Multi-level Learning Schema – A need of today for Geospatial requirements

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Geo-Spatial Technology – Road Map

Some Challenges ahead …
- Two-thirds of the World is yet to be mapped..
- 2D/3D city maps, Road and Utility Networks, Thematic maps...
- Integration of disparate sources, applications and data bases in real time… AI, BDA..
## Employment Profile

<table>
<thead>
<tr>
<th>Occupation Title</th>
<th>Total Employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total geospatial technology industry</td>
<td>78,990</td>
</tr>
<tr>
<td>Aerospace engineers</td>
<td>13,290</td>
</tr>
<tr>
<td>Engineering managers</td>
<td>2,110</td>
</tr>
<tr>
<td>Computer software engineers, systems software</td>
<td>2,030</td>
</tr>
<tr>
<td>Management analysts</td>
<td>2,010</td>
</tr>
<tr>
<td>Inspectors, testers, sorters, samplers, and weighers</td>
<td>1,870</td>
</tr>
<tr>
<td>Production, planning, and expediting clerks</td>
<td>1,590</td>
</tr>
</tbody>
</table>

### Geospatial Technology-Related Occupations

- Environmental engineers
- Environmental engineering technicians
- Surveying and mapping technicians
- Cartographers and photogrammetrists
- Geoscientists, except hydrologists and geographers
- All other drafters, engineering, and mapping technicians
- Engineering managers
- Industrial engineering technicians
- Surveyors
- Architectural and civil drafters
- Mechanical drafters

Drivers to Career Selection

- Employment
- Economic Development
- Education

**Power of E3**

- Community Development
  - Satisfaction
  - Security
  - Quality of Life
- Economic Development
  - Jobs & Income
  - Consumer Spending
  - Tax Base
- Business Development
  - Payroll
  - Revenues
  - Return on Investment
# Sustainable workforce – a need of today

## Human Resource Development

<table>
<thead>
<tr>
<th>Supply of Technical and Professional Personal (K12, UG/PG students, Teachers)</th>
</tr>
</thead>
</table>

## Organizational Strengthening

| Strengthen Govt./NGOs  
1. Management Capacity on Geo-ICT solution (systems, processes)  
2. Strategic Management Principles (professional, field managers, trainees...) |
|---|

## Institutional Strengthening

| Strengthen Capacity of Organizations to  
1. Develop appropriate Mandates & Modus Operandi  
2. Legal & Regulatory Frameworks (Decision makers, Local & National Govt. / NGO Administrators, Law and Policy staffs, ...) |
|---|
Identifying Multiple Levels in Geospatial Technology

To Whom: K-12 School Students

Characterization

IT Skills: LIMITED
Purpose: AWARENESS
Resources: LOW
Theory: LOW

To Whom: UG/PG Students

Characterization

IT Skills: MEDIUM
Purpose: BASIC/ADVANCED SKILLS
Resources: LOW/MEDIUM
Theory: MEDIUM/HIGH
# Identifying Multiple Levels in Geospatial Technology

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>IT Skills</th>
<th>Status</th>
<th>Purpose</th>
<th>Resources</th>
<th>Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Students</td>
<td>K-12</td>
<td>Limited</td>
<td>Awareness</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>UG Students</td>
<td>2 Years College</td>
<td>Limited</td>
<td>Basic Skills</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>PG Students</td>
<td>Degree/Diploma</td>
<td>Medium</td>
<td>Advance Skills</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Researchers</td>
<td>Masters</td>
<td>Advanced</td>
<td>Research</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Academicians</td>
<td>Masters/PhD</td>
<td>Advanced</td>
<td>Students</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Government</td>
<td>Degree/Diploma</td>
<td>Medium</td>
<td>Citizens</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Industry</td>
<td>Degree/Diploma</td>
<td>Advanced</td>
<td>Customers</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>NGO</td>
<td>Degree/Diploma</td>
<td>Limited</td>
<td>Focus Group</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
Pedagogy at K-12 Level Awareness

Characterization

- IT Skills: LIMITED
- Purpose: AWARENESS
- Resources: LOW
- Theory: LOW

Learning by “DOING”

Water Rocket Making & Launching Competition

Poster Competition

Ms. Yu Qi Chew (Malaysia)
Amazing Outcomes

THEME: “UNITED THROUGH SPACE”

Ms. Charlene Josephine (Indonesia)
Challenges in Geospatial Technology training

• Ever evolving technologies:
  - Advanced sensors,
  - innovative (agile) platforms,
  - intelligent processing,
  - multi-sources integration strategies,
  - Ready to Analyze data with high reliability,
  - Higher demand for specialized courses,

