the society. Today digital maps are everywhere.

Digital maps using other technologies like RS, Photogrammetry, Location based surveying combined with softwares and creative brains have given rise to thousands of applications. These applications are improving governance.

According to Jack Dangermond, President of Esri *Web-based 3D visualizations are everywhere, and maps are among the most common manifestations of this.*

Every one of us is interested in good living. Science & Technology has proved to be the right approach to be adopted. Wider use of Digital map-based (Geospatial) technology will improve efficiency and reduce violations. We need to build GIS data bases in all sectors and maintain them up-to date also. Huge effort and skills are needed. Decision makers and people should appreciate this. In World Bank assisted development projects use of digital maps is mandatory. *According to McKinsey Global Institute's report, effective use of geospatial and digital technologies in India's land records management has the potential to unlock $34.45 billion. In every field there is scope to improve efficiency, savings and employment.*

First thing you can do is to subscribe to this journal for 2/3 years and help the mission. In the modern parlance it is called "crowd funding". You can enrol others as subscribers. You can mail us examples of use of digital-map based techniques. You can organise events. We provide support and guidance. Give suggestions. Accountability and Transparency of GIS will bring paradigm changes in the society. Archival laws/Acts need to be modified. This is a win-win opportunity for each of us to be part of GIS mission.

Photomod : RACUR's Photogrammetry Software

Celebrating 25 Years of Photogrammetry Software Innovation -

https://www.gim-international.com/content/article/celebrating-25-years-of-photogrammetry-software-innovation

5 Questions to... Victor Adrov, Racurs

Racurs has a 25-year track record of success in the Russian and worldwide geomatics markets. The company, which was founded in 1993, has become a household name among photogrammetry specialists, particularly thanks to its innovative digital mapping software for processing aerial, spaceborne and terrestrial imagery: Photomod. Here Dr Victor Adrov, managing director of Racurs, answers five questions on the history, current

> *Practically speaking, at that time, it was one of the world's first photogrammetric systems running on a personal computer*

status and future of the company. Racurs has been celebrating its 25th anniversary this year – congratulations!

So how did photogrammetry software look in the early days of your company?

The first versions of Photomod allowed the processing of only one stereo pair of central projection images, but already had automatic capabilities for tie point measurement and digital elevation modelling (DEM). The system included a stereo-vectorisation module, realised with the use of anaglyph glasses. The output of photogrammetric processing included DEMs and contour lines, orthophotomaps and 3D vectors. The system had a modular structure and worked on IBM-compatible personal computers in OS Windows 3. Practically speaking, at that time it was one of the world's first photogrammetric systems running on a personal computer. It was used effectively both for processing aerial surveys and in terrestrial and close-range photogrammetry projects.

The first Photomod licence was sold in 1995, and it is still your flagship product to this day. How has it evolved over the years?

Obviously, Photomod has changed a lot over the years. The development of the system was determined by our goal – to create effective high-end photogrammetric

technology that allows processing of any remote sensing data and obtaining the output products needed by the customer.

As Photomod evolved, it began to process optical data from space and airborne push broom scanners, and a special package appeared for processing data obtained by SAR systems. Of course, a module for automatic triangulation and block adjustment appeared. One of the main competitive criteria when choosing a photogrammetric system is productivity. Therefore, during the development of Photomod, much attention was paid to the development of algorithms for automating basic photogrammetric operations, distributed computing and improving the ergonomics of operator-machine interfaces. Whereas photogrammetric projects used to involve hundreds of images just a decade ago, nowadays big production companies use thousands of satellite images and hundreds of thousands of digital aerial images. When developing new versions of our software, we take into account huge amounts of stored and processed information, focusing on the modern capabilities of computing facilities, cloud and cluster solutions.

I think that Photomod is currently one of the most productive digital photogrammetric workstations (DPWs) in the world. Your R&D department is a very important pillar of your company. How would you describe your research activities?

A distinctive feature of Photomod is that the algorithms and all programming code are developed by our own team. We don't use other companies' software modules for any technological operations. Therefore, it is obvious that we have to focus more on research work. That

research works allow us both to develop Photomod and to participate in R&D projects of our partners and users, such as ROSCOSMOS and defence industry initiatives. The main aims of our research are related to improving the efficiency of photogrammetric solutions and obtaining new types of output products needed by customers.

