Promoting the introduction of standardization technology into public surveying projects and educational activities in Japan through an education and certification program:

S-GI-Cert
(Certification of Professionals in Standards for Geographic Information)

Seminar “Standards in Action”, 11th November, 2019

Keiji YAMADA,  
the Association of Precise survey and Applied technology (APA)
Outline

1. APA in Brief
2. Geospatial Chronology in Japan
3. Purpose of S-GI-Cert
4. Background of S-GI-Cert
5. S-GI-Cert at Glance
6. Curriculums
7. Exam Example
8. Achievement
9. Supervisors and Lecturers
10. Current and Future
ASSOCIATION OF PRECISE SURVEY & APPLIED TECHNOLOGY

- Known as “SOKUGIKYO” among professionals in Japan.
- Has been established in 1980, and has become public interest incorporated foundation since 2012.
- Major businesses;
  - a) ISO/TC 211, the only domestic deliberative body in Japan appointed by JISC since 1995, and in charge of JIS.
  - b) Research and development on new technology.
  - c) Standardization in precise survey and mapping technology.
  - d) Dissemination and education of new technology.
- Supported by the investment and membership dues of the member companies.
2. Geospatial Chronology in Japan

**Legal Frameworks**

- **Early 00's**
  - Japan Profile for Geographic Information Standards (JPGIS) published
  - Essentials from both ISO19100, and JIS X7100

- **2005**
  - “Basic Act on the Advancement of Utilizing Geospatial Information (AUGI)” for promoting the advancement of utilization of GI

- **2007**
  - “the Rules for Operating Specifications” has been revised (GSI) to be compliant with JPGIS
  - “JPGIS2014” published (Revision of JPGIS)

- **2013**
  - “S-GI-Cert” launched

- **2014**
  - “S-GI-Cert” has been registered in “Certification qualification of surveying engineer for competitive bidding in contract surveying work” at Geospatial Information Authority (GSI)

- **2016**
  - 2016 Basic Act on the Advancement of Public and Private Sector Data Utilization
  - “G-Spatial Information Center” launched [https://www.geospatial.jp/gp_front/](https://www.geospatial.jp/gp_front/)

**Industry side**

- **2005**
  - 2001 APA has been organizing Standardization promotion seminar and training for more than 5,000 professionals by today

- **2007**
  - Japan Profile for Geographic Information Standards (JPGIS) published

- **2013**
  - Essentials from both ISO19100, and JIS X7100

- **2016**
  - Both legal framework and practical foundation have become mature, and Entering era of full range of distribution and utilization of geospatial data
3. Purpose of S-GI-Cert

Certification of Professional in Standards for Geographic Information (S-GI-Cert)

• Organized by APA in association with academic/3rd party supervisors.

• Qualification and registration of professionals who have knowledge and skills of GI-standards, and are engaged in the maintenance, management, and operation of GI.

• For the purposes of promotion of adaption and dissemination of GI-standards, and accelerating utilization of GI.
4. Background of S-GI-Cert

- APA has been putting efforts in conducting seminars and training courses for promotion and education for GI-standards in collaboration with GSI for 20 years.
  - More than 4,000 attendees, more than 1,000 trainees.
  - There were already many professionals trained who can perform GI-standard required works, and certification program for the professionals may give them more practical opportunities.

- S-GI-Cert aims to be an incentive for the professionals to contribute on GI works compliant with the standards, ensure GI quality, and distribution.

- GSI has registered S-GI-Cert on “Certification qualification of surveying engineer for competitive bidding in contract surveying work” on 2014 for a qualification requirement on public procurements.
5. S-GI-Cert at Glance

- Started in 2013 (7 years now).
- Over 1,800 qualified professionals (as of Jan 2019).
- Utilized for public survey and mapping procurements as a qualification requirement.
- The program qualifies professionals by hands-on training and exams to be endowed with the knowledge and skills of the GI-standards (ISO 19100, JIS X7100, and JPGIS).
- The program is designated for both professionals who provides GI-services, and those users.
- The qualifications are divided into 3 levels (See next slide) depending on the range of skills and knowledge.
Advanced
Qualifies by advanced level examination for examinees who has been qualified as intermediate level, and 10 years or more practical experience in survey and mapping projects, and is registered surveyor or Japan Information Technology Engineers Examination (Mid level) or PE.jp. Requires every 5 year refresh training course.

Intermediate
Qualifies by in combination of 3 days training course and intermediate level examination for examinees who has been qualified as basic level, and 7 years or more practical experience in survey and mapping projects, and is registered surveyor or Japan Information Technology Engineers Examination (Mid level). Requires every 5 year refresh training course.

Basic
Qualifies by in combination of 1 day training course and basic level examination. Requires every 5 year refresh training course.

