United Nations Interregional Seminar for Developing Countries (UN)

SUMMARY

The ISPRS hosted three interregional seminars for developing countries sponsored by the United Nations. Each plenary session concentrated on different aspects of technology transfer, including education for technology implementation. The coordinator for this seminar was Dr. Karl Heinz Szekielda, Chief Remote Sensing Section, United Nations, New York. Invited keynote speakers and moderators from Indonesia, Pakistan, Egypt, FAO, Poland, Canada, The Netherlands, Kenya, India and the United Kingdom participated in this diverse activity. Participants from developing countries, corporations, international societies, academia, and the commercial sector presented their views and recommendations through panels and invited papers.

Preliminary recommendations written by **A. F. Tambala** (Malawi) were adopted during the final session and constitute the first step in an understanding of international problems and potential solutions for developing countries. These are summarized below.

Technology transfer should be driven by international societies such as ISPRS and ICA.

Convergence of activities with IUSM should be undertaken and the IUSM should act as coordinator for future seminars.

An international advisory group is needed for assistance to developing countries. This group should focus on the mapping sciences. An approach called "cartographic crusades" should be initiated for developing countries.

IUSM should coordinate multiple country involvement in the major mapping science congresses, including ICA, FIG, ISPRS, and IAG. During each conference, it was felt that the issue of technology transfer should be revisited, updated, and reported.

Funding for these meetings should be provided by the United Nations.

The UN should assist in making available Earth observation space and ground systems containing portable data receiving and processing systems. It was suggested that the UN work with INPE to provide these to developing nations.

Technology transfer focus for some of the sessions in the future meetings should concentrate on applications for small island states in the Caribbean and Pacific.

Special efforts to encourage women and other minorities to enter the professional disciplines associated with photogrammetry and remote sensing should be encouraged. A progress report in this area should be generated, reflecting the success or failure of these efforts, and should be presented at the congress meetings mentioned above.

Summary discussions of each of the sessions are provided in the text that follows.

SEMINAR SESSIONS

Session UN-1 - **Session I - "Technology Transfer to Developing Countries"**
August 5, 1992, 08:30-12:00
Session Reporter: Dr. Bill Clark (USA)
Chairman: ***Prof. Jacob Rais*** *(Indonesia)*

During the opening ceremony, the audience was addressed by the Secretary General of ISPRS, **Professor Shunji Murai** (Japan), and by **Mrs. Dunja Pastizzi-Ferencic**, Director of the United Nations Natural Resources and Energy Division. Both stressed the need for further cooperation with developing countries, recognizing the role of ISPRS and the UN in accelerating the transfer of technology. The keynote address was presented by **N. Shah** (Pakistan). He focused on the transfer process and its many steps.

This was followed by a summary of activities of the FAO by **D. Kalinsky** (UN/FAO). His conclusion, that only satellite remote sensing combined with GIS can meet the information requirements of the tasks in developing countries, was discussed extensively by participants.

J. Koniecny (Poland) summarized Polish activities in remote sensing, surveying, and mapping. His conclusion was that there was no real transfer to date nor would there be in the future until such time that widespread education and training on the subject were provided. He was particularly concerned that the use of space based systems for remote sensing and mapping were providing a gap between the developing countries that could be surmounted only by education.

M. Wright (United Kingdom) commented on the understanding of real needs, requirements for specific local knowledge, the role of consultants in projects, the relevance of training, and the importance of cost consciousness in providing qualified personnel for technology utilization. Highlights relative to financial issues, timing issues, the scale of operations, equipment maintenance, and the ergonomics and environmental factors were mentioned in the context of social factors, quality factors, language problems, and different computer problems.

Professor J. Rais (Indonesia) emphasized the importance of government policy as applied to Indonesia. He mentioned that technologies for surveying and mapping should provide interdisciplinary activities with multiple benefits. He mentioned that guidelines have been developed that point agencies toward technologies not fully mastered. He concluded that the involved government should either become more active through on-the-job training or through contracts resulting in a core group capable of utilizing the new technology.

