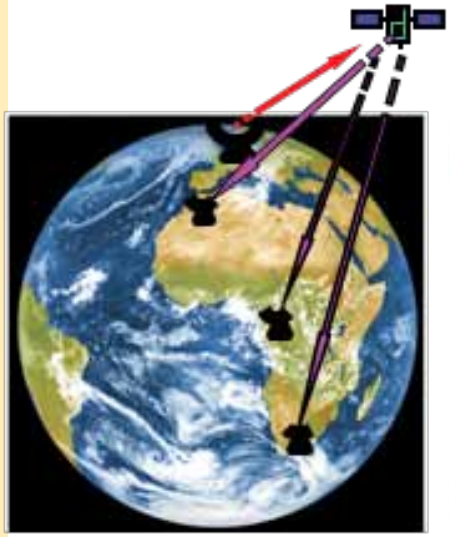

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ISPRS Commission VI
Mid Term Symposium

Cross-Border Education for Global Geo-information

2 – 4 June 2010 ITC, Enschede The Netherlands

ITC

GIN Geo-Informatie Nederland

AARSE

ICA ACI

Programme at a glance

Time	1 June	Wednesday 2 June	Thursday 3 June	Friday 4 June
09.00 – 12.00 09.00 – 10.30		**Registration** **Opening** • Martien Molenaar, Conference Chair • Tom Veldkamp, Rector/dean ITC • Marien de Bakker, on behalf of President Netherlands Society of Geo-information (GiN) • Orhan Altan, President of the ISPRS **Keynote presentations by:** • Ian Dowman: ISPRS Contribution to GEO Capacity Building • Chris Mannaerts: GEONETCast • P.L.N. Raju: The Indian Edusat Programme *location: Auditorium*	**Session 04: E-learning methods and tools** *location: room 4-004*	**Session 08: Cross-border education experiences** *location: room 4-004*
10.30 – 11.00		**Coffee/tea**	**Coffee/tea**	**Coffee/tea**
11.00 – 12.30		**Session 01: Cross-Border Education and Capacity** *location: Auditorium*	**Session 05: E-delivery of education** *location: Auditorium*	**Session 09: E-learning tools and web-enabled education** *location: Auditorium*
12.30 – 13.30		**Lunch**	**Lunch**	**Lunch**
13.30 – 15.00		**Session 02: Getting young people on board** *location: Auditorium*	**Session 06: Cross-border education in Africa** Invited presentation *location: Auditorium*	**Session 10: Closing Session** • Chairs of Commission VI working groups • Mark Shortis: Presentation on the next ISPRS Congress in Melbourne, September 2012, on behalf of Congress Director • President of the ISPRS, Orhan Altan *location: Auditorium*
15.00 – 15.30		**Coffee/tea**	**Coffee/tea**	
15.30 – 17.30		**Session 03: Students consortium** Presentations and discussion afterwards *location: Auditorium*	**Session 07: Demonstrations** *location: 0-146*	
17.30 – 19.00	**Icebreaker**	**Reception**	**17.00 – 18.00:** **TC VI Business Meeting**	
19.00 – 22.00			**Symposium dinner**	

Contents

1. Introduction

1.1. Welcome by Rector ITC

We are happy to see you in The Netherlands and more specifically here in Enschede at ITC. We have been known for 60 years as an institute for capacity building in the field of Geo-Information Science and Earth Observation. Our research and PhD program, our educational programmes and project services focus especially on the needs of the lesser developed countries. We have about 20,000 alumni in more than 170 countries.

In the last years, ITC has put a major effort in the development of e-learning in the form of distance short courses, MSc supervision on a distance, e-support to Joint Education Programmes, and multi-usable courseware. Now that ITC joined the Dutch University System as a Faculty of the University of Twente, we will further develop our activities on e-learning and cross-border education and capacity development in this new setting. Therefore we are happy to host this Symposium. On behalf of the ITC community I wish you a fruitful and enjoyable Symposium.

Tom Veldkamp
Rector ITC

1.2. Welcome by the Conference Chair

Dear Colleagues,

Technical Commission VI has always been a special member of the ISPRS family. The other seven commissions deal with different aspects of the academic and professional domain of ISPRS. They are the platforms where the professionals and researchers present, demonstrate and discuss the latest development. Especially young researchers find their challenges in the further development of the technology and its applications. But new developments become relevant only if they are properly communicated to those who should use them.

During the last two decades we saw a growing interconnectedness of professional and scientific communities around the world. They are involved in world-wide information production chains and they use geo-information for solving the global problems of today. This means that new developments should be communicated fast through these world-wide communities and should be absorbed in the training and education programs for young professionals and for upgrading the knowledge of active professionals.

That is why the modern technology and educational approaches for transferring this new knowledge is of great importance for the ISPRS community. ISPRS TC VI focuses its activities in this 2008-2012 inter-congress period on issues of e-learning, cross-border education and capacity development. But education and training are only effective if there are young people interested in a career in the field of geo-information and earth observation, therefore we will spend special attention to the recruitment of young professionals.

This Symposium will be a good opportunity to discuss these topics face-to-face. The organizing committee was very happy with the response to the call for papers and for participation. We did our very best to prepare this Symposium on “Cross Border Education for Global Geo-information”. It is now up to you to make it a success.

Martien Molenaar
President ISPRS TC VI

1.3. Information about Enschede

Enschede, with a population of 160.000 is in the eastern part of The Netherlands, 5 km from the border with Germany. It is a major educational centre with ITC, the University of Twente, the Enschede Polytechnic and many other schools and colleges in the area. The Symposium is held at ITC, with excellent lecture rooms and exhibition areas.

Detailed information about the city of Enschede can be found in the brochure “Welcome to Enschede” which is in the conference bag.

1.4. Contact information

If you have questions during the Symposium please go to the registration desk near the auditorium.

2. Programme Organisation

2.1. Scientific programme committee

- Prof. Martien Molenaar – President ISPRS Commission VI
- Dr. Henny Mills – Chair ISPRS WG VI/1
- Joel Fisler – Co-Chair ISPRS WG VI/1
- Dipl.-Inform Gerhard König – Chair ISPRS WG VI/2
- Dr. Peter Tian-Yuan Shih – Co-Chair ISPRS WG VI/2
- Drs. Sjaak J.J. Beerens – Chair ISPRS WG VI/3
- Dr. Tao Cheng – Co-Chair ISPRS WG VI/3
- Dr. Jide Kufoniyi – Chair, ISPRS WG VI/4
- Dr. V.K. Dadhwal – Co-Chair, ISPRS WG VI/4
- Dr. Manos Baltsavias – Chair, ISPRS WG VI/5
- Dr. Nguyen Dinh Duong – Co-Chair, ISPRS WG VI/5
- Cemal Özgür Kivilcim – Chair Student Consortium Board, ISPRS WG VI/5
- Prof. Armin Gruen – Chair, ISPRS WG VI/6
- Prof. Shunji Murai – Co- Chair, ISPRS WG VI/6
- Dr. Chris Mannaerts – ITC
- Dr. Rob Lemmens – ITC
- Dr. Marie-José Verkroost – ITC

2.2. Local organising committee

- Martien Molenaar
- Tsehaie Woldai
- Saskia Tempelman

3. Symposium Support Programme

3.1. Social events

Tuesday 1 June: 17.30 – 19.00 Icebreaker reception at ITC
Wednesday 2 June: 17.30 – 19.00 Reception at ITC
Thursday 3 June: 19.00 – 22.00 Workshop dinner

3.2. List of hosts and sponsors

ITC

University of Twente
Faculty of Geoinformation Science and Earth Observation (ITC)
P.O. Box 6
7500 AA Enschede
The Netherlands
www.itc.nl

ISPRS

Secretary General ISPRS
National Geomatics Centre of China
28 Lianhuachixi Road
Haidian District
Beijing 100830
PR of China
www.isprs.org

Geo-information Netherlands (GiN)

P.O. Box 1058
3860 BB Nijkerk
The Netherlands
www.geo-info.nl

AARSE

c/o ITC
P.O. Box 6
7500 AA Enschede
The Netherlands
www.aarse-africa.org

ICA

www.icaci.org

4. General Information

The overall topic of the symposium is: "*Cross-Border Education for Global Geo-information"*. The Programme of the Symposium embraces the Opening Session, with 3 keynote speakers, 8 technical sessions, a demonstration session and a closing session.

On this page you will find arrangements and programme information for the Symposium. Information regarding the keynote speakers, sessions, demonstrations and social events, organized by the Organizing Committee are also to be found here.

4.1. Venue

The Symposium will be held at ITC in Enschede. All meeting rooms for the Symposium will be located at ITC. Room 4-004 is on the fourth floor, room number 004. Room 0-142 is on the ground floor, room 042. Signs will direct participants to rooms.

Room assignments are as follows:

Opening Session	Auditorium
Keynote speakers	Auditorium
Sessions	Auditorium/ 4-004
Symposium Secretariat	Reception desk, near Auditorium
Coffee Breaks	Annex/0-142
Ice breaker reception Tuesday	Annex/0-142
Symposium Dinner	'*Restaurant 10*', Volkspark
Lunches	Annex/0-142

4.2. Registration desk / Symposium secretariat

The registration desk for Symposium will be located on the ground floor, adjacent to the entrance of the Auditorium. In case you have any questions, or if you need any facility, please go to the Registration desk / Symposium secretariat.
The registration desk / Symposium secretariat is open according to the following schedule of operation:

Tuesday 1 June 17.00 – 19.00 hrs
Wednesday 2 June 08.00 – 17.30 hrs
Thursday 3 June 08.00 – 17.30 hrs
Friday 4 June 08.00 – 15.30 hrs

4.3. Name badges

Name badges and conference information will be handed to all delegates when registering. Name badges are required for entry to all Symposium events: the Plenary and Technical Sessions, including the coffee breaks and the social event.

