

THAILAND - CANADA HRD PROJECT
SUT-CUTC INSTITUTIONAL LINKAGE
AND TECHNICAL COOPERATION

QUARTERLY PROGRESS REPORT NO. 8

1 April 1996 - 31 July 1996

Submitted to :
Ryerson Polytechnic University
and
The ARA Consulting Group Inc.
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December

Prepared by

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I. REPORT SUMMARY

1. Program and Achievements to Date

Program 1. Institutional Capacity Building Program

Arrangements for study tour of the Director of the Center for International Affairs and of a Program Officer of the Center to examine the administration and management of the SUT-CUTC Project in Canada as well as of Centers for International Relations/ Affairs of the partner CUTC universities have been made for September 1996.

Two Canadian experts from University of Waterloo have finished their assignments to assist in the formulation of SUT's MIS program.

Program 2 - International Academic Programs

2.1 International Applied Science and Engineering Undergraduate Programs

Two Canadian professors have finished their assignments while a third one is currently teaching the IUP Mechanical Engineering students.

A Mini-PRC meeting participated by 2 representatives from CUTC was held in June to discuss the on-going and future activities and the allocation of the remaining project funds.

The transcripts of the remaining five 1995 IUP students in Mechanical Engineering Program were sent to CUTC universities for consideration of admission to start the second year in Canada.

The new batch of 13 IUP students are now taking intensive courses. Only the Electrical Engineering Program will be offered in September 1996.

2.2 Joint Research and Ph.D. Program

One SUT faculty member has enrolled at TUNS. A second student will start in September, and another four candidates are being considered for admission at TUNS and the University of Guelph.

At present, two post-doctoral research proposals are available for consideration and placement. It is expected that another two will be submitted.

2.3 Co-op Student Exchange Program

Two Thai students have been working at the University of Guelph since June 1996. Another two students will start their co-op work terms at TUNS in September 1996.

Four Canadian students from TUNS have been hired by Thai companies for four-month terms.

Program 3 - University - Industry Linkage Program

The first industry-based seminars on "Advances in Water Resources Management and Wastewater Treatment Technologies" and "Science Park : Meeting Technological Challenges of the 21st Century" were held in July 1996 at SUT with the cooperation of Ryerson International and TUNS and University of Guelph.

Program 4 - Project Management

4.1 Provision of Project Management and Administration in Thailand

Dr. Sam-arng Srinilta has become the PRSC chairman and Dr. Prasart Suebka the SUT-CUTC project manager.

4.3. Project Supervision and Coordination

A Mini PRC was held at SUT with Dr. Stalin Bector from RPU and Dr. Feridun Hamdullahpur from TUNS as the Canadian representatives.

2. Planned Activities

Program 2 - International Undergraduate Program

Assignment of CUTC professors will be needed for the IUP electrical engineering program beginning September 1996.

Professors from the University of Guelph will help the department of food technology develop its undergraduate and graduate programs.

A study visit of two SUT faculty members in electrical and mechanical engineering is being proposed at the University of Waterloo and TUNS to familiarize themselves in research facilities and projects.

Program 3 - University-Industry Linkage Program

Dr. Robert Eagle from TUNS will visit SUT for discussion on other industry-based workshops for which some of the remaining funds will be used.

Program 4 - Project Management

A PRC meeting is scheduled at the University of Waterloo in 26-27 September 1996.

II. PROGRESS REPORT ON PROJECT PROGRAMS, ACTIVITIES AND DELIVERABLES

1. Accomplishments

Program 1 - Institutional Capacity Building Program

1.2 Development of Academic Program and Curricula at SUT

A1.21 Provision of customized study tour in Canada for SUT faculty members and coordinators.

Ryerson International has arranged the study tour Program for September 1996 of Prof. Dr. Ruben C. Umaly Director of the Center for International Affairs and SUT CUTC Project Coordinator. (Attachment 1) The study tour would familiarize Dr. Umaly with the administration and management of the CUTC Project in Canada.. It would also allow him to discuss plans for the implementation of the remaining activities in the SUT-CUTC Project including its evaluation and planning of possible Phase II

1.3 Development of Institution Support Services at SUT

A1.31 Provision of customized training in Canada for SUT support personnel

Ryerson International has arranged the 4-week training course in September 1996 for Ms. Mantana Thammachoti, Program Officer of the Center for International Affairs (Attachment 2)

The training program is aimed at familiarizing Ms Mantana Thammachoti with the strategic and operational management of Centers for International Relations /Affairs of the partner CUTC universities.

A1.32 Provision of technical services to SUT by 2 Canadian consultants to develop SUT's Institutional support services and information systems (MIS).

Two Canadians experts from Computer Center, University of Waterloo, Mr. John Sellens and Mr. Roger Watt were assigned to the SUT's Computer Center from 2nd-7th and 2nd -14th June 1996, respectively to assist in the formulation of an MIS program

The reports made by the two Canadian experts are provided. (Attachment3)

Program 2 - International Academic Programs

2.1 International Applied Science and Engineering Undergraduate Programs

A2.11 Academic programs planning and coordinations.

During the period under review three Canadian professors were seconded for short- term at SUT to teach some courses under the International Undergraduate Program:

Name /Institute	Subject Taught	Duration
1. Prof. Frank Juranka Ryerson Polytechnic Univ.	- Electrical Engr I & Lab I	7 Feb. - 29 Apr
2. Prof. David MacKay TUNS	- Engineering Practice, Ethics Technical Communication - ESL 300	1 June - 19 July
3. Prof. Gerry Schneider Univ. of Waterloo	- Engineering Graphics I - Fundamental of Mechanical Engineering	17 July - 29 Aug.

Prof. Frank Juranka was not able to finish his term due to a tragic bus accident at Rajdamri Road, Bangkok where he was fatally hit by a bus. His remains were cremated in Wat Lak Si (Lak Si Buddhist Temple) after a necrological service arranged by SUT and the Canadian Embassy.

