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2003 number 2

introduction

As we rush to press with this latest edition of *ITC News,* summer is at its height here in the Netherlands. Maybe that raises a wry smile on the faces of some of our readers from the warmer climes. Summer, the Netherlands … surely a contradiction in terms? But no, temperatures have soared over the last month or so and many of us have wilted in the scorching heat. Fortunately that doesn't apply to our contributors. They're in fine fettle, with the result that this issue is a mixed bag, with something for everyone.

PhD studies are in the spotlight (pages 18-21), with no less than four new publications now gracing the shelves of the ITC bookshop. Moreover, June marked another milestone in ITC education: our 100th research student received his doctorate (page 22) - a cause for particular celebration. Naturally, life goes on after you leave ITC with that hard-earned diploma tucked into your pocket, and the course it takes often makes for interesting reading. If you turn to page 24 you'll see what I mean, and also discover how academic achievements can be put to practical use.

The road to graduation is built on lectures, practicals and homework, in fact - let's make no bones about it - on serious study. But take heart, ITC students do manage to take time out for relaxation. The occasional party never comes amiss (page 10)

Wilt in the heat? Not a bit of it. On the contrary, our contributors seem to thrive on it. Projects, conferences, debates and powerful new software tools - whether your tastes veer towards animal, vegetable or mineral, you're sure to find something of interest on the pages of *ITC News 2003-2.*

Janneke Kalf
Acting Managing Editor

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ITC Students Learn about ArcCadastre

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From 16 to 18 June 2003 a group of 15 students and staff from ITC visited the training centre of the Swedish Cadastre (Lantmäteriet) to learn the principles of ArcCadastre.

The students are following ITC's Geo-information Management programme, which focuses on organisations with a mission to produce, provide, use, exchange and share large spatial data sets, and with a commitment to change. Most of the students are from national mapping and cadastral agencies in their own countries.

The ArcCadastre product can be of great value in developing cadastral infrastructures and, more generally, in developing geospatial data infrastructures important for the economic development in both developed and developing countries. ArcCadastre has some very powerful tools, such as workflow management and product definition, and is based on industrial standards such as UML (Unified Modelling Language) and ArcGIS. A link between surveying and GIS is available.

The product is highly suitable for customer- and country-specific extensions. ArcCadastre provides support in unified production lines - from fieldwork and computation, through data processing and the presentation of different maps, to the final storage of data in an object-oriented environment.

The student focus was mostly on the workflow management tools, and the evaluation of the product has been positive. The main conclusion was that ArcCadastre can be of value to all organisations where a link between workflows and the geo-database (and surveying) is important in supporting the core business. ITC will implement ArcCadastre for educational and research purposes.

The GIM group during their visit to the Swedish Cadastre

ESRI User Conference 2003

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Like last year a delegation from ITC attended the ESRI User Conference in San Diego, California - held this year from 5 to 11 July. This conference is most probably the biggest in the general GIS domain.

This year's attendance allegedly came close to 14,000, and the ITC delegation was also large, with no less than six (unprecedented!) staff members taking part.

The conference traditionally starts off with an opening address by ESRI's president, Jack Dangermond, his speech always a pleasant mix of technological perspective and understanding, commitment and esprit de corps, combined with a subtle sense of entrepreneurship. It draws the greatest audience by far. Thousands gathered in a vast hall equipped with eight enormous video screens that allowed everyone to follow the proceedings.

The address mentioned quite a few notable developments. Some were of interest to the public at large, such as the US government's initiative to develop the geospatial one-stop portal; others were of interest perhaps only to ESRI software users, such as the announcement of ArcGlobe, a package that apparently provides continuous zooming on spatial data (in 2D and 3D, in raster and vector) as a visualisation tool. Think of the famous advertisement for Dommelsch beer!

In the afternoon, Peter Hillary, son of Sir Edmund Hillary, who in 1953 became the first man to climb to the summit of Mt Everest, demonstrated his love for the Himalayas and its people in a truly entertaining speech, brilliantly complemented with video footage, a simulated flyby of Everest's summit, and 50-year-old pictures of the heroic ascent.

These addresses bolstered two long technical sessions that provided a view of the new ArcGIS version 9 and other ArcSomethings as companion software packages, all to be launched (in the USA!) later this autumn. Imagine perfectly staged example-laden presentations, interspersed with audience applause for new software features, in a style that Americans are so very good at, and you'll understand our feelings of being slightly out of place in this community.

Otherwise the conference was, as always, an interesting mix of technical workshops, paper presentations and product displays, not forgetting the famous map gallery. At times meetings took place in up to 16 parallel tracks - many on ESRI software technol-

The conference was, as always, an interesting mix of technical workshops, paper presentations and product displays, not forgetting the famous map gallery.

ITC information booth, which generated substantial interest at both the Education Fair and the general Industrial Exhibition



ITC organised an ITC alumni dinner for some 20 alumni attending the conference

ogy, but some on specific applications, and societal issues and their problems. Just drafting a personal schedule for the conference was a not-so-easy two-hour homework assignment!

The ITC representatives (Jan Hendrikse, Mark Noort, Jeroen Verplanke, Jeroen van den Worm and yours truly) left a small but indelible mark on the conference. We presented three well-received papers, (wo)manned ITC information booths, which generated substantial interest at both the Education Fair and the general Industrial Exhibition, and organised an ITC alumni dinner for some 20 alumni attending the conference.

A little extra ITC exposure was generated in the opening address as Jack Dangermond had picked Jeroen van den Worm's (in collaboration with other colleagues) Dutch National Risk Map - one of only 30 examples selected from the large number of mapping projects submitted - to illustrate the contemporary use of GIS.

In addition, we used our time to discuss various issues related to the ESRI-ITC Memorandum of Understanding with ESRI staff members and other people present. These issues included the software donations to our students, the continuation of the ESRI International Internship Program for ITC students (the next call to be published in November), and the participation of ITC in ESRI's virtual campus. We also had the opportunity to meet "big Jack" himself and debate some significant topics.

staff news

Welcome to ITC	Marcia van Doeselaar	Receptionist, Facility Management (per 28 April 2003)
	Drs Dinand Alkema	Lecturer, Department of Earth Systems Analysis (per 1 May 2003)
	Valentijn Venus	Lecturer, Department of Natural Resources (per 1 June 2003)
	Dr Hans van Noord	Engineering Geomorphologist, Bhutan Project (per 1 July 2003)
	Monika Kuffer	Lecturer, Department of Urban and Regional Planning and Geo-information Management (per 1 July 2003
Staff leaving	Liliana Alvarez Casallas	Scientific Assistant, Department of Urban and Regional Planning and Geo-information Management (per 28 June 2003)

Symposium on IT Renewal Strategy for Land Registry and Cadastre

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Many land registry and/or cadastre organisations implemented their computerised systems some ten to 20 years ago.

These systems are now outdated, and maintenance is complex and expensive. Increasingly these organisations are being confronted with rapid developments in technology (the *technology push*: Internet, (geo)-databases, modelling standards, open systems, GIS), as well as a growing demand for new services (the *market pull*: enhanced user requirements, e-governance, sustainable development, electronic conveyancing, integration of public data and systems).

Customer satisfaction demands a focus on the adoption of an open, transparent and innovative approach to providing products and services, as well as arrangements that guarantee delivery times and quality specifications. Organisations required to generate income by providing services to customers also need to devote additional attention to transparent managerial and financial structures, explicit costs and fair prices.

Experience acquired by many organisations has revealed that appropriate support from information and communication technology (ICT) is essential if these business objectives are to be achieved. Land registry and cadastre organisations, in particular, operate information systems with a large number of transactions – systems that must be *both* up to date *and* reliable at all times. As a result, these organisations are highly dependent on their ICT systems, which in turn results in a close relationship between their strategic objectives and their ICT policy (business alignment with ICT). Consequently, their managements assign high priority to achieving appropriate compatibility between their strategy and their ICT support.

Complications

Two factors complicate the replacement of these ageing systems: (1) the intrinsic migration from the legacy of the old system to the environment of the new, and (2) the need to implement the modernisation without disrupting normal operations (i.e. the imposition of a "business as usual" requirement during system replacement). As considerable effort is being devoted to developing viable strategies for modernising the ICT systems of land registry and cadastre organisations, an exchange of expertise, experience and insights into the modernisation process could benefit all concerned.

Symposium at ITC

A symposium was held on this subject at ITC on 8 and 9 May 2003. The objective was to provide a platform for chief information officers from land registry and/or cadastre organisations from countries currently

intensively involved in modernising their ICT systems. The focus was on European countries. The symposium reserved discussion time for exchanging experiences, identifying key issues and reviewing solutions – all with the ultimate objective of learning from one another's experiences. This symposium was sponsored by the International Federation of Surveyors (FIG), Commission 7 - Cadastre and Land Management, ITC and Kadaster Netherlands. Many issues relating to IT renewal were raised and discussed:

- Basic principles of IT renewal strategy: internal change of workflow, standards (and lack of standards in the cadastral domain), public-private partnership, more flexibility with a less complex system environment, "big-bang" versus "step-by-step" strategy, centralised and distributed solutions (mainframes or client/server architectures, high-performance networks)
- Integration of public data and systems, Internet access, e-government concepts
- Cadastral data for free? (meaning that registration fees would finance data)
- Change management: organisational impact or not, new jobs, business re-engineering
- Customer requirements: parallel access to old and new data, user advisory board

Conclusions

It was concluded that a strategy for change management and business re-engineering (there are examples where this has failed!) is strongly related to the capacity of the organisation (e.g. staff in the IT department). A strategy should be developed for a big time frame; so think big - but work small and act quickly. This means a step-by-step approach; a big-bang approach is not recommended. Documentation, modelling standards, and also standards for the cadastral domain are of relevant importance. Cross-border solutions will be of significance in the future, and this aspect should be included in IT strategies. Some technical approaches, as a consequence of user requirements, have legal impacts (e.g. electronic signatures in electronic conveyancing).