4.4. Refreshments

Coffee and tea will be served in room Annex/0-142.

From Wednesday 2 June to Friday 4 June:
08:30 - 09:00 Coffee/ tea
10:30 - 11:00 Coffee/ tea
15:30 - 16:00 Coffee/ tea

Lunch will be served to all Symposium participants' in room Annex/0-142. Participants should wear their name badge to enter the lunch area. The early morning coffee, the lunches and coffee/tea breaks are all included in the Registration Fee of all registered participants and guests of the Symposium.

Lunch breaks are as follows:

Wednesday 2 June:	12.30 -13.30 hrs
Thursday 3 June:	12.30 -13.30 hrs
Friday 4 June:	12.30 -13.30 hrs

4.5. Language of the Symposium

The working language of the Symposium will be English.

4.6. Internet connection

Wireless internet connection is available throughout the building and garden. During the Symposium, Internet computers will also be available for usage for conference participants (free of charge). Check the IT manual in your conference bag how to connect to the wireless network and other IT facilities at ITC.

4.7. Information for speakers

Speakers can hand in their presentation at the conference desk. A technician will be available to assist the speakers with their presentations. The presentation will be uploaded to the computer in the room in which you present.

The Speakers of the Sessions have a maximum of 15 - 20 min. for their presentation and discussion depending on the session. The Session Chair will give a warning to wrap up.

4.8. Attendance certificates

Attendance Certificates will be available from the Secretariat Desk upon request.

4.9. Travel Service

For any travel needs, such as reconfirmation of flights please report to registration desk.

4.10. Illness

For any medical problems please report to the registration desk.

4.11. Safety

Please do not leave anything of value unattended. There is security present but do not provoke theft.
If you notice a fire you should immediately raise the alarm by breaking the glass of the nearest manual fire alarm call point or dial 260 at the nearest phone.

In case of fire or other emergency please stay calm and listen to the announcements and to staff indicating where you should go and what you should do. We have trained personnel present within the ITC building.

4.12. Smoking policy

Smoking is prohibited in the ITC building. However, a special smoking room can be found in 0-108 near the Restaurant. Smoking is also allowed outside the building on the restaurant terrace (garden).

4.13. Mosque

A mosque is situated on the third floor (room 3-031).

4.14. Library

The library is situated on the third floor (room 3-036).

5. Detailed Programme of the Symposium

Tuesday 1 June

17.00 - 19.00 Registration

17.30 - 19.00 Ice Breaker Reception
Location: Annex/0-142

Wednesday 2 June

08.00 – 12.00 Registration

09.00 – 10.30 Opening Session
Location: Auditorium
Chair: Martien Molenaar / Rappporteur: Tsehaie Woldai

Welcome words by:
- Martien Molenaar, Conference Chair
- Tom Veldkamp, Rector/dean ITC
- Marien de Bakker, on behalf of President Geo-Information Netherlands (GiN)
- Orhan Altan, President of the ISPRS

Keynote presentations by:
- Ian Dowman: ISPRS Contributions to GEO Capacity Building
- Chris Mannaerts: GEONETCast
- P.L.N. Raju: The Indian Edusat Programme

10.30 – 11.00 Coffee/Tea Break

11.00 – 12.30 Session 01: Cross border education and capacity development

Location: Auditorium
Chair: Jide Kufoniyi / Rapporteur: P.L.N. Raju

Erasmus Mundus - External Cooperation Window as a Framework for Higher Education Cooperation in the Middle East Region: Opportunities and Challenges
Ali Akbar Abkar
Uranus Space Information Technology Ltd, Iran

Mapping Geo-Information Education in Europe
Frans I. Rip
Wageningen University, The Netherlands

Multi-level Geoinformation Capacity Building Programs for Domestic and International Training in Taiwan
Tian-Yuan Shih
Department of Civil Engineering, National Chiao Tung University, Taiwan

Capacity building in Applications of Remote Sensing and GIS for Disaster Risk Assessment
Nalin Senevirathne
Asian Institute of Technology, Thailand

12.30 – 13.30 Lunch

13.30 – 15.00 Session 02: Getting young people on board

Location: Auditorium
Chair: Armin Gruen / Rapporteur: Cemal Özgür Kivilcim

Activation, motivation and support of learning photogrammetry at the Bachelor's level
Anna Erving
Aalto University School of Science and Technology, Finland

The Role of International Geomatics Organisations in the Promotion of Continuing Professional Development (CPD)
David Fairbairn
Newcastle University, United Kingdom

The role of Geospatial Associations in Promoting the Profession to Young People
Rakesh Malhotra
North Carolina Central University, USA

Go Geo!
Hendrik Westerbeek, Cadastre, Land Registry and Mapping Agency, The Netherlands

15.00 – 15.30 Coffee/Tea Break

15.30 – 17.30 Session 03: Students consortium

Location: Auditorium
Chair: Manos Baltsavias / Rapporteur: Mila Ivanova Luleva

ISPRS Student Consortium Mid-Term Status Report (2008-2010)
Cemal Özgür Kivilcim
Department of Geomatic Engineering, Civil Engineering Faculty, Istanbul Technical University, Turkey

Role of Internet as a communication platform and ISPRS Student Consortium Web Site
Cemal Özgür Kivilcim
Department of Geomatic Engineering, Faculty of Civil Engineering, Istanbul Technical University, Turkey

Promotion of the GIS-ICT profession to Young People (The Student Consortium) through Web-Based Education
Olutoyin Justus Oloniteru
Walden University, USA

Open discussion

17.30 – 19.00 Reception
offered by Geo-Information Netherlands (GiN)

Thursday 3 June

09.00 – 10.30 Session 04: E-learning methods and tools

Location: 4-004
Chair: Gerhard König / Rapporteur: Ivana Ivánová

E-learning tools as teaching aid in Geomatics
Henny Mills
Newcastle University, United Kingdom

Efficient Communication Strategies for Online Training in Geoinformatics
Thomas Kastler, Beata Grendus
IGF University of Osnabrueck, Germany

Enhancement of E-Learning in Geomatics by the Integration of Dynamic Mathematics Tools
Deshogues Arnaud
EPFL TOPO, Switzerland

Introducing Web-based Elearning Platform at an African University
Mlenge Fanuel Mgendi
Ardhi University, Tanzania

10.30 – 11.00 Coffee/Tea Break

11.00 – 12.30 Session 05: E-delivery of education

Location: Auditorium
Chair: Henny Mills / Rapporteur: Liza Groenendijk

E-delivery of education services as enabling factor for worldwide network of academic partners in Land Administration
Chris Paresi
Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente, The Netherlands

Developing a distance education programming skills course for geo-information science and Earth observation students
Ivana Ivánová
Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente, The Netherlands

Teachers and international higher education
Liza Groenendijk
Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente, The Netherlands

12.30 – 13.30 Lunch

13.30 – 15.00 **Session 06: Cross-border education in Africa**

Location: Auditorium
Chair: Ian Dowman / Rapporteur: Jide Kufoniyi

Invited presentation:
Cross-Border Education in Africa for Global Geoinformation – Focus on WaterNet
W.R. Nyemba
Chairman of WaterNet

Prospects and Challenges of Building Capacity for Space Science and Technology Development in Africa
Joseph Olusola Akinyede
African Regional Centre for Space Science and Technology Education (ARCSSTE-E), Nigeria

TIGER Capacity Building Facility: Growing from Projects to Professional Community
Zoltán Vekerdy
Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente, The Netherlands

RECTAS: Strategies and Synergy of Accomplishing Objectives, Vision and Collaborative Research
Ambrose Isi Ikhuoria
Regional Centre for Training in Aerospace Surveys (RECTAS), Nigeria

15.00 – 15.30 Coffee/Tea Break

15.30 – 17.00 **Session 07: Demonstrations**

Location: 0-146 and 0-165

17.00 – 18.00 **ISPRS TC VI: Business Meeting**

19.00 – 22.00 **Symposium dinner**
Restaurant 10, De Jaargetijden: Het Volkspark

Friday 4 June

09.00 – 10.30 **Session 08: Cross-border education experiences**

Location: 4-004
Chair: Tsehaie Woldai / Rapporteur: Mlenge Fanuel Mgendi

IIRS Perspective on Lessons from Implementation of a Cross Border Joint Education Program
P.L.N. Raju
Indian Institute of Remote Sensing, India

ITC's joint courses – evaluation and new policy
Gerritdina Theresia ten Dam, Fred Paats, Tom Loran
Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente, The Netherlands

Cross-border education: experiences and challenges
Jide Kufoniyi
Obafemi Awolowo University, Nigeria

25 Years Experiences in "Cross-Border" GI Education, How can we Improve?
Marinus de Bakker
University of Groningen, The Netherlands

10.30 – 11.00 Coffee/Tea Break

11.00 – 12.30 **Session 09: E-learning tools and web-enabled education**

Location: Auditorium
Chair: Kevin Mooney / Rapporteur: Zoltán Vekerdy

A Web-Enabled Remote Sensing and GIS Course for Extramural Students
Michael Patrick Tuohy
Massey University, New Zealand

E-Learning Everywhere with Podcasts and Co. – The CityGML Training Course for Mobile Devices
Gerhard Koenig
Technische Universität Berlin, Germany

E-Learning support for hyperspectral remote sensing lectures with emphasis on spectral library database
Mozhgan Abbasi
Shahre-Kord University, Iran

Land Information System over Selenge Aimag, Mandal Soum of Mongolia.
Tuul Batbaldan
"Land Management and Fiscal Cadastre" project/The Administration of Land Affairs, Geodesy & Cartography in the Ministry of Construction and Urban Development (ALAGaC), Mongolia

12.30 – 13.30 Lunch

13.30 – 14.30 Session 10: Closing Session

Location: Auditorium
Chair: Martien Molenaar / Rapporteur: Tsehaie Woldai

- Chairs of Commission VI working groups
- Mark Shortis: Presentation on the next ISPRS Congress in Melbourne, September 2012 on behalf of Congress Director
- Chen Jun, Secretary General of the ISPRS

Abstracts

Session 01: Cross border education and capacity development

Erasmus Mundus - External Cooperation Window as a Framework for Higher Education Cooperation in the Middle East Region: Opportunities and Challenges

Ali Akbar Abkar
Uranus Space Information Technology Ltd, Iran, Islamic Republic of

"Erasmus Mundus External Cooperation Window" - student and academic staff exchange cooperation between Europe and Partner Countries - launched by European Commission in December 2006 as a complement to the original Erasmus Mundus programme (EuropeAid/124352/C/ACT/Multi). The programme provides scholarships for the third-country and European to facilitate mobility of Undergraduate, Masters, Doctorate and Post-Doctoral students between partner countries and Europe, as well as exchange of Academic Staff for the purposes of teaching, training and research.

