

# **The Education for Cadastral Surveying and Young Cadastral Surveyors Network in Japan**

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**Key words:** Young Surveyor Network, Education, License

## **SUMMARY**

The survey educational environment of the world, along with the information society, changes significantly; the demands for surveyors to play an active part in the future are increasing. It cannot be advanced; surveying education in Japan has many challenges such as aging policies. Shows the administrative and qualification systems and actual situation, we introduce that the young surveyors with a collection naturally and specific reality of the surveyor of Japan, we considered the educational environment as a surveyor to be requested in the future.

## **SUMMARY (Japanese)**

世界の測量教育環境は、情報化社会とともに、変化が著しく、未来に活躍する測量者への要求は高まっている。日本の測量教育は、先進的なものとは言えず、高齢化などの多くの課題を持っている。日本の行政・資格制度・実態を示して日本の測量者の特異な実態と青年が自然に集まりを持ったことを紹介し、これから求められる測量者としての教育環境を考察した。

# **The Education for Cadastral Surveying and Young Cadastral Surveyors Network in Japan**

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## **1. CADASTRAL SURVEY, ADMINISTRATION AND EDUCATIONAL ENVIRONMENT IN JAPAN**

First, in the discussion of the educational system for young professionals working in the field of cadastral survey in Japan, a general overview of the current situation of the survey administration would need to be mentioned. With regard to the reforms promoted in the survey administration, several reports have been compiled and publicized in Japan. In this paper, I would like to discuss the current situation of the working environment for young surveyors based on the contents of such reports (Reference Material 1)

### **1.1 Management and Administration of National Land Survey in Japan**

The administrative authorities responsible for the national land in Japan are divided: Ministry of Land, Infrastructure, Transport and Tourism holds the jurisdiction over the land, while Ministry of Justice administers matters related to cadastral information used for the registration of title deeds. These ministries are separately handling the spatial information and not able to cooperate with each other as they are sectionalized in parallel (or, as Japanese people call it “vertically divided”), which is a distinct characteristic of Japanese bureaucracy. (Figure 1) The cadastral survey conducted by the administrative agencies and local municipalities is wide ranged; national land survey pursuant to National Land Survey Act, cadastral investigation, land readjustment projects, agricultural land improvement projects, Real Estate Registration Law Article 14 map making projects, and so on. In such survey projects, mainly the boundaries of each land lot are surveyed and the area of that land is calculated. The administrative agencies plan a project, which is consigned through a bidding system by private survey enterprises having licensed surveyors who consider the scale and required manpower of the project, and the work is subcontracted to a private firm who wins the bid. With regard to the project of launching Geospatial Information Database, since the time it was completed, it has actually not been widely used until now. Much of the data cannot be accessed unless an application is submitted in compliance to the Law Concerning Access to Information Held by Administrative Organs. The Law of NSDI was also legislated, but in reality its effect is less extensive than we had anticipated. The level of understanding regarding NSDI in Japan is considerably different from that of the United States and Europe, and no education on spatial information is being provided to the working staff in the field at the moment.

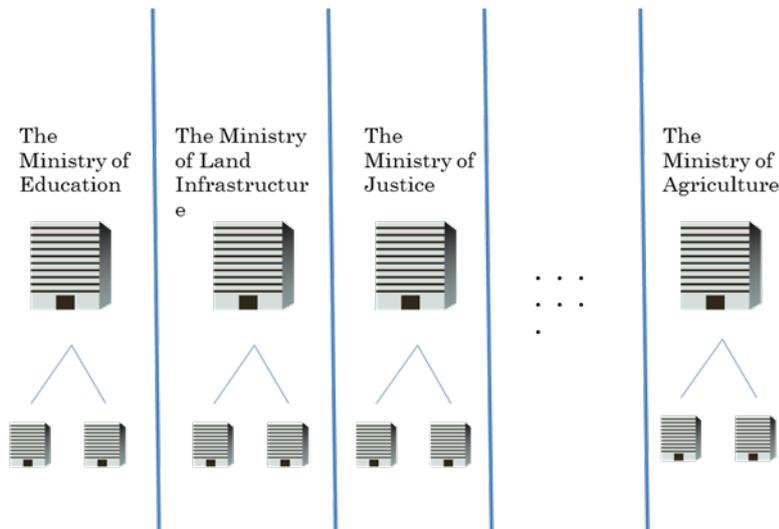


Figure 1: Communication between the Ministries in Japan

## 1.2 Types of Surveyors' Licenses in Japan

The licenses for cadastral survey professionals are designated for the target survey projects, and some licenses are certified by the jurisdictional ministerial agencies and others are certified by non-governmental organizations. (Figure 2)

There are also additional licenses that are highly specialized in certain fields. Such qualifications can help to evaluate the level of expertise and types of specialty of skilled professionals belonging to public agencies that order projects and survey enterprises that subcontract the projects requiring highly advanced survey skills.