• Challenges in
  - Getting suitable “Trainers”
  - Building Laboratories (in house and field)
Possible Solutions for Geospatial Technology

• **Cross-border Education**
  - Joint education programs (JEPs),
  - dissemination approaches (seminars, tutorials, workshops, symposia, e-bulletins and other mechanisms & tools),
  - Cooperating with other Geo-societies;
  - Cooperate with regional partners;

• **Webinars/Outreach programs for “first” awareness**
  - Promotion of web-based resources with free access,
  ......
Best Practices in Capacity Building:

Before

• What is the best way to accomplish
• To whom are we trying to accomplish
• How to measure that it is the best way

While

• How to quantify the performance of trainers, trainees, material and methodology..

Post

• What measures to be taken for improvement..
• What new topics for future training needs..
• Alumni Feedback and suggestions
• How to enhance retention of knowledge gained
Instructional Systems Design (ISD)

- **Purpose**: Determining the state and needs of the learner, defining the end goal of instruction, and creating some "intervention" to assist in the transition.

- There are many instructional design models but many are based on the **ADDIE model** with the five phases:
  - Analysis
  - Design
  - Development
  - Implementation
  - Evaluation
## ADDIE Model ... in a nutshell

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gain Attention</strong></td>
<td>• Present the learner with an introductory activity that engages him/her</td>
</tr>
<tr>
<td><strong>Inform objectives</strong></td>
<td>• Present the learner with learning objectives</td>
</tr>
<tr>
<td><strong>Stimulate recall of prior learning</strong></td>
<td>• Present the learners with an experience that stimulates their prior knowledge</td>
</tr>
<tr>
<td><strong>Present Stimulus</strong></td>
<td>• Present the learner with content materials</td>
</tr>
<tr>
<td><strong>Provide Guidance</strong></td>
<td>• Present the learner with examples</td>
</tr>
<tr>
<td><strong>Elicit Performance</strong></td>
<td>• Present the learner with practice activities</td>
</tr>
<tr>
<td><strong>Provide Feedback</strong></td>
<td>• Present the learner with practice and feedback</td>
</tr>
<tr>
<td><strong>Assess Performance</strong></td>
<td>• Present the learner with post-assessment items</td>
</tr>
<tr>
<td><strong>Enhance Retention &amp; Transfer</strong></td>
<td>• Present the learner with resources that enhance retention &amp; transfer of knowledge</td>
</tr>
</tbody>
</table>
Structure of “in-person” training @ IIRS

- Lectures: [VALUE]%
- Field Work: [VALUE]%
- Practicals/Tutorials/Project Work: [VALUE]%
- Self study/Seminars/Examination: [VALUE]%

75% - Hands-on training
Preparing a Multi-level Learning Schema

<table>
<thead>
<tr>
<th>Multi-Levers</th>
<th>Curriculum</th>
<th>Pedagogy</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Geoinformatics BoK</td>
<td>Domain-Specific Content</td>
<td>Field Work</td>
</tr>
<tr>
<td></td>
<td>SOP and Best Practices</td>
<td>Product Documentation</td>
<td>Lab work Work</td>
</tr>
<tr>
<td></td>
<td>Standardization</td>
<td>Instructor Led Delivery</td>
<td>Independent Activities</td>
</tr>
<tr>
<td></td>
<td>Learning Motivation</td>
<td></td>
<td>Team/Group Activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Familiarity with Curriculum</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Integration in Practice</td>
</tr>
<tr>
<td>School Students</td>
<td></td>
<td></td>
<td>Self-learning</td>
</tr>
<tr>
<td>Undergraduate College</td>
<td></td>
<td></td>
<td>Professional Progression</td>
</tr>
<tr>
<td>Graduate Students</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Researchers</td>
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<td></td>
</tr>
<tr>
<td>Academicians</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Industry Professionals</td>
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<tr>
<td>Government Employees</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>NGO Employees</td>
<td></td>
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</tr>
</tbody>
</table>

Source: ISPRS TC-V Initiatives
• **Analytical Model**
  • for Multi-level Geoinformatics Learning - a need to build a strong Human resources for Geospatial Workspace requirement
  • Promoting Space Education from K-12 school level for long term sustainable Geospatial Work Force

• **“Producer-Consumer” Effort**
  • Constant interaction between Industrial partners and Academia to achieve multi-level schema for long term workforce preparation and management.
Thank you for your kind attention