A. Ibrahim (Egypt) noted "technology pressure" should be avoided. Most technology transfer projects have been evaluated in the past using indicators not appropriate to the recipient organization. Projects are normally considered to be completed when the installation and basic training period is over and actual production is initiated. Training periods should continue through early production activities and be measured by constant improvements in quality and quantity of products generated for the user community. In the past, funding has been a major problem in that there are seldom monies set aside for extended production and troubleshooting.

During discussions, **S. Wik** (Finland) pointed out that a transfer of technology from one environment to another is no simple task. We have many examples of failure but few examples of success. Success occurs when sustainable results are achieved. Therefore, a choice of technology should be made based on a careful analysis of differences in existing conditions, including economy, education, living standards, government infrastructure, cultural habits, local attitudes towards technology, and the benefits to be achieved by technology transfer activities. He then pointed out that operational systems require continued training and testing to avoid collapse when altered to accommodate new technologies.

To further the discussion, **L.R.A. Narayan** (India) listed the following flaws in the existing technology transfer process.

Completion of projects funded by outside agencies in high technology areas have results that end up in a report. However, no implementation takes place.

Cost tradeoffs are seldom mentioned when the advantages/disadvantages of new technologies are considered.

At the end of most projects, funding does not exist for further information capture and development.

People well trained under aid programs do not stay in the production and data management facility for a time sufficient to implement their training and to pass it on to others.

Consultants will be needed for countries that receive assistance for new technology transfer activities.

Due to budget, some programs are halted prematurely due to a lack of expendable items such as raw materials, spares, film, etc. Early termination of projects and/or limited funding for only a few years results in the lack of technology transfer benefits.

Cultural factors play a dominant role in the acceptance of technology transfer activities. Unless accepted by the people of a nation, the final decision relative to implementation rests with local knowledge and should be recognized as one of the reasons for either success or failure of projects.

As many technologies as possible should be transferred directly to field sites. This does not and cannot be done with magnetic media and large computers.

Technologies like GIS are not yet understood by developing countries. In many cases, there is no cartographic database from which to build a GIS.

Funding from multiple agencies lacks in-country coordination.

Finally, it was suggested that the UN assist developing countries to launch a "large scale user awareness program" illustrating the benefits of new technologies. This program should be designed by experts in mapping, GIS, and remote sensing. Experts should be used to translate user requirements into technical requirements, and finally the political arena should be considered. In this latter context, political and technical staffs on all levels of government should be targeted. Different programs should be designed for each level and discipline.

Session UN-2 - **Session II - "Educational Aspects, Requirements and Needs in Developing Countries"**
August 8, 1992, 13:30-17:00
Session Reporter: Dr. Bill Clark
Chairman: ***Ato Asfaw Fanta*** *(Kenya)*

The central argument in the keynote address delivered by **D. F. Taylor** (Canada) was that, although the modern mapping sciences have the potential to be of utility in the struggle for development, that potential has yet to be fully realized. Education and training are critical factors for the future.

In developing nations, apart from a few research applications and exploratory projects, modern mapping techniques were not initiated until after 1986. Most of these applications were funded by international agencies. During the technology transfer process, most of the work was performed by consultants and other outsiders rather than indigenous scientists. Therefore, the actual contribution to the solution of problems of development has been marginal. It is necessary that the local scientific users of the data be participants on a daily basis in order to grasp the technology, take control, and obtain both socio economic and technical command of the situation for the technology transfer process to have its desired impact. This will require better communication, both in-country and from consultants, to convince local governments of the utility of the technology. Examination of strategies used by the People's Republic of China and Mexico were presented in order to illustrate their relevance to other developing nations.

F. Amer (Netherlands) paid attention to system design and related administrative functions and management procedures. His focus was on problem solving through work on case studies. His observations included the need for more emphasis on applications, system design, and user requirements. He pointed out a clear distinction in education for administrative management and planning and decision support functions. Extended cooperation between specialists from different disciplines will require a new education module. This was called an "infrastructure for national information systems" and included multi-sectoral

information at multiple planning levels. He encouraged the generation of such an education program that could be used worldwide.