The licensing can also indicate the size of survey enterprises.

The surveyor licenses listed below may not be widely known in society, but even a single license holder is highly regarded in the governmental administration and in the market of land transactions.

Certified	License Name	Jurisdiction
Government Certified	Land Surveyor	Geospatial Information Authority
	Land and House Investigator	Ministry of Justice
	Real Estate Appraiser	Ministry of Land Infrastructure, Transport, Tourism
NGO Certified	Land Readjustment professional	Japan Construction Training Center
	GIS expert	GIS Certification Association

Figure 2: Types of Popular Survey Licenses in Japan

**Land Surveyor:** Licensed surveyor who conducts basic survey and public survey carried out by national government, local municipalities, or public agencies. In Japan, each surveyor doing the work is required to be licensed, unlike the license system in foreign countries whereby the quality of cadastral survey results is guaranteed by a licensed firm. For this reason, the number of individual licensed surveyors in Japan is 30 times larger than the other advanced nations. When establishing a private survey enterprise, a licensed surveyor needs to be registered as a regular employee of that enterprise (Survey Act).

**Land and House Investigator:** Specialist of cadastral survey and land lot investigation. It is an exclusive qualification which authorizes the license holder to accept requests from general citizens for processing the division or merger of land lots (Land and House Investigator Law). The cadastral information of certain areas in Japan is a mixture of the survey results from old days and the latest cadastral information of modern days, and therefore, there was a need for specialists who are well versed in how to handle such information. The predecessors of this license were tax inspectors who conducted investigation on fixed property taxes.

**Real Estate Appraiser:** Specialized qualification for conducting appraisal or assessment of the price of a fixed property. Investigation on roadside land prices (to be a standard for determining land prices) can also be conducted with this license (Land Prices Public Announcement Law).

**Land Readjustment Professional:** Expert who readjusts the land in the project area, calculates the price and area for the land owner, and thus enhances the value of the fixed properties in the area (Land Readjustment Law).

**Agricultural Land Improvement and Replotting Professional:** Expert who readjusts agricultural land by improving and replotting the land for enhancing the productivity and promoting use of agricultural land (Land Improvement Law).

**Compensation Management Chief Consultant:** Expert who has the expertise for consulting on purchase of roadside land from the title deed owners and compensating for transfers of buildings in connection with road widening projects (Japan Compensation Consultant Association).

**GIS Expert:** Specialist who has made certain achievements in designing and management of geographic information systems (GIS Association of Japan). The certification system has been set up in reference to the recent qualification criteria of GIS engineers in the United States. Therefore, the license is granted on a point accreditation basis while giving emphasis to the professional achievements of the applicant in the fields of education, work career and contribution.

### **1.3 How to Acquire Surveyor Licenses in Japan**

In Japan, specific licenses are required according to the types of survey project to be undertaken. The license system, however, allows assistant surveyor license holders to be exempted from the survey examination required of Land and House Investigators. (Figure 3)

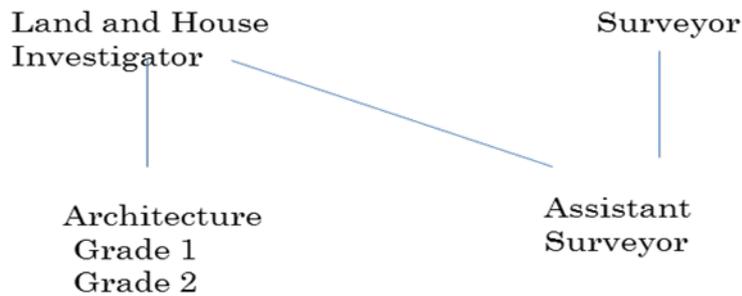


Figure 3: Upgrade License

### 1.3.1 Examination

A license is granted when passing the relevant examination that is held once a year. All examinations are given in Japanese; not available in any foreign languages. Preferential regulations are stipulated for a person who works for an administrative agency that has jurisdiction over such examination for over 10 years while engaging in certain type of work therein to be given the corresponding license.

