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THE MONTHLY MAGAZINE ON POSITIONING, NAVIGATION AND BEYOND

Tsunami in Japan

Japan committed a big mistake to have listed nuclear power plant as a sustainable development

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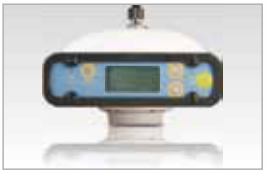

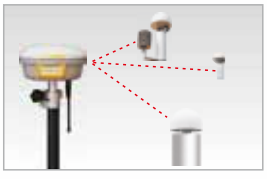

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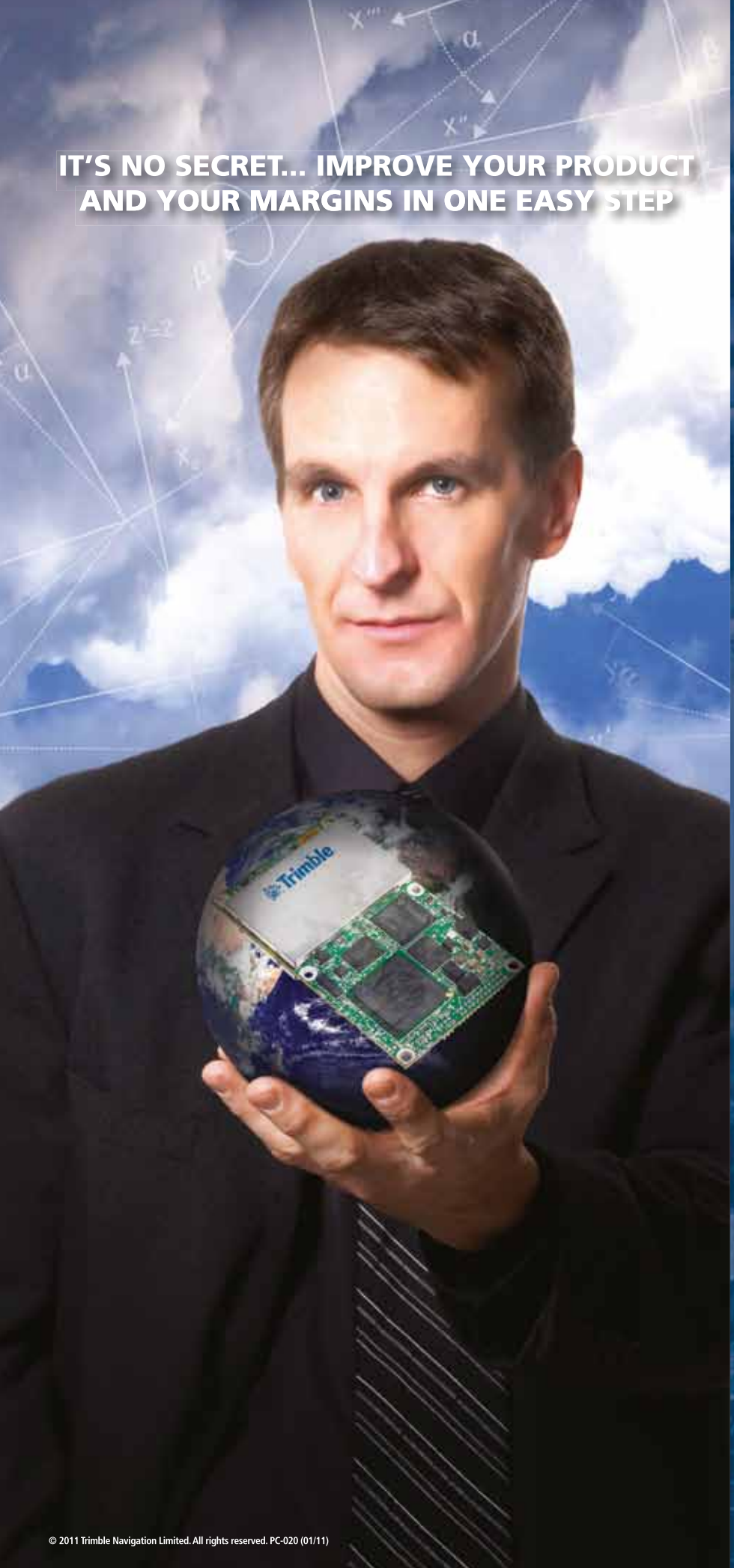

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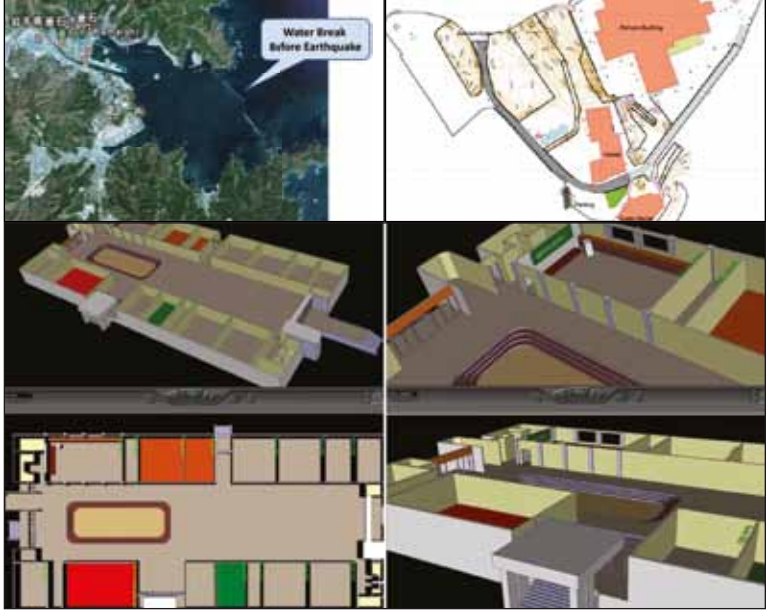

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This issue of Coordinates is of 44 pages, including cover

Tsunami continues

Tsunami in ocean, in coasts, in lands, ...

In our minds too.

Throwing new challenges

on develpoment models,

Raising questions

on research,

earthquake predictions, etc.

Managing disasters

of this magnitude,

Trigerring thinking

and rethinking.

The tsunami continues...

Bal Krishna, Editor
bal@mycoordinates.org

Tsunami in Japan

Japan committed a big mistake to have listed nuclear power plant as a sustainable development which proved to be of no more sustainable happiness

Shunji Murai
Professor Emeritus,
University of
Tokyo, Japan

I was given the title of this article "How Japan is managing the disaster of this magnitude?" by the Coordinates magazine but I dare to say that Japan is not yet managing the disaster but suffering from the hardships. Though all Japanese people are in mourning the sorrow, I feel it should be my duty as an old scholar to report on the biggest earthquake and Tsunami to the rest of the world. I hope that my report would be useful to prevent the similar misery.

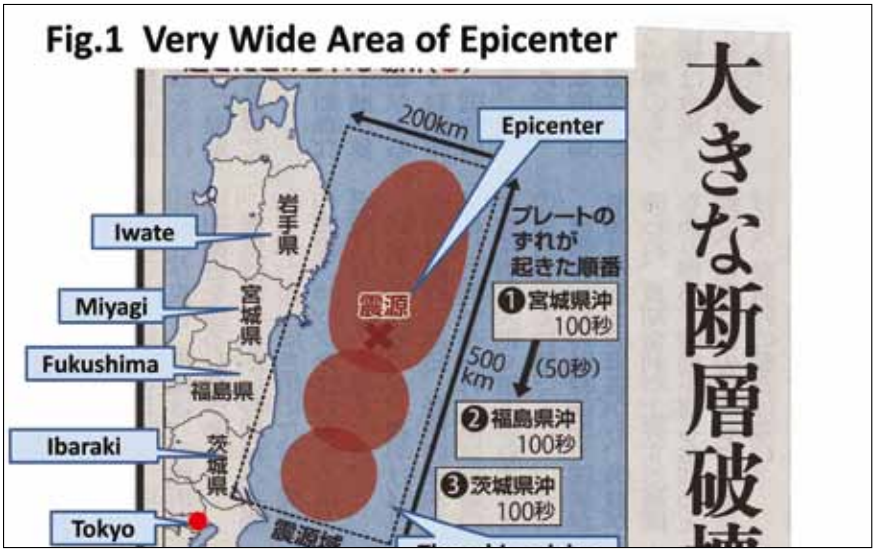
What happened?

At 2:46 pm on the 11th March 2011, the huge earthquake of M 9.0 (firstly it was 8.8) occurred offshore of Sanriku (north east of Japan) of which epicenter was 500 km long (north-south) and 200 km wide (east-west) in the Pacific Ocean (see Fig.1). Accordingly the damaged areas were also 500km long including a part of Hokkaido (the north island of Japan) to Tokyo. We had many big earthquakes in the past, for example, Kobe Great Earthquake occurred in 1995 but the area of the damage was limited in several 10 km. I was at my house located in the west of Tokyo at the time of the earthquake when I felt danger to stay in my room and jumped out of my house together with my wife. The shaking continued for almost 3 minutes (normally one minute long even in the case of very big earthquake) and repeated many times even after the earthquake. After the earthquake was settled a little bit I switched on TV and came to know that very serious damages were anticipated in the Tohoku Area (north east of Japan) and Tsunami would be coming soon.

The damages are as follows; 10,0489 dead (confirmed so far), 16,621 missing (still increasing), 2,777 injured, 144,194 houses destroyed, 245,689 evacuated, 2,200 road damages, 56 bridges dropped, 6 fuel power stations stopped, Tohoku Shinkansen and Tohoku Highway seriously damaged (as of 26th March, 15 days after the earthquake). The main damages were from Tsunami which swept away huge number of people, cars, houses, fishing boats, ports and harbors see (Fig.2a and 2b). Quickly measured height of Tsunami is as follows; 23 m at O-funato, 16 m at Minami Sanriku, 15 m at Onagawa, 14 m at Fukushima nuclear power plant area, 13 m at Kuji port, 7~8 m at Kamaishi, 5 m at O-arai etc. The Tsunami hit small coast towns 5 km upstream along river as Sanriku Area has special topography of V shape bay which exaggerates the height of Tsunami. Along the River Kitagami, 5 m Tsunami attacking at the outlet swept away all harbor facilities and boats, at 4 km point a bridge fell down, at 6 km riverside villages were flooded, at 14 km agriculture fields inundated and at 49 km point of water level gauge station the water level suddenly raised by 10 cm one hour after the earthquake. It would be unexpected to have such Tsunami propagation.

The most serious accident was the destruction of the Fukushima Nuclear Power Plants of which cooling system and electric and electronic facilities were completely damaged by Tsunami (see Fig.3). It resulted in the extraordinary heat up of the nuclear reactors and protected vessels. The atomic radiation was spilled out which polluted air, water and soil including vegetables and milk. People within 20 km radius had to move out of the residence and people within 20 ~ 30 km had to be inside of their houses. The total numbers of evacuated people were 450,000 at maximum not only from the earthquake and Tsunami but also from the nuclear power plant accident. They had to stay at congested houses without light, heater, water, foods, blankets, etc. in spite of cold night of below zero temperature until supporting materials had arrived.

Tokyo, the metropolitan area was also under panic as all trains and subways were stopped which made several million people impossible to go back home or very difficult to move. After 30 minutes from the earthquake, all drinks and foods were sold out at every shop. From the next day, water, foods, toilet papers, etc were also sold out at super markets, department stores, convenient stores and so on. Electricity failures were also started as the electric power stations stopped the operation which brought shortage of electricity. Tokyo Electric and Power Supply Company (TEPCO) had the capacity of 52 million KW before the earthquake which reduced to 31 million KW after the disaster. Fukushima Nuclear Power plant was providing about 9 million KW. Serious was the shortage of gasoline as the oil refinery facilities were also damaged. Almost all gas stations and tanks were swept away in the coast areas. It was a big trouble as we could not transport relief supplies to the damaged sites because of lack of gasoline. Even in Tokyo after two weeks, we have to make queue to wait for an hour for gasoline supply which is limited only 10 litters. In addition, almost all ports were damaged by Tsunami, roads and railways were not usable. Only helicopters of the defense agency were rescue parties. Mobile phones and Internet at the sites were not available for long days which made difficult to communicate between safe and damaged areas as well as among family and relatives. Many of survivors lost their mobile phones too. Even with mobile phones, they could not use them as electric services were completely stopped.



Lessons from the past disasters in Japan

Japanese people were well educated about the evacuation from earthquakes and Tsunami as there were so many terrible disasters occurred in the past. Particularly the area of Sanriku was heavily damaged by the Great Tsunami in 1896 which killed almost 22,000 people including my great grandfather. According to this miserable lesson, many coast towns prepared the construction of water break against Tsunami. For example, Kamaishi City, Iwate Prefecture constructed huge water breaks with 2 km long with 20 m thickness, 8 m height of the crust above the sea level and 65 m depth which has been registered as the deepest water break in Guinness World Records (see Fig.4a and 4b). Taro fishery village, Miyako District, Iwate Prefecture constructed 10 m high water break against Tsunami as the village was most seriously damaged by 1896 and 1933 Tsunami. But those water breaks were completely destroyed by Tsunami this time. The Tsunami was 14 m high this time much higher than the preparedness. Many people said that the Tsunami was beyond the estimation but the Tsunami in 1896 was 38 m high! We should have lessons that the hardware including very high water break cannot rescue people but we need software including how to provide early warning and evacuation system.

In the case of Kobe Earthquake occurred in 1995 which killed more than 6,000 people the establishment of GIS database was so important to recover from the damages. Many local governments started GIS database but everything including computers, databases, backups, even city and town halls/offices were swept away. Most of people lost ID card and passport which made difficult to identify with documented evidence. In several towns, the official registration data bases were also lost as well as town offices.

Lessons from the disaster

First of all, I have to say that there is nothing absolutely safe. Though many Japanese doubted the safety of nuclear power plant, Japanese government and industry oriented people supported the

construction of nuclear power plants as the safety was absolutely reliable. In spite of allergy against atomic matters as Japan was only nation who experienced atomic bombs, majority of local people accepted the construction of nuclear power plants through voting procedure. Electric power companies and consultants always said that the power cost should be cheapest in the case of nuclear power. But now we Japanese realized that the cost was tremendously high, and in addition, the accident is robbing of the life and land more than 250 km wide (Tokyo 250 km apart from the Fukushima Nuclear Power Plant is now under danger of drinking water due to the atomic radiation). We are learning how difficult, complicate and time taking to prevent the accident of nuclear plants.

Many local people have made mistakes and misjudge though they were lessons from their ancestors how to evacuate from Tsunami. But some of people did not have enough knowledge about Tsunami behavior. For example, Asahi City, Chiba Prefecture located at sea coast was attacked by the first Tsunami at 3:45 pm, one hour after the earthquake when local people succeeded to evacuate on a hill. After Tsunami withdrew, some people went down to their houses or the coast, even some people tried to fill their cars with gasoline. But the second Tsunami came at 4:20pm, 35 minutes after the first Tsunami when such people were swept away and died. After the withdrawal of the second Tsunami, survived people wanted to search for those victims in the city area near the coast as they did not think that Tsunami came again. Unfortunately the third Tsunami, even highest one attacked at 5:26 pm, an hour after the second Tsunami which killed the rest people. One of the survivors said that there would not be any more Tsunami after the second one. The attacking time of Tsunami and repetition were different place by place. The earliest Tsunami was 15 minutes after the earthquake while most Tsunami came 30 minutes after. But we Japanese did know that some time it took long time until Tsunami came. For example big Tsunami of 6 m high attacked Sanriku Area 22 hours after the Great Earthquake occurred in Chile in 1960, which killed 142 people. NHK TV immediately announces whether we have to prepare the attack by Tsunami or not every after big earthquake. At this time many people evacuated second floor or third floor of concrete buildings. It would or should be safe. But the height of Tsunami came up to fifth floor and its roof the was only safe place.

