

The Regional Training Programme in Design, Installation, Administration and Maintenance of Network Systems (DIAMN)

Shawn Mendes

**Department for Infrastructure
and Economic Cooperation**

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Sida Evaluation 04/18

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Author: Shawn Mendes.

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SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY

Address: SE-105 25 Stockholm, Sweden. Office: Sveavägen 20, Stockholm

Telephone: +46 (0)8-698 50 00. Telefax: +46 (0)8-20 88 64

E-mail: sida@sida.se. Homepage: <http://www.sida.se>

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Preface

This project was based at the Institute of International Education at Stockholm University during the period from November 2003 to February 2004. The field research for the project research was conducted in Sri Lanka in November–December 2003. All costs are converted to United States Dollars at a rate of USD 1 = SEK 7.5.

I would like to thank the many people who took time to share their insights and knowledge with me. In particular I would like express my gratitude to the following people, grouped by country.

Sweden

The evaluator would like to thank Sida ICT for Development staff member Per-Einar Tröften for his guidance and feedback throughout the project. I also appreciate the time Sida staff members Afzal Sher (ICT for Development) and Lisa Hellström (International Training Programmes) made available to speak with me.

Credit is also due to Americo F. Muchanga, who agreed to provide a technical analysis of the DIAMN curriculum. Americo is a Sida/SAREC-sponsored Ph.D. student from Mozambique at the IT University in Kista and his analysis contributed greatly to the evaluation.

Sri Lanka

First and foremost, the evaluator thanks Professor V.K. Samaranayake, M J P U Samanthilaka and Prasad Wimalaratne of the University of Colombo School of Computing. Their assistance and openness was greatly appreciated. I would also like to thank the DIAMN students, many of whom I met with on several occasions, for all the time they made to speak with me. The enthusiastic input and feedback by these students from Sida partner institutions around the world was the single most important input to this report.

I would also like to thank the Swedish Embassy's Head of Mission Ann Marie Fallenius, First Secretary, Åsa Heijne, and Programme Officer, K. Romeshun, for their comments and input.

Abbreviations

DIAMN	Regional training programme in design, installation, administration and maintenance of network systems
ICT	Information and communication technology
IT	Information technology
ITP	International training programme
JICA	Japan International Cooperation Agency
TCTP	Third country training programme
R&D	Research and development
SAREC	Sida department for research cooperation
SEK	Swedish Crown
Sida	Swedish International Development and Cooperation Agency
UCSC	University of Colombo School of Computing
USD	United States Dollar

Executive summary

Sida's department for research cooperation (SAREC) has supported the University of Colombo School of Computing (UCSC) since 1998. In 2003 the UCSC developed the regional training programme in design, installation, administration and maintenance of network systems programme (DIAMN) to train staff from other SAREC supported universities. Sida believes that the benefits of the programme are:

- To provide up-to-date networking training for staff from all the SAREC supported universities;
- Delivery of DIAMN builds and strengthens the capacity of the UCSC;
- Offering the programme in a developing country promotes "south-south networking," and it can serve as a natural platform for future contacts and cooperation between the SAREC supported universities;
- The TCTP model of DIAMN is more cost effective than the donor supported International Training Programme courses held in industrialized countries; and
- A course in a developing, tropical country is more relevant for participants, given similar challenges and constraints in the operating environment.

DIAMN was offered to network administrators as well as those involved with internet connectivity working at Sida/SAREC-supported universities and/or institutions. The programme provided a six-week full-time course in Sri Lanka, with the following primary objectives:

- To describe the principles of communication and networking operation of internet services;
- To design the network infrastructure for sharing of resources, accessing the internet and offering services to the internet;
- To administer, trouble shoot and maintain networks; and
- To implement security and recognize new trends.

The programme is offered in English and courses consist of lectures, discussions and hands-on work on an individual and group basis. Participants who successfully complete the course are offered a certificate issued by the University of Colombo School of Computing. The course can accommodate up to twenty participants, who are nominated by their respective Sida/SAREC-sponsored institutions in developing countries.

The cost of training is USD 3500 per participant, excluding the cost of travel to Sri Lanka, but including tuition and course materials; accommodation; cost of living per diems, local transportation to attend classes and study tours; and medical insurance.

Purpose and focus of the evaluation

This focus of this report is to provide an evaluation of the DIAMN programme at the UCSC. To date there have been two Sida-sponsored DIAMN intakes, in August–September and November–December 2003. The programme is designed to provide participants from other Sida/SAREC-supported IT departments (in Bangladesh, Bolivia, Burkina Faso, Ethiopia, Laos, Mozambique, Rwanda, Sri Lanka, Tanzania, Uganda, Vietnam) with the necessary skills required to design, install, administer and main-

tain local area networks and well as internet access. Details of all participants are listed in Appendix 6 at the end of this report.

As stated in the Terms of Reference, Sida wants to shed light on both the DIAMN programme as well as Third Country Training Programmes (TCTP) for ICT in developing countries intended for other developing countries with this evaluation. This would provide a comparison between Third Country Training Programmes (TCTP) for ICT in developing countries intended for other developing countries (such as DIAMN), with the donor supported more traditional International Training Programmes for ICT most often located in the industrial countries (such as Sida's ITP located in Sweden). The evaluation should therefore be useful as a tool for discussions concerning Sida's plans for future support to such third country training programmes for ICT training.

That said, the main focus of the evaluation is the DIAMN programme and covers issues such as: objectives; quality; cost effectiveness; relevance of the course/s (in general as well as for the individual participants); qualifications of students entering DIAMN; student satisfaction; use of new knowledge in home countries; recommendations for Sida regarding future support for DIAMN; and feed back for UCSC to how to improve the course.

Summary of findings, conclusions and recommendations

Most participants expressed concerns about the learning environment, in particular the state of the labs, computers and lack of hands-on, practical experience. Therefore, it is recommended that future programmes place a greater emphasis on practical exercises. To facilitate this, it would be desirable to have more networking equipment available to work on in labs and more up-to-date workstations. Moreover, the DIAMN programme needs to be refined to avoid duplication and overlap and build in more practical training.

Specific, technical recommendations include the following:

1. The course should include a component with at least DNS, Mail Transport agent, Network File Service, web server application and Authentication and Authorization services.
2. The course should be more practical than theoretical.
3. The course should include Network troubleshooting sessions in which network traffic analyzers are used as tool to monitor and detect errors in the network
4. Laboratories need additional equipment in order to provide the required environment for practical sessions.

In the Terms of Reference it was stated that Sida wants to shed light on both the DIAMN programme as well as other ICT TCTPs in developing countries intended for other developing countries with this evaluation. This comparison between ICT TCTPs in developing countries (such as DIAMN) and traditional donor supported International Training Programmes for ICT located in the industrial countries (such as Sida's ITPs located in Sweden) should be useful as a tool for discussions concerning Sida's plans for future support to such third country training programmes for ICT training.

Along these lines, the evaluator recommends that Sida further explore the use of TCTPs to provide critical training for key personnel from Sida-supported institutions in developing countries. Although the DIAMN programme is not perfect, it shows promise and with modification it could serve as a cost effective means to provide training while at the same time encouraging south-south cooperation and

building capacity in a Sida partner country. Indeed, a review of ITPs in Sweden, and meetings with Sida ITP officials, confirmed that DIAMN costs are very competitive with similar programmes (i.e., ITPs) held in Sweden. The challenge is to ensure DIAMN offers a similar quality training experience to those offered by ITPs in Sweden. The evaluator is confident that with some modification DIAMN will offer a very competitive quality to cost ratio vis-à-vis ITPs in Sweden.

An important question here is how does DIAMN rate compared with the other models? Unfortunately, it is not possible to provide concrete answers to this question. It can not be said that the DIAMN TCTP training model is superior to others such as those offered through in-country training or through ITPs in Sweden. However, it is safe to conclude that DIAMN offers a higher quality experience than is available with local, in-country training in many of the countries from which the participants were drawn. Moreover, DIAMN offers training at a lower cost than ITPs in Sweden because of higher costs for things such as accommodation and food in Sweden.

Therefore, without specifically judging the specific DIAMN programme, it can be concluded that the DIAMN model is the most appropriate training model under certain circumstances. These circumstances include situations where high-level training is either not available in-country or when there is insufficient critical mass in any one country to warrant offering such a programme. In this sense it may be that the DIAMN programme, providing somewhat generalist networking skills, may not be the optimal programme for the TCTP model. Consequently, the TCTP model may be even better suited to offer a more specialised, higher level programme providing training unavailable in other partner countries.

1. Programme context

Introduction

The Swedish International Development and Cooperation Agency (Sida) finances IT projects in approximately ten universities in developing countries. These projects support the development of IT infrastructure, establish internet connections and support IT education. The first of Sida's IT projects was in Sri Lanka and it is the Sida partner country that has come the furthest in its IT development. In particular, the University of Colombo School of Computing (UCSC) has received significant support from Sida, to the point that it has sufficient competence to provide training for staff from Sida-supported institutions in other countries. The UCSC recently started to offer the regional training programme in design, installation, administration and maintenance of network systems (DIAMN), designed to facilitate IT development at Sida-supported universities in other developing countries.

Background

Sida has had a strategy since 1999 for integrating ICT in Development Cooperation. More recently, an internal advisory group was assigned to lead this integration connects both to Sida Departments and to Swedish Embassies in cooperating countries. The advisory group has divided its tasks into two branches:

1. ICT as a tool for development. To facilitate the use of ICT within development co-operation areas and programs conducted by Sida's sector departments; and
2. To promote the development of ICT in Sida partner by supporting national ICT policies, strategies and plans; Human Capacity Development and Education for ICT; and physical ICT-infrastructure.

In recent years, Sida has commissioned a series of ICT country surveys to investigate the state of information and communications technologies in Sida partner countries. The surveys focus on human resources, though the analysis of ICT education and training is mainly at the descriptive level. The ICT country surveys have contributed to a significant body of knowledge about the state of ICT development in several developing countries and these surveys have been followed by more elaborated analyses of the issues pertaining to raising ICT competency in Sida partner countries.¹ The more detailed studies inform the policy work and programs of Sida's ICT Secretariat and staff in the field.