### 1.3.2 School Education

Students who have completed a specific curriculum provided by civil engineering or architectural department in designated universities or high schools may at times be granted a license. On the other hand, a survey technical school is designed for studying and acquiring knowledge and skills of land survey for a year or two and obtaining a professional license before being employed by a survey firm. Students who want to acquire practical survey skills attend such a school as completing the curriculum equips them to acquire a license. The education provided therein, however, is simply basics of modern survey techniques due to the limited duration of schooling, so the graduates need to continue to study and learn even after their employment in a firm to be a highly skilled specialist.

## 1.4 Survey License System and Surveyors in Japan

The relationship between the license system and actual work undertaken in the business scene is not arranged practically. Not every member of the administrative staff or surveyor working for private enterprises who is involved in the cadastral survey is carrying the relevant license. Especially, the staff engaging in investigation of boundaries with public land is not required to be licensed for such cadastral tasks, and therefore those officials who have never surveyed the land are doing the job.

Since the license system does not require any business experience before taking the examination, many of the license holders simply studied for passing the exam but have never experienced onsite survey work although they are licensed to do the work. For this reason, it can be said that the reliability of license is not really high since business experience is not a requisite for taking the examination. The examination's difficulty level is also said to be high, but the test problems are not mainly on practical knowledge or business processes, as, for example in the examination for Land and House Investigators, the test time is limited and

quick judgment is required for passing it. Moreover, the examination topics are quite limited, excluding the recent geospatial information, cadastral principles, or the latest survey information such as GNSS, 3-D scanning, or UAV.

A report on an ideal survey administration in response to the new age of survey (Reference Material 2) comments on the current survey administrative system as follows: “For a while after the enactment of Survey Act, there were few survey methods to be used, and only those who had a certain level of academic ability could attend universities and higher educational institutions where high-level education was provided, so we could conclude that the survey professionals were equipped with sufficient knowledge.” Looking back on the past 20 years, however, there have been a number of studies and researches on geospatial information published by FIG and other institutions, and it has been already 15 years since the announcement of international cadastral policies as typified by Cadastre 2014. Inside Japan, however, the cadastral licensing system today is almost the same as 15 years ago, and this fact only suggests that no meaningful changes have been practically made in this country.

The difficulty level of the examinations is not necessary high as the problems set out in the tests are not covering diverse fields, and thus the preparatory study does not need to go into widely different topics. For this reason, when the license holders begin to engage in field work, many of them are hardly useful for the task.

Some licenses restrict the holders’ belonging to a certain company. When undertaking a relatively large project, a work group can be made up of professionals who are not familiar with one another, and thus it can be a very inefficient project.

## **1.5 Educational System for Licensed Surveyors in Japan**

As mentioned earlier, in Japan, every one of the surveyors working onsite needs to be licensed, so the relevant license has to be acquired in the first place regardless of whether the person eventually becomes a professional surveyor or not. Therefore there are license holders who have never conducted onsite survey work. For this reason, survey training seminars are sometimes held or on-the-job training is likewise given to them by the agency or private company where they are employed despite the fact that they are already licensed surveyors. This situation is comparable to a licensed baker having his own bakery learning how to bake bread.

Not all enterprises or agencies that engage in survey work are equipped with a system or curriculum for educating their workers in-house. Since only major companies have established a training system for their own surveyors, such activity is supported by Japan Association of Surveyors or other organizations. (Reference material)

Having said the above, there are two steps in the licensing system: to acquire the license, and then to develop professional skills through taking trainings.

## **1.6 Exchange of Cadastral Information with Associated Countries**

South Korea, Taiwan and Japan jointly hold survey technical conferences called International Cadastral Surveyor Conference (ICSC) once every two years on a rotational basis as a venue for exchanging practical business information on cadastre. The conferences provide opportunities to introduce the survey techniques developed or information science studied in the field work and to promote the exchange among young surveyors.

In 2013, the Japanese network of young surveyors supported participation in South East Asia Survey Congress (SEASC) for expanding exchange opportunities with young professionals in Asian countries.