- Capable to find, analyze, and solve problems related to data acquisition, management, exchange, and application in accordance with GI-standards.
- Capable to design and develop complex service in combination with optimal data and system in accordance with GI-standards.
- Capable to stable run the developed service in accordance with GI-standards.
- => Consultants, Lecturers, etc.

- Capable to explain GI-standards to both professionals and non-professionals, plus capable to study relevant standards.
- Capable to design data product specification and producing dataset based on user needs compliant with GI-standards.
- Capable to design and develop application service based on user needs compliant with GI-standards.
- => Project managers, Engineers, etc.

- Capable to understands basis of GI-standards
- Capable to understands GI-standards complaint data product specification.
- Capable to understands dataset and quality evaluation principles compliant with GI-standards.
- => Data production technicians, Users, etc.
6. Curriculum (Basic)

<table>
<thead>
<tr>
<th>Target Examinees</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Expected level: Production technicians, Users, etc.</td>
<td></td>
</tr>
<tr>
<td>• Qualifies by in combination of 1 day training course and Basic level exam.</td>
<td></td>
</tr>
<tr>
<td>• Requires every 5 year refresh training course.</td>
<td></td>
</tr>
<tr>
<td>Day</td>
<td>9 July 2017 (1day)</td>
</tr>
<tr>
<td>Venues</td>
<td>Sapporo, Sendai, Tokyo. Nagoya, Osaka, Fukuoka (6)</td>
</tr>
<tr>
<td>Subject</td>
<td></td>
</tr>
<tr>
<td>1. Basis of JPGIS</td>
<td>40 min.</td>
</tr>
<tr>
<td>2. Application scheme</td>
<td>60 min.</td>
</tr>
<tr>
<td>3. Quality evaluation principles</td>
<td>50 min.</td>
</tr>
<tr>
<td>4. Metadata</td>
<td>20 min.</td>
</tr>
<tr>
<td>5. Data product specification</td>
<td>60 min.</td>
</tr>
<tr>
<td></td>
<td>(230 min.)</td>
</tr>
<tr>
<td>Exam.</td>
<td>Multiple-choice tests, 30 questions</td>
</tr>
<tr>
<td>Fee</td>
<td>Training 15,000JPY, Exam. 7,000JPY</td>
</tr>
</tbody>
</table>

Actual, in 2017
6. Curriculum (Intermediate)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Time (min.)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. GFM and application scheme</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>2. Spatial scheme</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>3. Temporal scheme</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>4. UML designing hands-on</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>5. Quality requirements</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>6. Coverage</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>7. Spatial identifier</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>8. Data product specification</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>9. XML</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>10. GML</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>(Actual, in 2017)</td>
<td>(960)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exam.</th>
<th>Time (min.)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Multiple-choice tests, 20 Questions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Essay-type and Drawing (UML) test, 3 Questions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Fee                                                  |             |  |
| Training 50,000JPY, Exam. 10,000JPY                  |             |  |

| Target Examinees                                     |             |  |
| Expected level: Project managers, Engineers, etc.    |             |  |
| Qualifies by in combination of 3 days training course and Intermediate level exam. |             |  |
| Examinees who has been qualified as Basic, 7 years or more practical experience, and is registered surveyor or JP Information Technology Engineers Examination (Mid level). |             |  |
| Requires every 5 year refresh training course.       |             |  |

Day: 28 - 30 September 2017 (3 days)

Venues: Tokyo, and Osaka (2)
### 6. Curriculum (Advanced)

<table>
<thead>
<tr>
<th>Target Examinees</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Expected level: Consultants, Lecturers, etc.</td>
<td></td>
</tr>
<tr>
<td>• Qualifies by Advanced level exam.</td>
<td></td>
</tr>
<tr>
<td>• Examinees who have been qualified as Intermediate level, and 10 years or more practical experience, and is registered surveyor or JP Information Technology Engineers Examination (Mid level) or PE.jp</td>
<td></td>
</tr>
<tr>
<td>• Requires every 5 year refresh training course.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day</th>
<th>5 May 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venue</td>
<td>Tokyo (1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exam.</th>
<th>No training course conducted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Essay-type test, Select 2 from 3 questions, 600 x 2 sheets</td>
</tr>
</tbody>
</table>

| Fee                        | Training Exam. 30,000JPY    |
Which of the following statements about class and instance is most not appropriate? Choose one from 1-5.

1. Class is a concept that describes objects that have a common property.
2. Data created based on the class contents and structure as an Instance.
3. Abstract class cannot create a instance directly, so it must have a concrete class below it.
4. When the spatial attribute of a class is a point, the instance is point data.
5. Concrete classes are used to simplify complex models.