The Erasmus Mundus External Cooperation Window (EM ECW) is a cooperation and mobility scheme in the area of higher education cooperation launched by Europe Aid cooperation Office and implemented by the Executive Agency Education, Audiovisual and Culture (Relevant information and documentation about the EM ECW can be found at the following webpage: http://eacea.ec.europa.eu/extcoop/call/index.htm).

The EM ECW objective is to achieve better understanding and mutual enrichment between the European Union and third countries cooperation in the field of higher education through promoting the exchange of persons, knowledge and skills at higher education level. This will be achieved through the promotion of partnerships and institutional cooperation exchanges between European Higher Education Institutions and Third Country institutions and a mobility scheme addressing student and academic exchanges.

ITC coordinates the External Cooperation Window Lot 8, former Lot 7 (Iran, Iraq and Yemen) phases 1, 2 and 3 (See http://www.erasmusmundus7.net) comprising 20 university partners (in Europe, Iran, Iraq and Yemen). In view of the implemented three successful phases of the ECW for the geographical window/Lot 8 and the prospects for new windows lunched this year by the EU for the Middle East region, we will highlight the opportunities and challenges experienced so far in higher education cooperation.

The launched of the windows for the Middle East region can be considered as a framework that can provide a better understanding of the challenges and prospects of the countries in the region.

Mapping Geo-Information Education in Europe

Frans I. Rip, Ron J. van Lammeren
Wageningen University, Netherlands, The

The measures to improve the educational infrastructure in the European Union, taken during the last decade, have as yet not influenced the content of Geo Information (GI) education. The introduction of the European Qualification Framework (EQF) might have an influence. The INSPIRE directive, issued by the European Commission is of great importance for the exchange of spatial data among and within countries, but it has no explicit educational dimension. So the question arises what guarantee there is that GI students learn the competences necessary to comply with the INSPIRE objectives like cross-border data harmonization?

In the United States of America, the publication in 2006 of the Geo Information Science & Technology Body of Knowledge (GI-BoK) was intended to set a standard for curriculum development, but outside the US there are few signs of adopting it. In Europe, it looks like every organisation that provides GI education or GI training sticks to its own way of describing the GI courses it offers. This could be a handicap for mutual understanding, for being understood by the private sector and for staff and student mobility. The GI profession would benefit from using a widely accepted common frame of reference for describing GI course content.

For this reason we started research to find out if the American GI-BoK could be such a frame of reference. The research question was how to characterize education content when using GI-BoK. Another question was on which points GI-BoK does not suffice. Finally, the third question was how to present the results of the characterization.

Having ascertained AGILE, the Association of GI Laboratories in Europe as a stakeholder, the first step was to devise a way to describe courses. This resulted in a spreadsheet in which local education content can be related to GI-Bok categories with ECTS as a measure of size. After a few local try-outs, an improved version, accompanied with a concise visualisation, was sent out to other education organizations in the Netherlands and a limited number of organizations elsewhere in Europe.

Results show a variety of non-GI course components and a number of educational elements not mentioned in GI-BoK. The results also indicate this approach enables cross border comparison of GI education, as well as comparison of private sector courses with formally accredited GI programmes. The study provides input for the next version of GI-BoK by showing a list of subjects that at least need to be included in GI-BoK.

Conclusions so far are, that mapping of local course content to GI-BoK needs a local expert, that the size of the non-GI-share is sometimes surprising, that systematic mapping of GI courses seems possible and interesting, and finally that there is an interest in using a common frame of reference to describe course content.

The implications of these findings are, that this method could support the implementation of EQF, and that it would help the cooperation between the pillars of the GI profession (Remote Sensing, geodesy, cartography, etc.) and the application fields.

Therefore the recommendation is to start systematic mapping of GI education in Europe, and at the same time collect input to contribute to the improvement of GI-BoK.

Multi-level Geoinformation Capacity Building Programs for Domestic and International Training in Taiwan

Fuan Tsai[1], Tian-Yuan Shih[2], Chi-Farn Chen[1]
[1]Center for Space and Remote Sensing Research, National Central University, Taiwan; [2]Department of Civil Engineering, National Chiao Tung University, Taiwan

Organized by the Center for Space and Remote Sensing Research (CSRSR) in National Central University (NCU), Taiwan, multiple capacity building curricula in different levels have been developed for domestic and international training programs over the decades. The objective of these programs is manifold, including increasing the awareness of geoinformation technologies and studies to college students and K-12 teachers; enhancing data utilization in applications and technology transfers for local and international users; and promoting international studies and cooperations. The curricula cover a wide range of spectrum in geoinformatics--from fundamentals of remote sensing, GIS and GPS to advanced courses in image processing and spatial analysis; or from data introduction to integrated applications etc. The formats of the programs consist of short-term and long-term training courses, workshops, and graduate (master and doctoral) level programs. Many distinguished scholars and scientists from local and international educational and research institutes are recruited as instructors. Contents of individual programs are designed according to the backgrounds of target students and trainees and the expectations of their achievements. These capacity building and promotion programs have achieved desirable effects in many aspects. The awareness of geoinformation technologies have rooted into the science education and more students are willing to pursue higher degrees in geoinformatics and related disciplines. On the other hand, the adoption and utilization of geoinformation technologies and data has increased in government and private sectors; and international cooperations in researches, applications and studies are also enhancing.

Capacity Building in Applications of Remote Sensing and GIS for Disaster Risk Assessment

Manzul Kumar Hazarika, Lal Samarakoon, Nalin Senevirathne, J.S.M. Fowze, R. de Silva
Asian Institute of Technology, Thailand

Asia-Pacific countries accounted for 90 percent of people affected by natural disasters since year 2000. The year 2004-05 was particularly catastrophic for south and south-east Asia due to the Indian Ocean Tsunami with several typhoons, floods, landslides and earthquakes. With the advances in space science and technology, more and more good quality satellite data are getting available both in terms of resolution and variety (optical and microwave). This has brought tremendous opportunities to the user community for using such a wide range of datasets in areas such as disaster and environmental monitoring.

However, there is not enough capacity in many of the developing countries of the south and south-east Asian region to make use of satellite data effectively for disaster management. This is particularly true for the satellite data available through the Sentinel Asia Project initiated by the Japan Aerospace Exploration Agency (JAXA). Sentinel Asia is consortium of a few space agencies from the region to provide satellite data to a country immediately after a disaster event. As a part of the capacity building effort, JAXA has initiated a program called Mini-Project in 2004 through the Asian Institute of Technology (AIT) in Bangkok. This capacity building project targets most prevalent disasters in the south and south-east Asian countries by selecting relevant agencies, providing need-based technical support, imparting training for handling satellite data, conducting field verifications and guiding them to achieve tangible results. Several projects have been taken up in areas like flood, landslide, drought, earthquake, forest fire, tsunami, volcano monitoring etc. in 14 countries of the region involving national mapping agencies as well as disaster related or development agencies. The results of the Mini-Projects are further disseminated for greater benefits of the society in respective countries. AIT is also implementing a similar project in the ASEAN member countries jointly with Asian Disaster Reduction Center (ADRC).

Session 02: Getting young people on board

Activation, motivation and support of learning photogrammetry at the Bachelor's level

Petri Rönnholm, Katri Koistinen, Anna Erving, Satu Marttila, Suvi Tähtinen, Maaria Posti, Henrik Haggrén
Aalto University School of Science and Technology, Finland

Institute of Photogrammetry and Remote Sensing at Aalto University School of Science and Technology (former known as Helsinki University of Technology) has a long tradition for teaching photogrammetry. During the years 2009 and 2010, two new tools for improving learning processes has been developed and applied. The first one has been an innovation oriented exercise that uses Problem Based Learning (PBL). In this exercise, students at Bachelor's level are asked to get familiar with a company and make a suggestion of innovation that is related with photogrammetry. This exercise was completed the first time in 2009 and again in 2010. Because the students are at the Bachelor's level, the main focus is to increase motivation towards photogrammetric studies. In addition, the exercise supports the students to learn active group working and communication with a real company. The progress of the exercise was monitored by requesting the students to update a blog in the e-learning environment "Optima" (Discendum Oy) provided by the Aalto University. After the first time in 2009, the student's opinions and experiences from the exercise were surveyed with an extensive feedback form. The results show that the motivation among students towards photogrammetry grew during the exercise. The main reasons were the presence of the real company and the authenticity of the exercise task.