At the broader level, Sweden, through Sida, participates in the United Nations ICT Task Force, including the Task Force's Working Group on Human Resource Development and Capacity Building. Sweden has proposed to the working group that one of the most important tasks would be to define models for the establishment of Education that promotes ICT, with special focus on education and training of ICT-personnel.²

Sida development cooperation in Sri Lanka

Sweden has been providing development assistance to Sri Lanka for almost 40 years. As with other partner countries, Sida's work in Sri Lanka is guided by the following goals:

- Economic growth;
- Economic and social equality;
- Education for all;
- Economic and political independence;
- Democratic development, with support for improved management and higher efficiency at state agencies;
- Environmental care; and
- Gender equality.

The main objective of Swedish development cooperation in Sri Lanka is to promote peace and democracy as well as economic development that benefits the poor. Sweden has also stated that it will contribute to reconstruction and rehabilitation in the areas affected by the civil war when sustainable progress is made towards long-term peace.

Moves to leverage development cooperation are important and Sida is working with other agencies to ensure better-coordinated, more effective support. Sida is also concentrating its efforts as it moves from project- to sector-oriented support. This shift means that the Agency is moving away from one-off, ad hoc projects to more sustainable, typically larger, supports. An example of this approach could be realised if Sida channels much of its future ICT support in Sri Lanka through the newly developed ICT Agency (ICTA) in Sri Lanka.³

A unique role for Sida is to export Swedish policy lessons to developing countries. This is particularly relevant given Sweden's experience with ICT training, not only for the usual post-secondary population but also for the general population. In this sense, the DIAMN programme represents an attempt

¹ One report was partly focused on Sri Lanka, *Training for ICT development in Sri Lanka and Tanzania*, available at the Sida website: <http://www.sida.se/Sida/jsp/polopoly.jsp?d=1250&a=17448>.

² In this context, it is important to distinguish between training ICT personnel and the support of ICT-solutions for education in general. This distinction is often overlooked.

³ ICTA is an arms-length agency in Sri Lanka with a mandate to drive ICT policy and implement the e-Sri Lanka initiative. ICTA's vision is to harness ICT as a lever for economic and social advancement by investing in human and physical infrastructure and by creating an environment to emerge as the preferred business destination in the region.

to foster and build on Swedish expertise that has been shared through Sida's International Training Programs (see box below), investments in Sri Lanka and sponsoring Sri Lankans' graduate studies in the field of ICT in Sweden.⁴

International Training Programmes (ITP)

Sida's International Training Programmes (ITPs) are geared to support capacity development for individuals from Sida partner countries. The programmes cover areas of strategic importance to the economic and social development of Sida partner countries and are based on identified priorities and needs. Ultimately, ITPs should contribute to institutional strengthening and capacity development in the cooperating countries. ITPs have a two-part structure: part one (4–6 weeks) takes place in Sweden; and part two (1–2 weeks) takes place in one of the participants' countries. In 2004 Sida will sponsor approximately 1500 participants in 60 training programmes, usually with 20 to 30 participants per course, in a wide range of areas. Participants often come from Sida partner countries and are typically middle and upper managers with a degree, or equivalent knowledge, and a high level of proficiency in English. Delivery of ITPs is delegated to private and public trainers. Sida covers participation fees (e.g., tuition, literature, study tours and insurance) and room and board for selected participants but the costs for international travel are not normally financed by Sida (Sida, 2003:7–8).

ICT programmes at Sri Lankan universities

There has been a significant demand for ICT-related courses in Sri Lanka and a number of new programmes have emerged to respond to this demand. There is a new department of Information Technology at the University of Moratuwa and newly created three- and four-year degree programmes in Management and IT at the University of Kelaniya. ICT programs have also been introduced at the University of Jayewardenepura and the Trincomalee Campus of the Eastern University.

The University of Colombo School of Computing (UCSC)

The leading centre of IT knowledge in Sri Lanka is the University of Colombo. It started with the Institute of Computer Technology of the University of Colombo, established in 1987 with support from Japan. In 2002 the Japan International Cooperation Agency (JICA) supported the establishment of a Centre for Advanced Media Technologies for Human Resource Development in Information Technology. Also in 2002, the UCSC was established after the merger of the Department of Computer Science and Institute of Computer Technology. The UCSC is the University of Colombo's first Centre of Higher Learning. It has 50 academic staff and several hundred students and offers both Bachelor and Master degrees as well as certificate programs. The School of Computing also provides a number of Third Country Training Programmes (TCTPs), which train individuals from developing countries in a developing country rather than in the donor country. Finally, the UCSC offers the innovative Bachelor of Information Technology.⁵

⁴ The Sida/SAREC project on IT cooperation with Sri Lanka (<http://www.dsv.su.se/~kasun/sida>) is sponsored and administered under an agreement of cooperation between the Department of Computer and System Sciences at Stockholm University (www.dsv.su.se), the Royal Institute of Technology (www.kth.se) and the University of Colombo School of Computing (www.ucsc.cmb.ac.lk). The universities of Peradeniya, Ruhuna, and Moratuwa are also involved. The cooperation is divided into two parts: 1) a split Ph.D. Programme where researchers from Sri Lanka spend a total of two years at a Swedish Institution and another two years in Sri Lanka in preparation for their Doctorate degree; and 2) development of an electronic infrastructure for universities in Sri Lanka including The Lanka Educational and Research Network responsible for interconnecting Educational and R&D Institutions across the country.

⁵ The fee-based Bachelor of Information Technology (BIT) external degree (www.bit.lk) is administered by the UCSC and leads to a Bachelors Degree in Information Technology. The programme produces qualified IT professionals in addition to traditional university output. It also gives those who could not enter university due to intense competition a chance to obtain a degree. It also gives opportunities to non-graduates already working in IT to obtain formal qualifications in IT through self-study. The BIT is also ladderized, with a certificate in IT given after first year, an advanced certificate after year two, and the BIT at the end of year three. Unlike regular degree programs at Sri Lankan universities, the BIT is not free.

⁶ All participants come from SAREC-supported institutions except those from Bangladesh (which Sida intends to support), Laos and the Dar es Salaam Institute of Technology (both of which are Sida supported but not SAREC supported).

The expansion of ICT programs at Sri Lankan universities continues and UCSC Professor V.K. Samaranayake estimates that the country will generate 2000 university graduates with degrees in ICT and ICT-related fields by 2004 (Samaranayake, 2003). Sida has supported several proposals in the university sector including ICT projects, primarily through UCSC, which recently received a Sida Planning Grant to develop a proposal to establish an e-Learning Centre in Sri Lanka, with the assistance of a Swedish partner university. During this planning phase several changes have been made to the BIT programme, identified as the prototype for showcasing the use of e-Learning.

DIAMN

Sida's department for research cooperation (SAREC) has supported the University of Colombo School Of Computing since 1998 and in 2003 the UCSC developed the regional training programme in design, installation, administration and maintenance of network systems programme to train staff from other Sida/SAREC supported universities. Sida believes that the benefits of the programme are:

- To provide up-to-date networking training for staff from all the SAREC supported universities;
- Delivery of DIAMN builds and strengthens the capacity of the UCSC;
- Offering the programme in a developing country promotes "south-south networking," and it can serve as a natural platform for future contacts and cooperation between the SAREC supported universities;
- The TCTP model of DIAMN is more cost effective than the donor supported International Training Programme courses held in industrialised countries; and
- A course in a developing, tropical country is more relevant for participants, given similar challenges and constraints in the operating environment.

The focus of this report is to provide an evaluation of the DIAMN programme at the UCSC. To date there have been two Sida-sponsored DIAMN intakes, in August–September and November–December 2003. The programme is designed to provide participants from other Sida-supported IT departments (in Bangladesh, Bolivia, Burkina Faso, Ethiopia, Laos, Mozambique, Rwanda, Sri Lanka, Tanzania, Uganda, Vietnam)⁶ with the necessary skills required to design, install, administer and maintain local area networks and well as internet access.

In total 35 individuals participated in the two DIAMN intakes (19 in the first intake and 16 in the second), five of whom were women and three of whom were recruited from within Sri Lanka. The age of participants ranged from 23 to 44 with an average age of just over 30 years among the 35 participants.

Ultimately, the course could be offered to network administrators as well as those involved with internet connectivity working with universities or public or private agencies and business. The programme provides a six-week full-time course in Sri Lanka, with the following primary objectives:

- To describe the principles of communication and networking operation of internet services;
- To design the network infrastructure for sharing of resources, accessing the internet and offering services to the internet;
- To administer, trouble shoot and maintain networks; and
- To implement security and recognise new trends.

The programme is offered in English and courses consist of lectures, discussions and hands-on work on an individual and group basis. Participants who successfully complete the course are offered a certificate issued by the University of Colombo School of Computing. The course can accommodate up to

twenty participants, including a limited number of Sri Lankans. An overview of the course curriculum is attached as Appendix 4.

DIAMN admission criteria and conditions

Participants in DIAMN are nominated by their respective Sida/SAREC-sponsored institutions in developing countries. They should either be employed or expect to be employed in the future in the field of computer communications networks. Participants should be under forty years of age, have a strong command of English and be in good physical and mental health in order to be able to complete the course. Participants are expected to attend all courses and be punctual for all classes; not have family members accompany them; return to their home country upon completion of the course; not change their travel schedules; follow instructions of their nominating institution as well as the Government of Sri Lanka; observe the rules and regulations of the UCSC; and refrain from engaging in political activities, or any form of employment for profit or gain.

Financial overview of DIAMN

The cost of training is USD 3500 per participant, excluding the cost of travel to Sri Lanka, but including the following:

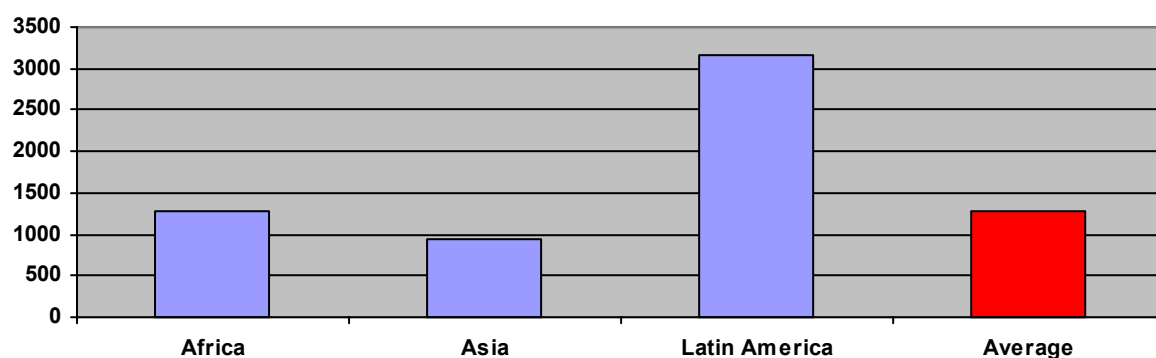
- Tuition and course materials;
- Accommodation;
- Cost of living per diems;
- Local transportation to attend classes for study and study tours; and
- Medical insurance.