A. Fanta (Kenya) and **R. Kaczynski** (Poland) summarized the assessment of a three-year training program in the Ethiopian Mapping Agency. Emphasis was given to the identified need for integrating this program in close cooperation with other governmental agencies and the user community. One critical point was that, though there is a growing private industry involvement in mapping production, including base mapping and thematic maps, these maps are often very nice in appearance but have no regulation regarding the reliability of their information content and geometric accuracy.

Through his year spent in Africa, **R. R. Rostom** noted that there was an inverted population of specialists required for the development process. Manpower classifications according to levels normally showed inverted proportions where engineers were more numerous than technicians. Furthermore, redundancy in capabilities across disciplines was not the norm. Instead, the scientific population was limited whereas the number of surveyors was excessive. He suggested that better manpower planning be initiated with a specific focus. This would allow technology transfer without a culture changing its mix of technical and administrative workers due only to changing circumstances.

Other factors mentioned and noted were a random training of staff within no specific programmatic areas by local and national universities, no enthusiasm, a lack of retention of faculty due to low pay, unnecessary duplication and waste of efforts, outdated instrumentation, and outdated literature. This leads to bureaucratic lack of appreciation for technologies and little or no maintenance for existing functional equipment.

He proposed that there should be a tighter link between education and industry, that duplication be avoided, that efforts be coordinated with donors, that there be established a training component with any aid package, and that education continue through on site training, and through local, regional, and international seminars.

This second seminar was summarized by **L.R.A. Narayan** with the following statements:

Regardless of good intentions, technology transfer and advanced training is not now leading to development.

Rural areas have not benefitted from any technology transfer program in any country due to a lack of continual information/communication/education.

We should begin preparing for the next ISPRS Congress meeting immediately. A committee should be established and funded by the UN to provide an update on educational activities. This should be the special responsibility of the next ISPRS Director.

Education and training should be considered to be a continuous activity rather than something that is brought to an abrupt halt. Otherwise, no economic return can be realized from our efforts.

One must realize that automated technology may not work and desirable technology in some developing countries may lead to wrong notions and political disturbances.

Remote sensing courses must be unified to get the maximum benefit from the educational process. An undergraduate professional educational program is recommended for all countries, producing students that can act as transfer agents for higher technology in the area of surveying, mapping, remote sensing, photogrammetry, cartography, and GIS.

A. F. Abdel Kadar (Egypt) then summarized further by stating that educational policies should be formulated to achieve short-term and long-term objectives. In the short term, the goal is to develop a user awareness of remote sensing and GIS. Courses, seminars, and workshops were suggested for education, industry, and government organizations. Long term objectives include building a structured network of sustainable GIS institutions and educational policies that can keep pace with this rapidly growing technology. It was suggested that the World Bank and the UN collaborate in this effort through development of educational tools such as video tapes and written matter. The main goal of such activities would be to circulate information relative to the benefits of this technology to multiple institutions, public and private, in third world countries to demonstrate the utility of the technology for the local populace.

Session UN-3 - **Session III - "Integration and Management of Technology in Developing Countries"**
August 13, 1992, 08:30-12:00
Session Reporter: Dr. Bill Clark
Chairman: ***Dr. Eng. Hussein Ibrahim*** *(Syria)*

R. Ashcroft (USA) emphasized changes of technologies and the beneficial feedback from space programs to mankind. Managing data to manage our environment was then reviewed, and production line efforts, hardware development, and software development activities were compared.

After summarizing market trends in the context of productivity, contrasting these with R&D, and speaking to the fact that the user community is now more sophisticated than it was only ten years ago, some emphasis was placed on the variety, volume, and diversity of data available today and in the future. Future sources of imagery will offer an even larger variety of spatial and spectral content. This drives a need for new software compatible with a wide variety of standard platforms for specialized market applications that have the ability to manipulate imagery, and integrate imagery with other databases.