Another new tool for improving learning has been a new database, which is dedicated for supporting learning in the fields of photogrammetry, remote sensing and laser scanning. This database was developed during 2009. In 2010 we have started a new exercise, in which students are filling and using the database. The idea is the following: during the complete course, the students are searching weekly some interesting links from the Internet that relate to the content of the lectures. The exercise encourages the students to read the lecture notes weekly and also to search additional information from the Internet. In addition, the database grows and can be used to find quickly relevant information that supports learning. Students have also updated a blog, in which they have asked to state reasons why they have selected a particular link. Therefore, the students have to think more carefully, what kind of links they are adding in the database. In addition, a blog assists for monitoring the progress of the exercise.

The Role of International Geomatics Organisations in the Promotion of Continuing Professional Development (CPD)

David Fairbairn[1], David Fraser[2]
[1]Newcastle University, United Kingdom; [2]Royal Melbourne Institute of Technology University, Australia

A number of diverse issues including changing labour markets, a perception among employers that employee competence in a job must be maintained, rapid development and obsolescence of technologies, globalisation and embracing of international standards, and developing views on the role of education, have directly led to an expansion of the supply of and demand for Continuing Professional Development (CPD) resources in recent decades. The implementation of CPD programmes, however, tends to be supply driven, as individual scientists and engineers seem reluctant to take responsibility for their own training needs. Clearly, therefore, there is scope for international organisations in the discipline of geomatics to pro-actively create and provide CPD material. This paper addresses the various methods by which such organisations can and do address such tasks.

The nature of CPD is considered: the process is modelled and each component is examined in the context of geomatics. Firstly, the type of person and institution interested in CPD is addressed. In geomatics, the consumer of CPD could be an employee within the industry, looking to maintain professional recognition and/or attain higher levels of expertise. However, because of the reluctance, noted above, of individuals to regularly embrace CPD programmes, it is more likely that geomatics companies, governmental mapping agencies, and spatial data analysis consultancies will consume formal CPD programmes on behalf of their staff. Their needs are examined. Secondly, there is a range of suppliers of CPD resources: these could be commercial companies (in our discipline, some large GIS companies have significant CPD programmes), educational establishments (examples are given from the authors' own experiences) or international learned societies (the focus of this paper). Thirdly, the material delivered also forms part of the model. In geomatics, there a wide range of content: this can vary in academic level, proportion of theory to practice, potential for static or dynamic delivery, and level of integration/progression/structure which the resources demonstrate. The material itself may well consist of complex geospatial data sets, resource-hungry software and, with high-speed connections perhaps assumed, dissemination is the final issue: methods can range from on-line, real-time, distance learning, to traditional, classroom-based, block release courses.

Members of the Joint Board of Geospatial Information Societies (JBGIS) include the leading international learned and scientific organisations devoted to the discipline of geomatics. After an overview of each member's CPD-related activity – some, such as FIG and ISPRS, are relatively far advanced in this field – the International Cartographic Association (ICA), which is perhaps less formal in its approach, is examined in more detail. The long-established Commission on Education and Training (CET) of ICA has developed an embryonic CPD programme over a number of years. This development is described, and the scope of the current programme is presented. The experiences of ICA in embracing other institutions' media, in co-developing material, and in independently providing its own resources are discussed. The potential impact of CPD programmes in cartography, both on formal accreditation and on the Association's own working practices, is discussed.

In addition to assessing needs, developing materials and disseminating resources, it is vital to make some evaluation of the impact of CPD programmes. Amongst the achievements of the ICA CET is the regular organisation of short CPD courses in a number of countries such as Iran, Vietnam and Indonesia. Experiences in such venues are described, and an assessment is made of the short- and long-term value of such educational provision.

The role of Geospatial Associations in Promoting the Profession to Young People

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The geospatial information and technology profession has always been one to attract bright young minds. However, as new techniques such as Geographic Information Systems (GIS), Global Positioning Systems (GPS), maps on the Internet and mobile phones have infiltrated our daily lives, interest in the geospatial field over the past 20 years has expanded considerably. This expansion of the field has drawn more young people into the profession and into professional organizations such as the American Society for Photogrammetry and Remote Sensing (ASPRS). In ASPRS, there has been a concerted effort to provide young members with opportunities for involvement in the society through student activities at conferences, mentorship, a place to share their research and findings with other specialists in the field, and exposure to job opportunities in the government, academic, and private sectors of the industry. This paper presents the strategic steps that ASPRS took to form a Student Advisory Council (SAC), offer enhanced volunteer opportunities for students, and establish a provisional certification program. In establishing the SAC in 2006, ASPRS sought to address student issues and concerns by giving them a forum and a voice in the Society to help plan student activities at conferences, facilitate student networking with future employers, and represent students on the national-level ASPRS Board of Directors. The SAC also plans to connect students in ASPRS with students of the International Society for Photogrammetry and Remote Sensing (ISPRS) Student Consortium (SC) through joint activities such as the upcoming Technical Commission IV Symposium in Orlando, Florida. Through the SAC, ASPRS expanded the existing student volunteer program to provide an increased number of students in attendance at national ASPRS conferences through competitive scholarships. The Society extended its long-established Professional Certification Program to include students by initiating the Provisional Certification program. This allows students to take the certification exam shortly following the completion of degree programs and, if successful, enhance their credentials and eligibility for work in the geospatial community. The initiatives highlighted in this paper have all added to the student-friendly and student focused nature of ASPRS.

GO GEO!

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Organisations in the private and public sector, together with educational organisations and the union for geo-experts in The Netherlands have joined hands to start a promotion campaign in secondary schools and universities: Go Geo. In the campaign the magnitude of geo information in modern society is expressed.

The campaign focuses on three kinds of activities. In the first place the Foundation for Labour market and Geo Information has started to make students aware of the importance of geo information and its many possibilities for study and employment. In the second place vital initiatives are being made to improve Geo education at all levels. In the third place the Foundation is taking the lead in organizing contacts and liaising among students, educational institutes and employers.

The campaign aims at sharing knowledge and skills as well as building cooperation in a growing geo information sector in The Netherlands and in Europe. On a yearly basis, employers in The Netherlands need over 300 new employees with accurate knowledge and skills. This includes about 20% real specialists and 80% of staff who are able to implement geo information in all kinds of processes from traffic up to agriculture. There is a huge mismatch between demand and supply. The ratio is out of balance between jobs and the number of students and the quality of education.

The activities of the Foundation Labour market and Geo Information fit within the initiative of the Dutch Government to implement a strategy towards realizing a national spatial infrastructure and also within European activities on promoting cooperation.

Session 03: Students consortium

ISPRS Student Consortium Mid-Term Status Report (2008-2010)

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A new period started in ISPRS with the establishment of the official student and young professional body; ISPRS Student Consortium (SC) in the year of 2004. SC has become a recognized structure of the society within the years. It is now a worldwide communication platform for students, young researchers and professionals within the fields of ISPRS. Various activities took place as it mission to provide a platform for exchange of information and organize student-specific events and other actions that integrate students and youth more effectively into ISPRS. The flame of youth was brought to the XXIInd ISPRS Congress Beijing in 2008. In addition to a number scientific and technical events dedicated to youth in the Beijing Congress, SC Assembly was held where statues of Student Consortium was voted and accepted. With the beginning of the new term, SC Board Members, Regional Coordinators and ISPRS TC VI/5 organized a number of technical activities and attended several events in international, regional and national levels in different continents, to promote SC and its mission.The volunteered members have been working to improve and extend the outputs such as high quality annual newsletter and public related materials and developing a well structured SC website. It organized the 4th annual Summer School in Warsaw, Poland in 2009, a SC Conference and co-organized workshops with with WGVI/5. Several activities were organized and ISPRS SC was presented by members in different student and professional organizations such as Asian Remote Sensing Society and United Kingdom Remote Sensing and Photogrammetry Society, International Geodetic Students Meeting, German Spoken Countries Student Society. In addition to these, SC has put in attention to increase the synergy and the participation of the young generation within ISPRS while maintaining its fundamental role. A number of the ISPRS TC Midterm symposiums in 2010 are targeted to increase the participation and activity of youth. This paper focuses to the continuous development in the organization, evaluates the activity and implementation of work plans between the years 2008-2010. In the final stage, it looks to the overall picture with ideas and further steps should be taken for the future of ISPRS SC.

Role of Internet as a communication platform and ISPRS Student Consortium Web Site

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Today many international organizations are becoming aware of the capacity of youth for a dynamic and sustainable organization. Students, young researchers and professionals are encouraged to attend the organizations with youth oriented events and activities under the main organization events. In order to sustain these activities, relevant commissions, chapters and working groups are taking more important roles for society. ISPRS-International Society for Photogrammetry and Remote Sensing had established its youth body in the year of 2004 after the successful youth activities during and the after of the XXth. ISPRS Congress in Istanbul. Namely, ISPRS Student Consortium was established under Technical Commission VI, Working Group V to guide its activities. In 2008 ISPRS Beijing Congress, Student Consortium had developed its structure and its outputs. To provide a continuous link through members from different countries is one of the main roles of the SC. Hence a website to provide a global communication platform on the Internet was evaluated with a high priority. This paper contains the necessities, needs and benefits of such an interactive system for SC members. The workflow and design for flexible needs, in house programmed database and website are explained with the fundamental software architecture.

Promotion of the GIS-ICT profession to Young People (The Student Consortium) through Web-Based Education

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This paper looks at the importance of web-based education in the promotion of GIS-ICT and GEO-Information profession to young people. It particularly highlights how web-based education (online learning) can be very effective in the delivery of GIS training. The author placed emphasis on the use of “scored” weekly discussion forums and application assignments as a way of ensuring effectiveness of study, students’ participation and ensures seriousness. The paper further highlights how web-based education can ensure remote access to secured GIS based data from different nationalities that would otherwise not be possible in a single interface (in the case of traditional classroom) environment. It concludes by detailing the use and importance of rubrics, class cafes, guidelines, gradebooks, drop box, email, chat, document sharing, webliography, user activities and tutor feedbacks etc for effective web-based education through sharing of the Walden University online learning platform experience.