Dr. Stalin Bector of Ryerson Polytechnic University and Dr. Feridun Hamdullahpur of TUNS came to SUT during 11-13 June, 1996 for a mini PRC meeting with Dr. Sam-arng Srinilta, VR for Academic Affairs and Chair of PRSC, Dr. Prasart Suebka, VR for Planning and SUT-CUTC Project Manager, Dr. Ruben C. Umaly, Director of the Center for International Affairs and SUT-CUTC Project Coordinator as well with other SUT staff involved in the project.

An update of the on-going and future activities was made for improved operation and management of the project.

A2.12 Curriculum Implementation of the international applied science and engineering undergraduate programs.

a) Status of Second Year Students

Of the 11 students, 4 transferred to the SUT regular program, 1 has left the program, 1 re-applied for admission to the 1996 IUP batch. Thus, presently only 5 are most likely to be considered for admission as second year students in September..

Academic transcripts of the five students were provided to Dr. Hamdullahpur and to Dr. Schneider for consideration of admission to either University of Waterloo or Technical University of Nova Scotia.

Discussion on admission of the students to University of Waterloo was made with Dr. Schneider at SUT by Dr. Thawit Chitsomboon, IUP Mechanical Engineering Coordinator.

b) Status of New Students

As of May 1996, there were 54 applicants to the program : 21 for electrical engineering, 19 for mechanical engineering, and 14 for chemical engineering. (**Attachment 4**)

However, of the applicants only 23 took the English placement examination and at present 13 students are enrolled in Intensive English, 11 in Intensive Chemistry and 12 in Intensive Physics. Only Electrical Engineering Program will be offered in September for first year students.

2.2 Joint Research and Ph. D. Program

A2.21 Ph. D. Program

One Ph.D. student is presently enrolled at TUNS in the field of industrial engineering (since October 1996) and a second student will come to TUNS to study electrical engineering in September 1996.

Another three candidates have met with Dr. Hamdullahpur. Two of these (one in transportation engineering and one in telecommunication engineering) will enroll in Ph.D programs at TUNS by January 1997, the latest. The third candidate in chemical engineering is expected to start her Ph.D program at TUNS by September of this year. There is a fourth candidate in food science who is expected to apply and enroll at Guelph University by the end of this year.

A2.25 Post-Doctoral Program

Presently, two four- month research proposals have been submitted for consideration and placement at the CUTC partner universities. One is in biology and the other in transportation engineering. Another SUT faculty member has expressed his wish to apply for the SUT-CUTC post- doctoral research program but will delay submission of his research topic pending discussion with Dr. Gerry Schneider.

A fourth candidate in environmental engineering is expected to apply and start his research project at TUNS in September 1996, and may possibly stay for one year if the necessary additional budget can be allocated.

2.3 Co-op Student Exchange Program

A2.31 Provision of work placement and supervision for Thai students in Canada by CUTC institutions.

Since June 1996, two Thai students in food science, have been at Guelph University for their Co-op work terms. They intend to stay for 6 months instead of the usual 4-month period. Two students from mechanical engineering and electrical engineering each will be hired by TUNS in September 1996.

A2.32 Provision of work placement and supervision for 10 Canadian students in Thailand by SUT

Four Canadian Co-op students from TUNS are presently spending four months each of work in Thai industrial companies. One student may continue for another term.

Program 3 : University - Industry Linkage Program

3.2 Joint University-Industry Cooperation and Training Activities

A3.22 Provision of 4-6 industry based training seminars in Thailand for personnel from Thai industries and enterprises.

Ryerson International in cooperation with TUNS and University of Guelph has made arrangements for the participation of five Canadian experts in the first industry-based seminar at SUT during 22-25 July on "Advances in Water Resources Management and Wastewater Treatment Technologies". (Attachment 5)

Dr.E.(Ted) Rhodes President of TUNS was the keynote speaker in another industry based Colloquium "Science Park : Meeting Technological Challenges of the 21st Century" held on 26 July at SUT . (Attachment 6)

A3.31 Visit of CUTC Co-op program Coordinator to Thailand.

Ms. Anne Marie Coolen, the CUTC Co-op program coordinator from TUNS, visited Thailand during 14-30 June, 1996 to coordinate with Dr. Thawatchai the placement of Canadian students in Thailand. (Attachment 7)

Program 4 : Project Management

4.1 Provision of Project Management and Administration in Thailand.

In principle, the Vice Rector for Academic Affairs serves as the PRSC's chairman. Therefore, with the change in position of Dr. Prasart Suebka from Vice Rector for Academic Affairs to Vice Rector for Planning, and the assignment of Dr. Sam-arng Srinilta as VR for Academic Affairs. Dr. Sam-arng Srinilta is the present PRSC's chairman. Dr. Prasart Suebka is the Project Manager.

4.3 Project Supervision and Coordination

A4.31 Canadian Project Review sub-committee visits to Thailand.

Dr. Stalin Bector of Ryerson Polytechnic University and Dr. Feridun Hamdullahpur from TUNS visited SUT on June 11th-13th for a mini PRC meeting. The agenda and report are provided herewith . (Attachment 8)

2. PLANNED ACTIVITIES

Program 2 : International Academic Programs

A 2.11, A 2.12 : Curriculum Implementation of the IUP

Since the remaining IUP mechanical engineering students may transfer to CUTC partner universities for their second year of study, the proposed assignments of CUTC experts to teach second year mechanical engineering courses may be cancelled.

In 1996, the SUT- IUP will offer only an electrical engineering program which is to start in September. Currently, there are 13 students taking Intensive Courses in preparation for the IUP program. The following four assignments for CUTC professors will therefore be needed for 1996/1997:

Fundamental Electrical Engineering and Lab , Jan 97

Electric Circuits II and Lab II, May 97

Applied Science for Electrical Engineering, May 97

Engineering Practice, Ethics and Technical Communication, May97

ESL III, May 97

The remaining funds for CUTC expert assignments will be used to help SUT in the formulation, planning and development of graduate programs in engineering and applied science.

Dr. Goff and Dr. DeMann from the University of Guelph will visit SUT in September of 1997 to help the Institute of Agricultural Technology develop its undergraduate and graduate programs in food technology.