In Japan, any local governments must produce hazard risk map which shows the place of refuge or shelter and guiding roads. Some villagers followed the guide map which have helped them to save themselves but in some other cases they were not successful as the estimated Tsunami was smaller than the actual one. There was an interesting report in which Sumo Hama. Miyako District, Iwate Prefecture succeeded to evacuate 109 people out of 110 villagers on a safe hill even though the village had no water break against Tsunami. Those villagers used to exercise the rehearsal of evacuation from Tsunami every year including communication among villagers and evacuation routing. At a primary school called Funakoshi Primary School located in Yamada Town, Iwate Prefecture, the school itself was designated as a place of shelter as it is located at 13 m above the sea level. 176 school children were evacuated to this school at first, but Mr Shuzo Tashiro (55), a school helper judged the shelter was not enough when he saw the Tsunami wave at the coast. He urged all children and teachers to escape up to 40 m higher hill. Then Tsunami came and swallowed the school. Had he not guided them, all people would have died. There was another successful story in the city of O-arai, Ibaraki Prefecture where 5 m Tsunami attacked. A young fire man of 19 years old continued to shout in front of disaster wireless microphone which warned people through 45 speakers, "Escape to higher hill immediately!" even though Tsunami came to his legs. He continued to shout after the Tsunami went away "stay there and don't move" for two and half hours. It resulted in perfect safety of all local people including an old lady of 91 years old. The lesson was obvious that software, particularly communication system could work much better than hardware such as super high water breaks.

Who survived and who did not?

Besides the above mentioned stories, I would like to mention several fortunate and unfortunate stories: A 60 years old lady was swallowed in Tsunami when she was sinking up and down in water and tried to go up to the water surface. Luckily a "Tatami", Japanese mat was flown in front of her and she jumped up the "Tatami" but she was in a whirl and vortex rotating with high speed. Again luckily a wooden house was flown and she jumped up on the roof. Finally, she was rescued by a helicopter.

A young mother with two children tried to escape to a place of refuge by her car, but

Need of coordinated efforts

The world experienced a devastating disaster on 11th March 2011, first the Earthquake of a very high magnitude and afterwards a massive Tsunami. Some authorities say that 'the magnitude was near the "Black Swan" category', and the travel time of the wave to the coast was reported to be only about 10-15 minutes, insufficient to inform the nearby communities of the impending disaster. These are conditions where even the most advanced Early Warning System (EWS) cannot make a significant difference. Therefore, the potential to mitigate such disasters in the future will have to be based on vulnerability reduction by adaptation, e.g. in urban planning and construction, based on risk and vulnerability maps.

Another question is the quality and coordination of disaster mapping activities to support response measures. Here it will be necessary to coordinate all efforts in the preparation of adequate Geoinformation on a global scale, as most of the disasters nowadays are not limited by national or regional boundaries. We believe that Geoinformation technologies developed for the purposes of disaster monitoring and management can contribute to assisting all facets of disaster management and alleviating their impacts for such purposes as the rescue of victims. Lastly everyone in the world must learn from the Japanese experiences, their calm behavior in the face of such a devastating event, without losing their well-known disciplined manner.

Prof Orhan Altan, President of ISPRS

Fig.3 Accident of Fukushima Nuclear Power Plants with Hydrogen Gas Explosion

©Digital Globe

Fig.4a The Deepest Water Break against Tsunami in Kamaishi Bay. Iwate Prefecture

©Google

Fig.4b Destructed Water Break in Kamaishi Bay By Tsunami

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she could not move because of traffic jam. She decided to go back but she could not make U-turn. She went to the opposite lane and put the car in reverse gear. Finally, she could escape from the Tsunami but many cars in front of her were flown away.

Another young mother tried to evacuate to a refuge place on a hill by car together with her mother and children. She listened to a voice of a policeman shouting "Tsunami is coming!" She decided to get out of the car and took her mother with her children to hilly forests nearby. Only a few seconds, Tsunami came and swept away her car together with other cars in front. Five days after she discovered her cars turned over and crashed.

Town mayor of Otsuchi Town, Iwate Prefecture organized a rescue party immediately after the earthquake with other staff outside of the town office. The deputy town mayor realized Tsunami coming and shouted to escape to the top of the fifth floor building of the town office. When the deputy town mayor reached the roof of the building, the town mayor was on the way and swept away by Tsunami. It was not more than 30 seconds different between safe and death. Similarly in Onagawa Town, a gentleman ran up to the fifth floor (15 m high) and saved himself but he said no one could believe that Tsunami would come up to such a height (see Fig. 5).

One of a journalists of Iwate Tohoku Newspaper tried to drive his car to collect information about the damages. He brought his personal computer from the second floor office into his car. His wife also helped him but she recognized Tsunami coming soon. She shouted her husband to escape to the second floor immediately, but it was too late for her husband though his wife could escape. She did see the face of her husband in the wave of Tsunami.

A woman escaped to the second floor of her house when Tsunami came up to almost the ceiling of the room. There was only little space, say 20 cm for her face to breeze. She grasped a curtain rail to prevent being swept away for more than 30 minutes until the Tsunami went down. She was lucky to be rescued in the next

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morning but she had to spend a very cold night in wet under below zero degree. A grandmother aged 80 years old and a grandson aged 16 years old were rescued 9 days after the earthquake. Their house was swept away about 100 m from the origin place in the direction of the coast, Ishinomaki City, Miyagi Prefecture. Luckily the house was collapsed but the kitchen was floated on the water and they were forced to be inside of the room for several days as she could not move and the grandson could not go out too. As the grandson could move in the lean kitchen, he found water, cakes and yogurt in the refrigerator which were provided to his grandmother. Finally, the grandson succeeded to go out after nine days and called for rescue which was discovered by rescue patrol. It should be a very rare case. At a hospital located in Rikuzen Takada City, Iwate Prefecture, Secretary General of the hospital tried to bring a satellite communication device placed at the ground floor up to the fifth floor. He handed it over one of his staffs and tried to climb up to the fifth floor, but it was too late. The staff could escape to the roof of the hospital with the satellite communication device and survived. Tsunami came up to the fourth floor and killed all patients who stayed at third and fourth floor, even fifth floor. The speed of Tsunami used to be 800 km per hour in the ocean and 60 km per hour at coast and land areas. It was much faster than expected.

Mr Ohtomo, Wakabayashi District, Sendai City, Miyagi Prefecture had the earthquake recognized long before that it was not appropriate for Sendai City to have designated a primary school as a shelter against Tsunami and requested Sendai City in September 2010 to change the hazard risk map to another place. When Tsunami attacked the district Mr. Ohtomo did not go to the school but a higher road from where he looked down the school saw that it was swallowed by Tsunami at the level of the second floor. The road he selected was safe, which was a just border of Tsunami and safe area. 300 people could survive at the road. But many other people who followed the hazard risk map died at the school.

Fig.5 Water Level of Tsunami (15m) in Onagawa Town Up to the Roof of the Fifth Floor Building

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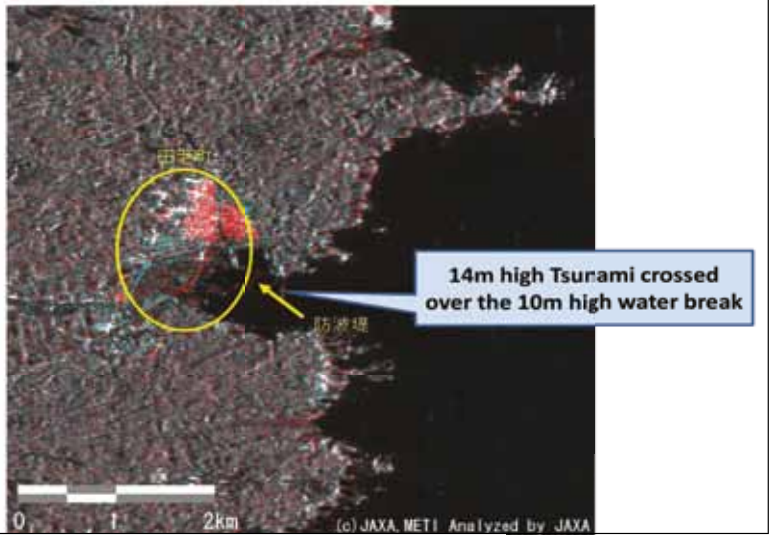
Fig.6 Damaged Areas (red) of Taro, Iwate Pref. analyzed by JAXA with ALOS SAR



Prediction of earthquakes

No one has succeeded so far the prediction of earthquakes. It will be one of the most difficult sciences and technologies in the world. Japanese seismic scientists and engineers have not yet succeeded too. I tried to make prediction using GPS fixed stations located all over Japan which are constructed by Geo-spatial Information Authority (GSI). Dr Harumi and I have developed a method for the prediction checking whether those triangle areas of GPS Stations exceed a threshold or not. I have already submitted a paper on "Prediction of Earthquakes with GPS Data" to GIM, Coordinates and Journal of Digital Earth. Unfortunately I and Dr Araki are retired persons who had no assistants and fund of research. We could confirm that all earthquakes in the past showed pre-signals before the earthquakes but we could not predict on which exact day the earthquake occur. Longest would be two months and shortest case was only one day before the earthquake. Sadly not many people showed interest in our research and the method has been neglected even though we succeeded to register the method as a Japanese patent in 2006. I and Dr Araki are not interested in business but in contribution to help people. I hope someone can follow our method of the prediction in future.

Role of remote sensing and GIS for the disaster management

RS and GIS are useful to damage assessment to compare between before and after the earthquake and Tsunami. There are two remarkable issues at this juncture

that need attention. One was high resolution satellite images which show clearly those damages and accidents of Fukushima Nuclear Power Plants. Air survey was not available because of high atomic radiation in air as well as the destruction of local airports. Satellite images showed the conditions of the power station buildings destroyed by hydrogen gas explosion, which was useful for recovery planning. Another issue was damage assessment to be compared between before and after the Earthquake and Tsunami. As the damaged area was so huge, helicopter is not enough. Satellite images of high resolution and also SAR were very useful to realize the damage scale (see Fig.6). We thank Digital Globe, Google, JAXA, RESTEC and many other organizations to release those satellite images on comparison bases on Internet. I also thank YouTube to publicize video images of Tsunami and other scenes. Many Japanese took video and pictures about the damage of the earthquake and Tsunami using Japanese digital cameras and video which would be very good reference in future to establish the countermeasure how to prevent, reduce or mitigate the disaster.

Concluding remarks

Although my family and my house in Tokyo are safe without any damage, I could not stand for watching TV scenes as the real situation was too miserable. I sympathize with affected people but as an old man living in Tokyo cannot help directly those people except with a certain amount of donations. However, I can inform my friends and colleagues in the world about the real situation and stories. It would be somehow useful for our society to save human life. In conclusion, Japan committed a big mistake to have listed nuclear power plant as a sustainable development which proved to be of no more sustainable happiness.

I would be pleased to know if you become wiser after reading my article. Finally I extend my condolence to the victims and their families lost by the Tohoku Kanto Great Earthquake 311. I thank many friends from foreign countries and regions to have sent me kind words to encourage me as well as Japanese people.

UN-SPIDER SpaceAid resource page

The UN-SPIDER team contacted its international partners immediately upon receiving the news about the earthquake and established a SpaceAid resource page in support of relief efforts within a few hours after the disaster. The UN-SPIDER global network includes the established UN-SPIDER Regional Support Offices and the nominated National Focal Points in the Pacific region, as well as the leading providers of space-based information and social media resources. Based on the support of this network, UN-SPIDER compiled available space-based information that could represent a significant source for the disaster relief efforts. This also includes information on products made available by value-adding institutions such as the Crisis Information Center of the German Aerospace Center (DLR/ZKI), the Regional Service of Image Treatment and Remote Sensing (SERTIT), through mechanisms such as the International Charter Space and Major Disasters and Sentinel Asia, as well as other governmental and non-governmental sources. For selected sensors, pre- and post-disaster primary imagery was shared with the response community through the UN-SPIDER Knowledge Portal (http://www.un-spider.org).

A number of relief and response websites identified the UN-SPIDER resource page as a major information- and data source, as the Programme continued to work with data providers and value-adders to ensure the flow of information. In addition to the exchange with its international network and partners, UN-SPIDER coordinated with other United Nations agencies, including cooperation with staff of the International Atomic Energy Agency (IAEA) by means of exchanging data and sharing information. In this particular context, UN-SPIDER supported monitoring activities related to the threat of a nuclear fall-out in Japan and its possible effects for neighbouring countries in the Pacific region as well. For further information: http://www.un-spider.org/japan-pacific

A long way to go

There will be several issues in the short, medium and long term recovery process at the aftermath of tsunami

Rajib Shaw
Kyoto University
Japan

An earthquake of magnitude 9.0 occurred on 11th of March at 14:46 in the east of Japan, causing a tsunami which hit the east coast, and made extensive damages in five prefectures: Aomori, Iwate, Miyagi, Fukushima and Ibaraki, and has made direct and indirect impacts to the other nearby provinces including Saitama, Chiba, Tokyo and Kanagawa prefectures. As of March 21, the confirmed number of death is 8,450 with reported missing 12,931. Thus, the total casualty may be over more than 21,000 people, and therefore making it as the worst disaster Japan has experienced after the World War II.

Highlights of the disaster situation:

A few characteristics features of the disaster include:

Co-occurrences of different hazards: In the current context, there was a massive earthquake of magnitude 9.0, followed by a gigantic tsunami [in some cases, the height may be more than 15 m, and in some case inland water more than 4 km]. This was followed by the nuclear meltdown, which posed another threat to the already existing grooming situation. Also, there was a cold spell [with snow fall in several parts of the worst affected areas] which also affected the relief and rescue operation. The aftershocks continued for a long time with larger magnitude than the usual one, which shows stronger activity in the fault regions. In the disaster management, we often talk about the worst case scenario, and the disaster preparedness needs to target the worst case scenario. The current multi-disaster situation shows the actual worst case scenario with multiple occurrences of different hazards at the same time. This situation is also one on the rare case of natural disaster causing industrial disasters.

Severity of damages: The damage level was extremely high, where the tsunami washed away most of the built environment close to the coastal areas, includes vital infrastructures [water, electricity], roads, railways, airports, schools, hospitals, government buildings [in some cases village office], houses etc. The damage was possibly beyond any imagination and expectation. Most of the designated evacuation centers were destroyed.