How has the rise of UAVs for mapping and surveying influenced your business?

The development of unmanned aerial vehicles (UAVs or 'drones') and the growing interest in their use in our industry have greatly influenced both the geomatics industry itself and the developers of photogrammetric technologies. First of all, active use of UAVs in aerial surveying led to the appearance of many small companies that required photogrammetric capabilities for data processing. But those companies didn't have the resources to buy expensive high-level software used by professional photogrammetry specialists. That created a market demand for more affordable photogrammetric systems, designed to obtain a limited number of output products in a maximum automatic mode when using non-professional, non-metric cameras. UAV companies did not require advanced stereo-vectorisation tools or satellite data processing capabilities. Therefore, suppliers of complex professional high-end photogrammetric systems, including us, had to change their working methods to limit and simplify the operations interface, to eliminate redundancy of source information and output production, and to create more affordable specialised automatic solutions for processing UAV data only. In order to compete with producers of specialised software for UAV data processing, we have released and are successfully developing the UAS version of Photomod that is now used by many companies in Russia and around the world.

When it comes to photogrammetry, what are your expectations for the next five years?

I think the following factors will have the biggest influence on the development of photogrammetry: new data sources; new sensors, both aerial (including UAV) and space-borne; the development of computer technologies and processing algorithms (including AI algorithms); the transition from 2D cartography to 3D representation of spatial data; and the development of internet and cloud solutions. We take all these factors into account when developing our technologies. I think that we can already speak of 'smart photogrammetry'. The ideal photogrammetry system of the future will have a huge set of various types of images as input, automatic data processing in order to obtain a metric 3D model of the territory, and automatic classification for subsequent use in different information systems. All producers of photogrammetric systems, including our company, are working on this.

INCA795 (Abstract)
Web Enabled Geo-spatial Urban Governance

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Under National Urban Information System (NUIS), 152 towns thematic urban geospatial database has been created on 1:10000 scale using high resolution satellite data. For effective utilization of these databases by respective Urban Local Bodies (ULBs), NRSC has developed a Geo-web portal (Bhuvan-NUIS) for updating/modifying and preparation of city level plans like Master Plan, Infrastructure plan as well as for governance. The main features are ULB specific access control for (1) Database creation by Junior Engineer (2) Review and approval of database created by the Junior Engineer along with the feedback mechanism (3) The Visualization and status control at city level, state level and at Central level. The access control is provided as per the responsibilities and jurisdiction. Nationwide training and capacity building has been imparted to the 2700 Town planning officials in all state and UTs through national workshop, regional workshops and state workshops. The application has been developed using OGC complied open-source technologies like Geoserver for data publishing, web services (WMS and WFS). Open-source QGIS software has been integrated with Bhuvan-NUIS through a plug-in with access controls. This feature augments the Bhuvan-NUIS with GIS capabilities. Bhuvan-NUIS is first of its kind to provide nationwide Geo-spatial governance in India.

Rapid Site Surveys

Rapid Site Surveys Using SLAM Technology - Geomatics Systems for the Future

Stuart Cadge

The difficulties of undertaking geospatial surveys, particularly within unstable buildings or underground environments, are well documented. However, the pressure to collect accurate, real-time data within strict timelines has certainly intensified in recent years. With increasingly tight deadlines coupled with strict budgets, conducting surveys of hard-to-access sites can be a real challenge for engineering and construction firms. In this article, Stuart Cadge from indoor mobile mapping specialist GeoSLAM explains how new innovations in Building Information Modelling (BIM) are providing an answer with the aid of simultaneous localisation and mapping (SLAM) technology.

As engineering and construction firms grapple with issues such as skills shortages, robust safety regulations and fierce competition for contracts, traditional survey methods are increasingly coming under pressure to provide scan data which is accurate and turned around as quickly as possible. Added to this, many project managers cannot afford to solely rely on highly skilled operators to collect data if they would then need to spend multiple days processing it. Such lengthy process times often mean that operators run the risk of missing key information about the integrity of a structure.