A.2.25 Postdoctoral Research Fellowships

SUT will forward the applicants' research proposals to RI. It is expected that at least 3 SUT faculty staff will commence their research in September, 96.

A 2.26 : Thai Ph. D. Visits

Two SUT faculty staff from electrical engineering and mechanical engineering are proposing a visit the CUTC partner universities in September, 96 to explore research facilities in the area of high voltage and energy or manufacturing.

A. 2.26, A. 2.27 : Collaboration and Co-supervision in Canada

Some of the funds remaining from these two activities may be used to support additional postdoctoral fellowships and additional industrial seminar activities.

Program 3 : University- Industry Linkage Program

A.3.22 Technical Service by Canadian Consultants to provide Training Seminars in Thailand

Dr. Robert Eagle from TUNS will visit SUT in October 1996 for discussions with the Director of Center for International Affairs and plan a workshop on other topics that will be identified after the survey. (e.g. agro-industry or industrial safety and health)

Program 4 : Project Management

A4.32 PRC Meeting in Canada

The third PRC meeting is scheduled to be held at the University of Waterloo, Canada during September 26-27, 1996.

III. Attachments

1. Invitation letter from RI for a study tour of Prof. Dr. Ruben C. Umaly.
2. Invitation letter from RI for a study tour Ms. Mantana Thammachoti.
3. Reports of the two Canadian experts in Computer Networks.
4. List of 1996 IUP applicants.
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8. Report of the Mini PRC Meeting

June 13, 1996

Dr. Ruben Umaly, Director
Centre for International Affairs,
Suranaree University of Technology
Tambon Suranaree
Muang District
Nakhon Rachasima 30000
Thailand

Dear Dr. Umaly:

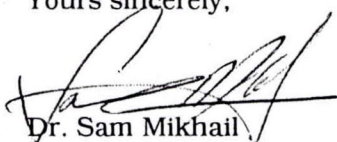
As part of the CIDA funded Thailand-HRD CUTC-SUT Institutional Linkage Project with Suranaree University of Technology, #906-14868, you are invited to Canada to participate in a 2-week Study Tour from September 16 to 27, 1996, involving visits to each of the participating university partner institutions and to attend the Project Review Committee (PRC) meeting at the University of Waterloo on September 26 and 27. The schedule is as follows:

September 16-17	Technical University of Nova Scotia
September 18-20	Ryerson Polytechnic University
September 23-24	University of Guelph
September 25-27	University of Waterloo (PRC 26-27)

The project will cover a full economy airline ticket, ground transportation in Canada as well as a weekly living allowance of \$300 per week to cover food, accommodation and incidentals. Ryerson International is responsible for purchasing your airline ticket, arranging for transportation and in making the necessary hotel reservations.

With this letter you can apply for the necessary visa documentation for your trip to Canada. We look forward to seeing you in September.

Yours sincerely,



Dr. Sam Mikhail
Director, RI
Project Director
Thailand-HRD CUTC-SUT

June 13, 1996

Ms. Manthana Thammachoti
Centre for International Affairs,
Suranaree University of Technology
Tambon Suranaree
Muang District
Nakhon Rachasima 30000
Thailand

Dear Ms. Manthana:

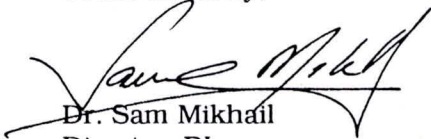
As part of the CIDA funded Thailand-HRD CUTC-SUT Institutional Linkage Project with Suranaree University of Technology, #906-14868, you are invited to Canada to participate in a 4-week Study Tour from September 3 to 27, 1996, involving visits to each of the participating university partner institutions and to attend the Project Review Committee (PRC) meeting at the University of Waterloo on September 26 and 27. The schedule is as follows:

September 3-6	University of Guelph
September 9-13	Ryerson Polytechnic University
September 16-20	Technical University of Nova Scotia
September 23-27	University of Waterloo (PRC 26-27)

The project will cover a full economy airline ticket, ground transportation in Canada as well as a weekly living allowance of \$300 per week to cover food, accommodation and incidentals. Ryerson International is responsible for purchasing your airline ticket, arranging for transportation and in making the necessary hotel reservations.

With this letter you can apply for the necessary visa documentation for your trip to Canada. We look forward to seeing you in September.

Yours sincerely,



Dr. Sam Mikhail
Director, RI
Project Director
Thailand-HRD CUTC-SUT

<http://www.apache.org>. This server is based on the NCSA server and claims to be a "drop-in" replacement for it. One nice feature that the Apache server has is the ability to leave the connection to the server open, and retrieve multiple documents or images without having to create a connection for each one.

If performance is a concern, I would recommend that SUT obtain and investigate the Apache server with the goal of replacing the current NCSA server.

DNS Name Service

We have noticed that many machines (primarily PC's) are not registered in the DNS name server database, even though they are using IP addresses. I believe that Roger Watt will address this along with some other DNS issues.

This morning (Thursday May 6) the network connection in Bangkok was not working, and there were problems resolving host names at SUT e.g. ccs could not resolve the name ccs.sut.ac.th. You should carefully review your DNS setup with an eye to being self-sufficient on campus, at least for the sut.ac.th domain, and to having redundant nameservers (i.e. a primary and at least one secondary). There are inconsistencies between the names of machines and the names recorded in the DNS database. For example, the machine known primarily as www.sut.ac.th thinks that its name is "sura", and there is confusion on the research machine about whether its name is "research" or "garfield".

Performance Tuning

Since the major UNIX servers are running SunOS and Solaris, I would recommend that SUT purchase a copy of the book *Sun Performance and Tuning* by Adrian Cockcroft, published by SunSoft Press through Prentice Hall, ISBN 0-13-149642-5. This book covers every possible performance and tuning question on Sun systems, and provides a lot of information on detecting and correcting problems. Adrian Cockcroft also writes a monthly column on performance issues in SunWorld Online, a net magazine, available at <http://www.sun.com/sunworldonline>. SunWorld Online also includes many other Sun-related articles.