Travel costs

One concern about holding DIAMN in Sri Lanka is the distance from many of Sida partners. Although Sri Lanka is well located for those from Asia it is difficult, in terms of flight connections and travel time, and costly to fly to Sri Lanka from Africa and, especially, from Latin America. An analysis of the airfares for the 32 DIAMN programme participants from outside Sri Lanka revealed an average return airfare of USD 1288. There was a wide range of airfares, however, with return fares ranging from a low of USD 593 for a participant from Laos to USD 3520 for one of the participants from Bolivia.

By region, the airfares averaged from USD 943 for the ten participants from Asia, USD 1273 for the 20 participants from Africa and USD 3154 for the two participants from Latin America. Airfare costs are illustrated in Figure 1.1 below.

Figure 1.1. Average airfare for DIAMN participant by region



It is no surprise that the airfares from Asia are the lowest but airfares for African participants were only one-third higher than the Asian fares and, all things considered, quite reasonable. On the other hand, the airfares from Latin America reflect the great distance, and limited connections. It is worth noting here that a Sida/SAREC-supported institution in Nicaragua declined to participate in DIAMN because of the high cost of air travel to Sri Lanka (in this case, estimated to be USD 4000).

2. Findings

A number of key issues are considered in this evaluation. At the broadest level, the evaluation attempts to determine whether or not the DIAMN programme met Sida's objectives, namely to support/fund a *quality, cost effective* programme that is *relevant* at the broad level as well as for individual participants. Key questions include the following:

- Did the participants have adequate qualifications prior to course entry to benefit from the programme?
- Were participants satisfied with the programme?
- Will the participants be able to utilize their new knowledge in their home countries?

There was also a desire to develop recommendations for Sida regarding continuation of funding for the DIAMN programme as well as providing feedback for UCSC to improve the programme.

It is useful to think about this type of training in terms of three approaches:

1. Local, in-country training;
2. Third country training programmes (TCTP) such as DIAMN; and
3. International training programmes (ITP).

The TCTP model represented by DIAMN is an attempt to address the limitation, in terms of resources, expertise and facilities, of local, in-country training in a developing country. This can, in turn, build capacity and further the development process in the country offering the TCTP.

Budget Issues

The most serious budget concern was that of travel costs from the various Sida partner countries to the DIAMN sessions in Sri Lanka. However, the analysis in Section 1 above revealed that travel costs were actually quite reasonable for participants from Africa and Asia. That said, travel costs were high, and travel times long, for the few participants from Latin America and it may be practical to limit participation in future programmes to those in Africa and Asia.

Other than travel costs, no serious budget issues were uncovered. The evaluator's opinion is that funds were used wisely and DIAMN administrators worked hard to deliver the programme and associated supports (e.g., accommodation, per diems, transportation, study visits) at a reasonable cost. Indeed, it is the evaluator's opinion that the quality to cost ratio of accommodation was outstanding. Overall, it is felt that the UCSC administrators of DIAMN used Sida funds wisely, perhaps to the point of erring on the side of spending too little on some aspects of the programme related to the labs and equipment. Finally, the evaluator is of the opinion that the organisers of DIAMN were of high integrity and truly

were committed to maximising the value of Sida's investment. This was also reflected in the fact that the programme was significantly under budget.

Functioning of the training programme

In terms of the functioning of the DIAMN programme, the evaluator considered the facilities and equipment, organisation, institutional resources and human resources. Curricula and textbooks were also reviewed as well as instructional time, teaching methods and completion rate.

DIAMN is a six-week programme offering approximately 210 hours of training in design, installation, administration and maintenance of computer network systems. The course involves both theory as well as practical laboratory assignments designed to help the students consolidate the theory. A summary of the content of the course is provided in Appendix 4. The course covers almost every aspect of computer networks, from data communication theory, transmission technology to network security.

DIAMN programme facilities, in terms of classrooms and labs, were adequate and located in the UCSC complex with significant physical and human capital in the immediate vicinity. However, *the facilities could be improved with more equipment to work on, newer computers and high bandwidth for internet access.* Moreover, the teaching methods may have relied too much on theoretical methods at the expense of practical exercises. The technical report presented in Appendix 5 concludes that most sessions should be half theory and half practical, which was not the case with DIAMN. Finally, as with many new, and emerging programmes, DIAMN suffered from a degree of repetition and overlap due to inadequate coordination of the various lecturers' presentations etc.

The technical analysis concludes that there was inadequate emphasis on UNIX and that the programme could benefit from a greater emphasis on internet and network security issues. The technical analysis also concluded that DIAMN would be improved with sessions on how to use Network Monitoring Tools that are essential for network operation, troubleshooting, and maintenance. Such tools include the use of network traffic analyser such as Ethereal, tcpdump, and MRTG tools, which would require more and better equipment in the laboratories.

The human resources dedicated to delivering DIAMN were strong, with teachers from both academia and industry. The mixed approach to teaching also provides up-to-date, real world experience, though perhaps at the expense of coordination.

Study materials were deemed to be adequate though several students expressed the desire to have texts to refer to after returning to their home countries. The evaluator also noticed that DIAMN participants were purchasing books in Sri Lanka to bring with them to their home countries.

Selection of participants

The evaluator attempted to determine if actual staff from Sida/SAREC-sponsored universities participated in DIAMN, rather than students from these institutions, and this was the case. Indeed all 35 participants in the two DIAMN intakes were staff, or in teaching and/or research assistant roles, at Sida/SAREC-supported institutions. Participant profiles are listed in Appendix 6.

The main challenge in terms of selecting participants was finding students of a similar level in terms of their networking skills. Ultimately DIAMN participants ranged in their networking skills from quite basic to advanced and this made it difficult for the UCSC to design a programme that meets all needs. Consequently, DIAMN went too fast for those with limited previous skills while leaving the most advanced students frequently bored. *In the future more efforts should be made to select participants with similar networking skills levels prior to entering the programme.*

Course evaluation forms

A critical component of this evaluation was gained in interviews with DIAMN administrators and participants as well as through two evaluative questionnaires. This evaluation focuses on the e-mail questionnaire distributed by the evaluator but also reports on the in-class evaluation forms distributed by the UCSC. The latter instrument involved the distribution to, and collection of, evaluation forms from each student at the end of the two DIAMN intakes. In total, 35 evaluation forms were collected. The forms included 17 questions rated on a 1–5 scale, three closed-end questions, and three open-ended questions. The evaluation form is attached as Appendix 2.

As a rule, the responses to the in-class questionnaire were more positive than to the evaluator's questionnaire. Overall, satisfaction levels in the questionnaire were high, especially among the participants from DIAMN *intake 1*. The evaluator asked the course organisers why this might be and was told the selection for *intake 1* may have been closer to optimal, with fewer levels of skills among participants. In any case, there was a somewhat lower level of satisfaction among DIAMN *intake 2* participants though their satisfaction was, on aggregate, also high.

Among all participants two areas of concern appear repeatedly in the in-class questionnaire: 1) the lack of attention to, and time for, practical exercises; and 2) the degree of duplication and overlap in the course material and presentations. There were also comments about the need to group participants according to their level of networking expertise in order to develop course appropriate for the varying skills levels of participants as well as less common comments about the programme being too long and a lack of attention to UNIX.

Overall, DIAMN participants ranked the programme as “very good” on a four-point scale from Excellent to very good to good to poor.

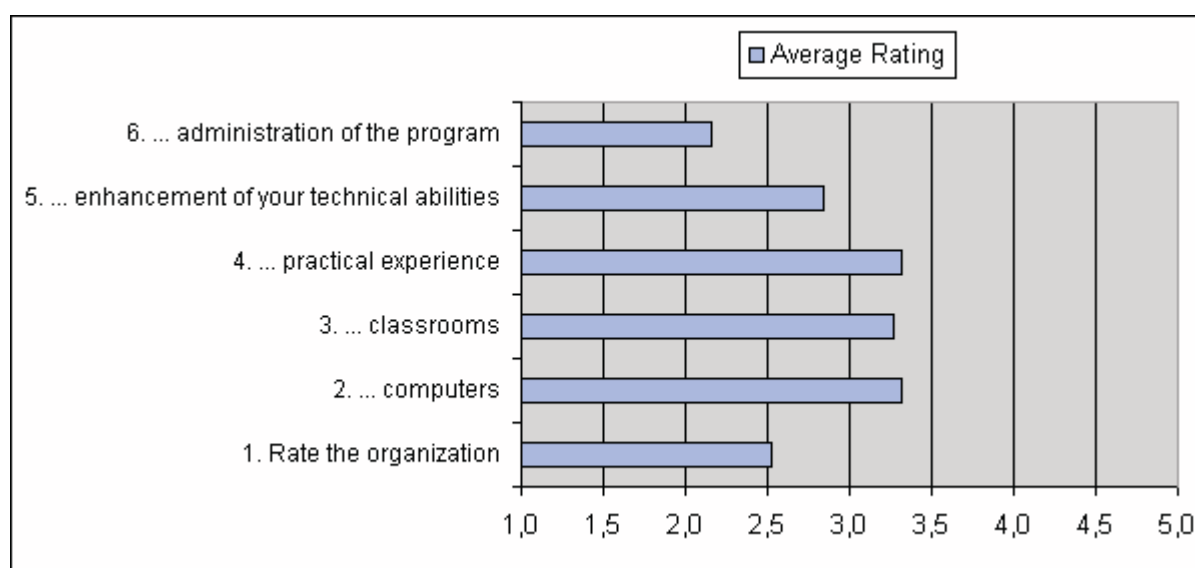
E-mail survey results

The e-mail survey was distributed to 33 DIAMN participants from both the August–September session and the November–December session. It was an attempt to probe issues stemming from the in-class questionnaire and from interviews with the course organisers as well as participants. Three of the e-mail surveys were undeliverable but 19 were completed and returned yielding a response rate of 66% of those who received the questionnaire. The questionnaire was sent to all participants, including the one Sri Lankan who participated, in the DIAMN programme offered in November–December 2003. It was also sent to all foreign participants in the first DIAMN intake in August–September 2003.