Proceedings

All papers and PowerPoint presentations can be downloaded from www.oicrf.org, the FIG electronic library on land administration. Use "IT renewal Enschede" as keywords and you will find all the contributions.

Considerable effort will be devoted to compiling all presentations and discussions into an appropriate publication, in order to disseminate further the information made available during the symposium.

announcements

Announcing the 7th Conference on GIS and Developing Countries GISDECO 2004, 10-12 May
Capacity Building for GIS in Developing Countries

Co-organised by
- GISDECO International Committee
- Department of Urban and Regional Planning, Faculty of the Built Environment
- Universiti Teknologi Malaysia.

GISDECO

The GISDECO International Committee is pleased to announce that the 7th GISDECO seminar, examining the issue of Capacity Building for GIS in Developing Countries, is being hosted by the Faculty of the Built Environment, Universiti Teknologi Malaysia (UTM), Johor, Malaysia, and will be held from 10 to 12 May 2004. The focus of the event is promoting the creation of human capacity, infrastructure and policy environments for successful applications of geographical information systems (GIS). The main purpose of the seminar is to facilitate the exchange of knowledge and practical experience between GIS experts and users in order to gain better insight into how users can build the capacity required to make efficient and effective use of GIS.

GISDECO is an international network of GIS experts, planners and project managers engaged in GIS applications in developing countries. The network has been coordinated via ITC since 2002 and focuses on the exchange of practical experiences with GIS applications by organising seminars and workshops in various countries. GISDECO provides a forum where GIS researchers and practitioners working in developing or developed countries and concerned with the problems of GIS technology transfer analysis application in developing countries can pool ideas on problem solving.
Proposals for papers and posters dealing with the following topics are most welcome and should be sent to the GISDECO Secretariat by 30 November 2003.

GIS Competencies and Skills in the Face of ICT Advancement
- Identification of core competencies and skills for GIS practitioners
- Acquisition, maintenance and interpretation of geospatial information
- Integrating qualitative research with GIS
- Opportunities and competency needs of Internet-based GIS

GIS Education and Curriculum Development
- Role of GIS education in increasing spatial awareness?
- GIS distance learning: expanding the reach of educational opportunities
- Teaching fundamental concepts of GIS
- Analytical GIS and knowledge-based techniques
- Interactive learning environments for the development of spatial competence (spatial literacy) and problem solving

GIS Infrastructure and Policies
- Capacity building and geospatial data infrastructures
- GIS adaptability to public sector requirements
- Policy issues in GIS development (data sharing among government agencies, GIS project management)
- Developing legal frameworks for GIS data

Delegates at the GISDECO 2002 Conference

We look forward to seeing you in Johor.
Richard Sliuzas
GISDECO International Committee Coordinator
Dept of Urban and Regional Planning and Geo-Information Management, ITC

All correspondence should be addressed to the local organisation committee at:
GISDECO Secretariat

E-mail address : b-haris@utm.my
Address : Jabatan Perancang Bandar dan Wilayah
Fakulti Alam Bina
Universiti Teknologi Malaysia (UTM)
81310 Skudai, Johor Bahru.

Contact numbers : Tel: +607- 553 7360 / 5591530 (Dr Ahris Yaakup)
Fax: +607- 553 7360 / 5591530 (Dr Ahris Yaakup)

Further information on the 2004 conference can be obtained via the conference website (www.fab.utm.my/gisdeco2004). For general information on GISDECO or details of past events, please see http://www.itc.nl/gisdeco/ or e-mail Richard Sliuzas, GISDECO International Committee Coordinator, at GISDECO@itc.nl.

Apply Now for ITC's Short Courses 2004!

For mid-career professionals looking to further their knowledge of geo-information science and earth observation and its applications, ITC offers a range of short courses.

Fellowships
Please note that the Netherlands Ministry of Foreign Affairs awards a number of fellowships annually under the Netherlands Fellowship Programme (NFP). Please note that the *deadline for fellowship* applications for some of the short courses is *1 September 2003*. Candidates who wish to apply for such fellowships should read the instructions below.

Overview of ITC's short courses 2004

Geo-information Infrastructure and Core Data Providers
- Three-month course, January to March 2004
- Tuition fee Euro 2,250
- Application deadline for fellowships 1 September 2003
- Application deadline 5 November 2003

Applications of Remote Sensing and GIS in Earth Resources and Environmental Geoscience
Part II: Advanced
- Three-month course, January to April 2004
- Tuition fee Euro 2,250
- Application deadline for fellowships 1 September 2003
- Application deadline 5 November 2003

Geographical Information Systems for Urban Planning, Land Administration and Infrastructure Management
- Seven-week course, February to March 2004
- Tuition fee Euro 1,400
- Application deadline for fellowships 1 September 2003
- Application deadline 16 December 2003

Aeromagnetics, Gamma-Ray-Spectrometry and Gravity: Essential Tools for Geoscience Applications
- Three-month course, February to May 2004
- Tuition fee Euro 2,250
- Application deadline for fellowships 1 September 2003
- Application deadline 16 December 2003

Remote Sensing and GIS Applications for Integrated Catch-ment and Water Management (ICWM)
- Three-month course, February to May 2004
- Tuition fee Euro 2,250
- Application deadline for fellowships 1 September 2003
- Application deadline 16 December 2003

Geophysical Data Acquisition, Processing and Interpretation for Groundwater and Environmental Studies
- Three-month course, February to May 2004
- Tuition fee Euro 2,250
- Application deadline for fellowships 1 September 2003
- Application deadline 16 December 2003

Groundwater Resources Monitoring, Evaluation and Modelling
- Three-month course, February to May 2004
- Tuition fee Euro 2,250
- Application deadline for fellowships 1 September 2003
- Application deadline 16 December 2003

Spatial Decision Support Systems and Multicriteria Evaluation Techniques
- Three-week course, April 2004
- Tuition fee Euro 600
- Application deadline for fellowships 1 November 2003
- Application deadline 29 January 2004

Advanced Use of Remote Sensing in Water Resource Management, Irrigation and Drainage
- Three-month course, March to June 2004
- Tuition fee Euro 2,250
- Application deadline for fellowships 1 November 2003
- Application deadline 28 January 2004

Spatial Information for Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA)
- One-month course, April 2004
- Tuition fee Euro 800
- Application deadline for fellowships 1 November 2003
- Application deadline 19 February 2004

Development of Organisations in a Geo-information Infrastructure Environment
- Six-week course, May to June 2004
- Tuition fee Euro 1,150
- Application deadline for fellowships 1 November 2003
- Application deadline 17 March 2004

Database Handling in Earth Sciences: A Study Project through Survey Planning, Execution, Analysis and Reporting
- Three-month course, May to August 2004
- Tuition fee Euro 2,250
- Application deadline for fellowships 1 November 2003
- Application deadline 17 March 2004

Principles of Spatial Data Handling: Databases, GIS and Remote Sensing
- Three-month course, October to December 2004
- Tuition fee Euro 2,250
- Application deadline for fellowships 1 June 2004

- Application deadline 4 Augustus 2004

GIS and Remote Sensing for Environmental Planning and Management

- Three-month course, October to December 2004
- Tuition fee Euro 2,250
- Application deadline for fellowships 1 June 2004
- Application deadline 25 Augustus 2004

Netherlands Fellowship Programme (NFP)

The NFP fellowship application procedure has been revised. Candidates who intend to apply for such a fellowship should begin the application procedure as soon as possible.

For detailed information on NFP fellowships please visit the Netherlands Organization for International Cooperation in Higher Education (Nuffic) website at http://www.nuffic.nl/nfp-npt.

1. Candidates first apply to ITC for admission to the short course by using the application form. An application form can be downloaded from our website www.itc.nl/education/register or please contact ITC's Education Affairs department. There are three fellowship application deadlines: 1 September 2003, 1 November 2003 and 1 June 2004. Each entry in the short course overview indicates which deadline applies.
2. Acceptable candidates will receive a letter from ITC indicating that they have been provisionally accepted.
3. Candidates then apply for an NFP fellowship through the Dutch embassy or consulate in their own country.
4. To do this, candidates must complete an NFP short course application form (can be obtained from the Dutch embassy or consultate and/or can be downloaded from the Nuffic website: www.nuffic.nl/nfp_npt) and submit it, together with all the required documents and information to the Dutch embassy or consulate in the candidate's own country.

Fellowship application forms should not be sent directly to Nuffic or to ITC, but should be forwarded to the Dutch embassy or consulate in the candidate's home country.

5. The embassy or consulate checks each application. Special attention will be given to the following: whether the application was submitted before the deadline; whether the information accompanying the application is complete and correct; whether the required documentation (such as passport, diplomas and English language test) is legitimate; whether the employer endorses the application and guarantees that during the applicant's absence his or her salary will be paid and a job held open.
6. Fellowship applications that meet all the criteria are forwarded to Nuffic by the embassies and consulates. Nuffic decides how many fellowships will be allotted for each course.
7. ITC then selects the candidates who will receive fellowships and informs all candidates directly of its decision.

More information

For more information about course content, the application process and other topics, please visit our website http://www.itc.nl/education/programme_levels/short_courses/default.asp and do not hesitate to contact us.