D. C. Ceballos (Brazil) presented in his paper some details on a proposed Earth observation space system involving portable data receiving and processing equipment. The use of on-board data compression makes feasible the UHF transmission of the Earth

observation data. The system is proposed for whole Earth, e.g., global coverage using eight satellites in two heliosynchronous data planes. This proposal can be achieved at low prices for both the space and ground segments. Space segment proof of concept could be tested using piggy back launching. It was further suggested that new technologies such as data compression, segmented CCD, and solid state mass memory makes this a potentially powerful system. Data compression would be used to obtain a high spatial resolution. For the communication link, the main characteristic is the Direct Data Receiving Concept from which the user would receive real-time image data around a circular area with one swath band radius. Other characteristics of the system would be prelaunch adjustable local crossing times in both morning and afternoon, and adjacent swaths for successive orbits. A preliminary schedule for development and launch of these satellites through the year 1997 was presented.

A. Fanta (Kenya) then summarized the impact of remote sensing in eastern and southern Africa. He felt this was essential for the development process for nations involved. Regional centers for training and technology transfer have thus far provided more than 1000 nationals from the subregion with training and on-the-job experience. However, only 60 professionals in the field of natural resources and Earth sciences have been certified to date. Future activities will lead to a stronger linkage between the regional center and national centers. This will require that several problems be overcome including: improved data receiving and processing capabilities, more emphasis on training, strengthening of indigenous personnel, sensitizing decision makers and planners, performance of regular user surveys to assess real needs, and a stronger linkage between users and the regional center.

Yang Kai (China) summarized the 8th FY plan for Surveying and Mapping (S&M) for the Peoples Republic of China. The basic goals of China's S&M program is to put into effect the revision of traditional technical systems and replace these by more productive systems, adjust the structure of existing S&M programs, standardize mapping efforts over important economic development regions, and use this technology to aid in decision making about major national problems. Major issues include purchase of instruments, hardware, software, and services from foreign countries; purchase of some instrumentation from Chinese manufacturers; transfer of scientific research products (made by Chinese experts) into production units; and generate in-country technical modifications and improvements in both research and production systems. Furthermore, this program will require both international cooperation, including technology transfer and personnel training by foreign nations. Issues in China relative to the technology transfer process must include scientific research into requirements for applications, standardization, and quality control for transforming laboratory products into production products, generation of products that can be modified by users, provision of user services, protection of technology ownership, and price evaluation for products.

Mrs. A. Adekoya (Nigeria) summarized the ongoing activities in management of surveying, mapping, and remote sensing in Nigeria. By administrative arrangement, the Nigerian federal government is responsible for the establishment of control and topographical mapping at the basic scales of 1:50,000, 1:25,000, and other smaller scales. State survey departments are responsible for large-scale mapping, township mapping, and cadastral surveys. Private sector participation lies in cadastral survey work and is very highly dependent on government patronage. So far, aerial photography and mapping have been the major beneficiaries of this policy. Every year the heads of government survey departments meet to discuss policy issues, plans, and programs in the survey and mapping sector of the economy. The National Advisory Board on Survey Training coordinates and harmonizes training programs and curricula for meeting the needs of the local industry while assuring that the latest technology is used and disseminated by researchers. The first major cartographic application for remote sensing was the mapping of Nigeria in 1975.

The Royal Jordanian Geographic Center was described by **O. H. Dhaimat** (Jordan). Its functions, the problems associated with operations, and the benefits, both past and present, were outlined.

Key issues were summarized and suggested for future meetings. These included the opinion that technology transfer should be driven by international societies such as the ISPRS where an ongoing forum for technology transfer can be maintained. At these meetings one should concentrate on multiple country involvement, including small island states, and a special emphasis should be placed on the education of women and other minority groups in each country. It was felt that this latter course of action was so critical that there should be a special report presented to ISPRS at each Congress meeting.