Perception-action gaps: There were some cases where people were trapped under the debris of the collapsed buildings due to earthquake. This was a major barrier for them to evacuate when the tsunami warning was heard. The area affected by the current disaster is well known for its high hazard and vulnerability. There are significant amount of research which simulated the trigger of earthquake and tsunami of the regions. Evacuation drills have been practiced for years with different group of people through initiatives of multi-stakeholders. On 27th of February 2010, there was a major earthquake in Chile, which posed a tsunami threat to Japan east coast [the current earthquake and tsunami affected areas] almost after 18 hours of the occurrence of the earthquake. A tsunami warning and evacuation order was issued in the Japanese east coast after 50 years [after the Valdivia, Chile earthquake of 1960 which caused a tsunami and killed more than 142 people in Sanriku coast of east Japan]. When the tsunami warning was issued on 1st of March, only a few % of the coastal communities [somewhere between 6-7%] actually evacuated, and many people went to the coastal areas to look at the condition of the sea and then take a judgment whether to evacuate or not. People in the coastal areas have their hazard maps and often the earthquake and tsunami issues are discussed in the media. Thus, there is a very high level of perception, but with limited actions at individual and community level.

The last mile communication: At the aftermath of the disaster, a survey was

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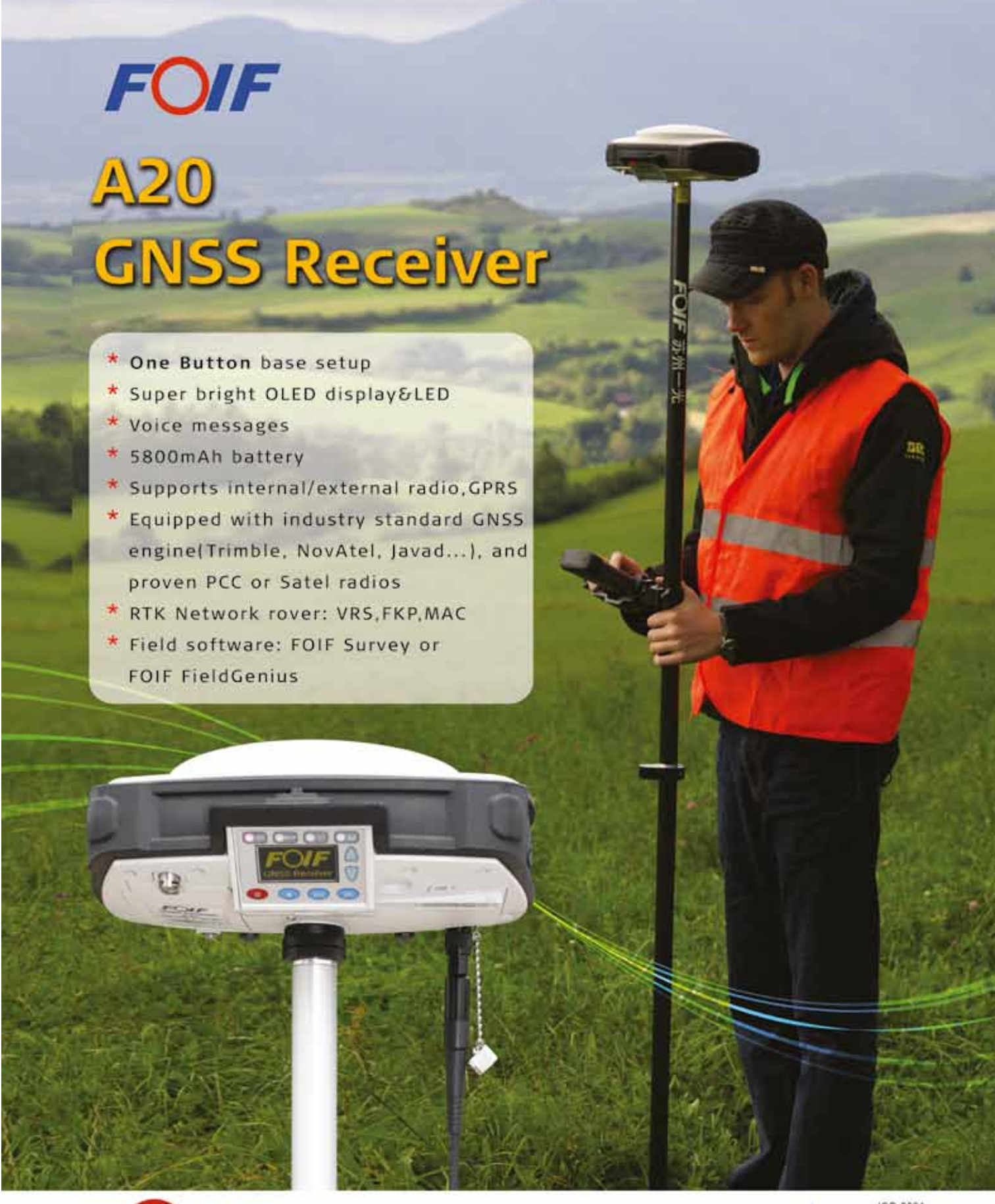
* Supports internal/external radio,GPRS
* Equipped with industry standard GNSS engine(Trimble, NovAtel, Javad...), and proven PCC or Satel radios
* RTK Network rover: VRS,FKP,MAC
* Field software: FOIF Survey or FOIF FieldGenius



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conducted by the Weather News of Chiba city [1] about the people's reaction [target: 37,000 responders with 7,900 responders from the five worst affected provinces of Aomori, Iwate, Miyagi, Fukushima and Ibaraki]. In the five mostly affected prefectures, the survey [1] showed that only 8% of the responders mentioned that they took shelters in the higher land. It was found that on an average it took 23 minutes for the residents to know about the tsunami, although the warning was issued almost simultaneously when the earthquake was recorded [the earthquake happened at 14:46, the tsunami warning was issues at 14:49, and the tsunami expected time and height was declared at 14:50]. In Iwate prefecture, the lead time was too short. However, in Miyagi it was an average of 10 minutes, in Fukushima an average of 20 minutes, in Hokkaido, Aomori and Ibaraki an average of 40 minutes. While for the Iwate residents possibly people got entrapped in tsunami while evacuating, however the high casualty in Miyagi and Fukushima, it surely shows the failure of the last mile communication.

Massive numbers of evacuees: In the current disaster [earthquake and tsunami], there was an unexpected number of evacuees due to the devastating nature of the event. The nuclear meltdown incidence also added another level of seriousness to the current threat. An evacuation order was made for the people living within 20 km of the nuclear reactor. Thus, the number of evacuees increased to almost more than 350,000 people, which was totally unprecedented.

Evacuation centers outside the city/ town/ villages: Usually in Japan, the evacuation centers are the schools or the public buildings in the community. However, in the current disaster, due to the extensive damage and nuclear emergency, people need to evacuate outside their town, city or village. The total number of evacuation center is more than 2300 places all over Japan. In some cases, the whole village or town with the village and /or town government made long distant evacuation. It has s serious consequence in terms of physical, psychological, institutional and socio-economic issues of the recovery process.[2]

Aged population: Many parts of Japan, as well as the affected areas have aged population and a significant part of the population needs regular medical care. Since the time lapse between the earthquake and the tsunami was very short, the evacuation of the aged population was a major challenge. At the aftermath, due to failure of the vital lifelines, the medical care of this group was population was seriously affected, in addition to the patients from the disasters.

Environmental issues: The tsunami has brought huge about of debris including housing materials, broken boats, cars, trees etc, and will have severe environmental consequence. Clearing of rubbles is a major task, and needs to be done with utmost care. The tsunami also made severe impacts to the agriculture land, which will need long term recovery, at least in next 2-3 years. The nuclear meltdown has started its effects, although minor in the first 10 days, due to its contamination to the ground and effectively to the food chain. The earthquake largely sank the ground level of the Pacific coast of Tohoku region and northern part of Kanto region. The risk of the submergence and flood in these regions has become larger than before the earthquake [3]. Therefore, it is necessary to pay special attention to the tide level and to prepare for the submergence and flood in these regions, especially during the spring tide, when the flood tide level becomes higher than usual.

Future issues and challenges:

There will be several issues in the short, medium and long term recovery process at the aftermath of the disaster. There will be several future issues, which need to be addresses at different stages of the recovery process. These are as follow:

Coordination: The key word at the aftermath of any major disaster is the coordination and proper management. The coordination is not restricted among the government departments, it has also a significant implication to the non-government organizations and other relief based organizations. A total coordination center needs to be set up at the prefecture level, which should be connected to the central coordination center in the upper level, and city or town coordination point, as the lower governance structure. The one-point coordination is of extreme importance to avoid confusion and mis-management. Sector based approach is preferred based on the past experiences, like shelter, health, education, livelihood etc.

Information: The related issue is sharing right information at the right time. Due to natural reason, there exist panic and mis-perception on different levels of information. Media plays an important role in reducing the panic, and sharing proper information to the people and communities. Due to evacuation in the far distant area, the proper information flow and information linkage is of utmost importance.

Collaboration: Many of the local governments [town, village level governments] have lost their personnel as well as people. This will have a severe impact on the recovery process, since several of the expertise in the local government was lost. In this junction, collaboration with non-government actors [like professional NGOs, academics, professional societies, private entities] will be required in these local governments. Also, support from other neighboring and non-affected local governments [earlier experiences of disaster recovery] will be helpful.

Volunteer management: At the aftermath, there are flows of volunteers from different parts of the country. This disaster is also no exception. Volunteer coordination centers are already set-up at different locations to make proper coordination. Volunteer coordination needs to be properly linked to the two above points, linkages to government coordination system, and information flow [linkage to media]. Two related issues need to be kept in mind: first, the roles and types of volunteer changes over time, and often past experiences provide important information. The second point is that there are often different intensity of volunteer initiatives in the same affected areas, which needs to be distributed evenly.

Temporary shelter: The temporary shelter construction is already started, with an initial estimate of 32,800. This would

The 11th South East Asian Survey Congress

and

the 13th International Surveyors' Congress

22 - 24 June 2011

Putra World Trade Centre, Kuala Lumpur, Malaysia

Theme

INNOVATION TOWARDS SUSTAINABILITY

Highlights

This combined event would be organised in conjunction with and as part of the Institution of Surveyors Malaysia's (ISM) 50th year celebrations. The Congress intends to highlight initiatives aimed at encouraging the convergence, sharing and use of innovative technologies and knowledge as well as other initiatives to forge new collaborations and identify potential avenues for research, development and innovation across all related disciplines for the benefit of the profession and the community towards sustainable development.

Who should attend

Geomatic and and Surveyors, Quantity Surveyors, Building Surveyors, Property Valuation Consultants, Financial Consultants Academicians, Engineers, Cartographers, Geodesists, Photogrammetrists, Land Administrators, Land Economists, GPS/GNSS Related Users, Rural and Urban Planners, Real Estate Appraisers, Researchers, Remote Sensing Professionals Navigators, Property Valuers, Property Managers, Geospatialists, GIS Professionals.

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be spread in different parts of the five most affected provinces. The allocation of people in the temporary shelter is an important issue. This is to be noted that people may live there for 3-5 years, and the neighborhood relationship is of utmost importance. Therefore, proper attention needs to be made when allocation of temporary shelter is done. The location of the temporary shelter is also of importance, keeping in mind the high level of seismic activities in the region.

Relocation versus in-situ reconstruction: At the aftermath of several disasters, especially in case of coastal hazards, there is always a challenge to choose between in-situ reconstruction [which is desirable and preferred by the residents] versus relocation [which cannot be avoided due to new policy and regulation and thinking of longer term safety and security]. If relocation is decided, proper strategy and policy needs to be incorporated for sustainable and adaptive relocation. Some of the examples from 2004 Indian Ocean Tsunami will be useful in this regard.

Adoption of village or town: Keeping in mind the vastness of the damages in the current disaster, integrated and consolidated approach is required from all parts of Japan. Adoption of a village or town or a neighborhood can be a good approach, which is practiced in different parts of the world after major disasters. Here also, proper coordination is required in the adoption process. This means that when a city X adopts a village or town Y, it takes care of different aspects of the recovery process. Based on the available resources, the adoption process can be coordinated based on sectors, like health, education, shelter, food, livelihood support etc.

One village one shelter policy: As a long term sustainable recovery, a "one village one shelter policy" can be adopted widely, or at least in some critical parts of the coastal prefecture. This means that a shelter needs to be built in the close vicinity of the coastal areas to reduce the time of evacuation. It will be have a significant cost implication, however, this needs to be properly designed and planned based on the available simulations of the existing fault system and expected tsunami arrival time.People's resilience: Finally, the whole recovery process depends on the people's power, its networking, neighborhood tie, and resilience. People of Japan are known for its resilience and to cope with the natural disasters. This disaster recovery will also show people's power through strengthening the resilience among the affected people. A total recovery needs time, people are strong, and should be chased with time. A proper well coordinated, planned and decisive recovery policy with well-thought participation of different stakeholders will be useful and efficient.

References

1. http://www.asahi.com/national/update/0319/TKY201103190101.html [in Japanese]

2. In Futaba-cho of Fuakushima prefecture, the whole village was evacuated. This is the same situation as that of Miyake-mura during Miyakejima volcanic eruptions. The other example is Kawaguchi-mura where the local government also moved along with the local residents. 70% of the 3,000 people village were affected, and rest 30%, a number of 525 people evacuated along with the local government.

3. Source: JMA: http://www.jma.go.jp/jma/en/News/2011_spring_tide.html

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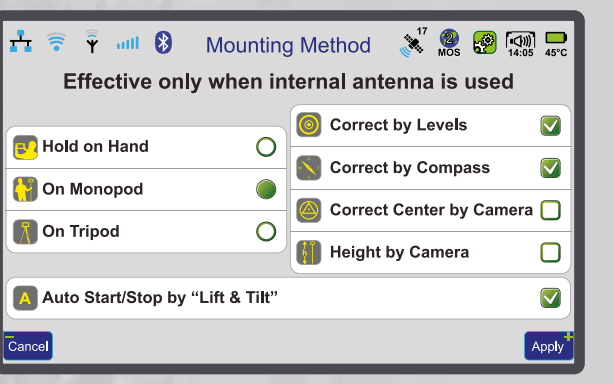
Triumph-VS

Lift & Tilt
Video Lessons
Galileo E5 altBOC

See us at JAVAD.com

Lift

First, put TRIUMPH-VS in “Lift & Tilt” mode.