The e-mail questionnaire consisted of ten questions, six of which were graded on a 1–5 scale (means are generated and graphed), one on a 1–3 scale (to probe the programme length issue) and three open-ended questions (from which participant comments are interspersed throughout this report). The questionnaire is attached as Appendix 3.

The e-mail instrument revealed similar concerns to those expressed in the in-class questionnaire. In particular, DIAMN participants expressed concerns, through lower satisfaction, with the quality of the workstations, quality of the learning environment (in terms of classrooms and labs) and the lack of practical exercises. The mean response on these factors was about 3.3 on a scale where 1 is excellent and 5 is poor. Moreover, 12 of 19 respondents believed the course was too long. Satisfaction was highest with the organisation and administration of the DIAMN programme, with most respondents rating these areas as good to very good. Aggregated results from the “1 to 5” scale closed end e-mail survey questions are presented in Figure 2.1 below.

Figure 2.1. E-mail survey results



1–5 score where 1 is excellent, 2 is very good, 3 is good, 4 is adequate and 5 is poor.

Specific issues addressed by the survey instruments are addressed under the headings below and provide further insight into the student perspective on the DIAMN programme.

Due to the tendency for some to provide “across-the-board” high ratings and the survey’s weighting towards measuring “good” scores, there are more meaningful differences when examining the data for negative outliers. For example, four of 19 respondents rated DIAMN “poor” when it comes to computers, classrooms and practical experience. On the other hand, not a single respondent rated DIAMN as poor in terms of administration or general organisation. It is evident that the programme organisers did a good job

Organisation of the DIAMN programme

In the e-mail survey participants rated the organisation of the programme to be good to very good, on average. Respondents to the in-class evaluation form also ranked the overall organisation of DIAMN highly. Overall, there were no major concerns in this area though some students expressed concerns about the adequacy of the transportation from the hotel to the UCSC. The evaluator explored this issue and found no major cause for concern though there is some room for improvement (e.g., using a sufficient number of vehicles to prevent over crowding and waiting times).

Quality of the computers

In both the e-mail and in-person questionnaires, many students expressed concerns about the quality of the computers in the lab. In fact, in the e-mail questionnaire interviews the DIAMN computers were rated, on average, as 3.32 out of 5 where 1 is excellent and 5 is poor. Several students thought the computers were inadequate because of slower CPUs, too little RAM and the need to share workstations. An African participant wrote, “the teaching facilities need to be improved with quality computers, hubs, modem, routers and switches.”

A related area of concern was internet access. In Sri Lanka, as in many developing countries, internet bandwidth is at a premium. Consequently, bandwidth available to DIAMN students in the lab was minimal. As an alternative, many students used internet cafes in Colombo to access information and communicate. *This issue was discussed at length with the course organisers and it was agreed that a dedicated DSL line could be supported for future programs.* This would provide adequate bandwidth at a reasonable cost.

Overall, the evaluator's judgement is that bandwidth availability and cost in Sri Lanka is reasonable compared with many developing countries.

Quality of the classroom/lab

This was another area of major concern, expressed by participants in both the e-mail questionnaire and in-person. A participant from Asia commented: "If Sida offers training in a third country, they should survey the facilities. Without a proper facility, the output will differ from what would occur in Sweden." An African participant added: Organising the course in Sri Lanka negatively affected the quality of training especially for hands on due to lack of equipment in the lab." Yet another student wrote: "We expected a better classroom and better lab facilities with better equipment and internet connection."

On the other hand, there were some students who appreciated facing similar challenges to those faced in their home countries. One African participant wrote: "DIAMN was effective especially when the participants are being trained in the same environment as their own country rather than being trained in Europe." Another added that "Sri Lanka was ideal because it was not far different from our countries in the level of IT development. We share common problems. The examples used could easily be used in our countries." However, another African participant wrote, "Providing training in a developing country was not positive since manpower and teaching materials were not adequate and enough to fulfil the objectives of the course."

Finally, on the issue of classroom and learning environment, it appears the course organisers achieved near optimal course sizes. All 35 respondents to the in-class course evaluation form rated the class size as good. Not one said there were too many or too few participants. It appears a class size of 16 to 20 is appropriate for this type of training.

Clearly, there is room for improvement in this area. *It is therefore recommended that the UCSC improve the quality and availability of the computers, hubs, routers and switches in the classroom/lab.* This issue was discussed with the course leader and he agreed that this could be addressed without too much difficulty or massive investment. Thus, while the value of offering the programme in a developing country is recognised, the classrooms and laboratories need to be improved to improve the practical experience offered in the DIAMN programme. As one African participant put it: "There is too much theory versus hands on training. The lab should be better equipped to support hands on training."

Practical experience

Along with the computers and classroom environment, this was the area of most concern as expressed by students in questionnaires and in-person interviews.

An African participant wrote: "The course had almost no practical training. Lectures should be paralleled with practical sessions." This situation led one Asian student to conclude, "training should be organised in Sweden because there are a lot of modern techniques related to ICT and we can have more practical training." Another Asia participant wrote, "there were repetitions in class lectures, the material provided was not adequate and DIAMN was too concentrated on theory."

Indeed, there was nearly unanimous opinion among students in interviews that DIAMN does not provide an adequate opportunity for practical, hands-on exercises. *Therefore, it is strongly recommended that future DIAMN programmes incorporate more practical, hands-on training in quality laboratory facilities.*

Length of the DIAMN programme

A majority of respondents to the e-mail survey (12 of 19, or 63%) indicated that the DIAMN programme was too long versus only 2 of 19 (11%) who said it was too short. Five of 19 respondents

(26%) indicated that the DIAMN programme length was appropriate. Results from the in-class evaluation forms differed slightly with 16 of 34 (47%) of DIAMN participants indicating the programme was too long versus only 2 of 34 (6%) who said the programme was too short. One respondent to the e-mail questionnaire addressed programme length when he responded: “if the programme had more practical training it would be worth having it for six weeks but with much theory and repetition six weeks is too long.” Another responded that the length of the programme was appropriate for those with lower skills but too long for the majority of participants, most of whom had fairly advanced ICT skills.

Clearly, it is difficult to determine optimal programme length but many students thought the programme was too long given the lack of practical experience. *It is therefore recommended that the DIAMN programme either be: a) shortened to four-weeks to more effectively convey the current content; or b) remain at six-weeks if a significant increase in practical exercises can be incorporated into the programme.*

Selection of students

This was another area where there was nearly unanimous opinion and many DIAMN participants expressed frustration with the difficulties accommodating the wide range of networking skills in the programme. A participant from Africa wrote, “I suggest the organiser group participants according to their knowledge level. I tell you that training the course was very good to the beginners in the system administration but not for us with more advanced skills.” Another African stated that DIAMN should “group participants because some have an advanced level and it seems to be boring for them during the first 3 weeks.”

Clearly, the programme could be improved if students were either selected from a more similar skills level or were perhaps separated into sub-groups to accommodate two different skill levels

3. Evaluation Methodology

The Institute of International Education has significant experience with research into education, especially education planning and policy. However, to accomplish this mission technical expertise on networking was contracted from the “IT university” in Kista.

The evaluation was commissioned not only to gain insight into the regional training programme in Design, Installation, Administration and Maintenance of Network, but also to explore the benefits of Third Country Training Programmes for ICT in developing countries intended for other developing countries (such as DIAMN) vis-à-vis more traditional International Training Programmes for ICT most often located in the industrial countries (such as Sida’s ITP located in Sweden). Consequently, the evaluation attempts to support Sida planning for future support to such third country training programmes for ICT training.

Evaluation factors and outcomes

In analysing the quality and efficiency of the regional training programme in design, installation, administration and maintenance of network systems the following factors were considered:

- Syllabi and curricula;
- Structure of curricula and extra curricula activities;
- Learning materials including systems for conceptualising, production and evaluation of text-books;

- Teaching/learning methods;
- Relationship between the educational institution and the environment (e.g. ICT sector, other educational institutions in both Sri Lanka and abroad, local community, cultural institutions, media); and
- Quality monitoring, assessment and evaluation (mechanisms built into the programme for quality monitoring, assessment and evaluation).

In terms of outcomes the analysis focuses on learning achievement vis-à-vis knowledge and skills; development of social, communication and life skills; opportunities created through increased skills among participants; and DIAMN as a basis for life-long learning.

Key goals of the evaluation were to assess:

- whether or not Sida's objectives were fulfilled;
- quality of the programme;
- cost effectiveness;
- relevance of the course (in general as well as for the individual participants);
- adequacy of student qualifications (to ensure they could benefit from the course);
- student satisfaction; and
- content.

Ultimately, Sida's goal is to confer students with new knowledge that will be useful in their home countries. Therefore, the evaluation provides recommendations to Sida regarding continued support for the course, and suggestions to UCSC on how to improve DIAMN.

Methodology

The evaluation methodology revolved around participant feedback in the form of written evaluations, verbal interviews, site visits and supplementary questionnaires. The Terms of Reference for the evaluation called for a thorough review of DIAMN participant evaluations collected by UCSC during DIAMN intakes 1 and 2. It also called for e-mail contact and phone calls with students for clarification. Finally, the TOR requested that the evaluator develop, distribute, collect and compile a separate course evaluation for the participants in the two DIAMN intakes. The TOR also stipulated that the evaluator analyse travel costs and other outlays to support DIAMN participants.

The UCSC collected written course evaluations from all the DIAMN participants, and provided the evaluator with the participants' e-mail address in their home countries to distribute an independent questionnaire. The evaluator reviewed all the in-class course evaluation forms collected by the UCSC, identified especially relevant comments for inclusion in the report and calculated averages for the coded answers.

The evaluator also created and distributed a separate e-mail questionnaire to probe students for their impression of the DIAMN programme. This was conducted from late December, 2003 through early January, 2003–04.

The evaluator also met with all participants in the second intake of the DIAMN programme on several occasions, both as a group and individually. The evaluator obtained a list of all the DIAMN participants, compiled a list of the each and every air ticket cost for all the different countries participating and check to see if the programme was delivered on budget (Sida funds for DIAMN totalled SEK 1.4 million).