Research Configuration Problems

It was brought to my attention that there are some configuration problems on the research machine. The most obvious problem is that there is confusion over the name of the machine – the machine itself believes that its name is "garfield", but it is registered in the DNS database as "research" and "garfield" is not listed as an alias. The machine also seems to be configured to use NIS+, but as it is a standalone machine, that just adds extra complexity and confusion – there seems to be inconsistencies between the passwd file and the information in the NIS+ database. I have noticed a few anomalies on the research machine (e.g. can't find the "vi" command), and with the confusion over NIS+ and naming, you may wish to re-install the operating system and rationalize the configuration at that point. You may wish to consider a "from scratch" installation in order to start fresh.

I would recommend that you purchase at least one copy of Sun's C compiler. The GNU C compiler (gcc) is very good, but there are a number of situations and software packages that require the Sun compiler in order to perform properly.

In order to optimize the performance of the research machine, I would recommend that you follow some of the tuning and monitoring suggestions in *Sun Performance and Tuning*. In particular, you should ensure that there is an appropriate amount of memory in order to run the larger jobs.

Future Directions and System Planning

I was asked to give some opinions on suitable ways to plan to expand the UNIX systems and services offered at SUT. As I understand it, there are currently only a small number of UNIX machines at SUT and within CCS. I believe that CCS has 3 Sun Sparc 10 and 20 systems, and 2 or 3 Linux machines. In addition, I understand that the Library is using a large HP system, and there is a DEC Alpha in an academic area.

At the University of Waterloo we currently have about 550 UNIX machines on campus, all provided with software distributed from a central server. We have spent a lot of time developing our software installation and distribution systems which enable us to deal with so many machines. As SUT is just getting started in UNIX services, I do not think that it will be practical for SUT to develop any sort of large scale software support mechanism. There is some software available on the Net to do some of the necessary software distribution and configuration, but I believe that it is still likely to be a difficult task for SUT at this time.

My recommendation is that it will be more appropriate for SUT to try to have fewer, larger UNIX systems than to have more, smaller machines. I would also recommend that SUT try to standardize on systems from one vendor, as multi-vendor system administration is much more complicated. Sun's current UltraSparc offerings are quite competitive, and offer a good range of capacities.

Examples of how this can be applied are as follows:

- Have one large, centralized database server, rather than multiple replicated servers.
- Have one student mail and UNIX server.

There are problems with this approach, however:

- Single point of failure – with only one database server, if it goes down, no database information will be available. With replicated databases, the information would still be available, but it may not be possible to modify the information in the database until all servers are up and running. This

potential impact of this kind of problem can be reduced by implementing some amount of redundancy and fault-tolerance in the database server itself. The most common example of this is disk striping and mirroring using RAID.

- Capacity limits and expansion. With a single server, you will likely hit the capacity limit of that server and will be unable to increase capacity without buying a substantially larger server (unless, of course, you buy a very large server to start with). If, on the other hand, you started with multiple servers, you would have already solved the (potentially substantial) problems associated with multiple servers, and adding another one should not be much of a problem.
- Purchase cost. Large UNIX machines tend to be more expensive per unit of computing power than smaller machines. By buying larger machines you would increase your acquisition costs, but decrease your human costs – the time to set it up. With multiple smaller machines, you save on the purchase price, but pay more to configure and administer the systems. At Universities in Canada, it is almost always worthwhile to spend more on the machines in order to save people time – the cost of a person's time tends to be much larger than the increased cost of a machine, especially at educational prices.

There are some situations and services in which it is appropriate to have separate machines:

- It is a good idea to separate student computing from administrative computing. This lessens the risk that students will gain unauthorized access to confidential information.
- It is a good idea to separate public services from private services – for example, the administrative web server should be a separate machine from the administrative database server.

Tracking System Changes

One very important aspect of UNIX system administration is keeping a record of the changes that have been made. There are several ways to do this, and I would recommend using a combination of all of them.

- Using a revision control system. A revision control system allows you to keep track of all the changes to a file or files, and allows you to view the differences between different versions of a file. There are two main revision control systems in use on UNIX systems. SCCS (Source Code Control System) comes with a number of UNIX systems. RCS (Revision Control System) is freely available software, and would usually have to be installed locally. At Waterloo, we make extensive use of RCS, recording changes to system configuration files, source code, and recording the changes that we have made to localize software that we have installed from the Net. RCS is available from the directory <ftp://prep.ai.mit.edu/pub/gnu> – I have temporarily installed RCS in `~john/rcs` on `ccs.sut.ac.th`.
- A log book and paper copies of important information are also important system administration tools. A log book is very handy because you can carry it around easily, to meetings or to other buildings, and it's always available, even when the machines are down. Paper copies of important information can be vital when repairing a system that is not running. Examples of things that should be available offline are copies of "df" output, the `/etc/fstab` and `/etc/vfstab` files, disk partition information from the "format" command, etc.
- Mailing lists are very useful in keeping people up to date on important changes. The most common type of mailing list is a system alias including all members of the system support group. This makes it easy to let everyone know about important changes or problems, as they occur. You may wish to have a mailing list for the users of a system, but such mailing lists can easily get too large to be useful.
- Local USENET newsgroups are very useful for recording changes. They are similar to mailing lists, but are less immediate and reach a (potentially) wider audience. This will be more difficult to implement at SUT since there is not currently a news system running on campus. A less convenient alternative that you may wish to consider would be to record changes and notices in a web page (or pages) and make the information available that way.

Training and Assistance for System Administrators

UNIX system administration can be a task requiring large amounts of knowledge and experience, and it is important for a beginning system administrator (or an experienced one) to have appropriate training and resources available to them if they are to be able to do an effective job.

Many of the References and Resources listed below will be helpful in providing training and assistance for the SUT UNIX system administration staff. Sun offers various Sun-specific training courses, and if Sun offers some of these courses in Bangkok, it might be worthwhile for SUT staff to attend. USENIX is one of the best opportunities for system administration training and publications – I have included information about USENIX below.

The USENET newsgroups are a wonderful resource for system administrators – it's possible to get an answer to almost any question, and often within just a few hours. And reading a few newsgroups is a wonderful way to learn more about systems, through reading about other people's experiences. SUT should determine whether it's possible to read news from a server in Bangkok – this will be much easier than trying to arrange and maintain a local news server at SUT (in the short term at least).