Growing demand for BIM

This need for greater operational efficiency is one of the reasons why demand for building information modelling (BIM) technology is growing so rapidly. Site teams can now test and optimise processes at every point of an asset's lifecycle via a dynamic 'digital twin', enabling them to identify potential issues such as unstable ground, existing utilities or, occasionally, historic remains that could unexpectedly halt work and push up the costs. Whatever the nature of the project, firms can ensure that any changes to building plans are digitally communicated to stakeholders wherever they are in the world, in real time. Fuelling some of the latest innovations in BIM are developments in high-definition 3D laser scanning technology, which enables operatives to produce digital

representations of a building or asset while reducing the need for anyone to access hard-to-reach and/or dangerous parts of the site.

SLAM-based mobile mapping solutions have the capablility of rapidly scanning buildings.

Advances in mobile scanning

Static scanning has certainly helped to improve the accuracy of site data, especially compared to manual tools like tape measures and total stations, yet it can be costly and time consuming compared to the recent technological innovations. Static surveys still require expert operators, and it takes hours – and often days – to process the data. Subsequently, without immediate access to information, decision-making is inevitably delayed and this could compromise the commercial viability of a project if deadlines are missed and costs escalate. To overcome this, project managers are increasingly deploying handheld mobile 3D laser scanning systems that empower anyone – not just surveyors – to scan a site in minutes and continually update a digital building model.

Mobile scanning is undoubtedly a great leap forward in terms of time savings and site accessibility. However, the fact that many devices rely on GPS can make them less suitable for use in tunnels, caves, mines or potentially dangerous buildings. One alternative is simultaneous localisation and mapping (SLAM) technology, which delivers the same accurate results without the need for GPS. When this is coupled with the ease of transferring to BIM, data can be captured and assessed quickly and efficiently.

BIM model of the 13-storey apartment block.

How scan results are used

One application for the implementation of SLAM-based mapping can be seen in a project undertaken by Danish survey specialist LIFA, which had been tasked with measuring the leasable floor area of a 13-storey apartment block that was under construction at the time. The site team needed a solution capable of rapidly scanning the building, and so turned their attention to SLAM-based mobile mapping solutions.

According to Danish law, all leased properties must

undergo an official, interior, as-built survey for property tax reasons. Using traditional techniques, this process would have taken at least two days – but the entire survey was completed in just 30 minutes by walking with the GeoSLAM ZEB-REVO on site, plus another hour for data processing. After data for all 44 apartments and communal areas had been captured, the site team created a BIM model by importing the point cloud into third-party software. Having scanned almost 5,500 square metres, the measurements using a ZEB-REVO were accurate to within a few centimetres across the entire building. Moreover, the results were well within acceptable tolerances for the tax office. The BIM model was able to display the building and had enough detail and accuracy to meet the requirements of Danish law.

LIFA is now able to measure buildings up to ten times faster using mobile scanning devices. In just six months, a two-person team mapped over 16,000 rooms in approximately 400 municipal buildings. A task like this would once have taken years to finish, rendering it commercially unviable as the processed data would have been immediately outdated. However, LIFA can now obtain the results it needs in a relatively short period of time, and apply them accordingly. Furthermore, new advancements in real-time capability are allowing for simultaneous data collection and processing, paving the way for even shorter survey times.

BIM model created by importing the point cloud into third-party software.

BIM and SLAM: What does the future hold?

All this seems light years ahead of the days when architects, surveyors and other stakeholders would manually update asset designs during the process. Instead, BIM technology enables project managers to carry out more work at the planning stage, identifying any potential issues before work begins on site. This is extremely important given that, according to industry research, a rework might amount to 12% of the total building cost. As well as speeding up construction projects, BIM also makes compliance more straightforward. For example, ISO certification can be easily shared with any stakeholder. Once the building work is complete, BIM continues to play an important role throughout the asset's lifecycle, even if it is eventually demolished.