International Institute for Geo-Information Science and Earth Observation (ITC)
Short Course Coordinator, Education Affairs Department
P.O. Box 6, 7500 AA Enschede, The Netherlands
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Email: education@itc.nl

List of countries eligible for the NFP programme (Determined by the Netherlands Ministry of Foreign Affairs):

Albania	Eritrea	Nicaragua
Armenia	Ethiopia	Nigeria
Autonomous Palestinian Territories	Georgia	Pakistan
Bangladesh	Ghana	Peru
Benin	Guatemala	Philippines
Bhutan	Guinea-Bissau	Rwanda
Bolivia	Honduras	Senegal
Bosnia-Herzegovina	India	South Africa
Brazil	Indonesia	Sri Lanka
Burkina Faso	Iran	Surinam
Cambodia	Ivory Coast	Tanzania
Cape Verde	Jordan	Thailand
China?	Kenya	Uganda
Colombia	Macedonia	Vietnam
Costa Rica	Mali	Yemen
Cuba	Moldova	Zambia
Ecuador	Mongolia	Zimbabwe
Egypt	Mozambique	[1] *Citizens of Hong Kong and Macao are not eligible*
El Salvador	Namibia	
	Nepal	

Student Association Board 2002

Martin Sekeleti sekeleti@itc.nl

The Student Association Board (SAB), to which all long-term course participants belong, is an active and interactive forum whose main interest lies in fostering the social welfare of ITC students during their stay in the Netherlands. Life at ITC can be so draining as a result of academic pressure that even the most stable and mentally balanced participant often becomes weary and disoriented. There's the hassle of shopping and preparing for the week ahead over the weekend and, worse still, the agony and pain of being away from family, acquaintances and friends. And what about coping with the unpredictable weather of the Netherlands? … let alone learning a new language in adulthood. Inevitably tension arises, making the body clumsy, weak, inefficient and ineffective, and bringing a feeling of hopelessness.

Against this background the SAB, in conjunction with other organisations and ITC structures, especially Nuffic and the Dean's Office, organises social functions to relax both mind and body. Top of the list over the last year was a series of end-of-module parties that the SAB organised every three weeks in the Schermerhorn lounge. A refreshing conclusion to each module!

Assisted by ITC's Education Affairs, subscriptions were made to four international newspapers in different languages, which were made available at the ITC International Hotel service desk. Table tennis and pool games were also on the agenda, and the SAB organised social excursions inside and outside the Netherlands, for example to Amsterdam, Vienna, Paris, Brussels, the Keukenhof gardens, Rotterdam and Burgers' Zoo.

ITC participated in the International Sports Day in Delft, as well as in the Batavierenrace, the biggest relay race in the world. The events in Delft included volleyball, soccer (for both men and women), darts, athletics and badminton. The Batavierenrace stretches over a 200 km route from Nijmegen in the Netherlands, through Germany, and back to Enschede and the Netherlands. In both events ITC demonstrated and maintained the supremacy it had established some years ago. Furthermore, ITC organises its own internal sports events in which students compete among themselves, such as the ITC Sports Day - very successful last year!

Exciting and memorable was the typically Dutch spring party, arousing emotions of happiness and brightness, especially after the dragging hours of the long cold winter, academic pressure and homesickness. For sure, the event was appreciated to the full.

At the end of the year, the SAB organised the annual International Social Evening, when scores of ITC participants gave cultural performances reflecting their countries of origin. This provided the time and opportunity for cultural exchange among staff, course participants and outside spectators.

For the first time in ITC's history, a cycling event was arranged for new students and certificates of proficiency were presented to the successful participants.

Other highlights that punctuated the year include the herring party, the international debating evening, the end-of-year party, the party welcoming new students, the MSc, PM and Geoinformatics diploma graduation parties, and the party marking the official opening of the Schermerhorn.

Life at ITC is not all GIS and remote sensing; there's more to it than meets the eye. And the SAB plays a leading role in promoting an environment conducive to learning through social interaction.

One highlight that punctuated the year was the "herring party"

visiting itc

Guatemalan Cadastral Organization, Unidad Tecnica y Juridica, Visits ITC

John Horn horn@itc.nl

On Thursday 9th May a group of 5 staff of the Guatemalan Cadastral Organization, Unidad Tecnica y Juridica (UTJ), visited ITC. The group were taking part in a one month training programme organized by the Netherlands Kadaster, which involved on-the-job training at both the Kadaster's Head office in Apeldoorn, and at various regional offices.

During the visit to ITC, the guests received an overview of the various courses in Geoinformatics and Geo-Information Management.

UTJ is presently undergoing a major modernization project and is working closely with its Netherlands counterpart in this process.

Visitors from the Guatemalan Cadastral Organisation, Unidad Tecnica y Juridica from left to right John Horn (ITC), Raul Apopa, Jan de Jong (Kadaster), Jovita Bolaños, Ronaldo Cruz, Carlos Suhr, Yvette Avila

Indian Forest Survey Managers Visit ITC

Lyande Eelderink eelderink@itc.nl

The Forest Survey of India, based in Dehra Dun, recently requested ITC to run a special programme for several of its senior staff. Funded by the European Union, two separate activities have taken place.

First, over the period 31 March to 17 April a group of ten officers followed the three-week elective module Advanced Remote Sensing, Image Processing and GIS in Natural Resource Management.

Coordinated by Dr Yousif Hussin of ITC's Department of Natural Resources, this module provided an in-depth review of the latest research and developments in remote sensing, image processing and GIS modelling, and critically assessed their relevance with respect to application in the natural resources management field. During the module the participants were encouraged to reflect on the possible applicability of the new ideas, techniques and methodologies to their own professional work and research.

In the second component, a group of senior managers from the Forest Survey of India participated in a three-day knowledge exchange programme. This involved a seminar at ITC and visits to other national organisations working in relevant technological fields.

Drs Sjaak Beerens, ITC's director external affairs, makes a presentation to Dr Alok Saxena at the end of the visit

Visiting senior managers of the Forest Survey of India, together with ITC staff

LARIS Programme: Visit of Russian Delegation

Lyande Eelderink eelderink@itc.nl

As part of a training course organised by the Netherlands Kadaster and within the framework of the LARIS programme, ITC was pleased to host a group of delegates from the Russian Federation on Friday, 13 June.

The general topic of the one-week programme in the Netherlands was "The Role, Functions and Structure of Land Administration Agencies", as part of the World Bank financed LARIS programme (Land Reform Implementation Support). This programme provides training for professionals involved in land management in the Russian Federation.

Spending their first days at the Kadaster offices in Apeldoorn and Arnhem, the group received briefings on the role and function of Kadaster in the Netherlands and on its organisation, (financial) management and strategy plan. Of particular interest to the group were aspects of the Netherlands property market and the roles of notaries, Kadaster, real estate agents and mortgage banks. Other topics discussed included the costs of transfer, the role of the tax authorities (Department of Succession), land taxation, methods of levying taxes, responsible parties, land use planning at national, provincial and municipality levels, and the roles - including the general societal roles - of each level of government.

During their visit to the Institute, the group received a short presentation on ITC's research and educational activities in geo-information management, as well as an overview of its various overseas project activities in these spheres. Mr Arbind Tuladhar gave a presentation on the role of ITC in capacity building in land management.

Members of the visiting LARIS group with ITC's Lyande Eelderink, Julia Bariskina and Arbind Tuladhar and Kadaster's Jan de Jong

Director of Saudi Military Institute for Survey and Geographic Studies Visits ITC

John Horn horn@itc.nl

On 25 April, ITC was delighted to receive a delegation from the Military Institute for Survey and Geographic Studies (MISGS), Riyadh, Kingdom of Saudi Arabia, for discussions on possible exchanges of technology and training programmes. The Institute's director, Brig. Dr Abdulaziz Alobieda, headed the delegation, accompanied by four of his senior staff officers, Col. Jamil Alharby, Col. Sami Almubarak, Col. Hussain Abodiab and Lt Col. Muhammed Alhowareni.

MISGS is the training organisation of the Saudi Military Survey Department, which for over 25 years has had a close relationship with ITC. A number of Saudi officers have attended regular and tailor-made training courses in both Enschede and Riyadh. MSD/MISGS is the foremost organisation in Saudi Arabia that is involved in all aspects of training in survey, mapping and the production of a wide range of geo-information products, as well as being the central authority in the assurance of quality standards, norms and specifications for spatial data.

In the course of the visit, presentations were given on ITC's regular

ITC's director external affairs, Drs Sjaak Beerens, exchanging gifts with Brig. Dr Abdulaziz Alobieda

Brig. Dr Abdulaziz Alobieda with Mr Gerrit Huurneman, GFM programme director

courses in geoinformatics (GFM) and geo-information management (GIM) by the respective programme directors, Mr Gerrit Huurneman and Dr Kees Bronsveld. Brig. Dr Alobieda expressed interest in ITC's current TMS/ESA project (training managers and supervisors at the Egyptian Survey Authority) and a presentation was given by the team leader, Dr Mostafa Radwan.

A Memorandum of Understanding between ITC and MISGS was drafted, with the aim of fostering closer collaborative links between the two organisations, and it is hoped that ITC will be able to contribute to the expanding educational programme being developed by MISGS in Riyadh.

ITC staff Mr John Horn, Drs Sjaak Beerens and Dr Kees Bronsveld with the Saudi delegation Brig. Dr Abdulaziz Alobieda, Col. Jamil Alharby, Col. Sami Almubarak, Col. Hussain Abodiab and Lt Col. Muhammed Alhowareni

Honorary Fellow Professor Soekiman Makes Surprise Visit to ITC

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On Monday, 28 April 2003, Prof. H. Soekiman Atmosoedaryo, alumnus and honorary fellow of ITC, paid a surprise visit to his alma mater to acquaint himself with the latest developments. Prof. Soekiman was one of the first two Indonesian professionals to study at ITC. In the period 1951-1953 he followed the course Use of Aerial Photography for Mapping and Interpretation, studying under Prof. Dr W. Schermerhorn, ITC's founding father.

Some years after his return to Indonesia to work for the Ministry of Forestry, Prof. Soekiman was assigned to such countries as Malaysia and Russia for a series of six-month overseas training courses for the Food and Agriculture Organisation (FAO) of the United Nations. The things he had learnt at ITC formed an integral part of these courses.

In 1976, Prof. Soekiman was appointed Honorary Fellow of ITC in recognition of his contribution to the collaboration between Indonesia and ITC.

