



Land Surveying Division

Sr Dr Conrad Tang LSD Council Chairman

The Working Group on Site Area Determination for Building Development

Dr Sr Ken Ching, member of the LSD Council and a delegate to the Working Group, which is convened by the Buildings Department, attended a meeting on 9 May to report on the latest key matters that were concluded in relation to the land boundary profession:

1. According to the current Appendix A1 to the *Practice Note for Authorised Persons, Registered Structural Engineers and Registered Geotechnical Engineers*, ADV-33 on “Essential Information in Plan submissions” substantiates for the claimed site area, which is a land survey plan (LSP) prepared by an authorised land surveyor who is required to update the site area AND boundaries, if necessary. The Buildings Department will, nevertheless, after pragmatic consideration, accept other relevant lease documents to substantiate a claimed site area before its owner’s application for building (superstructure) consent.
2. To maintain records in a consistent manner, authorised persons should deposit the same LSP with the Lands Department (i.e., its district survey office) for the purpose of confirming no encroachment on government land.
3. The decimal place on the presentation of site areas computed will be based on the Code of Practice of the Land Survey Ordinance (Cap 473).

Certainly it is an exciting development in the land boundary survey. Eventually, the Buildings Department has to deal with the messy site area determination using the professional service of an authorised land surveyor. It will incorporate

new guidelines for this in the very near future. Dr Sr Ken Ching kindly promised to give an elaborate talk on the details of the new site area determination guidelines in a coming CPD event, which should come this summer.

Integrated 3D Model by Dr Bo WU, Associate Professor, LSGI, PolyU

A project entitled, “Novel Integrated 3D Mapping Model,” undertaken by a research team led by Dr Bo WU, has won the “Gold Medal” and “Special Merit Award (R Alekseev Award) from Nizhny Novgorod State Technical University, Russia” during the 44th International Exhibition of Inventions of Geneva, where the awards presentation ceremony was held on April 17.

It is in our interest to learn about new developments and applications in our industry. Thus, Sr Paddy NG and Sr Ada CHAN interviewed Dr Bo on 6 May. The questions raised and Dr Wu’s answers are listed below.

Q: What are the characteristics of the multi-platform high resolution images and light detection and ranging (LiDAR) data geometrically and under the normal approach, especially in the mapping results?

A: The “Integrated 3D Mapping Model” is an innovative and unique approach for precise 3D mapping by integrating multi-platform (Satellite, Aircraft, or UAV) and multi-sensor (Camera, Laser Scanner) remote sensing data through strict mathematic models.

Normal approaches such as photogrammetry and laser scanning have different characteristics. Photogrammetry offers better accuracy in the horizontal than in the vertical direction, while laser measurements are more

accurate in the vertical direction than in the horizontal. Previous works generally focused on processing imagery and laser scanning data separately. They may produce errors at different levels and there are usually inconsistencies between the models derived from them.

The “Integrated 3D Mapping Model” integrates multi-platform and multi-sensor data for consistent and precise 3D mapping. This development is essential for the proper calibration, registration, and analysis of the multi-source spatial datasets. In turn, it allows for the full comparative and synergistic use of the datasets. The “Integrated 3D Mapping Model” is of significance in the era of spatial big data.

Q: Does this approach require ground control points (GCP) and how big is the improvement of the geometrical accuracy of both types of data (high-resolution imagery & LiDAR)?

A: The “Integrated 3D Mapping Model” does not require any GCP. It takes advantage of the better horizontal accuracy of the imagery and better vertical accuracy of the laser scanning data to remove errors and improve the accuracy of mapping products. For example, after using our model for the integrated processing of the Chinese Ziuyuan-3 imagery, the French Pleiades-1 imagery, and the airborne laser scanning data in Hong Kong, the mapping accuracy for the Ziuyuan-3 imagery improved from 16.5m to 5.6m, while that for the Pleiades-1 imagery improved from 3.2m to 1.7m. The accuracy of the laser scanning data also improved from over 1m to 18cm.

Q: Could this approach be applied to integrate Close Range Photogrammetry and Terrestrial Laser Scanning data to improve their geometrical accuracy?

A: Yes. The “Integrated 3D Mapping Model” can be applied to the integrated processing of close range photogrammetry and terrestrial laser scanning data, which are the most

common sources of survey data collected in current mobile mapping systems (MMSs).

Q: As you are also an expert in geoscience and geographical information systems (GISs), especially on earth modelling and integrating spatial data, can you share your views on the importance of spatial data and if it can be applied to earth science or developing spatial data infrastructure (SDI) and smart cities?

A: Spatial data is very important and is related to everybody’s daily life. For example, when you go to a new place, you need an accurate 2D/3D map of it to help you familiarise yourself with this environment. Spatial data is essential for generating 3D digital city models and smart city developments (e.g. with 3D city models you can sit at home viewing the ventilation, visibility, and sunlight distribution of residential buildings that interest you through online spatial information services).