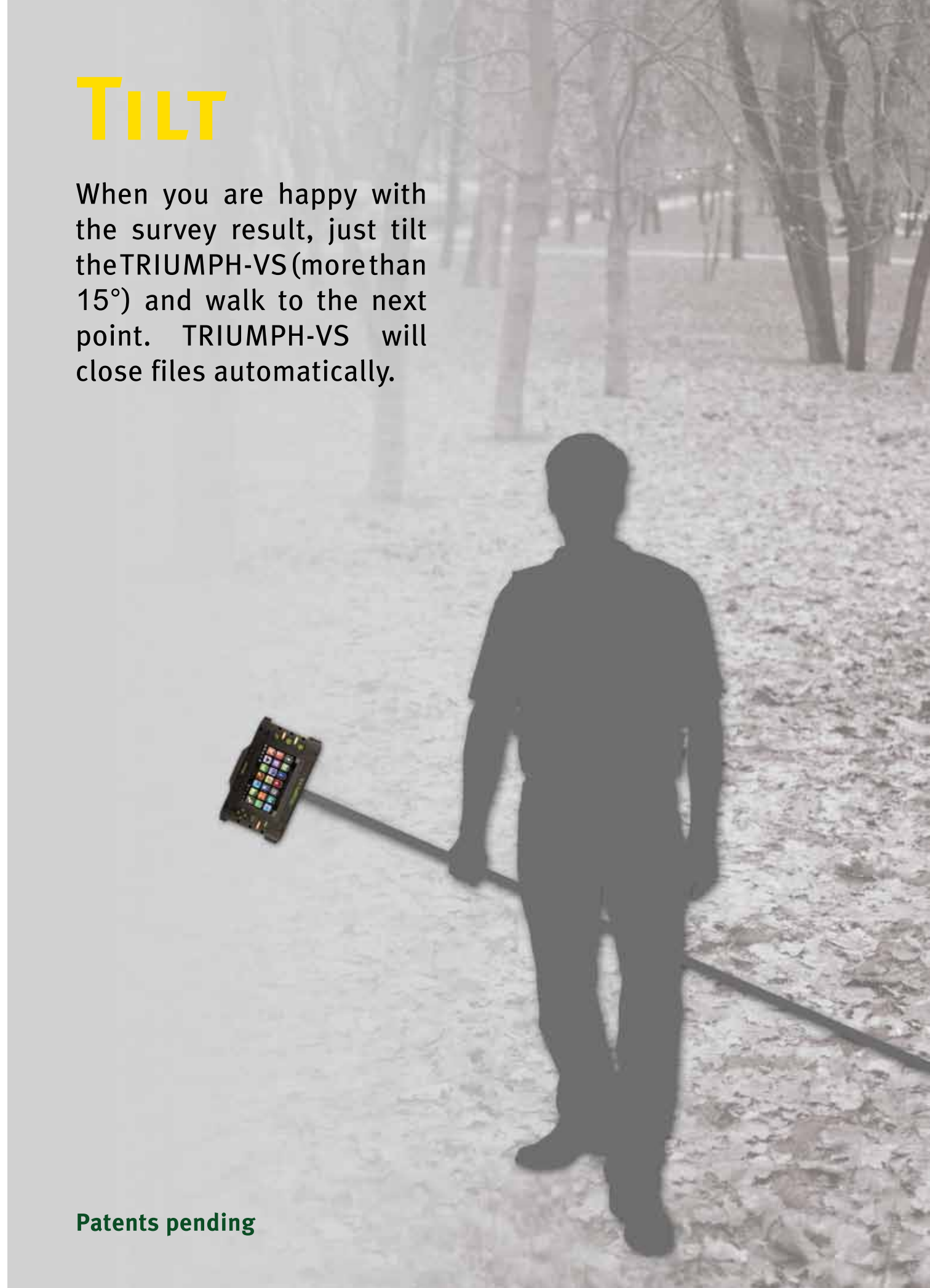


Then, go to the survey mark, lift TRIUMPH-VS to near vertical (better than 5 degrees). Survey will start automatically and sensors continuously compensate for leveling offsets. Audio tones keep you informed of the survey progress. You can use a headset if you are in noisy area. You can also take notes by talking to TRIUMPH-VS.

Patents pending

Tilt

When you are happy with the survey result, just tilt the TRIUMPH-VS (more than 15°) and walk to the next point. TRIUMPH-VS will close files automatically.



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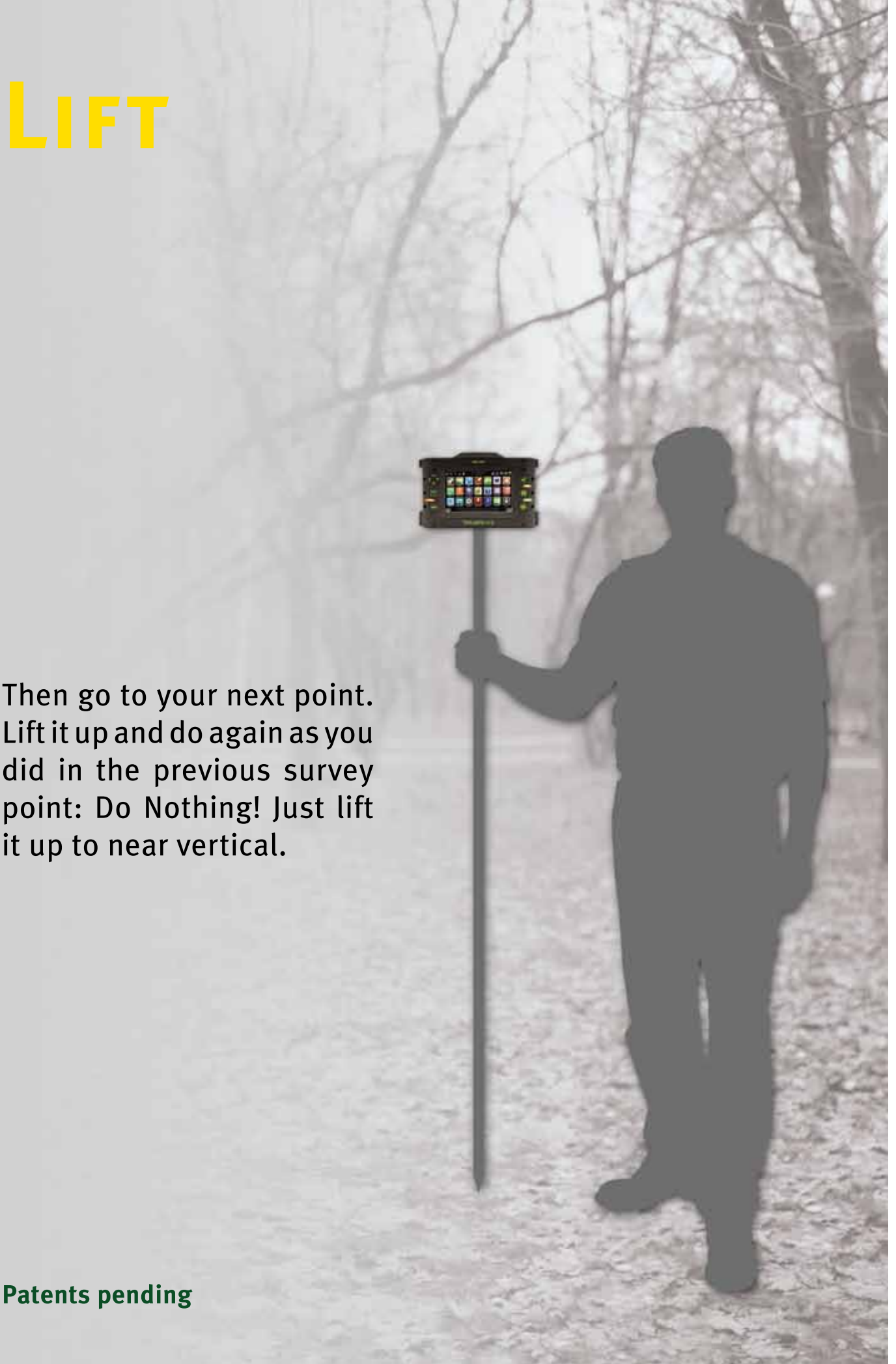
Lift



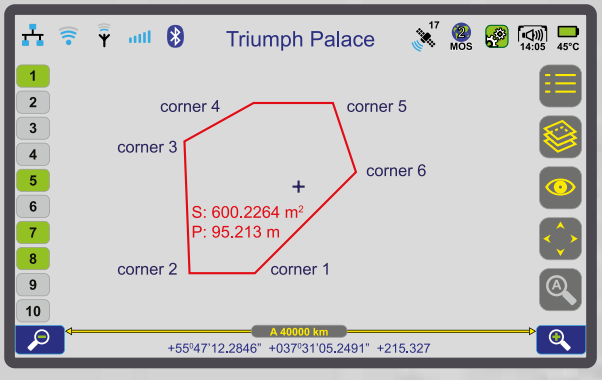
Then go to your next point. Lift it up and do again as you did in the previous survey point: Do Nothing! Just lift it up to near vertical.

Patents pending

Tilt

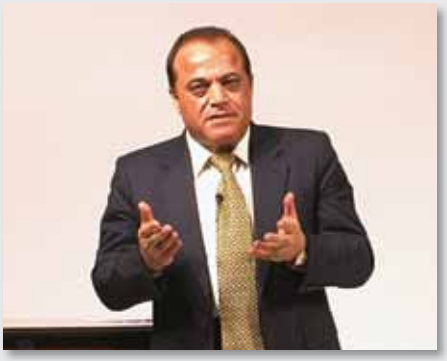
When you are happy again, tilt it again, and walk to the next point. Points and file names will auto-increment. You can over-write names if you like.

If you are doing a parcel survey (for example) after the last parcel point, push “Parcel End” and see the parcel map, parcel area and parcel perimeter instantly.



Patents pending

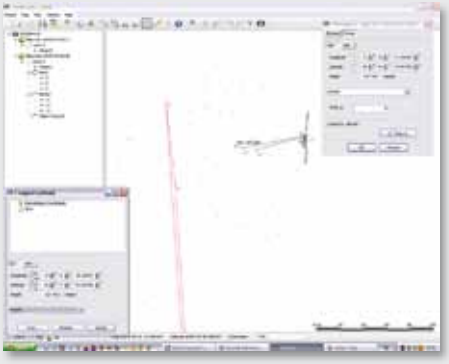
We have lots of news



Javad Video Lessons

He will personally guide you how to use TRIUMPH-VS. Click the image.

Triumph-VS External Battery Charger



Introducing Justin Link

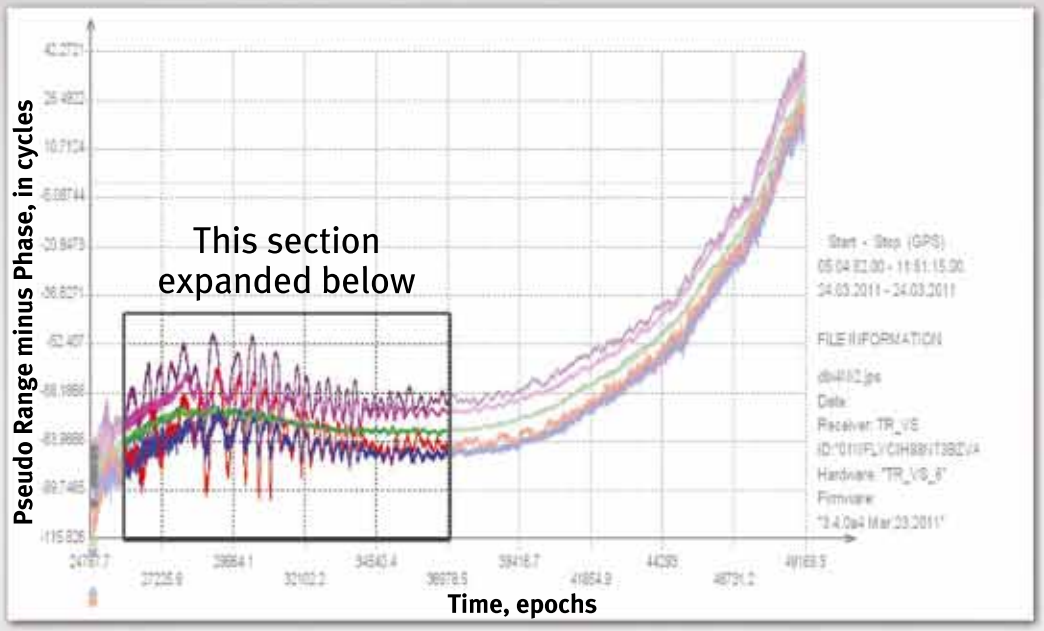
Transfer points and attributes from TRIUMPH-VS to Justin.

Introducing NetHub

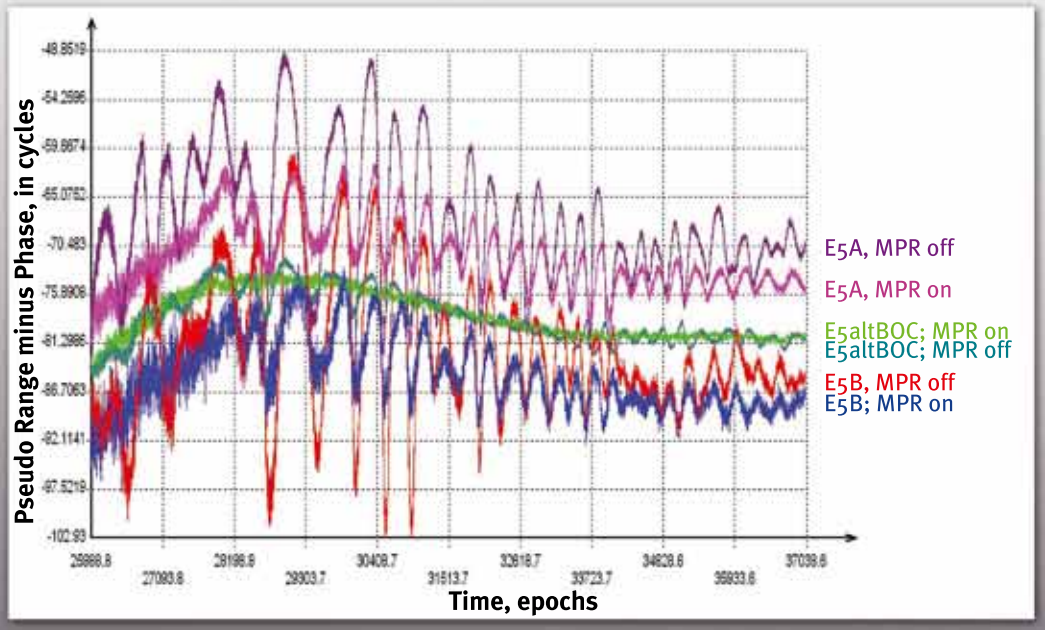
Download and upload to ftp Receiver files.

TRIUMPH-VS tracks Galileo E5 altBOC signal

Truimph-VS receiver has the option to track E5A, E5B and E5altBOC signals now. These 3 signals may be tracked independently, but as expected, E5 altBOC combination shows great multipath reduction compared with separate E5A or E5B signals. Javad's superior multipath reduction (MPR) technique makes it almost perfect.



Six plots in this graph show three signals, each with and without JAVAD's multipath reduction feature.



This plot zooms in the area of 30 degree elevation mask, where huge multipath existed due to a nearby metal roof.

Real time indoor location based service test bed

The purpose of this paper is to develop low cost and low power consumption Real Time Indoor Positioning System (RTIPS) and then integrate this RTIPS with a self-developed indoor GIS to form a indoor LBS prototype. Here we present the first part of the paper. The concluding part would be published in May issue

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Today, mobile devices are not only tools for the communications but also personal assistants. People could use the mobile device built-in Global Positioning System (GPS) receiver to search for information based on his/her location, thus called Location Based Service (LBS). However, due to the GPS signal propagation limit, the positioning and navigation services are discontinued when the user enters the indoor environments. When users are in the indoor environments, how to continuously obtain their locations becomes a popular research topic. Therefore, this paper proposes a practical solution to build a Real Time Indoor Positioning System (RTIPS), and this RTIPS also integrates with an indoor Geographic Information System (GIS) to form an indoor LBS prototype. Considering the power consumption, the Wireless Sensor Network (WSN) based on the ZigBee radio is utilized to implement the indoor positioning system in this work.