Although close to 80 years of age, Prof. Soekiman is enjoying relatively good health and is still active in certain fields, for example visiting the Netherlands within the framework of a PROSEA (Plant Resources of South East Asia) conference in Wageningen.

Meeting Indonesian students

Accompanied by his wife, Prof. Soekiman had a look round the ITC building, checking his stereoscopic vision, enjoying the atmosphere created by the exceptional architectural design, and talking to several Indonesian students - spanning an age difference of some 50 years.

Checking stereoscopic abilities

project news

Land Reform in Southern Africa

Hein van Gils gils@itc.nl

In the context of ITC's capacity building efforts in the region, a seminar on land reform in Southern Africa was organised at ITC on 21 May.

Reform of the skewed land ownership patterns across the region followed the implosion of apartheid in Southern Africa in the early nineties. Well-informed land managing organisations were required to deal with the massive land transfers foreseen in this land reform and, as land was the asset to be transferred, speedy and comprehensive land information was an essential management tool.

Under apartheid, the majority of the citizens in South Africa and Namibia received an inferior education, the so-called "Bantu" education, which resulted in the extreme scarcity of qualified personnel to staff the land managing institutions.

In 1994 the Ministry of Lands in Namibia (MLRR) entered into a project partnership with ITC with respect to training their technical staff. In 1996 the Polytechnic of Namibia joined the partnership as a regional training provider. Currently the annual number of students following the various land management courses is about 100. Since the start of the MLRR/ITC series of training projects, over 250 persons have graduated with national certificates or national diplomas. A critical mass of technical expertise has been generated, creating a substantial impact on the implementation of land reform.

In 1998 the Department of Lands in South Africa showed interest in the MLRR/ITC/Polytechnic of Namibia partnership as a model for educating a critical mass of its own staff. The Centre for Environment and Development (CEAD) was the willing and able provider of the customised education in land Information management, and the accredited Master's Degree Course in Land Information Management first started in 2000.

The land information management courses at the Polytechnic of Namibia and the University of Natal (South Africa) together form a seamless set of courses ranging from certificate level (undergraduate) to Master's degree. And yes, South African land managers study at the Polytechnic of Namibia and the first Namibian has been enrolled in the South African Master's Degree Course in Land Information Management.

The keynote speakers at the seminar were top decision makers and leading educators in land reform in Southern Africa: the permanent secretary of the Ministry of Lands (Namibia), the deputy director-general of the Department of Lands (South Africa), the director of Land Reform Implementation (South Africa), the deputy director of Land Reform (Namibia), the rector of the Polytechnic of Namibia, the director of CEAD (University of Natal) and the rector of ITC.

Ms. S. Choane, Deputy Director-General, Department of Land Affairs (DLA)

Mr. F. Tsheehama, Permanent Secretary, Ministry of Lands, Resettlement and Rehabilitation (MLRR)

Mr. S. Kapiye, Deputy Director Directorate of Land Reform, Ministry of Lands, Resettlement and Rehabilitation (MLRR) (left). Mr. H. Toolo, Director Land Reform Implementation, Dept of Land Affairs (DLA) (right).

Dr. T. Tjivikua, Rector of Polytechnic of Namibia

Prof.Dr. R. Fincham, CEAD, University of Natal

Dr. D. Rugege, CEAD, University of Natal

The first block of seminar presentations summarised current policies, targets and trends in land reform in both South Africa and Namibia. Subsequently the education providers in the second block presented the inputs and outputs of the ongoing capacity building in land management (Namibia) respectively land information management (South Africa) for land reform by the project partnership.

Two panels generated lively discussions after each block of presentations, with considerable participation from the audience in the ITC auditorium. A statement by an ITC PhD fellow from Zimbabwe led to an enlightening debate on the "Willing-Seller-Willing-Buyer" principle of the land reform in South Africa, Namibia and, early on, in Zimbabwe. Those attending the seminar could experience at first hand the unwavering dedication and passion underlying the land reform.

ITC Wins Contract for Evaluating Public Transport Corridors of Klang Valley, Malaysia

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John Horn horn@itc.nl

Following a visit to ITC in May by the Malaysian consulting firm Perunding Bersatu (PB), the Institute has been contracted to perform a research project evaluating multiple public transport corridors as a contribution to developing the Klang Valley Integrated Public Transport System and Land Use Development Plan. This plan will be developed for Bahagian Kemajuan Wilayah Persekutuan dan Perancangan Lembah Klang (BKWPPLK), which is the Federal Territory Development and Klang Valley Planning Division.

Recent studies of the Integrated Urban Transportation Strategies for Environmental Improvement in Kuala Lumpur (SMURT-KL) forecasted that traffic congestion would continue to rise owing to increases in private transport trips within Kuala Lumpur and the region by the year 2020. Current strategies would be inadequate to handle the escalating traffic problem and alternative ways need to be explored to mitigate the situation. An integrated land use and public transport strategy, such as the Klang Valley Integrated Public Transport System and Land Use Development Plan, is expected to raise the level of mobility via public transport.

The development of a rail-based public transport network would in future become the basis of a rail spine for the Klang Valley. This rail spine network would be supported by a sub-network of feeder buses, which would be vital to the success of the rail spine network. This fundamental shift would ensure the provision of good public transport facilities throughout the Klang Valley, while concurrently inducing a reduction in the usage of private transport.

In this particular research project, ITC will contribute expertise in providing a methodology and developing an evaluation framework by structuring elicited objectives, criteria and indicators in relation to spatial and non-spatial data available from a maximum of four different viewpoints. It will perform a (spatial) multicriteria evaluation of alternative rail routes from a maximum of four dif-

ferent viewpoints. Ultimately, a conflict analysis of these viewpoints will be carried out in a workshop and a consultative process will be conducted with the local authority.

Within ITC, the Planning and Decision Methods Group specialises in theory development and the application of spatial planning and decision support systems and methods. ITC has been involved in training several Malaysian government organisations in the field of theory and application of spatial multicriteria evaluation for problem analysis, solution design and option selection.

Congratulations after the contract agreement: Mr Kamaruzaman Hussen (unit secretary, Prime Minister's Department), Ir Azman Omar (project director, Perunding Bersatu), Dr Luc Boerboom (ITC Department of Urban and Regional Planning and Geo-Information Management), Mr John Horn (ITC Bureau Project Services) and Ir Ab. Samad Talib (project manager, Perunding Bersatu)

Wuhan University – ITC Joint MSc Course in Urban Planning

Jan Turkstra turkstra@itc.nl

In March 2003 a first group of 11 MSc students from the School of Urban Studies (SUS) of Wuhan University arrived at ITC for a six-month period of MSc research and thesis writing.

SUS has its roots in an ITC international education cooperation project, with initially postgraduate diploma courses in GIS and remote sensing applications for urban planning and management. Over the last 15 years many SUS staff have studied at ITC at PM and MSc level and this year two staff members received their doctorates from Utrecht University and ITC.

Gradually SUS has been integrated into the university structure of the former Wuhan Technical University of Surveying and Mapping, and since 2000 it has been part of Wuhan University. The SUS three-year MSc course in urban planning has many elements in common with ITC's course Urban Planning and Land Administration (UPLA).

The 35 students starting their MSc studies in September 2001 were offered the opportunity to conduct part of their MSc research at ITC. Staff from ITC have given a distance education workshop and two modules in Wuhan.

Based on English qualifications and the quality of the research proposal, 11 students were finally selected for the joint MSc study. The thesis reports will be defended in early September 2003, and the final graduation ceremony will take place in Wuhan in June 2004.

An advantage of this joint course is that it provides students within the Chinese MSc structure with the opportunity to experience a different research and cultural environment.

The partnership and dialogue between SUS and ITC is supported through the regular exchange of lecturing staff and the possibilities for joint research and projects.

Chinese course participants and departmental staff shortly after the start of the ITC programme

Special Course for Trujillo, Peru

Jan Turkstra turkstra@itc.nl

A special two-month course was developed for 15 participants from Trujillo (third largest city of Peru, with approximately 800,000 inhabitants). The course was held at ITC from 24 March until 23 May 2003. A preparatory phase with introductory courses on GIS and database development was conducted at the GIS laboratory of the local partner university, Universidad Privada Antenor Orrego (UPAO). A follow-up phase will take place in Trujillo in the second half of 2003. The Dutch government, through the NUFFIC special fellowship programme, financed the course.

The course was designed to equip participants with specific skills in developing and integrating databases, which could then be used to further develop the local spatial data infrastructure SIMTRU (Sistema de Información Metropolitano de TRUjillo). The course will produce a municipal website that will include part of SIMTRU.

A special course conducted last year for staff from Trujillo resulted in the production of an environmental atlas of Trujillo. Following a special last-minute request by the mayor of Trujillo, a CD-Rom version of the atlas was included in the course objectives. A first prototype was produced during the course and will be finalised towards the end of 2003.

Señora Leyla Moran Castillo receives her course certificate from Dr Jan Turkstra

Ir Mark Brussel, UPLA programme director, congratulates Señor Segundo Francisco Garcia Galarreta

The course participants came from the municipality (planning, information centre, cadastre and tax office), the regional offices of the Ministries of Education, Health, Agriculture and Finance, the regional government, the public register and UPAO.

Working directly with the municipality of Trujillo over the last three years has highlighted the difference between theory and practice in the development and implementation of geo-information systems. The positive but critical attitude of the mayor and the municipal council necessitated short-term results and benefits, but without losing the long-term vision of a SIMTRU embedded into different municipal departments and other geo-data producers and users.

The challenge now for ITC is to use the gained experience in its education and research activities, as well as to apply these techniques in projects for other municipalities.