(from 2014)
Look at the GML application schema below and select one of the following 1 to 5 for the correct combination that applies to A, B, and C.

```xml
<?xml version="1.0" encoding="UTF-8"?>
xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xs="http://www.ascc.net/xml/schematron"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
elementFormDefault="qualified" version="1.0">
  <xsd:B namespace="http://www.opengis.net/gml/3.2"
schemaLocation="http://standards.iso.org/ittf/PubliclyAvailableStandards/ISO_19136_Schemas/gml.xsd"/>
  <xsd:element name="Dataset" type="ts:DatasetType"
substitutionGroup="gml:AbstractGML"/>
  <xsd:complexType name="DatasetType">
    <xsd:complexContent>
      <xsd:extension base="gml:AbstractGMLType">
        <xsd:sequence>
          <xsd:element ref="gml:AbstractGML" maxOccurs="unbounded"/>
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
</xsd:schema>
```

1. gml include gml:AbstractFeature
2. gml import gml:AbstractGML
3. ts import gml:AbstractGML
4. ts include gml:AbstractFeature
5. (from 2014)
Due to the frequent occurrence of disasters in recent years, the importance of disaster prevention measures is increasing. According to the National Land Resilience Basic Plan, which was approved by the Cabinet in June 2014, “To secure collecting disaster-related information with a variety of collection methods from the public and private sectors by utilizing GI and ICT” is one of the policies to promote national resilience.

Now, assuming you are a project manager, and in order to improve accessibility to disaster-related information held by disaster prevention-related organizations, you will consider building a portal site that has a function to search and provide disaster-related information. Answer the following questions with a total of three answer sheets.

(1) From the point of view of search and provision, list three or more current issues related to disaster-related information that you envisage and show them on one answer sheet.

(2) From the issues extracted in (1), select one that you think is most important and describe the solution. In addition, explain the outline of the GI-standards to be used to solve the problem, and show the specific usage on one answer sheet. If there is a usage problem in the GI-standard, describe the problem and how to solve it.

(3) Propose an application that utilizes disaster-related information and GI-standards obtained through the portal site on one answer sheet. The disaster-related information to be used may be your assumption.

(from 2015)
8. Achievement
as of Jan 2019

- Basic training and examination (- 2013)
  - Total number of examinees 2,474, Qualified 1,694 (68%)
  - Could be qualified by having class room lecture

- Intermediate training and examination (- 2013)
  - Total number of examinees 538, Qualified 112 (20%)
  - Could be qualified with practically capable skills and knowledge (5% of total examinees)

- Advanced examination (- 2015)
  - Total number of examinees 78, Qualified 27 (35%)
  - Could be qualified with lecturer level experience, skills and knowledge (1% of total examinees)
Exam. (Intermediate) Results

<table>
<thead>
<tr>
<th>Year</th>
<th>Examinees</th>
<th>Passed</th>
<th>Pass rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>81</td>
<td>18</td>
<td>22.2%</td>
</tr>
<tr>
<td>2014</td>
<td>87</td>
<td>19</td>
<td>21.8%</td>
</tr>
<tr>
<td>2015</td>
<td>78</td>
<td>10</td>
<td>12.8%</td>
</tr>
<tr>
<td>2016</td>
<td>97</td>
<td>13</td>
<td>13.4%</td>
</tr>
<tr>
<td>2017</td>
<td>106</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exam. (Advanced) Results

<table>
<thead>
<tr>
<th>Year</th>
<th>Examinees</th>
<th>Passed</th>
<th>Pass Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>20</td>
<td>4</td>
<td>20.0%</td>
</tr>
<tr>
<td>2016</td>
<td>15</td>
<td>4</td>
<td>26.7%</td>
</tr>
<tr>
<td>2017</td>
<td>10</td>
<td>3</td>
<td>30.0%</td>
</tr>
</tbody>
</table>
9. Supervisors and Lecturers

- Program advisory board
  - To ensure fairness and transparency, experts from academia and experts from public authorities are appointed as program advisory board, supervises lecturers, approves exam contents, authorizes results of exams, and finally judges qualifications.

- Lecturers
  - Started with Lecturers who have been involved in TC211 national committee secretariat, Contracted experts for JIS study.

- Trainees to be trainers
  - Lately, advanced level qualified professionals may have an opportunity to be a lecturers, make the program self-sustainable.
10. Current and Future

• Continues Professional Development
  – Qualified professional must have refresh learning class every 5 years to be continuously registered.
  – 7 years past since the program started. APA runs e-learning refresh training course through the internet.

• Usage of the program in public works
  – Number of tenders of public survey works requires the qualified professional has been continuously ascending.

• Interest from public organization side
  – Major part of examinees are still contractors (Private survey and mapping firms). However, number of examinees from public organization side increases and showing the knowledge of GI-standards is becoming more essential on public sector side too.

• S-GI-Cert will continue to enhance utilization of GI-standards to the practical fields in Japan.
Thank You for Listening