According to the radio signal propagation theory, the signal strength will decay as the transmission distance increases, and this signal propagation characteristic can be used to determine the user position. Consequently, the indoor positioning algorithm applied in this paper is the fingerprinting method [1]. The matching algorithms used in the fingerprinting method have significant impact on the performance of the RTIPS. The matching algorithms used in this work are the Nearest Neighbor (NN) algorithm [2], the K-Weighted Nearest Neighbors (KWNN) algorithm [3], and the probabilistic approach based on the kernel method [4]. The positioning results with above matching algorithms are studied in this paper as well. Due to the indoor environment is a nonlinear system, some unexpected factors might affect the positioning results, and it would be difficult to estimate the real trajectories of the moving user based on the fingerprinting method alone. To further enhance the positioning accuracy and to smooth the indoor positioning results, an appropriate filter is needed. The suboptimal filtering algorithm, the particle filter [5], is used in this indoor positioning system to gain possible improvement on the positioning performance. However, the performance of a particle filter is proportional to the number of particles used in the filter, and this feature might be a problem when the

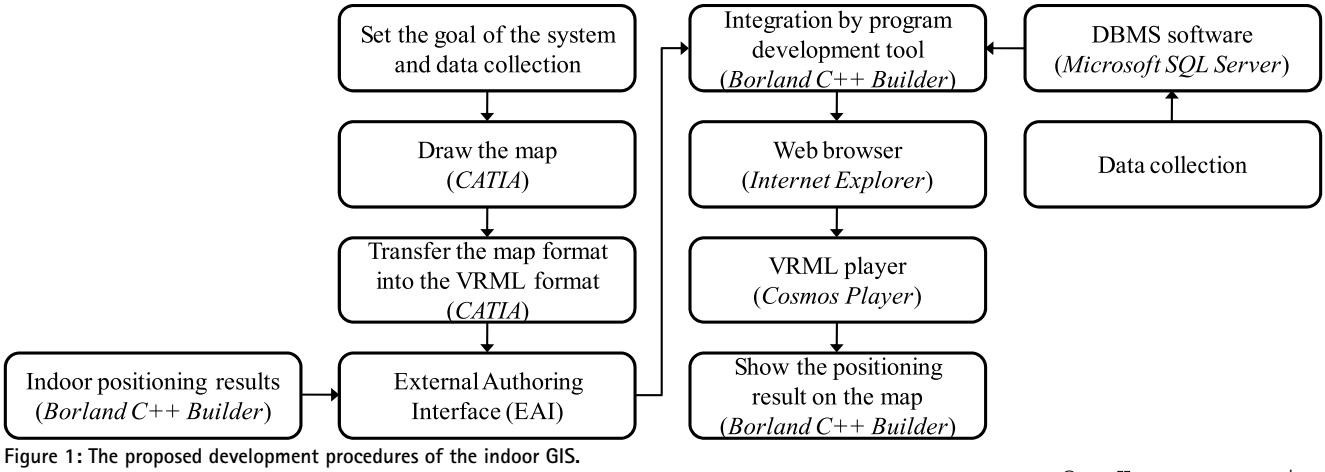

Figure 1: The proposed development procedures of the indoor GIS.

Figure 2: The snapshots of the 3D indoor GIS of the DAA building.

particle filter is applied to the RTIPS. In other words, as increasing the number of particles used in the filter, the resulting computation load will increase as well. Consequently, the trade-off study between the positioning performance and the computation time is investigated as well.

The other branch of this work focuses on a rapid and practical procedure to develop a three-dimensional indoor GIS. In addition, the developed indoor GIS must have high flexibilities and be able to integrate with the Virtual Reality Markup Language (VRML) technique. The basic procedure of this indoor GIS is to design the indoor map by the Computer-Aided Design (CAD) software, then combine it with the programming language and finally integrate it with the VRML technique. The advantages of this developed indoor GIS are easy for update and maintenance for users, and it has a user friendly interface with the virtual reality concept. Finally, a RTIPS test bed for the Department of Aeronautics and Astronautics at National Cheng Kung University is constructed for the demonstration.Accordingly, the reminder of this paper is organized as follows. The indoor positioning algorithms are described in "Indoor positioning algorithms". The development procedures of an indoor 3D GIS will be explained in "Geographic Information System". In "Experiment Results", several positioning algorithms are applied to investigate their positioning results. The development of the RTIPS is illustrated in "Real Time Indoor Positioning System". Finally, "Conclusions And Future Work" presents the concluding remarks and future work.

Indoor positioning algorithms

The indoor positioning algorithm used in this paper is the fingerprinting method [1] based on the received signal strength. The main concept of the fingerprinting method is to use the received signal strength as the location identifier. It requires two stages to implement the fingerprinting method, namely the calibration (training) stage and the positioning stage [6]. The positioning data is collected in the training stage and then the matching algorithm is used to find the most likely user location in the positioning stage. The matching algorithms applied in this paper are the NN algorithm, the KWNN algorithm, and the probabilistic approach based on the kernel method. In addition, to improve the positioning results, the particle filter is used in this work. The details of the NN algorithm, the KWNN algorithm and the particle filter can be found in [7-8]. These algorithms are briefly illustrated in the following paragraphs.

The nearest neighbor (NN) algorithm

The main concept of the NN algorithm is to compute the minimum distance between the current measurement and the prerecorded data in the positioning database, and the calibration point with the minimum distance is declared as the user location.

The K-Weighted Nearest Neighbors (KWNN) algorithm

The KWNN algorithm selects more calibration points in the database to average the estimation results, and the selected calibration points have their specific weighting values according to the inverse of their distances.

The calibration point with smaller distance has larger weighting value.

The probabilistic approach based on the Kernel method

Since the environmental uncertainties might cause severe fluctuations in the received signal strength, the received signal strength might not be the same even if the user stands at the same location. Specifically, the received signal strength is not constant even at the fixed location, and the distribution of the received signal strength could be approximated as a probabilistic distribution. The Gaussian model is commonly used to describe the distribution of the received signal strength, and this approach is also known as the kernel method [4]. Additionally, the received signal strengths from different transmitters are assumed to be independent. Therefore, the probability density function of the received signal strength can be expressed as Equation (1).

$$p(rss_i, pos) = \frac{1}{\sqrt{2\pi}\sigma_{rss_i}} \exp\left(-\frac{\left(rss_i - \mu_{rss_i}\right)^2}{2\sigma^2_{rss_i}} \right) \quad (1)$$

where *pos* is the coordinate of the calibration point, rss_i is the RSS value of the i_{th} transmitter at the location *pos*, μ_{rss} is the mean of the *rss*, and σ^2_{rssi} is the variance of the *rss*. If there are *M* transmitters, the probability density functions of RSS values from each transmitter can be obtained accordingly. After computing these probability density functions, we could multiply these probability density functions to form the likelihood function, as illustrated in Equation (2).

$$L(rss_1, rss_2, ..., rss_M ; pos) = \prod_{i=1}^{M} p(rss_i ; pos) \quad (2)$$

If a new RSS value set is obtained and there are *M* prerecorded data, the new measurement will be substituted into Equation (2) to get the likelihood function at position *pos*. If there are *M* prerecorded data, one could use Equation (2) to obtain the likelihood function at these *N* positions, respectively. If the maximum likelihood is obtained at position *pos**, then the position *pos** would be declared as the user location.

The particle filter

Because the indoor environment is a complicated system, the received signal strength might be affected by several uncontrollable factors. It would be difficult to obtain the position estimations based on the matching process alone. Therefore, an appropriate filtering algorithm is needed. A common filtering algorithm is the Kalman filter, but the Kalman filter is suitable for a linear system. The indoor environment is a nonlinear system, the Kalman filter might not be a good option for the indoor positioning system. Thus, the particle filter is implemented for the indoor positioning system in this work. The particle filter used in this paper is the Sampling Importance Resampling (SIR) particle filter. The procedure of implementing SIR particle to the proposed indoor positioning system is detailed in [7-8].

Geographic information system

One of the major challenges of constructing an indoor LBS is to build the indoor GIS and integrate it with the indoor positioning system. In general, we could utilize the program development tool (e.g., Visual C++) and the computer graphic technique (e.g., OpenGL) to develop the graphic system. However, if the requirements of the graphic system are complicated, it would be difficult to establish the graphic system by the approach mentioned above. In addition, the maintenance and update of this graphic system would also be time consuming. To reduce the workload of the developer, the CAD software, such as the AutoCAD and CATIA, would be a better tool for the rapid graphic construction. With the assistance of the CAD software, the developer could establish the graphic system efficiently. However, every CAD software has its own graphic format; therefore, the compatibility for different graphic formats needs to be taken into account. For that reason, the VRML graphic standard is used in this paper. A solution is proposed in this work to establish the indoor GIS by the CAD software and the VRML technique.

The development procedures of the GIS are as follows: the first step of the development is to set the goal of the GIS. After the setup of the goal, the next step is to collect the information required for this GIS, for instance, the building sizes and the location of the furniture in the room. In the next step, if the commercial GIS software meets the requirements of the system, the commercial GIS could be used to simplify the development process. On the other hand, the CAD software is utilized to construct the maps.

In order to integrate this developed GIS with other applications, the format of the map has to be changed to fit the VRML standards. Additionally, to provide the real time update of the area of interest, the External Authoring Interface (EAI) technique is used to achieve this goal. Finally, we can use the program development tool (e.g., C++ Builder) to combine the developed GIS with the indoor positioning system. The 3D GIS is shown through the web browser (e.g., Internet Explorer) with the VRML player (e.g., the Cosmo Player). In addition, a GIS is also denoted as the integration of the cartography and database techniques; therefore, the GIS has the ability to provide query service of the useful information. The useful information could be saved into the Database Management System (DBMS) software (e.g., Microsoft SQL Server) and be connected by the ActiveX Data Objects (ADO) technique. The complete development procedures of the indoor GIS are summarized in Figure 1.

A 3D indoor GIS of the Department of Aeronautics and Astronautics (DAA) building of National Cheng Kung University (NCKU) is used as an example to illustrate the development procedure. In this paper the CATIA is used to draw the 3D map of the DAA building. We use the CATIA to transfer the map format to be in the VRML file, and the VRML viewer used in this paper is the Cosmo player. In this paper, we use C++ Builder to integrate the GIS with the indoor positioning system. To show the real time positioning results on the map, the EAI technique based on the VRML standard is used in this work. Several snapshots of the 3D indoor GIS of the DAA building are shown in Figure 2.

To be concluded in May 2011 issue.

Books, Friends and Mountains

Did you pack in the camera? Where's my toothbrush? Hey, don't forget the blanket! These are just some of the words of excitement that seem to flow around Civil Engineering students at IIT Kanpur as their 5th semester nears an end. It's time for the Nainital Survey Camp to start. It is ironical that people think you are going for a vacation, while this is actually classified as a proper course with credit based weightage and is thus mandatory without attaching any of the holiday related ideas to it. The place of stay, a very calm and peaceful Aurobindo Ashram, is one not to be forgotten.

Survey Camp

The surveying part of the camp lasted for around 10 days forming a major portion. We conducted various GIS related tasks in and around the Aurobindo Ashram. All of the ground based surveying was linked with GPS data and represented in Global coordinates. We used various modern GIS equipment and technologies for our work such as the following:

1. Total Station
2. Geodetic and Differential GPS
3. Real-time Kinetic GPS
4. ArcGIS (Mapping Software)
5. GeoTrans (Coordinate Conversion)
6. Matlab (Data and error analysis)

Our tasks were made much easier by the constant support and encouragement from our Instructor Dr. Bharat Lohani. Also supporting our endeavour was the Lab Staff consisting of Mr Ram Kewal Maurya and Mr Shitla Tripathi.

Work Description

The entire batch of students was divided into 11 groups of around 7 students each. Each group had to perform the same tasks. Besides the reconnaissance sketches, the groups also worked on time allocation and group management for each task to ensure that the heavy work finished on time.

Topographic mapping of Aurobindo Ashram

Topographic mapping includes exact and to-scale reproduction of the salient features of an area on a map. The survey was conducted using Trimble 3600DR and 5600DR200 Total Stations (see Figure 3). They have accuracies in the order of 2mm for distances and 2" for angles which means that they are very accurate devices that combine the best power of Theodolites and EDMIs (Electronic Distance Measuring Instruments). The challenging terrain of the place required a very thorough renaissance. Control route, rough sketches and various design calculations were done to develop and efficient survey strategy which minimized errors and effort while improving the quality of the work (see Figure 1)

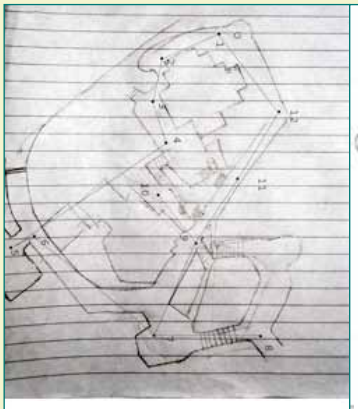

Fig1: Reconnaissance sketch for Ashram

Fig2: A version of the map of Aurobindo Ashram as produced by one of the 11 groups of students

During the survey, the total station was kept on all the pre-decided control points and through that more than a thousand topographic points were observed pertaining to various features like:

1. Point features: trees, electric poles, pots, manholes etc.
2. Line features: road, stairs, retaining walls, boundary walls etc.
3. Polygon features: Buildings, water tanks, electric house, park etc.

Due to the significant elevation differences across the map area, contour development was a very important task, hundreds of spot elevation points were taken for this purpose. At the same time, GPS readings from 4-6 control points in the closed traverse were taken using very advanced Trimble R3 GPS receivers with high accuracies of up to 5mm. These were adjusted and corrected later with readings from a permanent base station that had been established at the Ashram. The horizontal control traverse was adjusted using the advanced Least-squares method. This gave a huge 1300% improvement when compared to the standard Bowditch's method of adjustment. The map produced can be seen in Figure 2. Notice the similarity with the initial sketch in Figure 1 that was done during reconnaissance in the initial parts of the survey. A good reconnaissance can really save a lot of time and effort.

Road Profiling

The second task was road profiling of the road from Holy Angels School near the Ashram and leading up to the Ashram gate. Besides the development of a topographic map of the hilly road, we also needed to analyse the slope of the road throughout its length to find patches having a slope greater than 1:10 which then becomes unsafe for vehicles. We also needed to survey the area 3m on either side of the road to account for a road expansion task.

It involved similar techniques as in the Ashram mapping discussed before. The only difference was the type of traverse. The Ashram survey was done with a closed loop traverse; which is self-adjusting. But in the road profiling, we used a link traverse since closing back in at the origin would have meant traversing he road twice – which is inefficient.

Once the map was done, we also laid out a plan for a future widening of the road and suggested a strategy for efficient cutting and filling in some parts of the road. The constant traffic on the road made the task very challenging and required proper planning.

GIS route mapping

A Real-time kinetic (RTK) survey was conducted of two major routes of Nainital city. These routes were strategically important for tourism and commerce. Equipped with a map marking out the route, a Leica GS5 GPS receiver and an HP iPAQ loaded with ArcPad, each group marched out into the city. The main objective was to mark the road/route/paths and the various shops, hotels, mobile recharge spots, bus stands, travel agencies, food outlets, tourist spots, public services, ATMs etc. with an objective of these being vital to a person travelling in the city – especially a tourist. The objective was to make a tourist friendly map which could be integrated with a Web-GIS based solution to provide internet based navigational services and focus more on mobile platform.