Course participants and staff after the graduation ceremony

research news

PhD Graduation: Karin Sigrid Schmidt

Tuesday, 4 March 2003, ITC Enschede

research@itc.nl

Graduate
Karin Sigrid Schmidt

Karin Sigrid Schmidt was born in Windhoek, Namibia, on 6 November 1970. At the Deutsche Höhere Privatschule in Windhoek she acquired her general knowledge and was taught the most important survival strategies. After her schooling, she went to South Africa to study for her degree in geography and mathematics at the University of Stellenbosch.

Her first job was at the National Remote Sensing Centre - part of the Directorate of Forestry under the Ministry of Environment and Tourism of Namibia. As a research scientist she was responsible for the research and consulting activities of the National Remote Sensing Centre in the fields of GIS and remote sensing, including system administration of the local area network with UNIX and DOS/Windows operation systems. During this time she also followed advanced courses in ArcInfo (at Geographic Information Management Systems (GIMS), Midrand, South Africa) and in system administration of UNIX-operated systems (at CAD/CAM Systems Holdings (Pty) Ltd, Johannesburg, South Africa). The job involved a considerable amount of fieldwork for vegetation mapping using remote sensing.

In 1996 Karin applied for her MSc degree at ITC. Her final report, "Spectrometer Data and Multidate Radar for the Detection of Change in Structure of Grasslands", was the result of the relentless lobbying by Prof. Andrew Skidmore for research with hyperspectral remote sensing at ITC.

Prof. Skidmore invited Karin to continue her studies in the context of a PhD. A fieldwork area was found on Schiermonnikoog, and research on the topic of vegetation mapping using hyperspectral remote sensing data and ancillary data in an expert system was conducted in a joint project with the Dutch Survey Department and funded by the BCRS. Karin was involved with hyperspectral image processing, data handling, programming during software development, and testing theoretical concepts. The theoretical developments were then applied to vegetation ecology. She also became a reviewer for the *International Journal of Remote Sensing* and *Remote Sensing of Environment*, was involved in lecturing and tutoring, and undertook consulting work for the Dutch government, applying an expert system to map dune vegetation.

The research culminated in the thesis *Hyperspectral Remote Sensing of Vegetation Species Distribution in a Saltmarsh*, which is based on several published journal articles and others that are still under review. Karin was awarded her doctorate - a joint doctorate of the International Institute for Geo-Information Science and Earth Observation (ITC) and Wageningen University - on 4 March 2003.

Graduate with promotor
Prof.dr. A.K. Skidmore (ITC)

Copies of *Hyperspectral Remote Sensing of Vegetation Species Distribution in a Saltmarsh* by
Dr K.S. Schmidt are available from the ITC Bookshop.
P.O. Box 6, 7500 AA Enschede,
The Netherlands
E-mail: bunk@itc.nl,
Fax: +31 (0)53 487 44 00
Price: €15,00 (excluding mailing costs),
Dissertation number: DIS096

PhD Graduation: Mohammed Yahya Said

Friday, 21 February 2003, ITC Enschede

research@itc.nl

Graduate
Mohammed Yahya Said

Mohammed was born on 22 April 1960. He completed his undergraduate studies in 1984 with a BSc degree in zoology and botany. In 1985 he joined the Department of Resource Surveys and Remote Sensing (DRSRS) as a biologist. He was involved in ecological monitoring work, in particular conducting an aerial census of large mammals over the Kenya rangelands. Later, in 1987, he joined the Data Management Section and took on additional responsibilities for coordinating the development of a wildlife/livestock spatial database, while remaining involved in aerial census work and other ecological monitoring activities.

In 1989 he joined ITC for a postgraduate diploma course lasting 11 months. Later, in 1992, he joined Wageningen Agricultural University and followed an MSc course in the application of GIS in natural resources management. In 1994 he was involved in the further development of GIS and the updating of the African Elephant Database, a joint programme carried out by the African Elephant Specialist Group (AEfSG), the United Nations Environmental Programme (UNEP) and the International Union for Conservation of Nature (IUCN). In 1997 he was made head of the Data Management Section at DRSRS. In the same year he participated as a system analyst in the National Land Degradation Mapping Programme jointly conducted by UNEP, DRSRS, the Kenya Meteorological Department, Nairobi University, Kenya Soil Surveys and ILRIC. He worked for more than a year as a World Bank consultant (GIS application specialist). In mid-1999 he started his PhD research at ITC, and the last three and half years were spent investigating the factors that influence the species diversity of large herbivores at various spatial scales, ranging from sub-continental to local level.

Multiscale Perspectives of Species Richness in East Africa

This dissertation describes and analyses animal species richness in East Africa from a multiscale perspective. Diversity patterns were studied at sub-continental, national and sub-national levels. The study demonstrated that species diversity patterns were scale-dependent. Diversity patterns varied with spatial and temporal scales of observation. Processes and parameters important at one scale were not as relevant at another.

At sub-continental level large herbivore assemblages revealed maximum diversity at intermediate ecosystem productivity. This finding is consistent with other studies on the relation between productivity and species richness. Furthermore, when comparing climatic and remotely sensed estimates of ecosystem productivity, the first was observed to be a better predictor of diversity. Geographical patterns in species richness proved to be very similar among different taxonomic groupings of animal species. Most taxa revealed maximum diversity at intermediate productivity.

Graduate with promotor
Prof.dr. H.H.T. Prins
(Wageningen University)

The coexistence of pastoralism and wildlife was analysed at Kenyan national level. A study of 17 arid and semi-arid districts revealed that the biomass of human and livestock populations was negatively related to wildlife biomass. An increase in human population density was associated with a significant decline in the density of wildlife populations. This spatio-temporal extension of the "pastoral road to extinction" model provided more insights into the antagonistic relation between people, livestock and wildlife. Also it allowed the areas of conflict needing specific attention to be localised.

A further study in the arid zone of northern Kenya revealed that wildlife distribution was

negatively associated with the presence of livestock and water-points. This suggests that livestock-oriented interventions in rangelands directly degrade wildlife resources. Further, it was demonstrated that the local processes (competition and disturbance) have a direct link with regional patterns. In the northwestern, central and coastal areas of Kenya there are signs of local species extinction.

Finally, studies were conducted at sub-national level in the Masai Mara ecosystem. Significant declines were recorded for ten out of 13 wild ungulate species between the late 1970s and the turn of the century. Further analysis provided evidence that these declines were related to changes in land use rather than climate. This suggests that the processes underlying the dynamics of wildlife in the Masai Mara ecosystem differ from those reported for the neighbouring Serengeti National Park in Tanzania. These results indicate that conservation and rural development have arrived at a crossroads. Further uncontrolled rural development will lead to a continued decline in, and the eventual extinction of, wildlife.

The challenge would be to integrate rural development with sustainable wildlife conservation, with the latter defining the boundary conditions for development. This would require the long-term planning of land use, based on a realistic assessment of the interaction between wildlife conservation and other forms of land use, carried out at spatio-temporal scales that transcend what appears to be achievable according to the social, economic and political agenda.

Copies of *Multiscale Perspectives of Species Richness in East Africa* by Dr Mohammed Yahya Said are available from the ITC Bookshop.
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Price: €15,00 (excluding mailing costs), Dissertation number: DIS095

PhD Graduation: Zhengdong Huang

Friday, 28 March 2003, Utrecht University research@itc.nl

Graduate Zhengdong Huang with promotors Prof.dr. F.I. Masser (ITC) and Prof.dr. H.F.L. Ottens (Utrecht University)

Zhengdong Huang was born on 14 October 1968 in Hubei, China. In 1986 he went to the Wuhan Technical University of Surveying and Mapping (WTUSM). After two years of study in the Department of Geodesy, he transferred to the newly established Education Centre for Urban and Rural Surveys, Planning and Management (ECURSPAM) at the same university. In 1990, Zhengdong Huang was awarded a Bachelor's degree in urban planning, and received the Graduate of the Year Award from the university. In the same year, he became a staff member of ECURSPAM. He received an MSc degree at ITC in 1993. Since then he has worked at the School of Urban Studies (SUS) at WTUSM, now the new Wuhan University. In 1999 he started his PhD study at ITC.

Zhengdong Huang has been working on database management systems (DBMS), geographical information systems (GIS), and the application of these technologies in urban planning and management. His research interests include urban information systems, urban transport data integration, transport planning and transport simulation.

Data Integration for Urban Transport Planning

Urban transport planning aims at balancing conflicting challenges by promoting more efficient transport systems while reducing negative impacts. The availability of better and more reliable data has not only stimulated new planning methodologies, but also created challenges for efficient data management and data integration. These tasks cannot be effectively fulfilled without the application of advanced information technologies.

The major focus of this study is to improve methodologies for representing and integrating multi-source and multi-format urban transport data. This research approaches the issue of data integration based on the classification of urban transport data from both a functional and a representational perspective. The functional perspective considers the characteristics of the urban transport system and planning requirements, and categorises data into supply, demand, performance and impact. The representational perspective considers transport data in terms of their

spatial and non-spatial characteristics that are important for data representation. These two perspectives correspond to institutional and methodological data integration respectively, and are the foundation of transport data integration. This research is based on the city of Wuhan in China.

The methodological issues of transport data integration are based on the representational perspective. A framework for data integration has been put forward, in which spatial data are classified as point, linear and areal types, and the non-spatial data are sorted out as values and temporal attributes. This research has probed the integration of point, linear and areal transport data, respectively, within a GIS environment.

The locations of socio-economic activities are point-type data that need to be spatially referenced. A location referencing process requires a referencing base, source address units and referencing methods. The referencing base consists of such spatial features as streets, street addresses, points of interest and publicly known zones. These referencing bases have different levels of spatial preciseness and have to be kept in a hierarchy. Source addresses in Chinese cities are usually written as one sentence; this has to be divided into address units for automatic geo-coding. As they are difficult to separate from the sentences, the address units have to be clearly identified in survey forms. Depending on the types of address units, the referencing process makes use of either semantic name matching or address matching to link source addresses to features in the referencing base. The name-based and road-based referencing schemes constitute a comprehensive location referencing framework that is applicable to Chinese cities.