PC Networking and Integration

We believe that it is important for PC and UNIX systems to be integrated with each other. At

Waterloo, we are addressing this issue in the following ways:

- All PC networking will be based on the Microsoft protocols for file and print sharing, using TCP/IP as the transport protocol. We believe that NetBEUI is unsuited to networks larger than a few machines.
- We are using the freely available Samba software to allow our UNIX machines to talk Microsoft protocols, and so participate in file and print service. At SUT, this would allow the use of PC printers from UNIX machines, and would allow file service between PC's and UNIX machines.
- When a PC-based file server is appropriate, we are standardizing on Windows NT servers. The NT servers can be TCP/IP based, support lpr-based print service, and work with no additional software required on the PC's.

I would recommend that SUT investigate the Samba software to aid in integrating its PC and UNIX systems. I have included a reference to Samba below. I will attempt to put together a small experiment with Samba while I am at SUT.

Useful Software and Tools

There are many freely available tools and software packages that are useful for UNIX and network administration. I will mention a few here, and will make references to these programs available to you.

- Perl is a very useful language that is a cross between C, awk, sed, and the shells, that provides easy prototyping and is very powerful. Many system administration tools are written in Perl
- TCP wrapper is a program that helps control and log access to network services. It is useful for implementing certain security rules, and may be useful on those machines that you wish to control a little more tightly.
- rdist is a command that is used to ensure that files are consistent across sets of machines. It can be used to distribute software packages to different machines, or to ensure that configuration files (/etc/resolv.conf for example) are consistent across multiple machines. rdist is included with most UNIX systems. There is a newer version available with more features, but the stock rdist is likely sufficient for SUT's immediate needs.
- The CMU bootp server software with DHCP modifications will allow SUT to automatically configure PC networking parameters. I believe that Roger Watt will discuss this in more detail.
- The CMU SNMP tools are very useful for network monitoring, and I believe that Roger will also cover the use of tools like this.

Miscellaneous

Many documents from the internet come only in Postscript form, and it will be useful for SUT staff to be able to print Postscript documents. I was unable to identify a Postscript capable printer. There are 2 basic approaches that you can take:

- Buy a new Postscript printer, or upgrade an existing printer to add Postscript. In particular, it may be possible to add Postscript to the HP5si printer that you already have in the main office area (thereby converting it to an HP5si MX).
- Install the ghostscript software (available I believe from the GNU software archive) which is a Postscript interpreter and can, among other things, convert Postscript to HP's PCL.

The first option (a Postscript capable printer) will be the most reliable and convenient.

References and Resources

The following references may be useful

- UNIX System Administration by Nemeth et al
- O'Reilly Associates publishes a large number of books related to UNIX systems, and most of them are quite good. The books tend to be practical guides that can be put to use immediately. The O'Reilly catalog is available at <http://www.ora.com>.
- The newsgroups comp.unix.admin, comp.unix.sun, comp.unix.solaris (I think those are the groups I find most useful – I have to check the names).
- The USENIX Association home page <http://www.usenix.org> contains a lot of information about conferences, publications, and references to papers. You may wish to join USENIX, which will provide you with a subscription to the bi-monthly newsletter "login:" which contains a lot of information and tips for UNIX system administrators.
- USENIX also holds a number of conferences during the year, the most useful of which would likely be the LISA System Administration conference. The 1996 conference will be held in Chicago, USA in September, and will include a number of tutorials that SUT staff may find very useful. If SUT is unable to send someone to the conference, it would probably be worthwhile to obtain a copy of the conference proceedings, which will likely contain a number of papers that will be of use to SUT staff. More information about the conferences is available through <http://www.usenix.org>.
- The "UNIX Guru Universe" web site, containing links to lots of things that are useful to the UNIX system administrator, is at <http://www.polaris.net/ugu>.
- The GNU software archive at <ftp://prep.ai.mit.edu/pub/gnu> which includes things like gcc, rcs, and so on. The GNU project creates a large amount of software for UNIX systems, most of it quite good. Some of it is replacements for stock UNIX software, and some is useful additions. One of the most well-known is the GNU emacs editor, which can be very highly customized into an complete working environment – it may, however, be best left to the "experts".
- I made a presentation at the 26th Ontario Universities Computing Conference in late May, identifying some of the things that we are doing at Waterloo to make our administrative networks

Date: Friday June 14, 1996

From: Roger Watt
Associate Director, Distributed Computing
University of Waterloo

To: Dr. Weerapong Pairsuwan
Director, Centre for Computer Services
Suranaree University of Technology

Subject: Recommendations

Questions about issues in this report should be sent by email to
rwwatt@uwaterloo.ca

PART ONE IMMEDIATE-TERM CONSIDERATIONS

1.1 Administration of the IP Address Space

A strict administrative record-keeping "standard operating procedure" must be imposed on the IP address space, using SUT's Domain Name System database as the official record of the network. There are currently only a few dozen computers registered in the DNS database. There are no DNS records for the additional machines that have been assigned (or are using, without CCS authority?) an IP address, and this condition will lead to disaster.

The standard operating procedure should be that a device must not be connected to a cabling system until that device has been assigned a "host" name and an IP address by CCS personnel, and the name and address have been entered into the DNS database, and that they are now visible via mechanisms such as the "nslookup" command. For a device with multiple IP interfaces, such as a router, every IP address assigned to the device should be registered in the DNS. Also, every IP subnet should be assigned a name and be registered in the DNS database.

A naming scheme should be devised for the network-equipment IP devices (routers, network-management modules in the Ethernet/UTP repeaters), plus the network and its subnets. The name of each device and each subnet should reflect what it is and where it is or what it services (for example, by using building and floor codes). For example,

203.158.4.16	= net-campus.sut.ac.th
203.158.4.19	= router-W.sut.ac.th
	(same for its other interfaces)
203.158.5.32	= net-W-1a.sut.ac.th
203.158.5.64	= net-W-1b.sut.ac.th
...	