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A geo-spatial approach to urban development

From a cosmetic `GIS Mapping' to a comprehensive geo-spatial analysis and solution approach

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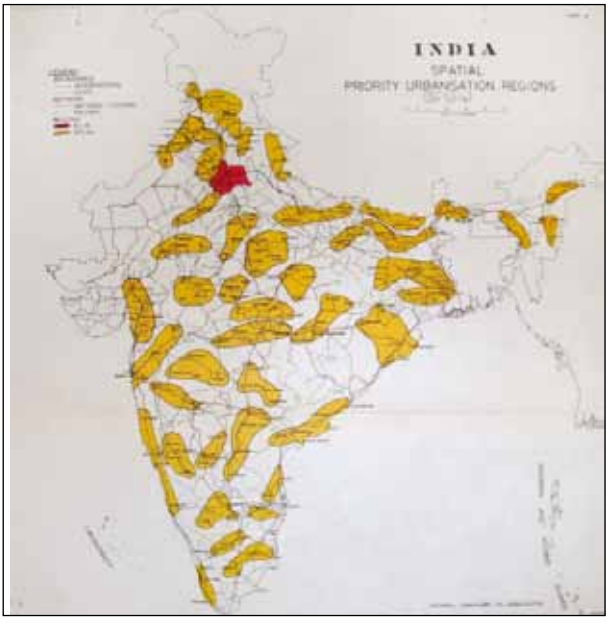
Recommendations of the National Commission on Urbanization (NCU), set up in 1985, covered the aspects of emergence of nodal points; special regional characteristics of urban growth; spatial eco-tones of urbanization; spatial distribution of wheat and rice productivity and industrial employment; and spatial planning of settlements[1]. Besides other analysis, it studied the spatial distribution of cities and urban agglomerations in 1971[2] and 1981[3]. Accordingly, the Commission came out with a set of recommendations that included a geo-spatial perspective to the pattern of urban settlements at the National scale. It went on to recommend location of urban settlements by population size and function in their regional/ sub-regional context. It highlighted the necessity of delineating properly the planning regions at national level and sub-regions at state level. Identification of 329 Generators of Economic Momentum (GEMs)[4] for development as National priority cities and 49 Spatial Priority Urbanisation Regions (SPURs)[5] (Map 1) were very important recommendations of the Commission from a geo-spatial perspective. The Commission reminded that a major dimension of the problem of meaningful growth of National cities, viz., Calcutta, Bombay, Delhi and Madras, is the spatial dimension[6]. Unfortunately, no elaborate efforts were made to implement the recommendations of the Commission. Despite two successive National Housing Policies within a span of a decade, the country is yet to evolve a National Urban Policy. Although numerous attempts have been made by the scholars and alike to analyse the spatial distribution of urban settlements in the country[7], this has not translated into an `official' approach for spatial settlement pattern planning for urban areas in the country. At the national level, the Planning Commission constituted a National Task Force on Urban Perspective and Policy in 1995. The reports of two (out of 5) technical groups are yet to be finalised. These are expected to provide input for the National Urban Policy[8]. This has been the state of affairs as far as spatial approach to urban India at all levels of planning, i.e. the National, regional (State), city/ town, zonal or area level.



Source: Ministry of Urban Development, Report of the National Commission on Urbanisation, Vol. II, Part I, Chapter 2, Map 6, August 1988, pp.51-52.

Lack of geo-spatial planning

As physical planners always knew and emphasised, solution to many of the urban problems lies in the rural areas or the hinterland. Yet, most efforts in urban planning overlook this aspect. The need for establishing a set of regions for planning purpose was realized in the 1950's, when the Housing and Regional Planning Panel of the Planning Commission made specific recommendation to this regard. Consequently, 15 agro-climatic regions for approach to agricultural planning were accepted by the Planning Commission. Subsequently, a tentative scheme of 13 macro and 36 meso-regions was formulated. Yet, there was no effort to locate or plan for a (urban) settlement pattern in these regions. Today, while we have a number of Metropolitan Regions and their plans (e.g., those of Delhi, Bangalore, Chennai, Kolkata, Mumbai, and so on), there is no effort to plan or guide their spatial arrangement at a National scale. The mega cites, metropolitan cities and various other large cities are growing spatially, vertically, economically and demographically without reference to their respective locations at the region, state or national level.

A missing ministry of regional (planning and) development

Thousands of crores of rupees are being pumped into urban areas under the Jawaharlal Nehru National Urban Renewal Mission (JnNURM), primarily for the betterment of slums and squatter areas and

related infrastructure development. Yet there is no matching effort to cut migration from rural to urban areas. Some regional planning is indirectly happening in the disguise of `Rural Development', through various schemes of the Government, viz., *Pradhan Mantri Gramin Sadak Yojna*, Mahatma Gandhi NREGS, etc. But these are isolated efforts at the `settlement' level rather than a comprehensively planned effort at a spatial level. The consequences of these efforts in evolution of a `urban' settlement pattern and therefore the spatial urbanisation seems to be no one's concern. Though we should be talking about sustainable employment, the various employment programmes generate daily wage jobs for limited number of days. This does not ensure that people stay in villages[9]. Some beginning was made with the conceptualization of PURA[10] (Provision of Urban Amenities in Rural Areas), a dream project of the former President, Dr. A. P. J. Abdul Kalam, where he advocated for the development of `clusters of villages' linking them through a loop of 30-40 km and providing them physical, electronic and knowledge connectivity. Even this effort was subsequently dumped by the Government.

Ironically, we do have separate ministries of Urban Development and Rural Development respectively, both catering to the planning and development needs of various `settlements'. Unfortunately, there is huge gap in terms of a Ministry of Regional (Planning and) Development both at the Centre as well as states. Geo-spatial planning at a regional scale, as a result, takes a back seat. As is the case for regional planning in general, there is hardly an organisation to plan and oversee the growth and development of `metropolitan regions' at the national level spatially. `Urban planning is a State subject', is the often used excuse to pass the buck to the State Governments, whereas most of these metro-regions have inter-state and/ or the National ramifications as in the case of the Central National Capital Region (CNCR), Puducherry Region or the Chandigarh Region. It is high time that besides creating a Ministry of Regional (Planning and) Development, the metropolitan city and region planning should be accorded a `Central Subject' status.

Lack of geo-spatial approach

Probably the first ever visible use of the Geo-Spatial technologies, in India, was made during the famous general elections to the Lok Sabha in 1984. GIS tool `PollMap' was extensively used to relate some key spatial indicators into predicting the number of Lok Sabha seats that the Indian National Congress was likely to win. This was by far the most accurate prediction of election results in India. The GIS expert behind this application[11], Dr Manoshi Lahiri, was recently honored with the Life Time Achievement Award[12], yet, when it comes to use of the technology for various formal tasks of the Government, the same Geo-spatial approach seems to be lacking. The recent exercise in delimitating the constituencies for the National and various State and local level elections did not use such technologies and the process is generally not backed by logic. The demand for creation of a separate state of Telangana and a chain of demands for the creation of other smaller states[13] also seem to have their roots in political calculations. Use of Geo-spatial technologies into analyzing the various spatial indicators apart from the original criterion of he language, could make the exercise more logical and convincing.

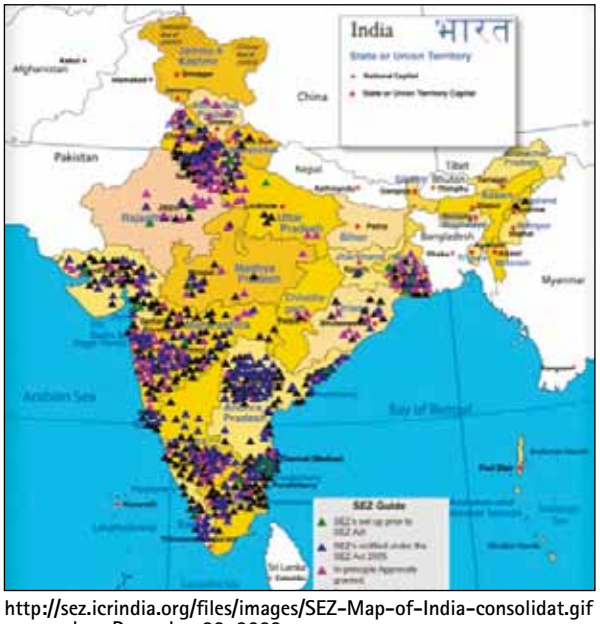
SEZs

Locating and developing SEZs is closely related to the process of urbanisation. However, in this case also, the approval and establishment of the SEZs is on a case to case basis by the respective State or the Central Government. There has been hardly any attempt to plan for a proper distribution of the same at the National or State scale. A cursory look at the locations of SEZs[14] (approved as well as in various stages of approval; Map 2) suggests large areas of gap in their spatial location. Clearly, there are concentrations of the SEZs and voids, across the States. An opportunity to coordinate their locations with that of large and metropolitan cities was not utilised.

Master plan of Delhi

Scope of Master Plans (or Development Plans) generally confines to broad proposals for allocating the use of land for various purposes such as residential, industrial, commercial, recreational, public and semi-public, etc. The various Master Plans (including Development Plans) prepared in the country dwell upon this premise and are essentially supported with an existing Land Use Map and one for target period, along with other related maps. The entire Plan (document) relates spatially to the various proposals under the Plan. The recent Gazette, notifying the Master Plan for Delhi - 2021[15], although making detailed proposals on various aspects, lacked a formally notified `Land Use Plan (map)', not only raising questions about its legal and professional sanctity, but also raising questions about geo-spatial considerations. Surprisingly, it also fails to provide an area-wise break-up of land under various proposed land uses.

Although there are a few examples in `geo-spatial' approach to Master Planning in the country, these are largely confined to `mapping'. The Master Plan for Delhi – 2021 states[16], "Mapping of the NCT of Delhi would be done using remote sensing and GIS tools and will



http://sez.icrindia.org/files/images/SEZ-Map-of-India-consolidat.gif accessed on December 29, 2009

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also be updated from time to time to have valuable data as regards ground situation …". We need to graduate from merely `mapping' to a comprehensive geo-spatial analysis and solutions.

A missing sub-regional plan

National capital Region (NCR) of Delhi is one of the largest metropolitan regions of the country, spreading across four states. The NCR Plan – 2021[17] envisages preparation of sub-regional plans, at the level of each state, to ensure a proper distribution of settlements, apart from other details. Delhi, however, has chosen not to prepare such a sub-regional plan, showing a disregard to a geo-spatial approach. At the NCR regional level too, a point based settlement pattern has been proposed where the largest urban settlement (i.e., Delhi) has not been differentiated from the smallest. Introduction of the concept of Central NCR (CNCR) was a right step in the direction of a geo-spatial approach. Unfortunately, this opportunity has also not been exploited in the absence of any plan for the CNCR, which could have also worked as a sub-regional plan. Similarly, no effort has been made to ensure a shift form a `point base approach' to large `Continuously Built-up Areas'[18] approach while dealing with settlement patterns as well as while dealing with large built masses spreading beyond administrative boundaries.

NUIS – JnNURM

The Union Ministry of Urban Development launched a centrally sponsored National Urban Information System (NUIS) Scheme, in March 2006. The Scheme comprises two major components, i.e, the Urban Spatial Information System (USIS) that includes development of GIS based multi-hierarchical database, with application tools, to support Master/ Zonal plan preparation; Urban Local Bodies (ULBs) administration and utilities management, and the National Urban Databank and Indicators (NUDB&I), that includes designing and establishing a comprehensive data bank and integration of these parameters to support planning and derive indicators for National Urban Observatory (NUO) for monitoring the health of urban settlements. The specific objectives of the NUIS Scheme include: to develop attribute as well as spatial database for various levels of urban planning and decision support to meet requirements of urban planning and management by use of modern data sources such as satellite and aerial platforms to generate a comprehensive 3-tier GIS database in the scale of 1:10,000 for utilities planning and to build capacity among town planning professionals in the use of modern automated methods.

Among various other targeted achievements, it is expected that the implementation of the Scheme will result in planning and management of urban settlements based on updated and scientific database supported as decision support system, employing modern planning methods using GIS technology. 168 towns and cities of the various sizes were selected under the Scheme. Simultaneous to the NUIS, the Government of India initiated Jawaharlal Nehru National Urban Renewal Mission (JnNURM), with objectives to include planned development of identified cities including peri-urban areas, outgrowths and urban corridors leading to dispersed urbanization. 65 towns and cities were selected under the Mission.

Though both the NUIS and the JnNURM aim at planned development of towns and cities of all sizes, the schemes remain largely in isolation to each other, from conception to detailing. The scale and size of the two schemes vary grossly. The coverage, both in terms of population covered and the spatial distribution of towns and cities is with apparent disregards to each other. Both the JnNURM and the NUIS have their independent criteria for selection of towns and cities. When translated into the objectives of the two schemes, it means that only 23 of these cities will have benefit of a planned overall development with the use of modern data sources such as satellite and aerial platforms to generate a comprehensive 3-tier GIS database, as well as focused attention to integrated development of infrastructure services. While for these cities the two schemes become complementary to each other, the remaining 210 cities would gain from only one of the two schemes. Spatial distribution of the selected urban settlements seems to have been overlooked in both the schemes (see Map 3[19]). While there are clusters of JnNURM cities, there are large regions without any JnNURM identified city. Similarly, while the NUIS cities are relatively uniformly distributed, there are regions devoid of NUIS cities (e.g., most of the Central and North-western India). At the same time, there are clusters of cities covered by both the NUIS and JnNURM. Criteria for selection of towns and cities, under both the schemes do not have any criterion for their geographic location in a state or a region. There are also cities, close to each other, yet covered by one of the two schemes separately. Non-synchronization of the selection of cities also means that while all of them would have a City Development Plan (CDP) prepared under the JnNURM, they may not necessarily have a Master Plan in place.

City development plans

The JnNURM also raises a pertinent question about the need of a new (planning) document when a Master Plan/ Development Plan may be already in place. The name `City Development Plan' itself is misleading to the general public and the legislator as well as the administrators. Many may take it a synonym to a Master Plan, which is a statutory document having gone through the process of `public opinions and objections' and backing of

Source: Mahavir and Maqbool Ahmed, D. (2010), 'A Tale of Two Schemes: JnNURM and NUIS', Spatio-Economic Development Record, Vol.17, No. 3, May–June, 2010.

the relevant Act of the State Government. CDP, on the other hand, is more of a guideline and may not stand in a Court of Law. A CDP also does not find place in the recommended planning system detailed out in the UDPFI Guidelines[20] and also not in force by the Institute of Town Planners, India (ITPI)[21]. There is no formally specified plan period for a CDP. However, a cursory look at many of the CDPs prepared[22] indicates it to be about 5 years, i.e. 2006-11, whereas the plan period for a traditional Master Plan is usually 20-25 years. Above all, as stated earlier, a traditional Master Plan essentially follows a geo-spatial approach to planning. The JnNURM is seemingly altering this position to a `non geo-spatial' approach, hence exposing a lack of `geo-spatial' vision to planned urban development. And there is now talk of undertaking `GIS Mapping[23]' of the slums and squatter settlements under the newly launched Rajiv Awas Yojana (RAY), to make it look `geo-spatial' and thus achieve the objective of `Slum Free Cities'.