The relationship between two sets of linear features can be identified with spatial overlay in the case of independent representation, or with internal linkage in a dependent representation. The bus line is one such feature that runs on the street network and can be dependently referenced by streets. In the heavily bus-oriented city of Wuhan, bus lines constitute a large public transit network that is important to transport planning and management. This research has extended conventional bus line representation to a more detailed level. Each bus line has been differentiated as two directional routes that are defined separately with reference to the street network. Accordingly, individual route stops are also represented in the database. These stop sites are spatial features with geometry that are linked to street segments and bus routes by linear location referencing methods. A data model linking the base street network, bus lines and routes, line and route stops, and other bus operations data has been constructed. The benefits of the detailed model have been demonstrated in several transport applications.

Zonal data transitions include three types of operations, i.e. aggregation, areal interpolation and disaggregation. This study focuses on disaggregating data from larger zones to smaller zones. In the context of Wuhan, zonal data disaggregation involves the allocation of statistical data from statistical units to smaller parcels. Given the availability of land use data, a weighted approach reflecting spatial variations has been applied in the disaggregation process. Two technical processes for disaggregation have been examined. Weighted area-weighting (WAW) is an adaptation of the classic area-weighting method, and Monte Carlo simulation (MC) is a stochastic process based on a raster data model. The MC outcome is more convenient for subsequent re-aggregation, and is also directly available for micro-simulation. An important contribution arising from this zonal integration study is that two standardised disaggregation tools have been developed within a GIS environment.

The research has also explored the institutional aspect of data integration. The findings of this study show that there is generally a good institutional transport structure in the city of Wuhan and that there is also a growing awareness of using information technology. Professional cooperation exists among transport organisations, but not as yet at a level for data sharing. An integrated data support framework requires data sharing. In such a framework, it should be possible to know where to get data for specific transport studies, or which kind of research an institution supports.

Copies of *Data Integration for Urban Transport Planning* by Dr Zhengdong Huang are available from the ITC Bookshop.
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Price: €15,00 (excluding mailing costs), Dissertation number: DIS098

100th PhD Graduation at ITC: a milestone

ITC News itcnews@itc.nl

On 4 June 2003 José Campos dos Santos from Brazil became the 100th research student of ITC to be awarded a PhD. On 6 February 1990, Dr Joseph Akinyede from Nigeria was the first. Looking back over the past 13 years, ITC's acting research coordinator Prof. Martin Hale gives the long and short of changes in the Institute's PhD studies and emphasises the importance of a more project-oriented approach for a more effective contribution to the world's environmental problems.

From left to right: graduate with Dr.Ir. R.A. de By (promotor ITC), Prof.dr. W.H.M. Zijm (Chairman) and Prof.dr. P.M.G. Apers (promotor Twente University)

Martin Hale: "When we first started PhD research in an organised and structured programme, the opportunities were largely driven by the expertise of individual senior staff members. Either they had identified problems elsewhere in the world, or the input came from individual students. Increasingly we are organising our research programme under clear themes or spearheads. The research programme has been developed to fit ITC's knowledge field. It is problem- and output-oriented, inter- and multidisciplinary in character, and is embedded in the national and European scientific network. Our PhD students execute work packages that are components of research projects we are carrying out within the programme spearheads. In that sense we are becoming more focused, having a large number of PhD students contributing to the solution of related problems rather than dealing with a variety of more isolated problems."

One of the spearheads in the ITC research programme is geo-information science and earth observation for a better understanding of global change. The research of the 100th PhD student, as well as the career of the first PhD graduate, has ground in common with this major issue.

The 100th PhD graduate, José Santos dos Campos, swam and canoed in the Amazon river in his youth and grew up in an area of enormous biodiversity. He has witnessed an immense change in the ecosystem. That is why, in spite of an ICT background, he chose ITC for his PhD study. His thesis comprises his investigation into the development and implementation of a new database architecture that can meet the specific demands of biosciences*.

Two years of biological survey in the Amazon and the contacts with various organisations and institutions for the study and conservation of the area are at the heart of his research. His initial ignorance in the field of biosciences needed some rectification - not least in order to set at ease the minds of the biologists in the area, who do not believe that computers can contribute to solving the problem of environmental change. Only through simulations and models can computers and bioscientific data yield information useful for conservation and protective measures. The development of this particular information system is also important because there are institutions in the Amazon area that possess data collected over the past 100 years. These data are of great value and need to be consolidated and shared.

Also the shortage of money for scientific purposes in the area has put

The 100th Phd graduate José Campos dos Santos

* A biodiversity information system in an open data/metadatabase architecture


Dr. Joseph Akiniyede
the first research student of ITC

enormous pressure on scientists to do more with less money. In future the system, with only limited means, should be able to present a good overview of the environmental situation in the Amazon. The data will be made available to all parties concerned with environmental change.

According to Martin Hale, geo-information science is a rapidly developing area at the moment. One reason for this is the fact that more satellite-borne sensors are being put into orbit. This will result in an increasing amount of data for ITC to work on. Although the subject of Dr Joseph Akinyede's PhD thesis does not directly touch on satellite sensors and geodata, his present job certainly does. His thesis was about highway cost modelling and route selection using a geotechnical information system. Although his studies at ITC greatly enhanced his performance and professional career as a road planner, unfortunately little practical use was made of his knowledge, owing to the lack of funds and computer facilities. But Dr Akinyede is now director of NASRDA (National Space Research and Development Agency) in Nigeria. NASRDA was established by the Nigerian government to implement the National Space Policy and Programme. NASRDA carries out research and development in space science and technology for the sustainable socio-economic development of Nigeria. This includes the building and launching satellites (e.g. NigeriaSat-1, which will be launched in July 2003) and space application support for sustainable development programmes.

In his current job the experience he gained at ITC is of great value: "I acquired a basic expertise in the use of remote sensing and GIS for solving socio-economic problems, and a capacity for conducting independent research - as well as a capacity for hard work. It was special being the first PhD student in such a highly reputable institution of international standing. It was also a successful experiment for both myself and ITC. For ITC it marked the fulfilment of an ambition, and it served as a solid foundation for others to build upon."

Best Conference Paper Presentation Award

Onisimo Mutanga mutanga@itc.nl

Onisimo Mutanga, a PhD student under the supervision of Prof. Andrew K. Skidmore (NRS department), won the best conference paper presentation award at the 3rd EARSeL (European Association of Remote Sensing Laboratories) workshop held in Oberpfaffenhofen, Germany, from 13 to 16 May 2003.

The paper, entitled "Continuum–removed absorption features estimate tropical savanna grass quality *in situ*", describes a novel technique for estimating the foliar concentration of macronutrients (N, P, K, Ca, Mg) in the grasslands of the Kruger National Park, South Africa. The results are based on field spectral measurements made using a GER 3700 spectrometer. The study is critical for a better understanding of wildlife feeding patterns. The technique is now being tested for mapping macronutrients in the park, using HYMAP hyperspectral imagery.


Lunchtime in the field – Onnie and Jelle


Onnie collecting samples for chemical analysis

life after itc

ITC Alumnus and ADT 2003 Innovator Awards

Ale Raza araza@esri.nl

Ale Raza is a software engineer at the Environmental Systems Research Institute (ESRI), Redlands, USA, the world's leading GIS organisation. After completing his MSc studies (with distinction) in GIS for urban applications at ITC in 1997, Dr Raza went on to receive his PhD from ITC and the University of Twente, the Netherlands, in early 2001. The main focus of his study was object-oriented spatio-temporal data modelling and urban applications. Currently his research interests include the modelling and application of spatio-temporal and version databases, and scaling and performance issues of large spatial databases. Dr Raza has published several highly-regarded GIS papers in professional journals and international conference proceedings, and in 2000 he received URISA's (Urban and Regional Information Systems Association) Horwood Award, Honourable Mention.

This year was marked by another milestone. In the ninth annual Application Development Trends (ADT) Innovator Awards, Dr Raza's work adopted by Jefferson County, Colorado, USA, won the category Component-Based Development with the project "Objects keep track of county addresses". This project is based on Dr Raza's PhD research on spatio-temporal databases.

ADT's editors and a team of experts from the Boston consulting firm Keane Inc. spent several hours evaluating more than 50 projects in order to determine this year's winners. The judges looked at the willingness of development managers to take substantial risks in building systems that provide a competitive advantage.

Objects in a GIS are dynamic. In a traditional (atemporal) GIS, however, these objects are treated as static and are deleted whenever there is a transaction in the system. In spatio-temporal databases or temporal GIS, old objects are not deleted but are kept in the system with a valid time stamp, along with their usual topology. Parcels are dynamic objects. In all parts of the world, a parcel object is a fundamental unit in many urban planning applications (operational or strategic). Everything from city boundaries and parks to transportation networks can be built up from an assemblage of parcels. From the perspective of geoinformatics and urban planning, an issue challenging many computer scientists and planners has been the managing, querying and display of spatio-temporal data. Difficulties are due to the inherent complexity of spatio-temporal data. Dr Raza was able to dilute the complexity by designing a model based on object-oriented concepts and the mathematical theory of cell complexes. In this model, called the cell-tuple-based spatio-temporal data model, the topology is stored explicitly.

In early 2001, Jefferson County needed to change the way it tracked its land parcels and addresses, without disrupting operations or losing or corrupting data. Commercial off-the-shelf software could not provide the necessary functionality or extendibility. The county realised it needed to

Dr. Ale Raza

upgrade its County Address Management System (CAMS) and create a unified spatial and tabular system to keep track of the addresses in the county. The county decided to restructure CAMS in a component-based Java architecture running in a Linux environment. The goal was to create a system that could unify the spatial data from the county's ESRI ArcInfo GIS software and the tabular data from its DB2 database, in order to keep track of the county's 220,000 parcels and 350,000 addresses. They decided on an object-based approach.