Spatial data is also indispensable in earth science, such as in earthquake research, monitoring of landslides, environment monitoring, geologic evolution, etc.

Q: According to its 2016 Policy Address, the government will formulate a digital framework and standards to develop a smart city. What challenges can we (society) expect to face and which is the most important part of developing a smart city? Also, what is the importance of land surveyors in all this?

A: Just like a city in reality is comprised of various types of infrastructure such as buildings, roads, bridges, etc., a smart city will build on the digital format of the aforementioned city infrastructure.

Land surveyors (geo-technologies) can make at least two contributions to smart city development. One is to provide an urban spatial data infrastructure (SDI; a 3D/4D digital city) for smart city development. The other is spatial data mining and knowledge discovery for smart

city applications. There are challenges related to these aspects such as accurate 3D mapping, multi-sensor data fusion, 3D modelling with more automation, 3D-based spatial analytics, spatial information service, etc.

Q: If you have the chance to advise the Government on driving the use of spatial data, what are the prime initiatives it should consider?

- A: 1) Using spatial data to build an urban SDI (a 3D/4D digital city) for smart city development.
 2) Developing effective spatial data mining and knowledge discovery techniques for various applications in a smart city environment.

Q: Compared to other cities/regions, what are the strengths, weaknesses, opportunities, and threats (SWOTs) for Hong Kong in geoscience research/development/application/big data analysis?

A: Hong Kong has a well-developed land surveying profession. Government departments have also spent much effort to develop and use various geo-technologies. However, the mode of surveying in both fieldwork and office data processing will change significantly in the coming years due to the quick development of new technologies (e.g., UAVs, oblique photogrammetry, MMS, 3D GIS, BIM, multi-sensor data fusion, etc.). Data fusion is especially important for the comparative and synergistic use of multi-source datasets, which is critical in the era of spatial big data. We need to prepare for these changes.

I am happy to see that different parties in Hong Kong, including certain industries, government departments, and universities, are focusing more on these new technologies. The workshops on UAVs and oblique photogrammetry recently organised by PolyU and AMBIT attracted many participants. However, this is just the beginning. Wide and in-depth applications of the new

technologies will enter different aspects of our profession regardless if we like it or not. Related standards will be modified as well. Fundamental research will also be necessary to facilitate and magnify the use of the new geo-technologies in Hong Kong.

Dialogue on LSD Membership Routes

Dr Bo Wu raised a question to me after the interview. While he is now a corporate member of the RICS's Geomatics Branch, he wonders if he can join the LSD as a corporate member. I could only reply that even during an earlier period, when the RICS and HKIS had a mutual agreement, the HKIS could only accept RICS members through the APC route only. Other ways, including being accepted as an academic member, were overlooked, not to mention that the LSD has no reciprocal recognition agreement with the RICS or ICES at this moment. Hence, Dr Wu would have to join the LSD as a probationer, in which case he would have to fulfill the training requirements listed in the Assessment of Professional Competence, for which he must secure a supervisor and a counselor; practice at least 440 days; submit a log book that is counter-signed by his supervisor and counselor; submit an interim practice record for the LSD's approval; and, of course, submit a final project and attend a professional interview.



But I can assure him that the LSD urgently needs to recruit professional members for its nine specialties, of which land boundary and engineering surveying constitute only two. For that purpose, the LSD has formed a working group to study and make recommendations on the policy of mutual recognition. They held an initial meeting on 13 May and have scheduled a second one for June, during which it will consider the recruitment of academic members.

Reinstate Membership Status for the HKIS's Land Surveying Division in the FIG

During the XXIX International Federation of the Surveyors General Assembly in Christchurch, New Zealand on 4 May, a short meeting was held with the President of the FIG, Dr Chryssy Potsiou (second from left in the picture below); Vice President Dr Diane Dumashie (far right); and FIG Director Louise Friis-Hansen (far left). I informed them of the LSD's willingness to return to the FIG umbrella. President Potsiou accepted the request with a warm welcome and

stated that there must be a way to resolve this membership issue.

The HKIS and similar surveying institutes, including the Singapore Institute of Surveyors and Valuers and Malaysian Institution of Surveyors, reluctantly left the FIG several years ago. The FIG demands a membership fee structure that covers all corporate and associate members in each member organisation. In the HKIS structure, other surveyor factions will not be required to accept the FIG as their international federation organisation. Different views on subscription memberships can exist.

The HKIS's Executive Council has kindly endorsed the LSD's request for an organisation membership status from the FIG during the April meeting. Thus, I proposed to the FIG the options for the outcome of the LSD's application for membership: as a subordinate organisation that is fully-owned by the HKIS under the Companies Ordinance [Cap 622] or as a fully independent organisation registered under the Societies Ordinance [Cap 151].

The FIG wants to include all surveyors in this big family. Director Friis-Hansen mentioned that it would be an important decision for the FIG administration, as this new intake policy affects many other member institutions. If all go well, the LSD may attend the General Assembly next year to observe the voting on its possible acceptance as a full member into the FIG.