Conclusions

There has been a general tendency of non `geo-spatial' approach to urban planning in India, be it at the National or at the lowest level of hierarchy. No concentrated attempts are in place to plan or recommend an urban settlement pattern in the country, spatially. Urban development, by Constitution, is a state subject. As a result, planning for metropolitan cities and their regions also remains a `local' initiative, though having national ramifications. Absence of a Ministry of Regional (Planning and) Development further contributes to a `non geo-spatial' vision at the National level.

Location of SEZs in the country (or in States) also does not reflect any geo-spatial approach. Though not directly related to urban development, the current debate on creation of smaller states had a potential to be resolved with geo-spatial technologies. Besides, a general tendency to bypass the time tested approach of Master Planning, which is essentially geo-spatial in nature, is emerging in the form of Master Plans without the supporting Land Use Plans (e.g., in case of Delhi) or in the form of CDPs, which is not only non geo-spatial, but also non-professional. The scheme of NUIS started with good intentions (towards geo-spatial approach) but was overwhelmed by its `flagship' cousin, the JnNURM. A geo-spatial approach for urban planning and development in India would include, establishment of a Ministry for Regional (Planning and) Development at the Centre, bringing `Metropolitan Planning including the Metropolitan Region Planning' under the Central ambit, initiation of another Commission on Urbanisation, better synchronisation between the NUIS and the JnNURM and bringing the CDPs prepared under the JnNURM into the planning framework suggested by the UDPFI Guidelines. Also, planning for urban settlements has to graduate from a cosmetic `GIS Mapping' approach to a comprehensive geo-spatial analysis and solution approach. The newly launched Rajiv *Awas Yojana* and the likely setting up of a National GIS[24] should provide the opportunity for ensuring a geo-spatial approach to urban planning and development. There is no dearth of technology and humanware, there is only a need for a strong geo-spatial vision and approach at all levels of urban planning and development.

Refferences

1. Misra, B., Regional Variations in Urbanisation and Urban-Rural Relationships, School of Planning and Architecture, New Delhi, in Ministry of Urban Development, Report of the National Commission on Urbanisation, Vol. V, Research Study Reports, Part – I, pp. 1-52, August 1988.
2. ibid., pp. 27.
3. Saini, N. S., Ansari, J. H. and Chatterji, M. N., Evolution of Urban Planning in India, School of Planning and Architecture, New Delhi, in Ministry of Urban Development, Report of the National Commission on Urbanisation, Vol. V, Research Study Reports, Part – I, pp. 232, August 1988.
4. Ministry of Urban Development, Report of the National Commission on Urbanisation, Vol. II, Part I, Chapter 2, Map 4 and 5, August 1988, pp.51-52.
5. Ibid, Map 6.
6. Town and Country Planning Organisation (TCPO), Urban and Regional Planning and Development in India, Ministry of Urban Affairs and Employment, Government of India, New Delhi, 1996.
7. http://e-geopolis.eu/spip.php?article78 accessed on December 30, 2009
8. http://urbanindia.nic.in/policies/nup/main.htm accessed on December 23, 2009
9. http://www.cseindia.org/programme/pov-env/master-plan.htm accessed on December 11, 2009
10. http://rural.nic.in/annualrep0405/chapter6.pdf accessed on December 24, 2009
11. PollMap, India Today, February 9, 1998.
12. GIS Development, Vol 14, Issue 02, February 2010.
13. Menon, Amarnath K., Dividends of Division, in India Today, Vol. XXXIV, No. 52, December 28, 2009, New Delhi
14. http://sez.icrindia.org/files/images/SEZ-Map-of-India-consolidat.gif accessed on December 29, 2009
15. Ministry of Urban Development (Delhi Division), Gazette of India: Extraordinary, Notification dt. 7th February, 2007, New Delhi.
16. ibid., pp. 121.
17. Ministry of Urban Development, Regional Plan – 2021, National Capital Region, NCR Planning Board, Government of India, New Delhi, 2005.
18. Mahavir, `Modelling Settlement Patterns for Metropolitan Regions: Inputs from Remote Sensing', ITC Publication No. 35, Enschede, The Netherlands, 1996.
19. Mahavir and Maqbool Ahmed, D. (2010), 'A Tale of Two Schemes: JnNURM and NUIS', Spatio-Economic Development Record, Vol.17, No. 3, May–June, 2010.
20. Ministry of Urban Affairs & Employment (1996), Urban Development Plans Formulation & Implementation (UDPFI) Guidelines, Government of India, New Delhi.
21. Institute of Town Planners, India (1998), Conditions of Engagement of Professional Services and Scale of Professional Fees and Charges, New Delhi.
22. http://jnnurmmis.nic.in/missioncities.htm accessed on December 22, 2009
23. Ministry of Housing and Urban Poverty Alleviation (2010); Guidelines for GIS Mapping, MIS Development and Integration of GIS with MIS, Unpublished Report of the Sub-Committee 1 on Rajiv Awas Yojana, Government of India, New Delhi.
24. Rao, Mukund; Establishing A National GIS Under Indian National GIS Organisation (Proposal under consideration of Planning Commission), Presentation made (on behalf of the Planning Commission) to the Secretary, Ministry of Urban Development, Government of India, New Delhi, February 3, 2011.

EGNOS Navigation System Now Serving Europe's Aircraft

The European Geostationary Navigation Overlay System (EGNOS) Safety-of-Life signal was formally declared available to aviation. For the first time, space-based navigation signals have become officially usable for the critical task of vertically guiding aircraft during landing approaches. By using three satellites and a 40-strong network of ground stations, EGNOS sharpens the accuracy of GPS satnav signals across Europe. The signals are guaranteed to the extremely high reliability set out by the International Civil Aviation Organisation standard, adapted for Europe by Eurocontrol, the European Organisation for the Safety of Air Navigation. *www.redorbit.com*

India grant-in-aid for GAGAN project

Cabinet Committee on Economic Affairs (CCEA) in India approved a one time grant-in aid of INR 378 crore as budgetary support for implementation of GPS-aided Geo Augmented Navigation system (GAGAN). The system is estimated to cost INR 774 crore. Of the total project cost of INR 774 crore, Aairports Authority of India (AAI) was required to shell out INR 604 crore, while ISRO was to contribute rest of the money (INR 170 crore).

AAI has already spent INR 226 crore and sought one time grant-in-aid of INR 378 crore from the Gross Budgetary Support to meet its balance commitment. The project is expected to be ready for operational use by May 2013. It would be an all weather national infrastructure and can be used by defence services, security agencies, Railways, surface transport, shipping, telecom industry besides personal users of position *www.business-standard.com*

Combat against GPS jammers

GNSS Availability, Accuracy, Reliability and Integrity Assessment for Timing and Navigation (GAARDIAN) Consortium has developed an equipment to provide real-time information about the reliability of GPS at airports or other sensitive locations using networks of probes, The Economist reports. Each probe can pick up GPS signals and signals from eLoran. The probes also contain a small atomic clock. By comparing the GPS and eLoran time signals with its internal clock, each probe can detect interference and determine whether it is natural or man-made.

Development of this equipment was funded by the UK Government's Technology Strategy Board and the Engineering and Physical Sciences Research Council. Member of the Consortium are Imperial College London, University of Bath, BT Design, Chronos Technology, and the Department for Innovation, Universities and Skills, the General Lighthouse Authority, the National Physical Laboratory, and Ordnance Survey. *The Economist*

UK dangerously over-reliant on GPS signals

The UK may have become dangerously over-reliant on satellite-navigation signals, according to a report from the Royal Academy of Engineering (RAEng). Use of space-borne positioning and timing data is now widespread, in everything from freight movement to synchronisation of computer networks. The academy fears that too many applications have little or no back-up were these signals to go down. Receivers need to be capable of using a variety of data sources, it says.

Dr Martyn Thomas, who chaired the group that wrote the report, told BBC News: "There is a growing interdependence between systems that people think are backing each other up. If these systems fail, it will cause commercial damage or just conceivably loss of life. This is wholly avoidable." *www.bbc.co.uk*

GPS signals might get drowned out

The Air Force is worried that a proposed commercial broadband Internet system could make the nation's Global Positioning System receivers go on the blink. Virginia-based LightSquared plans to combine a satellite network with thousands of ground transmitters to provide mobile Internet services. Air Force Space Command in Colorado Springs fears those ground transmitters, which operate at a frequency near the one used by its navigation satellites, could drown out GPS signals. *http://newsok.com/af-worried-that-gps-signals-might-get-drowned-out/article/feed/*

Korea Establishes National GNSS Research Center

Korea has launched an inter-institutional National GNSS Research Center (NGRC) with an ambitious agenda of projects to advance the Asian nation's role in the field. The center is headed by Sang Jeong Lee, a professor of electronics engineering at Chungnam National University (CNU) where the NGRC was established last November.

The NGRC includes five laboratories, the directors of which will comprise the center's steering committee along with Lee: GNSS Architecture Design, Changdon Kee, Seoul National University; GNSS Signal Structure Design, Jae Min Ahn, CNU; Satellite Constellation Monitoring, Moon Beom Heo, Korea Aerospace Research Institute (KARI); Anti-Jamming Signal Processing, Gyu In Jee, Konkuk University; and Convegence Technology, Tae Gyung Sung, CNU. Other universities and institutions, such as the Korea Research Institute of Standards and Science (KRISS) and the Electronics and Telecommunications Research Institute (ETRI) are also participating in the NGRC, along with several industrial companies.

Beidou to serve Chinese private car owners in 2012

Chinese private car owners will be able to enjoy positioning services provided by the Beidou satellite navigation and positioning system starting in 2012, said Sun Jiadong, chief designer of the Beidou satellite navigation and positioning system. He said the prices of the related navigation chips will be lower than the market prices of the GPS navigation chips. *http://english.peopledaily.com.cn*

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Assess need for data before planning satellite launches: CAG

Expressing displeasure over under-utilisation of remote-sensing satellites, government auditor asked the Department of Space (DoS) in India to assess the requirement of data in various thematic areas before planning and launching satellites. "NRSC/DOS may assess the need requirement of data in various thematic areas before planning and launching satellites and initiate action to maximize utilization of remote sensing satellites already launched," the Comptroller and Auditor General (CAG) said in its report. "Performance of three out of the seven remote sensing satellites was below their maximum capacity in terms of the number of remote sensing satellite data captured by them," the report said. The auditor said the satellites were planned without adequate thematic data need assessment. "The revenue realised from seven satellites in operation was not up to the desired level," it said.

Israel, Russia to cooperate in space

Israel and Russia have agreed to increase cooperation on space research and exploration. A project has been proposed which includes remote sensing of Earth from space, planetary studies and space medicine. The two nations may also join forces on astrophysical research and satellite navigation. *www.ctv.ca*

S African EO satellite survives in space

Despite being called a "crippled ship," South Africa's first low-orbit earth observation (EO) satellite SumbandilaSat, is doing what it was designed to do. Orbiting at about 500km from the Earth's surface, the satellite is transmitting EO imagery. Built by SunSpace, a microsatellite company, SumbandilaSat was launched in September 2009 from the Baikonur Cosmodome in Kazakhstan. "They made cost compromises because it wasn't built for longevity. It was built as a prototype to show that SA has the capacity. It doesn't have the back-up systems a fully functioning satellite would have," said Marian Shinn, Minister for Science and Technology. *www.businessday.co.za*

China to launch RS satellite

China's marine economy is expected to grow at an annual rate of more than 13% in the next five years. Hence China may launch HY-2 satellite, a marine remote sensing satellite series, later on this year according to Liu Cigui, Director of State Oceanic Administration in China. *Xinhuanet.com*

Indian PM urges to use RS

Dr Manmohan Singh, Prime Minister, India, urged scientists to expedite space-based applications in order to balance the share of economic growth in the society. "As the economy expands, there will be growing pressure on resources be it land, water or minerals. Remote sensing (RS) applications for such purposes will be critical," Dr. Singh said during his visit to Space Applications Centre (SAC), Ahmadabad. *www.dnaindia.com*

Space budget gets 35 percent hike

The allocation for India's space programme has been increased by more than 30 percent in the General Budget 2011-12, compared to last year's allocation. The human space flight and Chandrayaan-II have gained the lion's share. New missions for earth observation, which include launch of satellites like RISAT-3 and Cartosat-3, were allocated INR 200 crore. *Business Standard*

Fund for surveying in Sarawak

Malaysian Federal Government provided an additional MYR60 million for surveying native customary lands (NCR) in Sarawak, Natural Resources and Environment Minister Datuk Seri Dougles Uggah Embas said. The minister added that with the additional allocation, the Sarawak Land and Survey Department would be able to survey 300,000 - 400,000 hectares of NCR land. *www.bernama.com*

Ordnance Survey accused of monopoly

Tristram Cary, CEO and chairman of Getmapping complained that it has been frozen out of business opportunities because rival Ordnance Survey (OS) has an unfair advantage. Cary has had to cut jobs as the national mapping agency OS is given free rein to produce maps for central and local government from April. Getmapping was the first to create a complete colour aerial photograph of the UK. www.andoveradvertiser.co.uk

Hong Kong 3D spatial database

Lands Department, Hong Kong, is constructing and maintaining a territory-wide 3D spatial database which would include buildings, roads and terrain with positional and height accuracy up to meter level, according to Paul Ng, Chief Land Surveyor of the Land Information Centre, Lands Department. "The project will be completed by the end of year and the 3D spatial data will be made available to the public on a cost recovery basis," he said. *www.futuregov.asia*

Philippines' unified mapping project

Philippines is to undertake a unified mapping project. It aims to update the country's topographic map series and would implement a more detailed 1:10,000 map series for an estimated 50 per cent of the country's land mass. According to the Department of Environment and Natural Resources (DENR), Instead of the typical approach wherein different government agencies do their own mapping and GIS initiatives, this effort will pool funds for the acquisition of aerial photography and satellite imagery. *www.futuregov.asia*

Canada funds for geomatics industry

The Government of Canada granted funds, USD 30 million, over five years, to support geomatics industry. The amount is almost triple the original two-year allocation of USD 11 million for Natural Resources Canada's GeoConnections programme. *www.nrcan-nrcan.gc.ca*

SBSM to reassess authenticity of online mapping services

State Bureau of Surveying and Mapping's (SBSM) efforts to clean up China's geographical information market have entered the "retrospective" phase, during which it will review online geographical information and mapping services, according to SBSM's spokesperson. The cleanup will focus on a thorough investigation of online map data and map services, including whether or not companies providing online map services have the required mapping and surveying and publication authorisation for online map services; whether or not the maps carried by the services are provided by providers with authorized map numbers; whether or not the maps provide inaccurate representations of national territory; and whether or not the maps contain state secrets that have been designated as off-limits to the public. *www.marbridgeconsulting.com*

Indian state approves geospatial Bill

The Delhi State Assembly approved Delhi Geo-spatial Data Infrastructure (Management, Control, Administration, Security and Safety) Bill, 2011. It seeks to use geospatial technology for planning and executing various development projects and utility services. With the passage of the Bill, Delhi has become the first State in India to enact such an important legislation.