Data sources for DIAMN

Most of the information on the DIAMN programme was qualitative in nature and gathered from tin-class course evaluation surveys, in-person interviews and a follow-up e-mail questionnaire to all participants. Interviews were also conducted with DIAMN administrators. Public reports, public documents and secondary literature sources were also reviewed to better understand the DIAMN programme and some of the issues surrounding it.

Definition of policy goals

The report was informed by an evaluation approach structured around the four broad policy goals.

1. *Volume* – measures the number of projects, number of participants and allocated funding and programme spending on an aggregate and programme basis.
2. *Access* – measures support provided to programme applicants, organisers and participants.
3. *Equity* – is related to addressing barriers to participation. Key measures of equity are participation rates of women, people with disabilities, visible minorities, etc.
4. *Efficiency* – measures the relationship between inputs and outputs, such as cost per project and cost per participant.

4. Conclusions

DIAMN has contributed to building capacity in a Sida partner country and promoting “south/south” dialogue. Specifically, over the years the UCSC has become an effective centre for the generation and transfer of ICT knowledge, ideas and business and DIAMN reinforced this.

In terms of cost effectiveness, the DIAMN programme also proved to be less expensive than it would have been if held in Sweden as per the traditional ITP model. Indeed, the estimates detailed in the box below indicate that the cost of holding DIAMN was less than one-quarter that of holding an ITP in Sweden. It could also be argued that the TCTP model expressed in the DIAMN programme, offering training in a developing country, will reduce the loss of human capital that sometimes occurs when highly trained people from developing countries move their human capital to wealthy countries.

Cost analysis of TCTP (DIAMN) versus ITPs in Sweden

Sida often supports skills development for individuals from Sida partner countries through International Training Programmes held in Sweden. Many ITPs run for four weeks and course fees typically range from USD 5300 to USD 7300 plus accommodation, local transport and meal costs ranging from USD 3600 to 4400 for a total cost range of USD 8900 to 11,700 for a four-week ITP in Sweden. This would yield an average cost in excess of USD 15,000 for a six-week ITP in Sweden compared with the USD 3500 for the six-week DIAMN programme in Sri Lanka (i.e., over 400 per cent more than in Sri Lanka). Of course, these costs estimates do not take into account quality or efficiency and an ITP in Sweden may accomplish what DIAMN did in four weeks instead of six. However, even if an ITP could accomplish what DIAMN did in half the time (i.e., in three weeks) DIAMN costs would still be less than half those of holding a three week ITP in Sweden. (USD 1 = SEK 7.5)

DIAMN serves as a platform from which ICT professionals in developing country can build professional networks. In the evaluation conducted by the evaluator a participant from Asia wrote, “through DIAMN I still keep me contact with my friends and we share ideas together through the internet.” A participant from Africa wrote, “participants from different universities keep in touch with each other

and also help themselves out with the different problems encountered at work.” Even so, this positive attribute could be improved as evident in a Latin American participant’s comment that there “should be a post-course discussion forum to exchange experiences to facilitate cooperation between countries.” *Therefore, although DIAMN fosters “south-south” cooperation, it could be even better, perhaps by incorporating a session at the end of the programme on networking or even by establishing a chat site for ICT technicians and professionals in developing countries.*

Lessons learned

However, there are a number of improvements that could be made to make DIAMN a truly effective programme. In particular, it is concluded that the DIAMN programme needs to incorporate more practical, hands-on training in better-equipped laboratories, using more up-to-date workstations. Moreover, the programme should be better organised so that presenters do not overlap with previous and future presenters. Finally, it is felt DIAMN would be improved if selection criteria were tightened to ensure similar skill levels of participants in DIAMN. It must be noted here that the DIAMN organisers agree with this and would like to achieve it but point out that selection is largely determined by the nominating organisations in the Sida partner countries. Therefore, it is recommended that Sida and the UCSC very clearly communicate the level of required skills of potential participants in any future DIAMN programmes.

DIAMN in an international perspective

In the Terms of Reference it was requested that the evaluator make an attempt to compare DIAMN with similar courses in both developing and developed countries. This was a difficult task as DIAMN is an innovative model bringing together many elements of networking in an intensive, in residence, six-week, full-time TCTP. As such, there are no truly comparable programmes. There are a number of more specialised programmes offered (e.g., Cisco and Microsoft certified programmes) in many countries and tuition fees typically range from USD 100 to USD 300 per week of full-time study, excluding accommodation and other costs incurred in the DIAMN model. Costs are usually much higher in developed countries, except for programmes offered through heavily subsidised public post-secondary training institutions.

It would be possible to offer elements of the DIAMN programme at a lower cost through in-country training in developing countries. For example, a part-time (four hours per day) three month certificate in IT Essentials with Cisco certification in Tanzania costs USD 500. A more advanced course, in this case a part-time three month course for Microsoft Certified System Engineer in Tanzania, costs USD 1300. These programmes are similar in terms of training hours to DIAMN and are provided at a lower cost. It must be noted the actual costs of providing the first two DIAMN programmes, excluding accommodation, food, per diems, study tours and local transport costs, are somewhat higher than the Tanzanian examples given estimated “training” costs of approximately USD 1500 per participant for the six week, full-time programme. However, DIAMN officials claim their costs can be lowered somewhat now that the programme (e.g., curricula, etc.) is largely developed. Therefore, it is felt that DIAMN training costs, though slightly higher than those in some developing countries, are competitive given the uniqueness (i.e., not an off-the-shelf programme under Cisco or Microsoft) and the need to generate course content geared to the specific clientele.

In the end, it is concluded that the synergies of the DIAMN programme (e.g., an increase of contacts between the Sida supported universities in developing countries that may lead to more south-south cooperation, strengthening UCSC capacity to offer international ICT courses, etc) produce a net benefit both in terms of increased relevance for the participants (as the course is held in a developing country with conditions similar to their own countries, which are different from those in developed coun-

tries) and in terms of value for money. Additional benefits include creating professional networks among DIAMN participants.

Post-Sida project sustainability

As with all development cooperation projects, post project sustainability of DIAMN must be considered. Ideally Sida support can serve as a springboard for further efforts without donor support. A more realistic perspective might anticipate further action with less support, responding to demand from other universities in developing countries or even to market demand in Sri Lanka.

Regarding sustainability, it is worth noting that much of Sida's future ICT support in Sri Lanka may be channelled through the national Information and Communication Technology Agency of Sri Lanka (ICTA). ICTA is an ambitious "project" with energetic staff and a progressive organisation but it will likely be focused on larger, national-scope projects and may not seek support for a focused programme such as DIAMN. This big picture approach may be good for Sri Lanka but could jeopardise smaller projects such as DIAMN.

When asked about the sustainability of DIAMN, Professor V.K. Samaranayake replied, "in order to be sustainable in the future, we should gradually make it open to self- or other donor-supported participants as well with Sida supporting a minimum needed to make it worthwhile. Say Sida supports 15 and 5 extra places are left for other participants. This is just an idea for the future."

Indeed, a combination of donor support through Sida and market demand could result in an optimal programme although the distribution might be better if Sida were to sponsor five or 10 in an intake of 20. *Therefore, it may be that sustainability will depend on a staged approach where Sida provides some ongoing support but gradually lets DIAMN gradually moves to accommodate both the needs of international institutions as well as the market in Sri Lanka.*

Broader education goals

It is concluded that DIAMN contributed positively to lifelong learning, especially as it was a early- to mid-career stream opportunity for many participants. Moreover, it is believed that DIAMN contributed significantly to the development of communication and social skills, including among inter-cultural groups. This is seen as one of the primary secondary benefits of the DIAMN model where participants from so many countries get an opportunity to live and study together for an extended period of time.

5. Recommendations

As stated earlier most participants expressed concerns about the learning environment, in particular the state of the labs, computers and lack of hands-on, practical experience. *Therefore, it is recommended that future programmes place a greater emphasis on practical exercises.* To facilitate this, it would be desirable to have more networking equipment available to work on in labs and more up-to-date workstations. Moreover, the DIAMN programme needs to be refined to avoid duplication and overlap and build in more practical training.

Specific, technical recommendations include the following:

1. The course should include a component with at least DNS, Mail Transport agent, Network File Service, web server application and Authentication and Authorization services.

2. The course should be more practical than theoretical.
3. The course should include Network troubleshooting sessions in which network traffic analyzers are used as tool to monitor and detect errors in the network
4. Laboratories need additional equipment in order to provide the required environment for practical sessions.

In the Terms of Reference it was stated that Sida wants to shed light on both the DIAMN programme as well as other ICT TCTPs in developing countries intended for other developing countries with this evaluation. This comparison between ICT TCTPs in developing countries (such as DIAMN) and traditional donor supported International Training Programmes for ICT located in the industrial countries (such as Sida's ITPs located in Sweden) should be useful as a tool for discussions concerning Sida's plans for future support to such third country training programmes for ICT training.

Along these lines, the evaluator recommends that Sida further explore the use of TCTPs to provide critical training for key personnel from Sida-supported institutions in developing countries. Although the DIAMN programme is not perfect, it shows promise and with modification it could serve as a cost effective means to provide training while at the same time encouraging south-south cooperation and building capacity in a Sida partner country. Indeed, a review of ITPs in Sweden, and meetings with Sida ITP officials, confirmed that DIAMN costs are very competitive with similar programmes (i.e., ITPs) held in Sweden. The challenge is to ensure DIAMN offers a similar quality training experience to those offered by ITPs in Sweden. The evaluator is confident that with some modification DIAMN will offer a very competitive quality to cost ratio vis-à-vis ITPs in Sweden.

An important question here is how does DIAMN rate compared with the other models? Unfortunately, it is not possible to provide concrete answers to this question. It can not be said that the DIAMN TCTP training model is superior to others such as those offered through in-country training or through ITPs in Sweden. However, it is safe to conclude that DIAMN offers a higher quality experience than is available with local, in-country training in many of the countries from which the participants were drawn. Moreover, DIAMN offers training at a lower cost than ITPs in Sweden because of higher costs for things such as accommodation and food in Sweden.