The DNS "HINFO" and "TXT" record types can be used to publish additional information about the DNS entry. HINFO's purpose is to record information about hardware and software. TXT's purpose is to record arbitrary comments; multiple TXT records per device could be used to record date-last-modified and who-to-contact information.

Also, the IP-topology map for the campus must up to date at all times.

Planning For and Making Changes

Any change to the IP network requires a change to the corresponding DNS entry or entries (such as the name or address of a device). Any such change must be planned far enough in advance of the default TTL (time to live) value such that the TTL value for the device can be set to a lower value (from days to hours, and then from hours to minutes) before the change, so that the rest of the world will detect the change in a timely fashion.

Also, making a change must involve updating the map as well as the DNS.

1.3 Network Connectivity and Utilization Monitoring

A program that provides real-time information about the current state of the network is required. It must have more features than the PC-based "WS-watch" currently in use. The program must have an "auto discovery" mode that uses SNMP to determine the topology of the network, rather than depending on information provided by a human. The program must also show current traffic levels on the links between the devices that it has discovered, and provide a mechanism for logging such data to an external file for post-processing analysis and reporting.

There are two approaches to such a program. The "complexity" approach involves a large "industrial strength" network monitoring program such as Cabletron's "Spectrum", HP's "OpenView", or Bay's "Optivity" (which I understand SUT has but is not currently using). Such programs provide a vast range of features, but they do so at the considerable expense of requiring CCS Unix-support staff to learn, install, configure, and use. The "simplicity" approach involves a program such as "InterMapper" from Dartmouth College in the US. InterMapper runs on an Apple Macintosh. We use it at the University of Waterloo to monitor the campus network, and I recommend it most highly; it is available from <http://www.dartmouth.edu>, and installs over the Internet. It is currently free, but will soon cost several hundred US dollars (for an academic institution). It is almost immediately "obvious" as to how to use it. There is also a PC program called "SNMPc" that is somewhat similar, but it does not have all of the same features as InterMapper, but it is much less complex than Optivity. (URL <http://crc.castlerock.com>)

1.4 Network Utilization Data Collection and Reporting

Some basic information about the loading of the critical components of the IP network must be maintained so that projections can be made that will identify "future requirements" long before they become "current problems". There are three traffic loads that must be measured ... response across the external connection, traffic through the backbone router ports, and traffic within each cabling system.

Response across the external connection can be measured by a PERL program that issues a "ping" command to transmit ten 1024-byte packets and then record the transit times (min, average, max) and percent packet loss. This task can be run by "cron" from one of the backbone-connected Unix systems, automated by a control program that collects the data at intervals throughout the day, reduces the interval records to a single daily-averages record at the end of the day, reduces the daily-averages records to a single monthly-averages record at the end of the month, keeps the most recent 24 monthly-averages records, and performs linear and exponential projections for the next 12 months. I have copied software to

do this from UWaterloo and modified for SUT, as a model for the "interval, day, month" process, in research:/user/roger/software/linkspeed. It is currently running under control of a crontab entry.

Traffic though the backbone router ports can be collected, reduced, and reported using the same "interval, day, month, projection" methodology, again from a backbone-connected Unix machine. In this case, the interval program will need to invoke a program that can issue SNMP "GET" requests to each of the routers. I have copied software to do this from UWaterloo and modified it for SUT, in research:/user/roger/software/routerwalk. However, it requires "snmpwalk" software from Carnegie-Mellon University (available via FTP from cmu.edu) that does the SNMP communication.

Collecting data on the traffic within the cabling system that services an IP subnet requires the continuous presence of an "agent" device that supports the SNMP "RMON" MIB. Such devices are expensive (several thousand dollars US, each). However, the network-management module of the Bay Networks "SynOptics 2813SA" Ethernet/UTP hub contains a Data Collection Module (DCM) that implements all nine groups of the RMON specification.

The daily and monthly reports from all three types of collection should be published in a "campus networks" section of the SUT webspace so that all interested parties within the university can stay abreast of the "health" of the network.

1.5 Labelling of all Cabling Runs

Every fibre and UTP connection should have a label on the cabling that identifies the device it connects to and the device at the other end of the connection. Otherwise, if two connections are unplugged at the same time (for maintenance work), it is too easy to make a mistake and plug the wrong cable into the wrong port when reconnecting them.

PART TWO SHORT-TERM CONSIDERATIONS

2.1 Dynamic IP Configuration of Computing Systems

Every IP-connected computing system that COULD be configured to obtain its IP-configuration information (hostname, IP address, subnet mask, address of default route, etc) from a central network server SHOULD be configured to do so, rather than hardcoding that information in the computing system, so that making a change does not require that a person go to the machine.

Today, the means for doing this is a central "bootp" server. This requires a CCS Unix-support person to install and maintain the "bootp" server, and enter and maintain the data for each computing system, but the resulting simplicity will provide long-term payoff.

The industry is currently in the process of developing a much more functional mechanism, based on the "Dynamic Host Configuration Protocol" (DHCP). Some Unix-based DHCP server software exists, and vendors (such as Microsoft) are in the process of developing industrial-strength DHCP servers. Today's DHCP servers do not yet integrate adequately with the DNS, and I would advise a "wait and watch" approach for perhaps the next six to nine months before any acquisition. However, something should be done before the environment gets much bigger.

2.2 Connection to the Student Residences

The current 28.8Kbps modem link to the computers in the Student Residences is not sufficient to support any significant use. If a fibre link to the Ethernet cabling system within the Residences is not justifiable, then perhaps it will be possible to consider a spread-spectrum radio (SSR) link. This involves a matched pair of "remote Ethernet bridge" devices that communicate over a line-of-sight low-power low-frequency radio link, with a mast and antenna on the building at each end of the link. Several vendors make such equipment in CA and US. The product with which I am familiar is the ARLAN 640, made in Canada, which operates at 2Mbps, and costs CA\$7000 for the pair. (Sorapat has the URL for further information.)

2.3 External Connection

The external 64Kbps connections from SUT to Bangkok and beyond via satellite introduces packet-latency delays that make effective real-time interaction unworkable, and I strongly recommend you replace them with a single higher-speed land-based line to Bangkok as soon as funds permit.