## **2. YOUNG SURVEYORS AND SURVEY EDUCATION**

### **2.1 Young Surveyors and Cadastral Education**

In the midst of such a current situation surrounding survey education, the meaning of the word “survey” is usually never taught in junior or high school unless students attend a civil engineering or architectural course. Unless a person has a parent or relative who is involved in surveying in the work, he will rarely get to know the profession of survey. The promotional activity by surveyors targeting young students is very limited though they may give a lecture on surveying in high school or university, but it is simply a general introduction, far from education in basics of the profession. In addition, there is no academic society that specializes in cadastre in Japan while such researches that are to be categorized as the field of cadastre are actually broken up and conducted separately under geography, sociology, public administration, civil engineering, architecture, information engineering, and so on, thus making up a structure whereby implementation of Land Administration (LA) is quite difficult in Japan.

There are some technical schools in Japan that provide education in surveying to high school graduates, but mainly geodesy is taught therein and the duration of schooling is only one year or two, so the students are given the license as assistant surveyor without acquiring knowledge and skills required of field surveyors. Therefore, as mentioned earlier, these young surveyors are not being trained as useful technical workers in onsite surveying although having certain field experience.

### **2.2 Current CPD Education System**

Survey CPD system which is implemented mainly by Japan Association of Surveyors provides training sessions ranging widely from basic knowledge required of surveyors to more specialized surveying expertise. Point-based evaluation is given to each of the development fields, whereby a surveyor who is often attending various training seminars can achieve more points. Similar lectures or seminars are being held in different localities throughout Japan. As discussed earlier, surveyor is a license to carry out surveying work consigned by governmental agencies, local municipalities or public organizations, and in 2008 the CPD point system was launched for the project ordering body to consign the work according to the acquired points of license holders. As this system has been in operation for a short time yet, it is expected to expand in the future. In recent years, more seminars on surveying are held for students, and ID registration is proactively promoted in schools related to surveying, and such trend also is thought to be growing.

## 2.3 Structuring Organizations for Young Surveyors

In such an environment in Japan where the population is declining and educational systems are not sufficiently organized, it is increasingly important for young surveyors to upgrade their surveying know-how through their own effort. Young technicians can maintain their value as experts by continuously acquiring higher techniques and skills. In our growing information-oriented society, organizations of young surveying professionals are being formed gradually by networking their educational environment through SNS or other media platforms. Among the variety of survey licenses in Japan as introduced in Section 1.2, the group that is taking the lead in networking young surveyors all over Japan is Land and House Investigators who specialize in cadastral survey. They have organized a network of young surveyors in Sapporo and Sendai from as far back as 40 years. Also, as the information infrastructure such as the Internet has been developed further, licensed young surveyors have shared their thoughts and worries regarding the current educational environment by means of video messages using facebook, Ustream, or similar platforms, and thereby the network of young professionals is rapidly and spontaneously growing at the moment.

There are two kinds of groups of young Land and House Investigators; one that originated from a mother association based in the local area and one that was formed by young members who share the same purpose. As many of the young surveyors are more or less aware of and share similar problems, in their information exchange and close communication, they shared the local customs and example cases in their own area, and such information exchange developed the formation of their associations. Such associations also function as a forum where the young surveyors contemplate their role in the upcoming spatial information society from the standpoint of devising a new type of survey work required in the future and also fundamentally reforming the current cadastral survey system. There is Over 700 surveyors in the young surveyor mailing list now

## 2.4 Transition of Age Composition of Young Surveyors Association

Many surveyors are licensed in their 30's: they graduate from university where they study law, architecture, civil engineering or economics, and they join a survey enterprise wherein they continue their study for 3 or 4 years before they can finally pass the surveyor examination. Consequently, it usually takes about 10 years after graduating from university for them to become a licensed surveyor, and therefore there are few license holders under the upper limit age of 35 as qualified to join FIG Young Surveyors Network (Figure 4). At present, such associations are open only to those young surveyors who have already acquired a basic license, and there is no organization in operation for supporting young people who now begin their study to be a professional surveyor. Therefore the association network tends to be composed of members of higher ages.