Therefore, without specifically judging the specific DIAMN programme, it can be concluded that the DIAMN model is the most appropriate training model under certain circumstances. These circumstances include situations where high-level training is either not available in-country or when there is insufficient critical mass in any one country to warrant offering such a programme. In this sense it may be that the DIAMN programme, providing somewhat generalist networking skills, may not be the optimal programme for the TCTP model. Consequently, the TCTP model may be even better suited to offer a more specialised, higher level programme providing training unavailable in other partner countries.

6. References and interviews

Sida (2003) *International Training Programmes 2004*, Stockholm: Human Resources Department, Sida.

Sida (2003), *Training for ICT development in Sri Lanka and Tanzania*, by Shawn Mendes, Albert Tuijnman and Nina Young, Stockholm: Sida.

Sida (2002) *Evaluation of ICT projects at universities and research organizations in Sri Lanka*, Greenberg ICT Services, Stockholm: Sida.

Interviews

University of Colombo School of Computing (UCSC)

V.K. Samaranayake,
Mr Samanthilaka
Prasad Wimalaratne

Sida

Per Einar Tröften, ICT for Development
Afzal Sher, ICT for Development
Lisa Hellström, International Training Programmes

Swedish Embassy – Sri Lanka

Ann Marie Fallenius, Head of Mission
Åsa Heijne, First Secretary
K. Romeshun, Programme Officer

DIAMN participants (more details on these participants in appendix 6)

ASM Ariful Hasan
Iris Pervin
Roberto Zambrana
Abdoul Karim Douani Diallo
Amadou Sanon
Zacharie Koalaga
Tadewos Beyene Belaineh
Bandith Ramangkoun
Manoluck Bousihalath
Ricardo Mario Taca
Bisanukuli Jean Francois Chantal
Anil Nishantha Illangantilaka
Samwel Mujinja Charles
Aloyce William Rugalinda
James Methew Lwali
Florence Nameere Kivunike

Others

Dinesh Amarasekera, Senior Project Manager, ICT Agency of Sri Lanka (ICTA)
Giham Dias, Programme Director, ICTA
Manju Hathotuwa, CEO, ICTA
Adith P. Madurapperuma, Dean, Faculty of Information Technology, Univ of Moratuwa
Americo F. Muchanga, IT University, Kista

Leonel Plazaola, Universidad Nacional de Ingeniera, Nicaragua

Thivanka Rangala, Manager, Finance and internet business, Dialog GSM

Roschaali de Silva, Project Coordinator, ICTA

Sanjiva Weerawarana, Research staff member, IBM

Appendix 1 – Terms of Reference

ICT for Development Secretariat
Per Einar Tröften

Terms of reference for commissioned evaluation on the regional training programme in design, installation, administration and maintenance of network systems (DIAMN)

Introduction

Since 1999 Sida has a strategy for integrating ICT in Development Cooperation. The internal advisory group assigned to lead this integration connects both to Sida Departments and to Swedish Embassies in cooperating countries. The advisory group has divided its main tasks in two branches:

1. ICT as a tool for development. To facilitate the use of ICT within development co-operation areas and programmes conducted by Sida's sector departments;
2. Develop ICT in co-operating countries. To promote the development of ICT through:
 - a. Support to national ICT policies, strategies and plans
 - b. Support to Human Capacity Development and Education for ICT
 - c. Support to physical ICT-infrastructure

Background

The ICT advisory group has commissioned a series of Country ICT Surveys to illuminate the situation in co-operating countries regarding ICT. Human Resources, Education and Training has been part of these studies, but mainly on a descriptive level. There is a need for elaborated description and analysis of the issues pertaining to raising knowledge on ICT in the countries.

Sweden, through Sida, also participates in the UN ICT Task Force, among other things in the Task Force's Working Group on Human Resource Development and Capacity Building. Sweden has proposed to the working group that one of the most important tasks would be to define models for the set-up of Education that promotes ICT, with special focus on education and training of ICT-personnel. (In this context it is important to distinguish this emphasis from support to ICT-solutions for education in general. This distinction is often overlooked.)

Sida's department for research cooperation (SAREC) have supported University of Colombo School of Computing (UCSC) since 1998. UCSC now invite other SAREC supported universities to send participants for the DIAMN course. The benefits are many:

- all the SAREC supported universities gets updated in networking,
- offering this course also strengthen the capacity at UCSC,
- it promotes "south-south networking". DIAMN can become a natural platform for future contacts and cooperation between the SAREC supported universities,
- it is cheaper than other donor supported International Training courses held in the industrialised countries and
- a course in a developing tropical country is more relevant for participants from other such countries.

Purpose and Scope

Sida has decided to commission Shawn Mendes at the Institute for International Education at Stockholm University to perform an evaluation of the regional training programme in Design, Installation, Administration and Maintenance of Network systems (DIAMN) hosted by Sri Lanka.

With this evaluation Sida want to shed light on:

- a. the DIAMN training programme but also
- b. get a comparison between Third Country Training Programmes (TCTP) for ICT in developing countries intended for other developing countries (such as DIAMN), with the donor supported more traditional International Training Programmes for ICT most often located in the industrial countries (such as Sidas ITP located in Sweden). The evaluation should therefore also be possible to use as a tool for discussions concerning Sida's plans for future support to such third country training programmes for ICT training.

The DIAMN part should in principal cover issues like: were Sida's objectives fulfilled, quality, cost effectiveness, relevance of the course/s (in general as well as for the individual participants), did the students have adequate qualifications making sure they could benefit from the course, are the students satisfied and content, will the students have use of the new knowledge in their home countries, recommendations for Sida if it should continue supporting the course, and feed back for UCSC to how to improve the courses even more. The evaluator is free to include other important aspects as well.

The evaluator shall also attempt to make some comparison/reference of the costs of similar courses in developing countries (e.g., in Nicaragua a Cisco networking course of 3 to 4 weeks is 1000 USD, and a Microsoft Networks course of 3 to 4 weeks 500 USD) but also these courses in industrialized countries (e.g. Sweden, Canada etc). In such a comparison, however, the evaluator will also have to take into account the special synergy effects resulting from the Sri Lankan DIAMN course (e.g. an increase of contacts between the Sida supported universities in developing countries that may lead to more south-south cooperation, strengthening UCSC capacity to offer international ICT courses, etc) but also an increased relevance for the participants (as the course is held in a developing country with limitations/ complications similar to their own countries and a similar tropical environment with special needs that are different from those in industrialized countries etc). Thus the evaluator will have to conclude if it is worth the money to send participants from other developing countries to Sri Lanka.

A very minor issue is to get an indication why Nicaragua declined to participate in this Sida offer. Leonel delivered the following explanation – “We have been looking for cheap tickets to Sri Lanka and seems that the cheapest one is around 4,000 US\$. We believe that this is too expensive for assisting to such course. It seems that could be good idea to have an American course.” Sida would have funded the ticket anyway so please find out if this is the only reason or not. As a comparison, how much was the ticket for the participants from Bolivia? Contact Leonel Plazaola (leonelp@nic.ni), Universidad Nacional de Ingeniera, Nicaragua.

The Assignment

The commissioned report should include two specific sections:

- a. the evaluation of the DIAMN training programme; and
- b. a comparison of the Third Country Training model vs the International Training Programmes.

The evaluator shall also develop a model for how Sida can support ICT training in developing countries for developing countries as a complement to Sida's International Training Programmes for ICT that most often is located in Sweden.

The evaluation should issue recommendations advising if Sida should continue support for DIAMN but also if Sida should support other similar third country training programmes for ICT.

The evaluation should be conducted during November 2003 to January 2004 with a final report presented not later than 30 of January 2004.

Shawn Mendes at the Institute of International Education (IIE) have experience researching education and ICT, especially education planning and policy. However, to accomplish this mission the IIE needs to involve special expertise in Networking from the IT university in Kista.

Methodology

Read the DIAMN participant evaluations that should have been collected by UCSC during DIAMN 1 & 2. E-mail contact/phone calls may be necessary with students for clarification. Mendes will also have to distribute, collect and compile his own course evaluation to the participants from DIAMN. UCSC should have collected written course evaluations from all the students, and shall provide the evaluator with a file of the participants' private address, home university address, telephone number as well as e-mail address in their home countries so the evaluator can distribute his own questionnaire.

Make a list of all participants in DIAMN. List air ticket price for all the different countries. Calculate how much of the available Sida funds (SEK 1.4 million) were used.

A number of interviews with selected key persons should be used to clarify and raise important issues. See list below.

The evaluation should be done in totally 3 weeks, allowing for one week of preparations, one week of field studies and one week of compilation. Data should be collected through interviews, documents, questionnaires, site visits and the use of any other appropriate data source.

Reporting

A draft report should be presented not later than 15 of January 2004.

A final report should be ready not later than 30 January 2004.

Budgets

Costs for the commissioned evaluation must not exceed 200 thousand Swedish kronor. A budget prepared by the IIE should cover salaries including LKP, reimbursable costs for travelling and materials pertaining to the study, sub-contacting a network specialist from the IT-university, and university overheads, not exceeding 30 per cent of the total. IIE shall negotiate with the Administration of Stockholm University to exempt costs incurred abroad, and travel costs, from overhead. The budget should be endorsed by Sida before any contract could be made.

Necessary Interviews:

- University of Colombo School of Computing (UCSC) – prof V.K. Samaranayake, Mr Samanthilaka and others.
- Sida – Per Einar Tröften (ICT4D), Afzal Sher (ICT4D) & Lisa Hellström (ITP).
- Swedish Embassy – Possibly Ann Marie Fallenius (for comparison between donor supported traditional International Training Programmes in ICT most often located in industrial countries such as Sidas ITP, and Third Country Training Programmes). Åsa Heijne (for finding out if the embassy appreciates DIAMN. However, please notice that they have no responsibility for it or fund it. Embassy only fund bilateral while Sida can fund International like DIAMN).
K. Romeshun
- DIAMN participants – The participants present at DIAMN 2.

Additional information:

- UCSC DIAMN website (<http://www.ucsc.cmb.ac.lk/diamns/index.htm>).
- Sida decision for supporting DIAMN.
- Enclosure 2 – calculation of funding & participants.
- List of participants from DIAMN 1.