Session 04: E-learning methods and tools

E-learning tools as teaching aid in Geomatics

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Within the School of Civil Engineering and Geosciences at Newcastle University (UK) a variety of e-learning tools have been developed to aid the Geomatics teaching. The tools are offered to students on a voluntary basis and are recommended in lectures simultaneously with reading lists. The students are advised to use the E-learning tools in preparation of practicals, exams and the fieldcourse.

The e-learning tools are all based on a Geomatics background and present the basic knowledge required to understand Geomatics methodologies. A virtual and interactive traverse e-learning tool was developed as first e-learning tool and has now been available for over two years. Further e-learning tools are based on an introduction on levelling, setting out in a civil engineering background and GPS for non-surveyors. The tools were developed with the help of Java programming and Adobe Captivate. They are based on animations, diagrams as well as quizzes to enable the students to test their knowledge. It has been found important to include both animations and quizzes in e-learning tools to keep the interest and concentration of students in the e-learning tool.

The paper will present an overview of the developed e-learning tools. Additionally it will contain an overview of an evaluation of the tools carried out with students at the School of Civil Engineering and Geosciences at Newcastle University. The evaluation showed that students appreciate e-learning tools and find them interesting but only use them if forced to use with an incentive, i.e. a follow up exam and as necessary preparation for a practical.

Efficient Communication Strategies for Online Training in Geoinformatics

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Online training in geoinformatics has been used at the University of Osnabrueck (Germany) for several years now, i.e. FerGI (online tutorial in geoinformatics), virtual lectures, and UNIGIS_eXpress (online studies in GIS: a joint program together with University of Salzburg). Online learning has turned out to be an effective means for training university students as well as learners who want to improve their knowledge and skills in GIS to start new career. Learning efficiency mainly depends on the quality of the course material, learning styles and skills of the students, the reliablity and quality of the computer system and online connection, and interactions between students and instructors. Several communication techniques have been used to provide students with an effective introduction on the specific processes and procedures of geoinformatics:

In FerGI tutorials asynchronous learning and communication methods are used (learning management system LMS with discussion board). Instructors and students interact intermittently over time with students usually working self-paced. Interactive elements such as simulations, online tests and discussion boards are used as communication techniques without any direct real-time feedback from the instructor or other students. In order to prevent students from demotivation, isolation or even panic, communication intensity and response-time in the discussion boards are very important factors.

Virtual lectures with students and the instructor online at the same time to communicate directly and share information engage the learner directly in a life-like set of complex answers, cues and responses. Realtime interaction and communication with individuals or groups is performed via chat (text/audio/video). Communication efficiency depends on the reliablity and quality of the network connection, discussion style, group dynamic processes and personal activity and attitude of the instructor and the students. Virtual classroom sessions need intensive preparation, and adapted technical requirements. One of the disadvantages of learning and teaching in a virtual classroom is the loss of flexibility in time, topics, and space.

In the UNIGIS courses we use a blended communication strategy. Learning activity is based on LMS (Blackboard ® etc.) supported by discussion boards and distributed e-mail. Scheduled discussion sessions with the class and individual synchronous discussions (with Skype ® etc) are a useful obligatory supplement to improve communication. Requirements are small classes of 5-15 students, adapted material with links and stimuli like excercises and starting points for open controversial discussions. Typical are discussion points with open results and joint group tasks. Our experiences show, that real-time availability of the instructors has to be granted, communication should be directed using agendas and basic rules („nettiquette“) and an apdapted moderation strategy.

There are many advantages to e-learning in geoinformatics, and even the potential disadvantages (i.e. high complexity, self-direted motivation, dependency on technical infrastructure, isolation) can be alleviated with a properly designed communication strategy.

Enhancement of E-Learning in Geomatics by the Integration of Dynamic Mathematics' Tools

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The Swiss Federal Institute of Technology in Lausanne (EPFL) has introduced a Learning Management System (LMS) based on Moodle. This trend was a source of motivation for our teaching staff who has initiated a project called *Exomatic* for the enhancement of the fundamental course in geomatic attended by 200 students from civil and environmental sections.

The basic concept of *Exomatic* is a collection of on-line exercises with dynamic graphical figures and smart calculus tools linked together. This platform allows a fully automated correction and evaluation process of the exercises, what is appreciated by the teachers who can spare precious time.

Exomatic is mainly based on the interconnection of different resources gathered in a common web interface in order to simplify the tasks for the creation of exercises datasets and for the calculus provided by the students. This paper attempts to describe the technical structure of *Exomatic* and its performance with a particular focus on the use of the dynamic mathematics software Geogebra. This tool is efficient for the graphical representation of geometrical features (e.g. resection, orientation). The paper will highlight the improvement of users' interface in the e-learning environment and underlines the importance of graphic tools for a better comprehension, and the usefulness of on-line resources in actual education. It will present also the different open source material employed in the development of this shareable resource which can be integrated in other geomatic courses (e.g. photogrammetry and remote sensing). *Exomatic* has demonstrated the effectiveness of on-line dynamics resources in teaching the basic geomatic course.

Introducing Web-based Elearning Platform at an African University

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Web-based Elearning platforms are a relatively new phenomenon in higher education settings, providing a relatively equal footing for African universities as elsewhere to jump-start using them. Coupled with availability of freely available open-sourced platforms, cost of software should not be the bottleneck towards adoption of elearning technologies.

In this paper, author aims to present and discuss pertinent issues as related to success of both introducing and making good use of elearning platforms to African university settings, by using narration and discussion of author's experience as a University Webmaster and a tutor for an undergraduate class and attempts at introducing Moodle (www.moodle.org) elearning platform to both students and fellow faculty.

There are more to adoption of freely available elearning software tools in African university settings than mere availability and utility of the software tools. Both technological and non-technological issues are discussed.

Session 05: E-delivery of education

E-delivery of education services as enabling factor for worldwide network of academic partners in Land Administration

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The UNU-ITC School for Land Administration Studies aims to promote the role of land administration worldwide for good governance in developing countries. A key component of the mandate of the School is to develop a worldwide network of academic partners. The academic partnership covers joint-education at post-graduate level, knowledge transfer through short courses, workshops and seminars, research (including PhD studies), advisory services and mobility of staff, students and teaching material. Each partner in this network contributes with complementary knowledge and experience, yet distribution of this knowledge to local capacity building institutes and curricula requires a mechanism to deliver content, skills, methods and approaches in a sustainable and student-centric way. To address this challenge, this paper discusses the design and the first experiences with e-learning courseware and activities within the network.

The objective of the e-learning programme was not only to make the cooperation in the network concrete, but also to test how sharing of knowledge could be enhanced. The assumptions underlying the design e-learning material and of e-learning approaches was twofold:

First, that the mobility of knowledge through e-learning packages and facilities (rather than people moving from one place to another) could combine the global and local knowledge in land administration, and hence would sustain both global and local capacity building. This assumption is based on (Braa, Monteiro et al. 2004), who argue that such international networking is an important condition, not only important for sharing of experiences and knowledge, but also to scale up and sustain the locally established efforts. Setting up new forms of development, including education, thus requires both a local focus and an international network.

Secondly, the approach was based on the educational development theory of (Shriberg 2002), who notes that sustainable education is achieved through an incremental, yet systemic, progress, whereby actions across organizational boundaries.

The testbed of e-learning design concerned a module on land information infrastructure. Although the content had been designed and the execution of this module had been operational within ITC, it was obvious that the operationalization of sharing the teaching material and teaching approach could not easily be organized with the other partners in the network. Therefore, a project was set-up to migrate this module incrementally to an e-learning module with an e-learning environment, which would be suitable as shared module. The module content was derived from story boards on individual inter-related units with content. The migration to e-learning was supported by various technical tools, such as Articulate software, PBworks course wiki environments and video shoots, amongst others.

The results of the courseware showed that the incremental approach (in contrast to a radical change) meant that certain components migrated immediately to e-learning units, while other components remained initially conventional. This incremental approach not only had pragmatic advantages in terms of the resources needed for courseware development, but also allowed more time for interaction, testing and customization with partners in the network. We conclude therefore that developing e-learning courseware has enabled the network building among partners who build capacity in land administration. This network further enables combining and complementing both global and local knowledge and thus promotes the role of land administration worldwide for socio-economic development in developing countries.

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Developing a distance education programming skills course for geo-information science and Earth observation students

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The motivation for developing a distance education course on programming skills is twofold: firstly, to support our so called Joint-Education Projects (JEPs), and secondly, to broaden the target market for educational services. One of the key aims in teaching programming skills using any programming language is to teach the students how to approach problem-solving in a structured, logical way. The challenges in doing so are many, including how to provide the fundamental learning skills, as well as providing adequate learning resources which are both intuitive and functional. Drawing upon several years of experience of teaching programming skills at Faculty of Geo-Information Science and Earth Observation at the University of Twente (ITC), we have designed a course based around an interactive learning environment, developed for a previous distance education course, but significantly extended to support the new content.

Python is a general-purpose open-source computer language best suited to be used in hybrid context of databases, geographic information systems, image processing, and web applications Programming skills learned in the course will be useful for a wide variety of real world problems (especially those that require analysis of spatial data) that can

be solved with computational approaches. After the completion of this course, it is expected, that students will be able to decompose and structure a problem, formulate algorithms to solve the problem, and be able to implement these using Python programming language.