From examining the documentation for release 8 of the Wellfleet router software, I found Wellfleet's solution to the "alternate default routes" problem. It requires a two-step "traffic filter" on the router that has the two satellite links. The router must examine every packet that arrives from the FDDI ring, first to ensure that traffic destined for local interfaces is delivered there, and second to decide which of the remaining (ie, off-campus) traffic is to try which of the two satellite links as its first choice. In testing, we discovered two problems that I believe are "bugs" in Wellfleet's code.

The version of software currently running in the routers is almost two years old, and should be upgraded to Wellfleet's current version as soon as possible. Bay Networks has most certainly found and fixed numerous bugs in the last two years; the problem we encountered may be among them. The Bay Networks representative in Bangkok is pursuing the matter with central technical-support personnel at this time.

2.4 Cabling-System Security in Student Areas

A number of vendors make a version of Ethernet/UTP repeater (hub) in which a port can be configured to talk only to a specific Ethernet address, and also not to send an Ethernet frame out a port other than the one to which the destination device is connected without first destroying the data portion of that frame. This creates an environment in which it is possible for students to attempt to install "sniffer" software on a connected PC, or to disconnect the PC and connect a machine of their own.

At UWaterloo, we no longer install hubs without these features. We have tried several vendors' products and are currently using hubs from ATI for this purpose, because SynOptics did not have them at the time we needed them. I do not know if SynOptics now has such hubs.

2.5 Campus Newsgroups

The "network newsgroups" features now common in web-browser software such as Netscape provide an excellent opportunity to establish a central NNTP network-newsgroups server for use within SUT (it is not necessary

Initially to obtain an external newsgroup to do this; that can come later). For example, a set of "th.ac.sut.*" newsgroups would provide a mechanism for SUT students, faculty, and staff to voice concerns and discuss issues in a campus-wide open electronic forum.

Doing this will require obtaining and installing news-server software on one of the central Unix machines. The software currently in use at most places for this is called "INN" (Internet Network News). I did not have time to track down a reference, but will do so when I return to UWaterloo.

PART THREE LONGER-TERM CONSIDERATIONS

3.1 Transmission Layer

The design of the transmission system that supports SUT's two-level campus IP network is excellent.

The level-one IP network is serviced by an FDDI-transmission fibre cabling system between buildings that contains the "building point-of-presence" IP routers plus the critical network-server computing systems. Each level-two IP network is serviced by an Ethernet-transmission Category 5 UTP cabling system that connects office/lab computers back to the workgroup's "floor point-of-presence" wiring centre containing an Ethernet/UTP repeater that is connected by fibre back to the building's router.

The use of fibre and Category 5 UTP in this tiered and modular design enables future expansion as necessary. As the distributed-computing environment grows, a workgroup can acquire its own server(s) so that it is no longer dependent on central servers, and if transmission-loading conditions within the workgroup become too severe for shared 10Mbps Ethernet, the workgroup's Ethernet/UTP repeater can be replaced by a 10Mbps/100Mbps Ethernet switch. If transmission-loading conditions between a workgroup and the building router become too severe for 10Mbps Ethernet, that link can be upgraded to 100Mbps Ethernet. Similarly, if and when warranted, the Ethernet/FastEthernet transmission systems and the core FDDI transmission system can be upgraded to ATM (or, hopefully by then, Gigabit Ethernet will be a commercial reality and the complexities of ATM can be avoided).

I did not have time to determine whether Bay Networks has a FastEthernet interface for the models of Wellfleet routers that SUT is currently using.

3.2 Network Layer

The complexities of multiple aggregated Class-C network numbers and the related problems that the Internet is encountering with the growing size of routing tables could eventually lead to disaster for SUT. To date, the only possible solution to this appears to be the emerging field of "Network Address Translation" devices that would permit SUT to exist behind such a device in a private Class-B (or even Class-A) address space as set forth in RFC1597, "Address Assignment for Private Networks". Until such devices become a commercial "commodity", it will be some time before this becomes a move that SUT can consider.

3.3 A "Proxy Caching" Web Server for the Campus



The Association of Universities of Asia and the Pacific

Secretariat : c/o The Center for International Affairs

Suranaree University of Technology

111 University Avenue, Suranaree Sub-district, Muang

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mento Ferreira
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Dao, President, Viet-
nam National Univ.
Hanoi, Vietnam

"Some web-server software provides the ability to perform "proxy" and "caching" services for the web-browser clients. In this manner, the client's request to retrieve a document is sent to the proxy/caching server rather than the destination server. If the proxy/caching server does not currently have that document in its cache, it fetches it from the destination server, stores it in the cache, and then delivers it to the requesting client. Under certain circumstances, this can save considerably on the off-campus traffic consumption cause by web-space browsers.

NCSA's server, which SUT is currently using, does not provide this. However, both Netscape and Microsoft have commercial-strength server software that does this.

PART FOUR PROFESSIONAL DEVELOPMENT

There are a number of reference-materials sources that will be of significant benefit to the CCS staff involved in support of the campus network. (Some of these may already be in use.)

- books, such as:
O'Reilly Associates has many great books (<http://www.ora.com>)
- trade magazines, such as:
Network Computing (<http://www.cmp.com>)
Communications Week (<http://www.cmp.com>)
- network newsgroups, such as:
comp.dcom.sys.wellfleet
comp.dcom.net-management
comp.security.firewalls

The network newsgroups are invaluable ... they provide the ability to post a question or a request for advice that will be seen and responded to by experienced people throughout the world in less than 24 hours, and to learn from questions/responses on related topics. Unfortunately, one also gets responses from people who do not know what they are talking about, so it is always wise to wait and see if someone's response is rapidly criticized by other readers of the newsgroup, before taking action. I used this ability, from UW, several times this week in pursuit of the Wellfleet traffic-filter routing problem. CCS should attempt to obtain permission from the Internet Service Provider in Bangkok for CCS staff to use its NNTP newsfeeding machine (if it has one) as a remote newsreading/newsposting server, until such time as it is appropriate to obtain an actual newsfeed for SUT and begin importing some of the newsgroup structures.