Appendix 2 – Evaluation form (end of class, in class)



Regional Training Programme In

DESIGN INSTALLATION ADMINISTRATION & MAINTENANCE
OF NETWORK SYSTEMS (August 04–September 12, 2003)

Course Evaluation Form

Name: (optional)

Country: (optional)

Please circle to what extent you agree or disagree Wwith the following statements

	Strongly	Agree	Neither	Disagree	Strongly
1. Subject matter was adequately covered	5	4	3	2	1
2. Content was suitable for my background and experience	5	4	3	2	1
3. Programme was well paced	5	4	3	2	1
4. Handouts were relevant	5	4	3	2	1
5. Participants were encouraged to take an active part	5	4	3	2	1
6. The course met my individual objectives	5	4	3	2	1
7. The course was relevant to my job	5	4	3	2	1
8. I would recommend this programme to my colleagues	5	4	3	2	1

Please rate the following, as applicable

1. Facilitation	5	4	3	2	1
2. Group exercises	5	4	3	2	1
3. Case Study exercise	5	4	3	2	1

4. Meeting space	5	4	3	2	1
5. Meals/refreshments	5	4	3	2	1
6. Overall organisation	5	4	3	2	1
7. Accommodation	5	4	3	2	1
8. Transport	5	4	3	2	1
9. Medical facilities	5	4	3	2	1

1. Was the course length: Correct ☐ Too short ☐ Too long ☐
2. Where their: Just enough participants ☐ Too few ☐ Too many ☐
3. If more than one subject was covered, which received too much or too little time?

4. Do you have any suggestions that you feel could improve this course?

5. What is your overall rating of this course?

Excellent ☐ Very good ☐ Fair ☐ Poor ☐

6. Any other comments?

Appendix 3 – E-mail questionnaire (distributed by the evaluator)



Institute of International education
Institutionen för internationell pedagogik

Dear DIAMN participants:

I have been contracted by the Swedish International Development and Cooperation Agency to evaluate the Regional Training Programme in Design, Installation, Administration and Maintenance of Network systems (DIAMN). I know you all completed an evaluation form at the end of the course but I am following up with this shorter questionnaire.

I am keeping this survey as simple as possible in order to minimize the burden on you. Please respond by replying and writing the answer below each question. For questions 1–6, simply answer with a 1–5 score where 1 is excellent, 2 is very good, 3 is good, 4 is adequate and 5 is poor. For questions 7–10, comment below the question as appropriate.

1. Rate the organisation, structure and presentation of course material?
2. Rate the adequacy of the workstations (the computers you worked on)?
3. Rate the classroom, learning environment and lab facilities?
4. Rate the degree of practical/hands-on experience?
5. Rate the degree to which your technical network abilities have been enhanced?
6. Rate the administration of the DIAMN programme (application procedures, course organisation, study tours etc.)?
7. How would you rate the length of course (too long, too short, just right)?
8. Have you used the training in your home institution? How?
9. Has the DIAMN programme been effective at promoting ongoing contacts and cooperation between universities in different countries.
10. Do you think this new approach of providing training in a developing country rather than in Sweden is positive? Do you feel holding the course in Sri Lanka provided the quality of training you needed?

Please write any overall comments on the DIAMN programme below.

Appendix 4 – DIAMN Course Curriculum

Regional Training Programme in Design, Installation, Administration and Maintenance of Network Systems

Course Curriculum

WEEK	DAY	CURRICULUM ACTIVITIES
1	Monday Tuesday to Friday	Opening Ceremony, Registration and Orientation Introduction to Design, Installation, Administration and Management of Networks. Network Design – LAN Technologies, LAN Cabling, WAN Technologies, Wireless Networks, Storage Area Networks
2	Monday to Friday	Network Installation and Configuring, Subnetting, TCP/IP networking, ARP, Routing protocols, DHCP, DNS, Switching Technologies, Spanning Tree and Port trunking, VLANs, QoS and traffic prioritization (802.1p,
3	Monday to Friday	Installation of Windows 2000 Server, Configuration of Windows 2000 Server Active Directory, Configuration of DHCP Server, WINS Server, Terminal Server, Windows 2000 Router. Troubleshooting.
4	Monday to Friday	Carrying out the above activities in the UNIX platform.
5	Monday to Friday	Packet Technologies, Fast Packet Fundamentals, Congestion Control, Service Provider topologies, Frame Relay, Multi Protocol Label Switching (MPLS)Asynchronous Transfer Mode (ATM), Virtual Private Network (VPN), IP Virtual Private Networks, IPSecMPLS VPN, Managed IP Networks, The QoS Issues Fundamentals of Network Security. Setting up Firewalls, Virtual Private Networks. Network Security Policies. New Trends. Setting up Web Servers, FTP, Telnet and Mail Services.
6	Monday to Friday	Access to Wide Area Networks, Dial-Up Access, Integrated Services Digital Network, Leased Lines Digital Subscriber Line (DSL), ADSL, Multimedia Services Intranets and Extranets, Voice over Data ApplicationsVoice over Data Architectures, RF CommunicationsVSAT Communications, Network ManagementNetwork Security

Appendix 5 – Technical report on the suitability of DIAMN

The suitability of the DIAMN technical networking course – By Americo F. Muchanga

The Institute of Computing Technology (ICT) and the Department of Computer Science of the University of Colombo have established a separate organisation, the Computing Services Centre (CSC) in 1990 using the computing and manpower resources of both the ICT and DCS. CSC provides a course entitled “Regional Training Programme in the Design, Installation, Administration and Maintenance of Network Systems (DIAMN)”.

The purpose of this report is to review the suitability of the technical networking course. Specifically, to review the curriculum and assess among others its relevance, quality, and value for money.

The DIAMN course is a six-week based course offering an average of 210 hours of professional training in design, installation, administration and maintenance of computer network systems. The course involves both theory as well as practical laboratory assignments designed to help the students consolidate the theory.

The following is a summary of the content of the course provided in each week:

Week #1

Fundamentals of Data Communications, Signaling, Transmission Media, Switching. Networking fundamentals, Addressing, Routing. Network Design Issues, Setting up of a Physical LAN using Ethernet hubs/Switches and UTP cables. Design of Networks. (LANs, WANs, Wireless LANs)

Week #2

Network Installation, Subnetting, TCP/IP networking, ARP, Routing protocols, VLANs, Switched Networks.

Week #3

Installation of Windows 2000 Server, Configuration of Windows 2000 Server Active Directory, Configuration of DHCP Server, WINS Server, Terminal Server, Windows 2000 Router. Media Server

Week #4

Carrying out the above activities on the UNIX (LINUX) platform. A Study Tour to visit another University in Sri Lanka

Week #5

Wide Area Network Technologies, Packet Technologies, Fast Packet Fundamentals, Congestion Control, Service Provider topologies, Frame Relay, Multi Protocol Label Switching, Asynchronous Transfer Mode, Virtual Private Network, Integrated Services Digital Network (ISDN), ADSL, ADSL2, G.shdsl, VDSL, Voice over IP, Voice over Frame Relay

Week #6

Network Security, Network Management, Satellite Networks

1. Relevance

As can be seen from the summary of the curriculum, the course covers almost every aspect of computer networks, from data communication theory, transmission technology to network security, therefore

it can be concluded that the course it has a degree of relevance. The programme could however be improved. Many networks today use Unix as a platform for the main servers. Therefore my suggestion is that the course has to be based mainly on Unix. Some of the basic network services are the address and names resolution, electronic messaging systems and network file services and file transfer.

Another important aspect of network operation is the Authentication and Authorization. Kerberos and IPlogin are popular systems for the above processes. I suggest that they be included in the course as part of the authentication and authorization. In particular Kerberos has the ability to provide encrypted flows in the network, that prevent sniffers from stealing passwords they can use to carry attacks in the network.

It is with this in regard that I suggest to include, perhaps in the Week #4, the following missing important matters of network operations under Unix environment:

1. Domain Name Services (DNS)
2. Simple Mail Transfer protocol (SMTP) transport agent, for instance Sendmail or EXIM.
3. A webmail programme, for instance the Open webmail
4. Installation and Configuration of NAT
5. Installation and Configuration of FTP servers
6. Configuration of Web servers, for instance the popular Apache server
7. A network file system, such as AFS or NFS
8. Authentication, Authorization and Accounting (AAA) services, for instance Kerberos and IPlogin

In the Windows environment the programme could be improved by adding to the existing programme the following:

1. Secure network traffic using IPSEC and certificates
2. Configuration of Network access
3. Monitoring of network access

Overall the course lacks sessions that teach how to use Network Monitoring Tools that are essential for network operation, troubleshooting, and maintenance. Such tools include the use of network traffic analyzer such as Ethereal, tcpdump, and MRTG tools etc. It could be the case that these tools are used but I could not find them in the slides that I have had access to them.

2. Quality

Overall the course has a very high quality from the theory point of view as also confirmed by former students. However a course in Network Management should be both practical and theoretic. In fact the practice is even more important than theory in the sense that the main objective is to teach students such that they have the ability to do things. Most of the sessions should be half theory and half practice. I suggest that DIAMN strive to have a balance of nearly 50/50 between practice and theory.

For that more and better equipment is needed in the laboratories. For that I suggest that the University should source resources that are required to equip the labs with computers that can run reliable both Windows and Unix operating systems, routers, switches and hubs, etc. With enough network interface cards, routers can be built using computers rather than resorting to expensive dedicated hardware routers such as Cisco routers.

3. Course Organisation Aspects

Coordination of the course

It is good to note that the course was taught by instructors coming not only from the University but also coming from the Industry. This has the advantage of bringing experts from the field that deals with network design, operation and management in a daily base. However looking to the slides of the course I could see that there was overlapping of the material that was covered by several instructors. I suppose this happened because of lack of coordination about the content of the course between the instructors. I suggest that for the next courses the instructors do meet for planning sessions where they will discuss the content they intend to cover in their lectures such that the time can be optimized and the participants will benefit more from the time of instructors.

Bibliography

Through communication with former participants to the course we were informed that the students had access to books from the university library during the course, but did not have books to take back home. In this regard I suggest that the cost of the books be included such that the students can take home not only the books, but also the materials that were used during the course. Some content could be packed in a CDROM or made available online for students.

Selection of participants

The students attending the course should be selected among those people who have some experience in computer networking. When a class has very different degree of previous experience it make a course less interesting for those who are already experienced or very challenging for those with less experience. We understand that is sometime difficult to do that assessment, however, more efforts should be done to select candidates that are as close as possible to the desired participants. Minimum experience of system administration would be from our point of view a requirement for admission to the course.