Sheila Dikshit, Chief Minister of the State said that the Delhi State Spatial Data Infrastructure (DSSDI) Project was approved by the Cabinet to frame and implement policies for issues related to geo-spatial data. The Bill was aimed at creating, updating, managing, disseminating and sharing for Delhi geo-spatial data, maps, system, application and portal to serve as a base for planning and executing various development projects. A common and integrated GIS is planned and 30 departments or local bodies have been brought under the ambit of the project, she added. The Bill makes the utilisation and application of the data infrastructure mandatory. *www.thehindu.com*

Galileo update

EU aims to curb Galileo costs

The EU Commission isn't willing to accept further costs increases for the Galileo satellite navigation system, German daily Handelsblatt reported, citing industry commissioner Antonio Tajani. "On the contrary, the estimated additional costs for the time after 2014 must decrease," Tajani told *www.totaltele.com*

Government to resist demands for more Galileo funds

Transport minister Theresa Villiers has warned MPs that the UK will insist on keeping within Galileo's €3.4bn budget. It will achieve this by slashing the number of satellites proposed for the controversial EU global navigation system from 30 to 18. Villiers, addressing a UK parliament committee, added that the Commission must also accept UK demands for the inclusion of security considerations as part of the Public Regulated Service, one of four functions an 18-satellite system could deliver. The others are: an open public service, a commercial service and a search and rescue service. She conceded the reduced satellite constellation would be unlikely to be able to support a proposed safety of life service, whose main function would be to assist aircraft to land at airports lacking instrument landing systems – a function not required in the UK.

She said she had told EU Commission vice-president Antonio Tajani that Britain needed a far clearer explanation as to why the programme was over budget and had demanded assurances that problems besetting it would be remedied and that British demands for enhanced security would be met. She admitted axing Galileo is not a viable option and claimed it would be possible to expand it later to 30 satellites. *www.computing.co.uk*

SSTL's European GNSS payload passes design review

Payloads being delivered by Surrey Satellite Technology Ltd (SSTL) for GALILEO have passed the Preliminary Design Review (PDR), having proved to a panel including the ESA that they demonstrated a sufficient level of design maturity. SSTL is teamed with OHB System of Bremen, Germany, for the provision of the first 14 satellites in the Full Operational Capability, or FOC, phase of the GALILEO system.

The 8th European Satellite Navigation Competition is about to begin

The 8th European Satellite Navigation Competition event will be held on 11 May and is hosted by the Institute of Engineering and Technology (IET) in London. The event will be opened with a lively 'elevator pitch' session. Any innovator can apply to give a 5-minute presentation about their business idea to a jury on the evening of 10 May. *European Space Agency*

Trimble to acquire OmniSTAR for land applications

Trimble has agreed to acquire certain assets related to the OmniSTAR GNSS signal corrections business from Fugro N.V. It will enable Trimble to provide correction services for land-based agriculture, construction, mapping and GIS and survey applications.

Vexcel Imaging receives ISO 9001:2008 Certificate

Vexcel Imaging GmBH, a Microsoft company, received an ISO 9001:2008 Certificate from the certification body SystemCERT. The Certificate certifies that Vexcel Imaging has implemented and maintained a quality management system which fulfils the requirements of the international standard ISO 9001:2008 and has demonstrated a commitment to continuous improvement of its processes.

Ashtech aid for GIS field researchers in Greece

Terrain, an Athens-based cartographic company, is publishing the first highly detailed, large-scale maps (1:10,000 to 1:100,000) of Greece using GIS data exclusively acquired by mobile teams of cartographers. By foot, bike, auto and boat, Terrain surveyor teams, travelling with Ashtech MobileMapper 100 handheld smart GNSS receivers.

Rapid geo-name translation for Japanese-produced maps by East View

Immediately following the earthquake and tsunami off the coast of northern Japan, East View Cartographic (EVC) was approached by the Japan Map Center in Tokyo to make English versions of eighteen 1:25,000 scale topographic maps over the affected area in and around Sendai, Japan. EVC performed this task in four business days utilizing automated geo-name conversion processes and human editing. *http://wms.cartographic.com/japandisaster.htm*

Maptek engages PT Globecon Indonesia as local Vulcan representative

Maptek has announced an agreement with PT Globecon Indonesia (PTGI) to promote Maptek™ Vulcan™ geological modelling and mine planning software in Indonesia. *www.maptek.com*

Bentley Advances Sustainable Licensing Through Portfolio Balancing

Bentley Systems has introduced an innovative new "sustainable licensing" business model based on annual Portfolio Balancing. With this industry milestone, users no longer need to settle for software investments that depreciate in value due to changing technology, project mix, or operations needs. Through Portfolio Balancing, new purchasers of Bentley product licenses, along with existing Bentley SELECT subscribers, can annually exchange underutilized Bentley software for software of equal value (based on current list price) that meets existing or upcoming needs. *www.bentley.com/500.*

Ultra-Small SXBlue GPS L1/L2 RTK Receiver by Geneq

Geneq has announced an ultra-small SXBlue GPS L1/L2 dual frequency GPS RTK receiver for high accuracy positioning. It weighs only 268g (~1/2 lb) and having dimensions of 11.26cm x 8.54cm x 3.53cm (4.43" x 3.36" x 1.39"), the SXBlue L1/L2 GPS is designed to be mounted on vehicles and use the vehicle power for machine control applications such as agriculture, mining, construction and other high-precision applications. It has a long-range Class 1 Bluetooth implementation capable of distances of up to 100 meters (300 feet) and RS-232 interface port. *www.sxbluegps.com.*

Timing for 4G networks

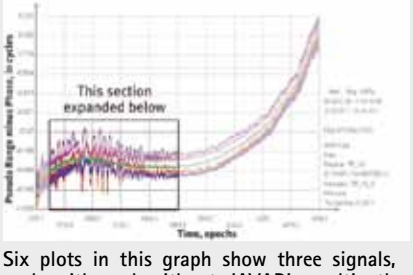
The TimeProvider 1500 is optimized to enable rapid deployment of 4G/LTE networks. It is a packet-based primary reference source (PRS), providing ubiquitous and continuous access to PRS quality reference sources for operators. The TP1500 is a packet-based synchronization system that delivers a PRS-quality clock without requiring a GNSS antenna installation. Until now, the only way to achieve traceable stratum-1 PRS network synchronization was to install costly GPS antennas or Cesium clocks.

Topcon introduces new GNSS receiver

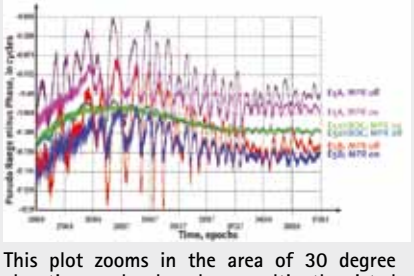
Topcon Positioning Systems (TPS) introduces its patented Fence Antenna technology and expanded channel support in the new GR-5 GNSS receiver. The GR-5 provides industry-leading tracking sensitivity and multipath rejection in a compact and lightweight package.

AltBOC really works! Another first from JAVAD

JAVAD Triumph-VS receiver now has the option to track E5A, E5B and E5altBOC signals. These 3 signals may be tracked independently, but as expected, E5 altBOC combination shows great multipath reduction compared with separate E5A or E5B signals. Javad's superior multipath reduction (MPR) technique makes it almost perfect.



Six plots in this graph show three signals, each with and without JAVAD's multipath reduction feature.



This plot zooms in the area of 30 degree elevation mask, where huge multipath existed due to a nearby metal roof.

Leica News

Cyclone II update

Leica Geosystems has announced a major update to Cyclone II TOPO, version 2.0. The new version automates the previously time-consuming process of creating accurate ground surfaces (TINs or meshes) from rich High-Definition Survey™ (HDS™) point clouds.

New HDS7000 Ultra High-Speed, Phase Scanner

The HDS7000 is a new phase-based laser scanner that lets users take advantage of ultra-high speed scanning for more as-built survey applications on more sites. It features key enhancements over its predecessor. *www.leica-geosystems.com*

Leica Geosystems enhances SP Technology

Leica Geosystems releases the next generation of its unique Leica SP Technology further enhancing flexibility & productivity when grading with a dozer. SP Technology now also supports machine control with total stations, providing high precision and increased grading speed in environments where GPS is not useable. This additional functionality allows users to choose the positioning sensor for their machine control system and to achieve excellent results in any environment.

NovAtel news

OEMStar™ Firmware V1.101

NovAtel released V 1.101 firmware for its OEMStar GNSS receiver products. The OEMStar is NovAtel's lowest cost, high performance L1 GNSS receiver which provides accurate positioning using L1 GPS, GLONASS and SBAS signals.

FlexPak6™ Enclosure

FlexPak6 GNSS enclosure is the first product to house the company's new OEM628™ multi-constellation receiver. It is is capable of tracking all current and upcoming GNSS satellite signals plus L-band. It builds on the FlexPak-G2™ series of products by adding powerful OEM6™ features such as RAIM (Receiver Autonomous Integrity Monitoring) for improved GNSS system integrity, NTRIP client and server capabilities for seamless integration into network reference applications, and 100 Hz measurements for high dynamic applications. *www.novatel.com*

NovAtel and Raven agreement

NovAtel Inc and Raven Industries (Raven) have announced a new strategic partnership that will see NovAtel's GNSS positioning technology integrated into Raven's precision agriculture products.

NavCom's SF-3040 STARFIRE™/RTK GNSS pole-mount receiver

NavCom Technology has released SF-3040 pole-mount receiver that features StarFire/RTK GNSS capabilities. Steven Wilson, NavCom's GNSS Products Business Manager highlights the key features of SF-3040 to Coordinates:

Please summarize briefly about key features of SF-3040.

RTK base or rover with RTK Extend™ enhanced performance

The SF-3040's Ultra RTK™ and RTK Extend capability, powered by StarFire™, assure traditional high accuracy RTK positioning over long baseline lengths even during radio outages saving users valuable time and effort. Ultra RTK provides RTK-level accuracy up to 40km away from a base station and RTK Extend allows for continuous RTK positioning during radio outages by allowing StarFire™ to take over when the RTK radio communication signal is blocked or out of range.

Built-in StarFire receiver

The first of its kind, this global satellite-based augmentation system (GSBAS) provides the SF-3040 with decimeter positioning accuracy on a worldwide basis without the need for a base station allowing users to roam freely while maintaining the most precise positioning information.

GNSS Performance

Powered by the Sapphire™ Integrated StarFire/RTK GNSS Engine, the SF-3040 offers 66 channel "All-in-view" tracking with the required flexibility to track all civilian GNSS (GPS, GLONASS & Galileo) and SBAS signals including StarFire.

What are different applications SF-3040 best suited for?

The SF-3040 is recommended for Surveying & Mapping applications. With its all on the pole morphology that includes dual hot swappable batteries, internal 1 watt UHF radio, removable SD card and highly competitive RTK performance the SF-3040 is an ideal choice to form the core of an advanced land survey system.

Could you please tell us briefly about Sapphire GNSS engine?

NavCom's next generation integrated StarFire/RTK GNSS engine provides 66 channel tracking, including multi-constellation support for GPS, GLONASS and Galileo. It also provides patented interference rejection and anti-jamming capabilities. Integrated StarFire decimeter global accuracy makes Sapphire ideal for applications in high accuracy surveying to control and guidance of mobile platforms. The compact form factor offers durability and reliability for your precise positioning system integration. Offering the "freedom to choose," Sapphire is software upgradeable, allowing users to transform the engine from a single frequency receiver to multi-frequency and anything in between with software optioning alone saving users the expense of purchasing new hardware. This flexible framework makes Sapphire ideal for any application.

When do you start shipping SF-3040?

NavCom's SF-3040 is available for order today from NavCom's dealer network. Units will ship 30 days ARO.

China plans to track Beijing residents

China Government announced a new plan "Platform for Citizen Movement Information," to track the 17 million people using their cell phones, who live in the capital city of Beijing, reports The Next Web. According to the government, the initiative is intended to help improve public transportation and reduce traffic congestion. *Yahoo*

NAVTEQ forays into interior mapping business

NAVTEQ launched Destination Maps which feature a set of interior map attributes (e.g., escalators) with detailed place data. The maps enable users to more efficiently navigate and explore interior spaces. It also include a Virtual Connections feature that enables more intuitive guidance by recognizing how pedestrians "cut across" open areas. *www.navteq.com*

Mobile Apps, Watches and Apparel Will Spur Outdoor, Sports and Fitness GPS to $2bn in 2016

In a new study, ABI Research has forecast that a combination of smartphone applications and device shipments will drive the next big trend in the GPS market. This has always been a niche market, with limited competition. However, Garmin's Outdoor and Fitness division represented 40% of the firm's total 2010 operating income, with fitness watches at the forefront of this growth. This is becoming a very important market, and with the PND market in decline, it will become a vital segment to address for many companies. *www.abiresearch.com*

Berg Insight says shipments of smartphones grew 74 percent in 2010

According to Berg Insight report, global shipments of smartphones increased 74 percent in 2010 to 295 million units. Growing at a compound annual growth rate (CAGR) of 32.4 percent, shipments are forecasted to reach 1,200 million units in 2015. An increasing number of users are now discovering how smartphones can act as personal computing devices. *www.berginsight.com*

April 2011

6th National GIS Symposium in Saudi Arabia
24-26 April
Khobar, Saudi Arabia
www.saudigis.org

Geo-Siberia 2011
27-29 April
Novosibirsk, Russia
www.geosiberia.sibfair.ru/eng/

May 2011

ASPRS 2011
1-5 May
Milwaukee, Wisconsin, USA
www.asprs.org/milwaukee2011/

Gi4DM 2011
3-8 May
Istanbul, Turkey
www.gi4dm.org

Global Space & Satellite Forum
9-11 May
ANEC, Abu Dhabi
www.gssforum.com

Geospatial Intelligence Middle East
15-18 May
Abu Dhabi
www.geospatialdefence.com

FIG Working Week 2011
18-22 May
Marrakech, Morocco
www.fig.net

Be Together: The Bentley User Conference
23-26 May
Philadelphia, USA
www.bentley.com/betogether

June 2011

2nd Annual Geospatial Summit
1-3 June
Budapest Hungary
www.flemingeurope.com

Trans Nav 2011
15-17 June
Gydnia, Poland
www.transnav.am.gdynia.pl

South East Asian Survey Congress
22-24 June
Kuala Lumpur, Malaysia
www.seasc2011.org

2011 Cambridge Conference
26 June - 1 July
Winchester, England UK
www.cambridgeconference.com

July 2011

Summer School "Advanced Spatial Data Infrastructures
4 – 8 July (Advanced SDI-Management)
7-15 July (Advanced SDI-Professional)
Leuven, Belgium
www.spatialist.be

Survey Summit
7 - 11 July
San Diego, California
www.thesurveysummit.com/

ESRI International User Conference
11-15 July
San Diego, USA
www.esri.com

August 2011

XXV Brazilian Cartographic Congress
21-24 August
Curitiba - State of Paraná, Brazilia
sbc.tatiana@gmail.com

7th International Symposium on Digital Earth
23-25, August
Perth, Australia
www.isde7.net

September 2011

ION GNSS 2011
20-23 September
Portland, USA
www.ion.org

INTERGEO
27 - 29 September
Nuremberg, Germany
www.intergeo.de

October 2011

ACRS 2011
3-7 October
Taipei, Taiwan
www.acrs2011.org.tw

AfricaGIS 2011
10-14 October
Cairo, Egypt
www.eis-africa.org/EIS-Africa

November 2011

Regional Geographic Conference – UGI 2011
14-18 November
Santiago, Chile
www.ugi2011.cl

ENC 2011
29 Nov-1 Dec
London, UK
www.enc2011.org

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