The course material is being developed for plug-and-play deployment on students PCs reducing the initial technicalities related to installation and optimization of the work environment. Although the nature of studying programming language is self-study, this plug-and-play solution will also allow components of the course to be deployed in a face-to-face set-up as well as the distance education mode.

Most of the course content is based upon open-source materials – the textbook and some of the exercises. However we are extending this material to tailor the course better to geoinformation science students by adding material (in the form of lessons, as well as adding a chapter to the book itself). In so doing we hope to release the new chapter into the opensource realm through some sort of creative commons licensing.

As mentioned, the course is designed around an interactive learning infrastructure: environment that seamlessly integrates the *Python environment* (= program scripting and command line) and the *teaching environment* (= lecture material, exercise environment, and the book). This type of integrated learning environment currently does not exist anywhere; existing solutions are mostly in form of tutorials or books. From didactical perspective, the presented course will be a system of self-instructional learning objects allowing students to proceed at own location, at own time, and at own speed, with an extensive direct feedback embedded in the course material.

Teachers and international higher education

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The Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente provides international postgraduate education, research and project services in the field of geo-information science and earth observation using remote sensing and GIS. The faculty is has a long standing experience in international education and is actively involved in innovative teaching and cross-border education including, student-centred learning, project education, e-learning and joint education.

Teachers play a key role in shaping the changes in academic international education; designing new curricula, developing course material, implementing the new programs and guiding graduate students from a diversity of backgrounds. How to support academic staff in developing new teaching competencies in changing environment? Before answering this question, an exploratory survey will be carried out to get better insight in the opinions of key players in international higher education in the Netherlands about the required competences of academic teachers responsible for teaching international students, and in particular adult, mid-career students. The paper will report on the process and outcome of this exploratory research.

Session 06: Cross border education in Africa

Cross-Border Education in Africa for Global Geoinformation – Focus on WaterNet

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The SADC regional programme of WaterNet draws its membership from university departments and research institutions from 17 countries in Eastern and Southern Africa that are involved in education, training, research and outreach in Integrated Water Resources Management. WaterNet is governed by its members through the WaterNet Trust and managed on a day to day basis by the Secretariat currently domiciled at the University of Zimbabwe. Since inception in 1999, WaterNet's flagship has been the Masters degree in Integrated Water Resources Management, hosted by six universities offering six different specialisations within SADC, although at the moment the degree is only conferred by two of these. So far, four professors, sponsored by WaterNet have been appointed to provide academic guidance at the various host institutions. To date, over 300 students have graduated from the programme. Various research projects have been carried out, resulting in a number of practical implementations within the region as well as PhD graduates. Several hundreds of water professionals have benefited from short professional development and training courses sponsored by WaterNet and offered at various locations within the region. To date, nine symposia have been held annually and throughout the SADC region, at which fora, practitioners have presented their research findings and several of these have been peer reviewed and published in the *Journal of Physics and Chemistry of the Earth*, of which eight volumes have been produced so far. The modules offered in the Masters programme and the professional development courses are continually reviewed and updated through WaterNet's quality control and review committee, of which there have been new additions including aspects of climate change. Earth Observation and Geographic Information Systems (EO and GIS) are integral parts of IWRM-related studies; hence the objective of cooperation to strengthen the EO and GIS related curricula in the WaterNet educational system. ITC and WaterNet will jointly work together to develop EO-GIS related curricula of which it has already been agreed to set up a seventh specialization in this area to be based at the University of KwaZulu Natal. This paper outlines the objectives, governing structure, activities and achievements of WaterNet and further justifies the need to incorporate global geoinformation for Integrated Water Resources Management.

Prospects and Challenges of Building Capacity for Space Science and Technology Development in Africa

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The need for capacity building in information communication technology (ICT) and navigation systems, as well as geo-information production and management in Africa cannot be over-emphasised, as ICT and geospatial information, which can be obtained from space technology development, remain the backbone for sustainable development in the continent. Capacity building in space science and technology (SST) as a whole is especially critical to the development of various sectors of the economy including petroleum and energy, solid minerals, forestry, agriculture, water resources management, navigation, weather forecast and aviation, transport, environmental and disaster management/monitoring, defence and security, tourism, population census, telecommunication, education and health. The use of space and geographic information systems (GIS) technologies in planning, project execution and decision-making is of paramount importance in any sustainable development efforts.Therefore, the translation of many African nations from the present status of space aspiring nations to space fairing nations is in itself a roadmap to the transformation of the African continent and society. In recent times there has been an increasing interest of some African countries in Space Science and Technology development and the development of geospatial data infrastructure (GDI). Lately, GI-specific issues and events have brought to the front burners the need for proactive capacity development efforts in Africa. Accordingly and in responce to these needs, three African countries, Algeria (2002), Nigeria (2003) and South Africa (2008) launched their own Earth observation satellites (EOS) thereby joining the league of 'sensing' countries and moving Africa out of the former class of being totally a 'sensed' continent. South Africa has been involved in space technology development, particularly in the area of astronomy for a long time, while the Egyptian Nilesat (a communication satellite) and Morocco's shared experience in Arabsat are also part of the heritage of the African continent in recent time. All these efforts are associated with some forms of capacity building in astronomy and satellite technology development. Do these efforts constitute the bedrock for furure development in the space enterprise? What are the prospects for the requisite knowledge generation, development and sharing through regional and international cooperation? What specific roles should the tertiary institutions and the existing Centres of Excellence play in this endevour. What challenges needs to be overcome. These and other related issues are discussed in this paper.

TIGER Capacity Building Facility: Growing from Projects to Professional Community

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Water security has become one of the most important challenges in the sustainable development of Africa, but only limited reliable information is available on the use and availability of water to support adequate planning and management of water resources. Data acquired from space can contribute to meet the urgent information need. But to satisfy the demand, a good synchronization based on a shared knowledge is required between water managers, who can indicate their specific information needs; developers of the satellite-based data, who can indicate what information is needed; and the knowledge institutes, which transfer their knowledge on collection and dissemination of the information to users. In other words, a continent-wide capacity is needed to utilize Earth Observation (EO) technology.

In the context of the Committee of Earth Observation Satellites (CEOS), ESA launched the TIGER Initiative in 2002 as a concrete action to match the resolutions of the World Submit on Sustainable Development held in Johannesburg. The initiative aims at assisting African countries to overcome problems faced in the collection, analysis and dissemination of water related geo-information by exploiting the advantages of EO technology. The first phase was completed in 2008, which contained a capacity building facility (TCBF) that supported about 100 individuals from more than 20 institutions all around the continent with training at various levels and methods:

1. Basic education, provided via distance learning.

2. Tailored short courses, selected according to the research interest and technical background of the participants.

3. Research topic oriented supervision, provided by specialists of the research fields of the participants.

4. Advanced short courses focusing on selected earth observation techniques.

ITC implemented the TCBF. Today we are in the second phase of the TIGER Initiative (TIGER II), which aims to build upon the success of the first one. TCBF II is implemented now by a consortium of four partners (ITC, TU Delft, VITO and ISEGI-UNL), with the aim of supporting 20 research projects and establishing 3 Regional Offices in the time span of 2009-2012. They support African efforts to develop sustainable observation systems by using EO technology to learn more about the water cycle and to improve water-monitoring resources that will help to establish sound scientific bases for developing effective adaptation or mitigation measures against the impacts of climate change. The TCBF focuses on the research component of TIGER II that supports African scientists furthering their scientific skills and the technical capacity to address the issue of the water resources in Africa.

The second phase is more complex then its forerunner, although the applied capacity building tools are similar to the first phase. For example, the first training course on earth observation basics was held in Cairo in April 2010. Twenty three participants were supported by the TIGER programme, and another eleven joined using their own resources.

There is a larger variety of participating institutions, from universities to regional water authorities. It is a very important aspect that several projects address trans-boundary issues with multinational staff. The participating institutions and regional offices get free access to ESA satellite data. A large number of training activities are being implemented with the aim of broadening the EO literacy among the information users, i.e. the water practitioners, and providing higher academic qualifications to the key players in EO research and education, to enable them to teach new generations of EO specialists and users in Africa. Besides capacity building, these activities contribute to building a community that unites the users of earth observation technology for water applications around the continent.

RECTAS: Strategies and Synergy of Accomplishing Objectives, Vision and Collaborative Research

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The Regional Centre for Training in Aerospace Surveys (RECTAS) was established in 1972 *under the auspices of* the United Nations Economic Commission for Africa (UNECA) as a joint Institution of African countries currently constituted by Benin, Burkina, Cameroon, Ghana, Mali, Niger, Nigeria (host country) and Senegal. RECTAS' vision is to be a leading *centre of excellence* providing one-stop solution for quality geospatial science training, education and research and critical capacity for sustainable development in Africa. The mission is to contribute to rapid sustainable development of member states in particular and Africa in general, through the development of critical capacity for timely delivery and responsible use of appropriate geospatial information.

In this presentation the strategies and synergy of accomplishing the objectives, vision and mission of the Centre as well as prospects of collaborative research are discussed.

Session 08: Cross border education experiences

IIRS Perspective on Lessons from Implementation of a Cross Border Joint Education Program

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Indian Institute of Remote Sensing (IIRS) is a premier institute in Asia Pacific region in the field of Capacity Building for Earth Observation Application and Geo-information Science. Since its establishment as IPI in 1966, IIIRS has been making continuously efforts to keep pace with the rapidly changing technology to upgrade its programs as per the technological advances and transfer the technology to State/ Central government level with full financial support of Indian Space Research Organization (ISRO), Department of Space, Government of India. To share and upgrade the knowledge, IIRS has collaborated actively with international partners like ITC, IHE, WUR, The Netherlands, ITTO/JOFCA, WMO, UNFAO, UNESCO, ADPC, GDTA, JRC (EC) and Commonwealth etc. The institute also hosts an UN affiliated regional Centre i.e. Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) and is solely responsible to conduct regular Postgraduate (PG) and short courses in Remote Sensing and GIS for the UN Centre, first of its kind established in response to the UN General Assembly Resolution (45/72 of 11th December 1990) endorsing the recommendations of UNISPACE-82, the United Nations Office of Outer Space Affairs (UN-OOSA) envisaging the requirement for all five regions all over the world.