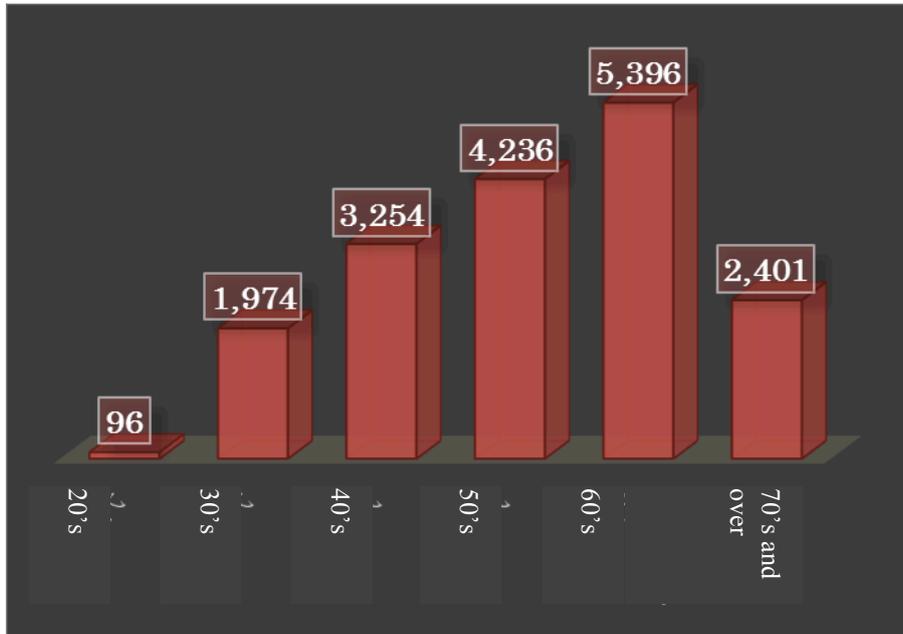


Figure 4: Cadastral Surveyors' Age Composition

This situation is not only an issue that the licensing system is facing today but also the general educational system in Japan which is not structured for the purpose of developing human resources useful for society from their teenage years. Therefore, the above situation will not be fundamentally changed or solved unless the Japanese educational structure is reformed entirely.

## 2.5 History of Young Surveyor Conferences

It was 12 years ago that young surveyors began exchanging information using the mailing list about their concerns over the situation in the cadastral associations where the central representatives were busy organizing and steering the national organization's activities but not actively addressing the issue of the organization's aging population in a systematic manner. Initially, the conference was like a summit meeting for considering the future organizational management mainly through discussion, business information exchange and socializing. The keynote addresses are given by experts in Japan as invited by the executive committee in each area.

After the first conference held in 2004 in Kyoto (see the table), it was subsequently held in Tokyo, Kyoto, Hokkaido, Fukuoka, Hyogo, Nagoya, Fukushima, Hokkaido, and Osaka in order, and then in 2014, it will be held in Okayama. The half of the past conferences were held in metropolitan cities and the other half in different prefectures. There are also efforts in launching Association of Young Land and House Investigators, which is under way to encompass the entire country of Japan. The significance of young surveyors' taking action with keen awareness of relevant issues and initiatives for improvement as well as their style of structuring a cooperative network of surveyors working in neighboring areas is well in harmony with the spirit of sustainability. There is no place for imposing anything on their spontaneity.

Year	Held in	Agenda
2004	Kyoto	Cadastral system and Registration
2005	Tokyo	Cadastral Map (Tokyo, Sendai)
2006	Kyoto	Cadastral system and Registration
2007	Hokkaido	The future of cadastral surveyor
2008	Fukuoka	Alternative Dispute Resolution and Surveyor
2009	Hyogo	Addressing and Spatial Data Infrastructure
2010	Nagoya	Resisted Boundary and Cadastral Surveyor role
2011	Fukushima	Cadastral surveying and Disaster
2012	Hokkaido	The first FIG Young Surveyors Conference in Rome
2013	Osaka	Openstreetmap and Cadastral Surveyor

#### Japanese Young Cadastral Surveyor Conferences

## 2.6 Association of Young Land and House Investigators and Activities

In 2011, Japan suffered Great East Japan Earthquake that victimized thousands of lives. In the midst of that huge disaster, the nation-wide network of young surveyors who have been spontaneously gathered together as mentioned above fully utilized their own effective, emergency online network for exchanging vital information. They communicated what is needed by the disaster victims, what are the topographical features of the disaster area, etc. The onsite disaster victims first accessed their companions all over the country, who then took actions to check the whereabouts of these victims, realizing that it was the top priority.