The county wanted to build a parcel object component that would maintain both spatial and tabular data while tracking spatial changes over time. This part of the project - historical versioning - was the biggest challenge (David Gallaher, Director IT, Jefferson County, Colorado). "No one had ever built a commercial, truly spatial object that could manage

time," he said. "When we first looked at it, we didn't think it was possible." Not one of the nine developers working on the project had had any experience with object-oriented design. The problem, according to Gallaher, was that taking "snapshots" of the entire data set at any given time (a common solution to tracking spatial changes temporally) would not satisfy the county's requirements. Instead, the developers had to track spatial change over time on a per-parcel level.

Jefferson County decided to adapt Dr Raza's research on object-oriented modelling for the parcel object. This would allow the county to create the parcel object it wanted. The county used Versant ODBMS for the object-oriented database. This product allowed the county developers to use parent-child relationships to manage what happened to a parcel, zoning or any boundary. It also allowed them to determine spatial change over time, not by a snapshot of a layer but by a discrete feature. Based on the work of Dr Raza, the county came up with a unique GIS, which it calls Temporal/Spatial Information Systems (T/SIS). This new version enables an address to be treated as an attribute of a parcel, and introduces the ability to include time in the GIS.

The county can now link a variety of information to the parcel address, and then augment that data with historical data. This means that residents can look at the history of any parcel before buying it. The county can make spatial objects persistent as ready-to-use actual objects and avoid the overhead in dealing with object-to-relational methods. But this simplicity comes at a price - topology is not explicitly stored in the database and must be re-created on the fly.

The parcel object component serves as the engine for the county's new parcel/address management system called Encoded Neighborhood Data Object Repository (Endor). To support the integration of Endor with the county's other applications, the IT department built a J2EE-based hub-and-spoke architecture, using BEA WebLogic Integration as the hub. The IT staff selected the Linux platform for the application server and for future application development. In-house software is now built primarily with Java code, using BEA's WebLogic Server and Integrator components

"If every parcel were tied to one common set of data, we'd never have to re-precinct again," said Gallaher. "We'd never have to deal with a new precinct or zoning map if all the county's tabular and spatial data were tied to one package."

The parcel-object-based system makes more information available online to county workers and residents. This should reduce the amount of time county employees spend creating data sets and answering individual questions. It should also help the county to serve its increasing population with its current resources. Furthermore, it is a core piece of infrastructure that will be used to build additional applications in the future.

By developing the application in Java, utilising J2EE design strategies and persisting the data in an OODB (Versant), the team eliminated the need for an EJB construct. This simplified the model, although the use of emergent technologies increased the risk. The result was an inventive use of spatial relationships via objects using an OODB, and a uniquely extensible system that is likely to be copied by other counties (Neville Goedhals, Manager, Enterprise Architecture Global Services, Keane Inc.).

For more details please visit:
http://www.adtmag.com/article.asp?id=7448
http://www.adtmag.com/article.asp?id=7457

ITC to Initiate Alumni Association in India

John Horn horn@itc.nl

In line with its ongoing support its 'Alumni Interaction System", the Institute initiates the establishment of ITC Alumni Associations, the main goal being to maintain contact with as many of its alumni as possible. It is with pleasure that we announce the launch of a new ITC Alumni Association in India

With over 200 graduates from ITC in the last 15 years alone, and a thriving educational partnership with the several prominent educational and research centres, the sub-continent was a logical choice for this initiative.

ITC is delighted to announce that Dr. Mahavir, Professor of Planning and Head, Centre for Remote Sensing, School of Planning and Architecture, New Delhi, has consented to act as local coordinator of the association. Prof. Mahivir studied at ITC for his PhD on "Modelling settlement patterns for metropolitan regions: inputs from remote sensing", graduating in 1996. Earlier, in 1989, he completed

the Postgraduate Diploma course on Urban Survey and Human Settlement Analysis.

Prof. Dr. Mahavir who has kindly agreed to act as coordinator of the ITC Indian Alumni Association

As local coordinator, his terms of reference will include, the establishment of the association, and on-going coordination of its activities. He will maintains contact with a wide circle of ITC alumni throughout the country and actively encourages them to participate in the association.

It is intended to organize periodic meetings of association, and hopefully accompany these with talks by visiting ITC staff.

Though regular liaison with ITC Prof. Mahavir will endeavour to act as a focal point for information relating to ITC programmes and new initiatives.

If you wish to participate in the association, please provide your latest contact information to Prof. Mahavir.

For more general information about the association please contact either:

Prof. Dr. Mahavir
School of Planning and Architecture
4-B, I. P. Estate, New Delhi
110002 INDIA
E-mail:
mahavir09261@alumni.itc.nl
or
John Horn
Bureau Project Services
ITC Enschede
E-mail: horn@itc.n

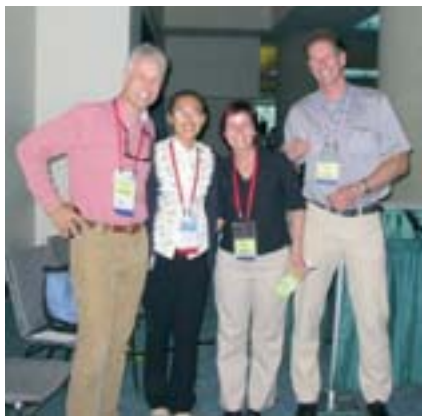
My ESRI Internship - A Precious Experience

Yongjun Zhao zhao_yongjun@hotmail.com

First of all, I would like to take the opportunity to show my great appreciation to ITC. After I finished my study in geoinformatics at ITC, I was nominated as an ESRI intern at my MSc. graduation ceremony in 2002. This internship, which will last six months, started on 8 February 2003.

After 35 years of development, ESRI is now the largest GIS software production company in the world, and undoubtedly influences GIS trends and techniques in many ways. Besides its main task of GIS software production, ESRI has been involved in many scientific research and education activities in the field. Reflecting their close relationship, ESRI and the University of Redlands jointly organise a GIS seminar at ESRI every Wednesday afternoon. Many visiting professors are invited to share their knowledge, information and experience - moreover, ESRI managers take the opportunity to introduce their staff to new ArcGIS products and future prospects. It has been such a wonderful chance for me to learn and to share. I've been enjoying these seminars a great deal and haven't wanted to miss even one.

Throughout the year the ESRI Learning Center offers various types of excellent training courses related to its different products. As an intern from ITC, I have the privilege of being able to take any courses. After studying GIS theory at ITC, it is a great opportunity for me to learn the practical side, with plenty of hands-on knowledge from course instructors. The courses I'm taking (such as ArcGIS Desktop, ArcGIS Extension, Customising ArcGIS with ArcObjects, ArcSDE, ArcIMS and GIS Management) cover many ESRI products.



From left to right: Rolf de By, Yongjun Zhao, Lyande Eelderink, Mark Noort

Apart from attending courses, I also work in the internationalisation group. The main task of this group is to test ESRI software in different language environments. At my request, they arranged for me to test various software packages after I had completed the relevant courses. It is definitely the ideal way to learn and understand. Based on my knowledge of, and interest in, programming with ArcObjects, I was asked to develop a demo to show how ArcGIS works in

the Chinese environment. This demo was presented at the ESRI 2003 User Conference.

Besides studying and working at ESRI, I was honoured to be the only one of four interns to have the chance to attend the ESRI User Conference in San Diego. It was the first time in my life that I participated in such a large-scale conference of high professional level. I managed to attend many different technical workshops and gained a deeper insight into both ESRI and ArcGIS. I came to realise even more just how lucky I am to be here for six months, working together with these experts. And I greatly enjoyed the beautiful city of San Diego.

Being an intern at ESRI, I always think of myself as an ambassador for ITC at Redlands. Luckily I have an ITC tag on my ESRI badge, so I take every opportunity to introduce people to ITC whenever they're interested, and I am very proud to present myself as an ITC graduate.

Please allow me to thank ITC and the ITC selection committee for ESRI international internships. Special thanks go to Dr Rolf de By, Ms Lyande Eelderink and Ms Marijke Smit, who have all supported me in my internship in many ways.

I will complete my internship next month and then go back to China. With all the knowledge and experience I have gained at ITC and ESRI, I am looking forward to working with even greater professionalism.

ITC Alumni Meeting in Thimphu, Bhutan, 25 April 2003

Niek Rengers rengers@itc.nl

Since February 2003 ITC has been engaged in an institutional cooperation programme with the Department of Geology and Mines (DGM) of the Royal Government of Bhutan. The core of this programme is capacity building and institutional strengthening to cope with any slope instability problems that arise in developing the infrastructure of this small Himalayan country between India and China (Tibet). For more details of this programme, see *ITC News* 2002-4.

ITC team leader in Thimphu Dr Niek Rengers (associate professor of engineering geology and from 1992 to 2000 ITC's vice-rector) invited the Bhutanese alumni for a meeting in the Yeedzin Guesthouse in the capital on 25 April. A total of 38 Bhutanese have followed courses at ITC since the late 1980s and of these 23 participated in the meeting.

Just over half the alumni are employed by the Survey of Bhutan. Other employer organisations are the Ministry of Agriculture (Department of Forestry Services, as well as the Policy and Planning Division), the Renewable Natural Resources Research Centre, the Urban Development and Housing Division of the Ministry of Communications, the Department of Geology and Mines, and the Thimphu City Corporation.

Mr Sangay Gyaltsen (ITC MSc with a specialisation in engineering geology) gave a presentation on the DGM-ITC Institutional Cooperation Programme. This was followed by a presentation by Niek Rengers on recent developments at ITC (a new name for ITC, what does this mean? the new set-up of the educational programmes; research spearheads; the new Alumni Interaction System (ITC-AIS, e-mail: alumni@itc.nl).