4. Value for Money

It is easy to gauge the value for money provided by this course, since most of the course materials would be usual provided in separate courses and not as part of one course module.

Also, part of the course is related to travel and accommodation expenses that would be different depending on the place where the course is organized. A course of this nature organized close to the place where the participants come from would be of course less expensive in regard to travel and accommodation costs. However, between organizing this course in Europe or North America the cost would be the same since the cost of travel would be about the same. The advantage of organizing this course in Sri-Lanka is the fact that the environment in the country of origin of the participants is the same as the one in Sri-lanka and that enables the lectures to be more closer to the options that are available as well as the problems that have to be faced in a developing country. In the other hand that builds capacity in Sri-Lanka and empowers the south-to-south cooperation.

5. Conclusion and Recommendations

Conclusions:

The course it does have the quality that is necessary for a course in design, installation, Administration and Maintenance of Network Systems. It could however be improved by bringing additional disciplines and making the course more practical than theoretical.

For that to happen additional financial support will be required in order to allow the University of Colombo to upgrade its computer laboratories and buy the books that will be given away to participants.

Organisation aspects need to be improved especially in regard to coordination between the instructors in the planning process of the material that each intends to cover.

Recommendations:

5. I strongly recommend that the course include a component with at least DNS, Mail Transport agent, Network File Service, web server application and Authentication and Authorization services.
6. I recommend that the course be more practical than theoretical.
7. I recommend the inclusion of Network troubleshooting sessions in which network traffic analyzers are used as tool to monitor and detect errors in the network. In particular I suggest that the use of tools such as MRTG and Ethereal be included in practical sessions.
8. Laboratories will need additional equipment in order to provide the required environment for practical sessions.

Appendix 6 – DIAMN participant profiles

Regional Training Programme in Design Installation Administration & Maintenance of Network Systems (August 04-September 12, 2003) PARTICIPANT INFORMATION

No:	Country	Name	Gender	Age	Workplace	Designation	Official Address
01.	Bangladesh	Mrs. Fahima Khanam	Female	32	BRAC University	Assistant System Manager	BRAC University, 66, Mohakhali C/A, Dhaka 1212, Bangladesh
02.	Bangladesh	Mr. A S M Khayrul Akther Chowdhury	Male	39	Shahjalal University of Science & Technology	Assistant Maintenance Engineer	Shahjalal University of Science & Technology , Sylhet , Bangladesh
03.	Bolivia	Mr. Edgar Octavio Ruiz	Male	29	University Mayor De San Andres	Network Manager	University Mayor De San Andres, Av. Villazon 1995 La Paz, Bolivia
04.	Ethiopia	Mr. Dawit Yismaw Alemu	Male	25	ADDIS ABABA University	Graduate Assistant	ADDIS ABABA University, Academic Personnel Office, P.O.Box 1176, Addis Ababa, Ethiopia
05.	Ethiopia	Mr. Abyot Asalefew Gizaw	Male	24	ADDIS ABABA University	Service Administrator	ADDIS ABABA University, Faculty of Technology, P.O.Box 1176, Addis Ababa, Ethiopia
06.	Lao P D R	Mr. Vixinh Mounksingh	Male	44	National University of Laos	Vice Director	National University of Laos, IT Centre, Dangdok Campus, Vientiane, Lao PDR
07.	Lao P D R	Mr. Thongsamouth Sounthavong	Male	43	National University of Laos	Not Mentioned	National University of Laos
08.	Mozambique	Mrs. Maria Agriana Germano MPomberah	Female	36	Universidade Eduardo Mondlane	Technician	Universidade Eduardo Mondlane, Centro de Informatica Av. Julius Nyerere campis Universitario 257 Maputo, Mozambique

09.	Mozambique	Mr. Joao Celso Rafael Zibia	Male	31	Universidade Eduardo Mondlane	Technician	Universidade Eduardo Mondlane, Centro de Informatica Av. Julius Nyerere campus Universitario 257 Maputo, Mozambique
10.	Rwanda	Mr. Karenzi Fidele	Male	29	National University of Rwanda	Network Technician	National University of Rwanda, Computing Centre
11.	Rwanda	Mr. Hakizimana Munyarugerero	Male	30	National University of Rwanda	Asst. Lecturer & Network Technician	National University of Rwanda, Computing Centre
12.	Tanzania	Mr. Joseph Elias Mbowe	Male	29	Dar Es Salaam Institute of Technology	Assistant Tutor	Dar Es Salaam Institute of Technology, P O Box: 2859, Tanzania
13.	Tanzania	Mr. Paul Fahamuel	Male	31	Dar Es Salaam Institute of Technology	Tutorial Assistant	Dar Es Salaam Institute of Technology, P O Box: 2859, Tanzania
14.	Uganda	Mr. Okwangale Fredrick Richard	Male	36	Makerere University	Assistant Lecturer	Makerere University, Institute of Computer Science, P O Box 7062, Kampala, Uganda
15.	Uganda	Miss. Dhaala Beatrice	Female	29	Makerere University	Technician	Makerere University, Directorate for ICT Support, P O Box 7062, Kampala, Uganda
16.	Vietnam	Mr. Bui Manh Tuong	Male	29	Hai Phong Institute of Oceanology	Not Mentioned	Hai Phong Institute of Oceanology, 246, Da Nang Street, Ngo Quyen district, Hai Phong City, Vietnam
17.	Vietnam	Mr. Nguyen Tuan Hai	Male	30	National Centre of Scientific & Technology Information	Staff of Computer Department	National Centre of Scientific & Technology Information, No: 24 Ly Thuong Kiet Street, Hanoi, Vietnam

LOCAL PARTICIPANTS

No:	Country	Name	Gender	Age	Designation	Workplace	Education Qualifications
01.	Sri Lanka	Mr. Janaka Prasad Lokugamage	Male	27	National Aquatic Resources Research & Development Agency (NARA), University of Jaffna	Research Assistant	National Aquatic Resources Research & Development Agency (NARA), Crow Island, Mattakkuliya, Colombo 15, Sri Lanka
02.	Sri Lanka	Mr. Sriskandarajah Shriparen	Male	28	University of Jaffna	Assistant Network Manager	University of Jaffna, Sri Lanka

Regional Training Programme in Design Installation Administration & Maintenance of Network Systems (November 3 – December 12, 2003) PARTICIPANT INFORMATION

No:	Country	Full Name	Gender	Age	Workplace	Designation	Official Address
1	Bangladesh	Mr. A S M Ariful Hasan	Male	23	BRAC University	Assistant System Administrator	BRAC University, 66, Mohakhali C/A, Dhaka 1212, Bangladesh
2	Bangladesh	Mrs. Iris Pervin	Female	33	BRAC University	Assistant System Engineer	BRAC University, 66, Mohakhali C/A, Dhaka 1212, Bangladesh
3	Bolivia	Mr. Roberto Zambrana	Male	32	Mayor De San Andres University	Technical Manager	Mayor De San Andres University, Capitan Ravelo# 2366, Casilla No: 14309, La Paz, Bolivia

4	Burkina Faso	Mr. Abdoul Karim Douani Diallo	Male	31	Universite Polytechnique de Bobo Dioulasso	Manager	Universite Polytechnique de Bobo Dioulasso / Ecole Supereure d'Informatique, 01 BP 1091 Bobo Dioulasso 01, Burkina Faso
5	Burkina Faso	Mr. Amadou Sanon	Male	41	Centre National de la Recherche Scientifique et Technologique (CNRST)	Scientific Research	Centre National de la Recherche Scientifique et Technologique (CNRST) BP 7192 Ouagadougou, Burkina Faso
6	Burkina Faso	Mr. Zacharie Koalaga	Male	41	University of Ouagadougou	Teacher	University of Ouagadougou 03 BP 7021 Ouagadougou, Burkina Faso
7	Ethiopia	Mr. Tadewos Beyene Belaineh	Male	25	Addis Ababa University	Assistant System Administrator	ADDIS ABABA University , P.O.Box 1176, Addis Ababa, Ethiopia
8	Lao PDR	Mr. Bandith Ramangkoun	Male	43	National Agriculture & Forestry Research Institute	Head / Information Service Unit	National Agriculture & Forestry Research Institute P O Box: 7174, Vientiane, Lao PDR
9	Lao PDR	Mr. Manoluck Bousihalath	Male	27	National Agriculture & Forestry Research Institute	*****	National Agriculture & Forestry Research Institute, Nongviankham (DangDok) Saythani District, P O Box: 811, Vientiane, Lao PDR

10.	Mozambique	Mr. Ricardo Mario Taca	Male	26	Centro de Informatica da Universidade Eduardo Mondlane	Webmaster / Com. Security Technician	Centro de Informatica da Universidade Eduardo Mondlane Campus Universitario, Maputo, Mozambique
11.	Rwanda	Mr. Bisanukuli Jean Francois Chantal	Male	34	National University of Rwanda	*****	Computing Centre, National University of Rwanda, P O Box: 117, Butare, Rwanda
12.	Tanzania	Mr. Samwel Mujinja Charles	Male	29	University of Dar Es Salaam	Technical Staff / Instructor	University of Dar Es Salaam, Computing Centre P O Box: 35062, Dar Es Salaam, Tanzania
13.	Tanzania	Mr. Aloyce William Rugalinda	Male	30	University of Dar Es Salaam	Network Engineer	University of Dar Es Salaam, Computing Centre P O Box: 35062, Dar Es Salaam, Tanzania
14.	Tanzania	Mr. James Methew Lwali	Male	26	University of Dar Es Salaam	Network Engineer	University of Dar Es Salaam, Computing Centre P O Box: 35062, Dar Es Salaam, Tanzania
15.	Uganda	Mrs. Florence Nameere Kivunike	Female	28	Makerere University	Web/ e-Mail Administrator	Directorate for ICT Support, Makerere University, P O Box 7062, Kampala, Uganda

LOCAL PARTICIPANT

No:	Country	Name	Gender	Age	Workplace	Designation	Official Address
01.	Sri Lanka	Mr. Amith Nishantha Illangantilaka	Male	32	University of Peradeniya	Technical Officer	University of Peradeniya, Dept. of Chemistry, Faculty of Science, Sri Lanka

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SWEDISH INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
SE-105 25 Stockholm, Sweden
Tel: +46 (0)8-698 50 00. Fax: +46 (0)8-20 88 64
E-mail: sida@sida.se. Homepage: <http://www.sida.se>