Those surveyors who experienced the gigantic urban earthquake in Hyogo Prefecture back in 1995 took the lead in arranging emergency vehicles to travel to the Tohoku disaster area before anything else as they knew what is needed most in such a situation from their own experience wherein many lives were lost in that earthquake. The vehicles were secured only two days after the earthquake, and the procurement of water, food and fuel was organized in the south and it was relayed to the disaster area. Four days after the disaster, the supply was delivered to the earthquake site.

Before the earthquake struck, Young Surveyor Conference was planned to be hosted in Fukushima Prefecture that year, but in the wake of the disaster, discussion was held on whether to cancel the conference. The group of young surveyors in Fukushima area unified their efforts through their network, and as a result, the conference was held as planned.



Pic 1: The 9<sup>th</sup> Conference in Fukushima

After of that disaster, young surveyors who live in there couldn't survey for a while because thier instrumentals and PCs were lost or broken. The other of them ware near knew about that and lent them. No young surveyor thought it happened before that disaster.

One of young surveyors group which is Yamanashi area attend local festival "Shingenko Festival" for introducing our job. Because the Samurais had done a survey in Japan once upon a time. Such activities are carried out in many places, it has helped understanding of the profession of surveyors.



### **3. Young Surveyors Network and Issues of Educational Environment**

#### **3.1 Awareness for Reformation, Land Administration Policy and Cadastral Education**

The decline in academic ability of students in Japan and the current environment of cadastral education system necessitate certain improvement measures to be taken against the national land management policy. The unique system of Japanese land administration has been maintained basically unchanged over 100 years due to modern history of Japan and the concept of possession with the will to occupy a land lot, a different concept from that of the Western nations. Because of the extremely complicated land administration that has been practiced according to local and others customs not specified in relevant laws, there are some experts who even insist that any reforms would not virtually change anything. As an age of multi-purpose cadastre and spatial information society is soon coming, the national land whose administrative information is kept and shared in the legacy system can be in a vulnerable situation against disasters due to its many flaws.

#### **3.2 Proposals for Cadastral Education Reform**

The Law of NSDI is supposed to be featured more and more for the effective utilization of the national land, but it has been pointed out that the number of experts who can truly understand the significance of such policy is not large enough. The reducing number of students due to declining birthrate is one of the reasons why the educational institutions are not staffed with teachers who are familiar with information processing technology. This issue needs to be addressed with a combined approach of the integration of educational environments, improvement in vocational counseling in higher education and curriculum designed to draw out the potentials of each student's favorite field, and it is not enough for any one of these elements to be implemented singly to promote the reform but all of them need to interact with one another together.

The surveying education also needs to accommodate a vocational training system for those who want to shift their career to surveying. The study courses and examinations for almost all licenses are open to anyone, but there are limitations for the system whereby training seminars are open only to license holders. Changes have to be made for an extremely unclear structure whereby the work ordering side cannot evaluate the technical capability of survey enterprises or organizations.

The involvement of professional surveyors in the educational system of young surveyors is also necessary for them to present and promote the surveying as an attractive profession since it is highly specialized and regarded in social position.

- Preparation of Japanese Surveyor 2.0 (To introduce the standard on what kind of surveyors are needed)
- Obligation of having field experience before a license is granted
- Information sharing with higher education, vocational training or other systems, and liberalization of participation, organizing workshops facilitated by experts
- Formulation of survey education guidelines and systemization of educational levels
- Coordination and liberalization of common basic education environment with foreign countries and cadastral principles

- Improvement of language skills and lexicography of survey related terms
- Structuring and assessment of online educational environment such as e-Learning systems which is live or not
- Fund management system for supporting studies of young surveyors

It is clear that in order to realize the above measures it is necessary to comprehensively improve the current curriculums of universities and survey technical schools, CPD subjects and operations for experts, and OJT by survey enterprises. To do this, the “vertically divided administrative system” needs to be reformed so as to improve and promote communication and cooperation between the ministries. In the future the international exchange among surveyors in Japan and other countries will be activated, and such information exchange will enable the restructuring of Japanese cadastral environment and the formation of an educational environment beyond the national boundaries. This means we need to look to and learn from cadastral advanced countries while we also try to be useful for other countries where we can, thus creating opportunities for next generation young surveyors to make contributions. It will be a course of wisdom for us to realize and acknowledge that the barriers of international cooperation among young surveyors coming from different countries are lower than aged surveyors may imagine.

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## BIOGRAPHICAL NOTES

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