Speed and ease of use make handheld mobile 3D laser scanning systems an attractive choice for firms looking

to remain competitive. By embracing BIM firms have significantly reduced materials waste, enabling them to offer better value for money, increase investor confidence and secure new contracts for large-scale capital projects. The fact that surveys can be completed so rapidly also means that project managers can do them more frequently, so architects, designers and facilities managers have the most up-to-date information both during the construction phase and throughout the asset's lifecycle. As a result, scan-to-BIM, using SLAM technology, is increasingly being deployed both on large-scale projects in the construction and engineering, mining and forestry sectors and on comparatively small housing developments.

Within tightly regulated industries such as engineering and construction, the need for more frequent surveys will only grow in the coming years, as contractors are expected to deliver detailed verification and progress monitoring reports. Rather than relying on professional surveyors only, it surely makes good business sense to equip others on the team with increasingly accessible geospatial devices so they can capture new data and update the BIM representations accordingly.

Walking with the GeoSLAM ZEB-REVO on site.

Last updated: 26/10/2018

English & Geography are unlikely friends

EVENTS

FOSS4G Asia 2018	December 2 – 5, 2018	Moratuwa – Sri Lanka	www.foss4g-asia.org/2018/
Esri Middle East	December 11-13, 2018	Dubai, UAE	
GeoWeek	January 25-31 2019	Denver USA	www.lidarmap.org/geoweek/
International LiDAR Mapping Forum (ILMF	January 28-30 2019	Denver USA	www.lidarmap.org/geoweek
ASPRS Annual Conference	January 28-31 2019	Denver,U.S.A	www.lidarmap.org/geoweek
Esri Federal GIS Conference	January 29-30, 2019	Washington, D.C	https://www.lidarmap.org/geoweek
International Geoinformatics Conference	February 10 – 14, 2019	Riyadh, Saudi Arabia	http://saudigs.org/en/international-geoinformatics-conference2019
WLIA's 32nd Annual Conference	February 20 – 22, 2019	Wisconsin, USA	www.wlia.org/annual-conferenc
QGIS Developer Meeting	March 7 – 10, 2019	A Coruña, Spain	http://2019.qgis.es/
EUROGEO 2019	March 14-16 2019	Paris, France	www.eurogeography.eu/conference-2019
Geospatial World Forum 2019	April 2-4 2019	Amsterdam, The Netherlands	www.geospatialworldforum.org
UAV Expo Europe	April 8-10 2019	Amsterdam, The Netherlands	www.expouav.com
Future Cities Show 2019	April 8-10 2019	Dubai, UAE	https://www.gis-professional.com/content/event/future-cities-show-2019
Ocean Business 2019	April -11 2019	Southampton, GB	www.gis-professional.com/content/event/ocean-business
Geology and Earth Sciences	April 10-13 2019	Valencia, Spain	geoscience.madridge.com/
FIG Working Week	April 22-26 2019	Hanoi, Vietnam	www.fig.net/fig2019
GISTAM 2019	May 3-5, 2019	Greece	www.gistam.org
Information Fusion & GIS	May 10 – 12, 2019	St.Petersburg, Russia	
International Symposium on Deformation Monitoring	May 15 – 17, 2019	Greece	isdm2019.survey.ntua.gr/
GEO Business 2019	May 21 – 22, 2019	London, UK	www.geobusinessshow.com/
Urban Remote Sensing Event	May 22 – 24, 2019	Vannes, France	www.jurse2019.org
UAV-g 2019	June 10 – 12, 2019	Enschede, The Netherlands	www.gsw2019.org
Geospatial Week	June 10 – 14, 2019	The Netherlands	www.isprs.org/
GeoInformation for Disaster Management	September 3-6, 2019	Prague, Czech Republic	www.gi4dm2019.org
INTERGEO 2019	17th – 19th September 2019	Stuttgart, Germany	www.intergeo.de
International Symposium on Digital Earth	September 24-27, 2019	Sesto Fiorentino Italy	www.gis-professional.com/content/event/11th-international-symposium-on-digital-earth-isde-11
InfraTech 2020	14-16 January 2020	Germany	https://www.infratech.de

Information about events has been compiled from different sources. . Readers are advised to check correctness from the organisers.