IIRS was conducting short and long duration training programmes regularly for user organizations, mainly government sponsored professionals since its inception. However the major paradigm shift taken place with initiation of Cross Boarder International Joint Education Programs (JEP) in 2002, thus helping Indian students to study an International Masters Programs in Earth Observation and Geo-information Science with specializations of Geo-informatics and Geo-hazards which otherwise will be difficult for them to obtain it without going abroad. Apart from financial aspects, the total costs for student being less, the JEP has allowed for upgradation of PG programs, kept IIRS syllabus in tune with international standard and exposed IIRS faculty to International way of thinking.

There are many benefits in implementing the Cross Boarder Joint Education program, maintaining high quality standards by addressing all possible issues like continuous change of course curriculum, support of ITC expert faculty to conduct the advance modules of the courses, following standardized European Credit Transfer System, orienting student with strong research skill development, very well established evaluation procedures to award the degree etc. Since 2001 IIRS conducted Masters and postgraduate diploma programs under JEP regularly with the total student turnout of 225.

IIRS has gained experience and enriched its knowledge from the JEP and it was altogether different experience. Though we are successful in implementing the Cross Boarder JEP, there were many bottlenecks to resolve and challenges to achieve the targeted results. They are:

Many new and advanced topics are covered as part of Masters and PG diploma programs of geo-informatics and geo-hazard disciplines.

Majority of course work is done at IIRS, i.e. 15 months as compared to limited time at ITC i.e. 3 months. At the beginning of the JEP due to stringent visa procedures for long duration of stay in The Netherlands various issues had to be resolved.

The Master's program involving strong component of research due to which the student has to quickly increase his knowledge base in research theme to produce high quality outputs.

Financial constraints for Indian students as compared to similar courses conducted at other universities and colleges. But it is good opportunity for foreign students as it is most economical to attend in India.

Paradigm shift for IIRS from training to education and difficulties due to pedagogical differences.

The lessons have been on:

- Adopting different evaluation system by staff and students of IIRS.

- Improving cross-cultural appreciation by Indian students after their visit to IIRS.

The successful students IIRS have been fully recognised and are successful to get absorption for work / study in international environment. These programs are sustained even after the project funded phase, mainly due to the institute taking keen interest in continuation of the program, financial commitment and support of parent organization and willingness of ITC, The Netherlands to continue with Cross Boarder Joint Education Program.

ITC's joint courses – evaluation and new policy

Gerritdina Theresia ten Dam, Fred Paats, Tom Loran
ITC, Netherlands, The

The International Institute for Geo-information Science and Earth Observation (ITC) in the Netherlands has offered joint courses with partners in less developed countries for several years already. The first joint course started in 2002 and the first policy document was made in 2003, describing the rationale, development guidelines, quality assurance framework and the management of joint courses. Currently ITC has 21 joint courses running with 14 partners in 11 countries.

In 2008 a start was made with the evaluation of the joint course program and internal reviews of the joint courses as a first step towards the development of new policy on joint education.

The developments within the joint education program and the main outcomes of the internal reviews will be described and the outlines of ITC's new policy will be presented for discussion.

Cross-border education: experiences and challenges

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Obafemi Awolowo University, Nigeria

Cross-border and joint education initiative has been recognised as an important means of achieving rapid production of critical mass of skilled human capacity in Earth observation and geo-information sciences. Many international organisations notably ISPRS and GEO have indeed set-up technical commissions and working groups to fashion out modalities for achieving the objectives of the initiative. This paper attempts to contribute towards the above by discussing some important challenges that should be envisaged and planned for in the implementation of cross-border education and further shares experiences gained in the four-year implementation of a joint education programme. The paper also describes the various categories and levels of cross-border education that can be deployed for education and training in geo-information science and Earth observation including an examination of the different models of implementing the programme.

25 years Experiences in “Cross-Border” GI Education, how can we improve?

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University of Groningen, Netherlands, The

Experiences during 25 years with GI education in different settings (students from abroad studying in the Netherlands, international workshops and curricula development projects) delivered several aspects that should be incorporated in order to develop and maintain successful and sustainable cross border GI education.

The major aspects are the organizational context of lecturers and participants, the perceived cultural differences and the involved educational methodologies (especially regarding learning styles).

By acknowledgement and recognition of the mentioned aspects by the involved parties, by integrating cultural differences into the curriculum and by a safe and social learning environment improvement of cross-border GI education can be done.

Session 09: E-learning tools and web enabled education

A Web-enabled Remote Sensing and GIS Course for Extramural Students

Michael Patrick Tuohy
Massey University, New Zealand

Massey University, New Zealand has a long pedigree in distance education with an extramural roll almost three times that of the internal students. Remote sensing and GIS have been part of the curriculum in the College of Sciences since 1989 and offered in extramural mode since 2000. This year a further step towards e-learning has been taken with the introduction of the open source Virtual Learning Environment known worldwide as Moodle.

The usual practice has been to provide students with a study guide which contains selected readings and detailed instructions for the practical exercises that are completed using the software and data supplied on CDs. Over a period of fifteen weeks eleven assignments based on the practical exercises are required to be submitted for assessment. Model answers and flowcharts detailing the correct procedures accompanied the marks and grades which were also accessed via Moodle. A practical test and final exam completed the assessment.

In 2010 the study guide, software and data CDS were again printed and dispatched but the course was also web-enabled. The readings, exercises and assignments were all available on-line. In addition various activities such as self-learning quizzes, wikis, chat rooms and discussion groups were available. Forums were established to explore relevant topics. Instructional videos and links to useful websites were often added to the course website to keep it interesting and current.

A new and exciting parallel development has been the OASIS project. This initiative has resulted in an on-line archive of satellite imagery and spatial datasets for the whole of New Zealand. Students and researchers can select the full gamut of imagery, elevation and vector data for their particular area of interest.

E-Learning everywere with Podcasts and Co. – The CityGML Training Course for Mobile Devices

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Technische Universität Berlin, Germany

The needs to acquire, update, and develop skills regularly, in order to be up to speed, are a major educational mandate in our societies. Lifelong learning is a prerequisite for people's employability and leads to a great challenge to developers and providers of training material. Large companies such as Adobe, Autodesk, Erdas, ESRI, Fugro, Trimble, etc. recognised the unbeatable capabilities of e-learning techniques for customer training and setup online tutorial videos or courses to improve the users' software skills. Also universities, organisations, and other companies offer training modules in the fields of photogrammetry, remote sensing and GIS, not only for students but also for scientists and employees of small and medium-sized enterprises. The European Organization for Spatial Data Research (EuroSDR) for example organises an annual series of short distance e-learning training courses, focussing on hot research topics. In this context, an e-learning course on the City Geography Markup Language (CityGML), an OpenGIS® Encoding Standard for the representation, storage and exchange of virtual 3D city and landscape models, has been realised twice with great success. The course has been developed and operated by the Institute of Geodesy and Geoinformation Science, Technische Universität Berlin (Germany).

The training course on CityGML is embedded in an open source Learning Management System (LMS) and requires an Internet browser for execution. The main knowledge transfer is realised by lectures on demand, based on Flash-movie streams. A major requirement for the development work was to use prepared material which already exists for a face-to-face teaching, such as PowerPoint presentations, and to get along with minimal expenses. Because of the great success of the desktop based CityGML course version, we are about to develop a version for portable devices like mobile phones, PDA's and especially Apple's i-family devices. Using the hype around iPod and iPhone, which fascinate especially the young generation, we decided to complete the learning content on CityGML by supporting these devices.

In this paper, we discuss the potential of mobile learning and demonstrate the workflow to create own podcasts for developing learning material, like lectures on demand, available on mobile devices. We discuss the three major technical aspects which have to be considered in order to run a podcast successfully: choosing the appropriate movie format, writing optimal RSS-Feeds and publishing the podcast on adequate platforms. These aspects are important to make podcasts executable on as much as possible devices and to guarantee that proper podcasts will be found by the interested users. We present examples of the realisation of the CityGML course *mobile version* and explain the difficulties, not only from the technical perspective, but also on aspects of timing the podcast-episodes with respect to human power of concentration. Finally we focus on how to satisfy the major requirement to use existing class-room material such as PowerPoint presentations for mobile devices and to get along with minimal expenses.