After these presentations there was a lively get-together, with a buffet dinner and the opportunity to exchange anecdotes about the study period spent at ITC. Some expressed the wish to establish an official ITC alumni association in the country. What will be the outcome? Only time will tell.

ITC Bhutanese alumni of the last 25 years with Dr Niek Rengers (front row, far right), Mr Dorji Wangda, director of the Department of Geology and Mines (second row, far left), and Ms Yangchen Doma, secretary Dutch consulate in Bhutan (seated next to Niek Rengers)

CONFERENCE CALENDAR

Space Applications for Sustainable Development
08-Sep-03 - 11-Sep-03
Austria, Graz
http://www.oosa.unvienna.org/SAP/act2003/austria/index.html
oosa@unvienna.org

SPIE's Remote Sensing Europe
08-Sep-03 - 12-Sep-03
Spain, Barcelona
http://www.spie.org
spie@spie.org

World Summit for Satellite Financing
09-Sep-03 - 10-Sep-03
France, Paris
http://www.euroconsult-ec.com
marketing@euroconsult-ec.com

International Conference on Mathematical Modelling of Ecosystems
09-Sep-03 - 12-Sep-03
Kazakhstan, Almaty
http://www.space-science.narod.ru/MAINE.HTM
ikikz@yandex.ru; space-science@narod.ru

ION GPS/GNSS 2003
09-Sep-03 - 12-Sep-03
United States, Portland
http://www.ion.org

Scales and Dynamics in Observing the Environment
10-Sep-03 - 12-Sep-03
United Kingdom, Nottingham
http://www.geog.nottingham.ac.uk/~rspsoc03/
rspsoc03@geog.nottingham.ac.uk

15th Annual EAIE Conference
10-Sep-03 - 13-Sep-03
Austria, Vienna
http://www.eaie.nl/conf2003/

International Congress of the Geographers of the Islamic World
17-Sep-03 - 18-Sep-03
Iran, Tehran
http://www.igctmu.org/edefault.htm
info@igctmu.org

Intergeo 2003
17-Sep-03 - 19-Sep-03
Germany, Hamburg
http://www.intergeo.de
info@intergeo2003.de

Photogrammetric Image Analysis
17-Sep-03 - 19-Sep-03
Germany, Munich
helmut.mayer@unibw-muenchen.de

Annual Meeting and Symposium on Advanced Technology
19-Sep-03 - 23-Sep-03
Poland, Krakow
http://www.fig.net
pauline.vanelsland@kadaster.nl

Digital Earth - Information Resources for Global Sustainability
21-Sep-03 - 25-Sep-03
Czech Republic, Brno
http://www.geogr.muni.cz/digitalearth03
digitalearth03@geogr.muni.cz

Theory, Technology and Realities of Inertial/GPS Sensor Orientation
22-Sep-03 - 23-Sep-03
Spain, Barcelona
http://www.ideg.es
karten@ipi.uni-hannover.de

Optical 3D Measurement Techniques Conference
22-Sep-03 - 25-Sep-03
Switzerland, Zurich
http://www.photogrammetry.ethz.ch/optical3d/
stein@geod.baug.ethz.ch
ITC attendance: Klaus Tempfli

X Latinoamerican Congress on Marine Sciences
22-Sep-03 - 26-Sep-03
Costa Rica, San José
http://www.una.ac.cr/Xcolacmar/
ioicos@una.ac.cr

Symposium "25 Years of Assessment of Erosion"
22-Sep-03 - 26-Sep-03
Belgium, Ghent
http://soilman.ugent.be/symposium_erosion/
Greet.Oltenfreiter@UGent.be
ITC attendance: Abbas Farshad

EnviroInfo Cottbus 2003
24-Sep-03 - 26-Sep-03
Germany, Cottbus
http://www.tu-cottbus.de/enviroinfo
enviroinfo@tu-cottbus.de

XXI Brazilian Cartographic Congress (cbc)
29-Sep-03 - 03-Oct-03
Brazil, Belo Horizonte
http://www.cartografia.org.br
sbc.rlk@terra.com.br

CIPA 2003 Symposium
30-Sep-03 - 04-Oct-03
Turkey, Antalya
http://www.cipa2003-antalya.org/

ISPRS Workshop: Spatial and Temporal Data Modelling
02-Oct-03 - 03-Oct-03
Canada, Quebec
http://sirs.scg.ulaval.ca/isprs_wg4-1/workshop.asp

High Resolution Mapping from Space 2003
06-Oct-03 - 08-Oct-03
Germany, Hannover
http://www.ipi.uni-hannover.de/ISPRS_workshop
boettcher@ipi.uni-hannover.de

3DIM2003
06-Oct-03 - 10-Oct-03
Canada, Banff, Alberta
http://www.3dimconference.org/3dim03-home.html
3DIMconf@nrc-cnrc.gc.ca

3-D Reconstruction from Airborne Laserscanner and InSAR Data
08-Oct-03 - 10-Oct-03
Germany, Dresden
http://www.tu-dresden.de/fghgipf/photo/ALS_DD2003/ALS_DD2003.html
hmaas@rcs1.urz.tu-dresden.de

URISA's Annual Conference and Exposition
11-Oct-03 - 15-Oct-03
United States, Atlanta, Georgia
http://www.urisa.org/annual.htm
info@urisa.org

Map Asia 2003

13-Oct-03 - 15-Oct-03
Malaysia, Kuala Lumpur

http://www.mapasia.org/2003/index.htm
info@mapasia.org

3rd International Symposium on Geophysics

14-Oct-03 - 16-Oct-03
Egypt, Tanta

http://www.tanta.edu.eg/EN/isg.htm
akafafy1@yahoo.com

Geo-Information for Practice

15-Oct-03 - 18-Oct-03
Croatia, Zagreb

http://www.comm6wg3-isprs-meeting2003.com.hr/
ivana.sainovic@dgu.hr

CoastGIS 2003

16-Oct-03 - 18-Oct-03
Italy, Genova

http://www.gisig.it/coastgis/
http://www.gisig.it/coastgis/home.htm
gisig@gisig.it

Geomatics for Industry - Micro to Macro

16-Oct-03 - 18-Oct-03
Canada, Calgary

http://www.cig-acsg.ca/page.asp?intNodeID=8202
admincig@magma.ca

From OEEPE to EuroSDR, 50 Years of European Spatial Data Research and Beyond

16-Oct-03
Germany, Munich
barbara.klumpp@blva.bayern.de

International Workshop on Next Generation Geospatial Information

19-Oct-03 - 21-Oct-03
United States, Cambridge (Boston)

http://dipa.spatial.maine.edu/NG2I03/
peggy@spatial.maine.edu

ISPRS Workshop Monitoring and Modelling of Global Environmental Change

21-Oct-03 - 22-Oct-03
Japan, Kyoto

http://jsprs.iis.u-tokyo.ac.jp/jsprs/isprs/top.html
chiwa@iis.u-tokyo.ac.jp

IAIN World Congress

21-Oct-03 - 24-Oct-03
Germany, Berlin

http://www.dgon.de/iain2003.htm

Congress on Globalisation, localisation and tropical forest management in the 21st century

22-Oct-03 - 23-Oct-03
Netherlands, Amsterdam

http://www.tropenbos.org/news/new_AllD seminar.htm
m.ros@frw.uva.nl

Geodesia Congress

22-Oct-03 - 24-Oct-03
The Netherlands, Utrecht

http://www.geodesia.nl/nl/geodesia.html

ASPRS/MAPPS Fall Conference

28-Oct-03 - 30-Oct-03
United States, Charleston, South Carolina

http://www.asprs.org/terrain_data2003/index.htm
asprs@asprs.org

ACRS 2003 ISRS

03-Nov-03 - 07-Nov-03
Korea, Busan

http://www.acrs2003isrs.org
jswon@yonsei.ac.kr

7th South East Asian Survey Congress 2003

03-Nov-03 - 07-Nov-03
China, Hong Kong

http://www.seasc2003hk.org
enquiry@seasc2003hk.org

GEOPRO2003

04-Nov-03 - 05-Nov-03
Mexico, Mexico City

http://geopro.cic.ipn.mx/
mtorres@cic.ipn.mx

Annual Conference Global Disaster Information Network 2003

04-Nov-03 - 07-Nov-03
United States, Washington DC

http://www.eis-africa.org/events_upcoming.htm
gdin2003@hotmail.com

AFRICA GIS '03

04-Nov-03 - 08-Nov-03
Senegal, Dakar

http://www.eis-africa.org
niang@cse.sn

Sustainable Development and Management of the Subsurface

05-Nov-03 - 07-Nov-03
The Netherlands, Utrecht

http://ssm.nitg.tno.nl/
info@delftcluster.nl
ITC attendance: Marco Huisman, Robert Hack

30th International Symposium on Remote Sensing of Environment

10-Nov-03 - 14-Nov-03
United States, Hawaii, Honolulu

http://isrse.pdc.org/
30isrse@eastwestcenter.org
ITC attendance: Andrew K. Skidmore, Bert Toxopeus

International Symposium on GPS/GNSS

15-Nov-03 - 18-Nov-03
Japan, Tokyo

http://www.gnss.jp
hidemi@gol.com

Informatics and Geosciences: GEOINFO' 2003

24-Nov-03 - 27-Nov-03
Cuba, Havana

http://www.iga.cu/geoinfo/
liz@iga.cu

ISPRS Workshop on Spatial Analysis and Decision Making

03-Dec-03 - 05-Dec-03
China, Hong Kong

http://kartoweb.itc.nl/sadm2003/
isprs@hkbu.edu.hk

ISRS Annual Convention/Symposium

09-Dec-03 - 12-Dec-03
India, Thiruvananthapuram

http://www.cessind.org/isrs.htm
msd@eth.net

International Conference on Web Information Systems Engineering

10-Dec-03 - 12-Dec-03
Italy, Rome

http://www.dis.uniroma1.it/~wise03/dinamico/index.htm
wise03@dis.uniroma1.it