E-Learning support for hyperspectral remote sensing lectures with emphasis on spectral library database

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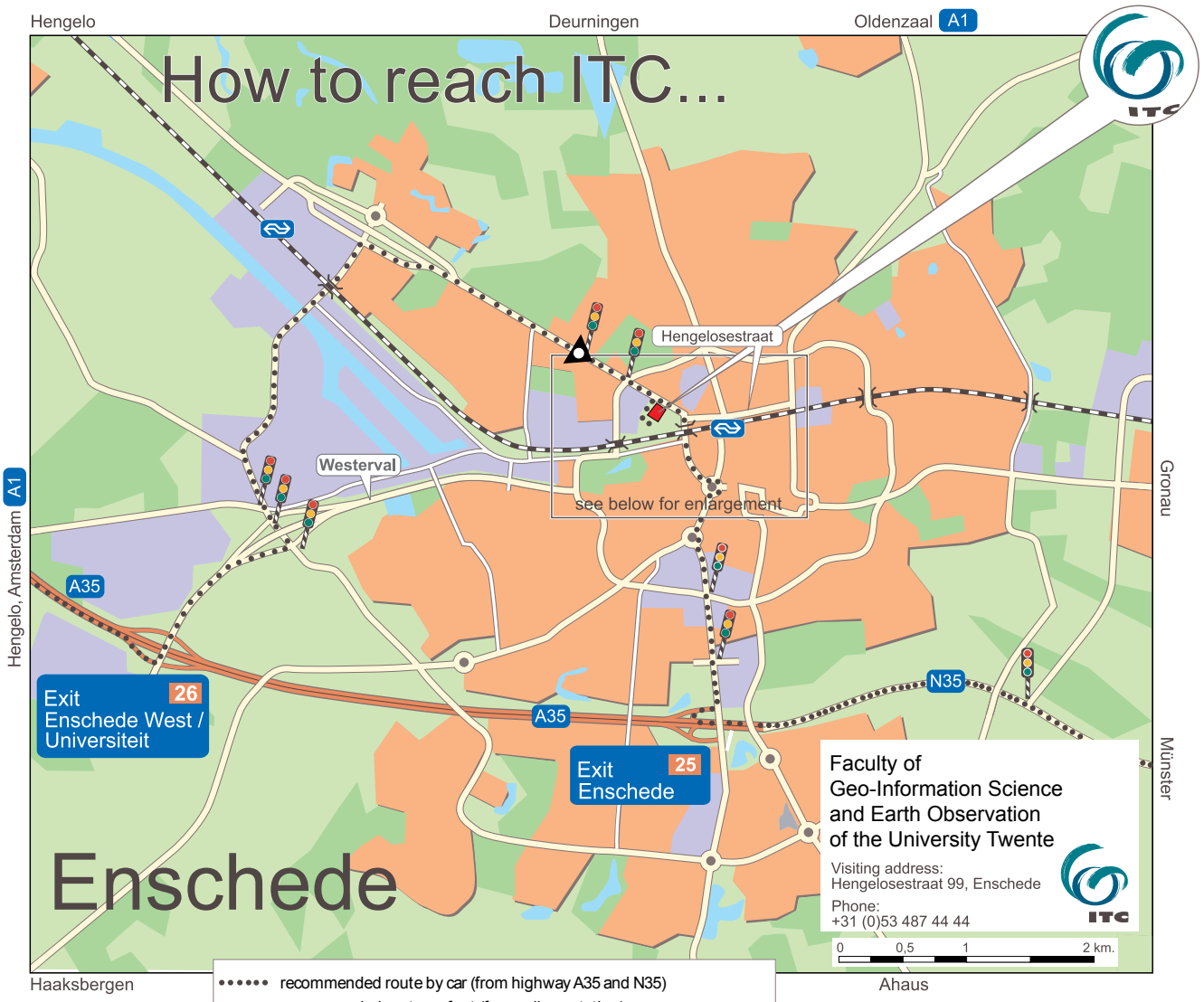
Shahre-Kord University, Iran, Islamic Republic of

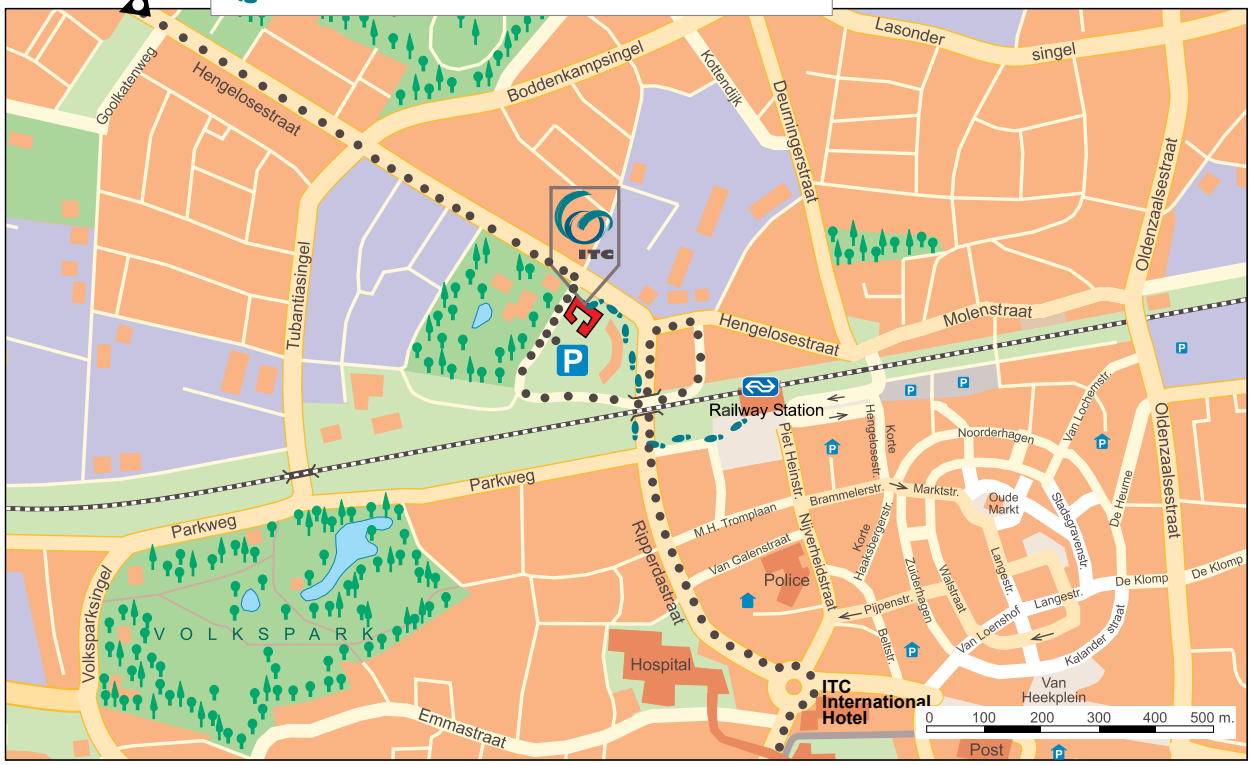
Since content development is growing rapidly, it is very important to follow with this speed especially for students in developing country. International partnerships and cooperation in education will help them to get knowledge about new developments. It will also make possible the integration or exchange of learning material for sharing and reuse among different universities. This paper has reviewed online learning content illustrating the extremely valuable contribution of the database in e-learning, with a particular emphasis on spectral library and its data acquisition quality in hyperspectral remote sensing. A related aspect of e-learning material that could be important is the quality of the provided spectral reflectance and the source of noises. It also will help the implementation and establishment of metadata information based on international standards. Online digital reflectance spectral library that covers wavelengths from the ultraviolet to near-infrared along with sample documentation will be a reliable practice for students and researchers before doing filed measurements

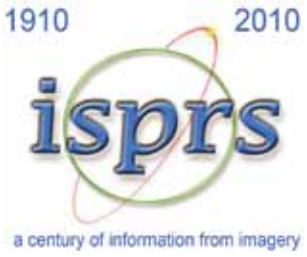
Land Information System over Selenge Aimag, Mandal Soum of Mongolia.

Tuul Batbaldan
"Land Management and Fiscal Cadastre" project/The Administration of Land Affairs, Geodesy & Cartography in the Ministry of Construction and Urban Development (ALAGaC), Mongolia

It is important to learn about and use Geographic Information Systems and Remote Sensing data and software for our profession nowadays. Modern technologies like geo-data processing and earth observation data processing and analysis are needed for Mongolian young researchers and students. This research work is dedicated to create the land information system over Selenge Aimag (state), Mandal Soum (province) of Mongolia. Task of the work is to establish a land information database which is based on a Open Source Geographic Information System. Work is starting of acquisition of existing geodata and information, qualification, maintenance, utilization and transferring data about one soum of Mongolia. Furthermore, one soum database principle will be applied to other Selenge soums. This research work will be helpful to establish a structured cadastral database, access of multi users to one database, avoid data redundancy of different organization and follow international standards for geographic information. The “Land Management and Fiscal Cadastre” project's aim is to develop a land valuation methodology based on a land information system for selected project areas. The project established a cadastral database for Darkhan-Uul Aimag settlement area. Continuing work will be done for agricultural and rural area of Selenge, Mandal area. Promoting education and training at fundamental and professional level for land managers and students are vital for the establishment of land information systems in developing countries. The establishment of a land information system for Selenge Aimag will contribute to the National Land Information System of Mongolia. The project demonstrates that Land Information Systems can be created using open source GIS software like QuantumGIS, gvSIG, uDig and open source database program PostgreSQL, PostGIS, pgAdmin. Systems which are based on open source GIS programs are new for many professionals in Mongolia and of special importance for developing countries due to their cost efficiency. To connect this work to the practice, we are teaching students of GIS-RS laboratory at Plant Science Agricultural Training Research Institute (PSARTI), which belongs to the State University of Agriculture of Mongolia as well as staff from other Government institutions. PSARTI works with several international institutes and projects on different fields. We are sharing the results of project activities and advise about the use of Open Source GIS software for different education, research and professional level, using the establishment of a land information system with complete land coverage and multi cadastral functions in Mongolia. Promoting the use of open source GIS software, enhancing existing data quality, data and knowledge exchange are the main problems to be solved further. It is important to experiment and use project results on national level and to provide education on Geographic Information Science and Systems to researchers and land managers, students in the land management and administration sector. The results will promote good governance and provide fact based information to decision makers and government.






1910
2010
isprs
a century of information from imagery