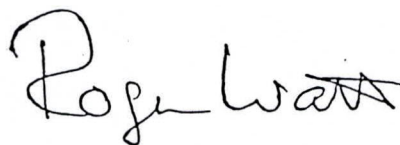
- conferences sponsored by "user group" associations and by vendors
- (?) working groups of support staffs from the universities throughout Thailand, who meet regularly to discuss common problems and solutions

In closing, I wish to thank you VERY MUCH for inviting me to SUT for these past two weeks. It has been a fascinating experience, and I have enjoyed working with Sorapat and Prapat and Krit; you have every reason to be

proud of them.

Please, whenever there are questions or issues on which you would like comment from me, whether in the immediate future or beyond, I would welcome email from you and/or your staff.

Sincerely,

A handwritten signature in cursive script, reading "Roger Watt". The signature is written in dark ink on a white background.

1996 SUT-IUP APPLICANTS

No.	NAME	Intensive Course	
1.	Ms. Sunisa Sandhu	Chemistry	—
2.	Ms. Piyapa Wongla	—	—
3.	Mr. Mehedi Munsur Khan (Bangladesh)	Chemistry	Physics
4.	Ms. Patcharaporn Pongjaratphan	Chemistry	Physics
5.	Ms. Noppawan Motong	—	—
6.	Mr. Tanyawat Sanpote	—	—
7.	Ms. Ratchaporn Wisedrat	—	Physics
8.	Ms. Komchai Thaiying	—	Physics
9.	Mr. Arwut Arunsit	Chemistry	Physics
10.	Ms. Thanida Pinsiri	—	Physics
11.	Mr. Gal Smanmoo	Chemistry	Physics
12.	Mr. Patchara Piloug	—	—
13.	Ms. Yada Sawangkokkhkhrud	Chemistry	Physics
14.	Ms. Duan Intarakumhaeng	—	Physics
15.	Mr. Tharapong Singto	Chemistry	Physics
16.	Mr. Jackapong Khamraksa	—	Physics
17.	Mr. Sathit Wajceprasac	—	Physics
18.	Ms. Wajee Teswanich	—	—
19.	Ms. Sudaporn Locket	—	Physics
20.	Ms. Pitanan Datsawana	—	Physics
21.	Mr. Prapoosak Talerngsri	—	Physics
22.	Mr. Jesada Sinsiripong	—	—
23.	Ms. Kantima Dara-in	—	—
24.	Ms. Al-U-Ma Virikun	—	—
25.	Mr. Tawan Gunatilaka	Chemistry	Physics
26.	Ms. Sirinapa Yuangyai	—	Physics
27.	Ms. Supichaya Kitrunroj	Chemistry	Physics

28.	Ms. Napan Kitpanit	—	Physics
29.	Mr. Nawanon Kochawat	Chemistry	Physics
30.	Ms. Thawadee Leelatjaroen	Chemistry	Physics
31.	Mr. Tanawit Nirundorn	Chemistry	Physics
32.	Mr. Karuna Thanapongsothorn	—	—
33.	Mr. Ronnachai Triratanaprapuntha	Chemistry	—
34.	Ms. Kawintra Chongsuksantikul	—	—
35.	Mr. Aunnop Hongthong	—	—
36.	Mr. Kavee Stithongkul	—	—
37.	Mr. Krisada Paldool	—	Physics
38.	Ms. Wanitchaya Wongwattana	—	Physics
39.	Ms. Euai Chantarasombat	Chemistry	Physics
40.	Ms. Natawan Wannatrong	Chemistry	Physics
41.	Ms. Pilaiwan Rasanon	—	—
42.	Mr. Pawee Lorsuwannarat	Chemistry	Physics
43.	Mr. Avirut Kat Kaew	Chemistry	Physics
44.	Mr. Peetaya Raksaboldej	Chemistry	Physics
45.	Mr. Weerasak Pattarasiripanya	—	Physics
46.	Mr. Sudkhet Satthamnuwong	Chemistry	—
47.	Mr. Panit Prinyanusorn	—	Physics
48.	Ms. Kritsadaporn Komkong	Chemistry	Physics
49.	Mr. Surayut Pinyomit	Chemistry	Physics
50.	Mr. Damrong Sudta	—	—
51.	Mr. Suwatchai Phasuk	Chemistry	Physics
52.	Mr. Nuttawit Konjing	Chemistry	Physics
53.	Mr. Namruthep Cherdchai	Chemistry	Physics
54.	Mr. Prin Sae-Hor	Chemistry	Physics



Sixth Anniversary
Suranaree University of Technology
(SUT)

International Seminar Workshop

*" Advances in Water Resources
Management
and
Wastewater Treatment Technologies "*

Surasammanakhan Hall
Suranaree University of Technology
Nakhon Ratchasima, Thailand

22-25 July 1996



INTERNATIONAL SEMINAR WORKSHOP ON ADVANCES IN WATER RESOURCES MANAGEMENT AND WASTEWATER TREATMENT TECHNOLOGIES

22 -25 JULY, 1996

PROGRAM

22 July Monday

0830 - 0930 REGISTRATION

0930 -1000 OPENING CEREMONY

Welcome Remarks :
Prof. Dr. Wichit Srisa-an,
Rector, Suranaree University of Technology
Address :
H.E. Mr. Boonchoo Treethong,
Minister of University Affairs

1000 -1045 COFFEE BREAK

1045 -1200 KEYNOTE PAPER PRESENTATION

*Advances in Water Resources Management and
Wastewater Treatment Technologies*
by Mr. Pramote Maiklad,
Inspector General, Ministry of Agriculture and Cooperatives

Chair: Assoc. Prof. Dr. Sam-ang Srimita
Rapporteur:
Prof. Dr. Ruben C. Umaly

1200 - 1330 LUNCH BREAK

1330 - 1500 PLENARY SESSION I: INVITED PAPERS ON
WATER RESOURCES MANAGEMENT

Canada Experience
by Dr. Bruce Mitchell, Technical University of Nova Scotia
Thailand Experience
by Prof. Dr. Kasem Jankaew,
Faculty of Forestry, Kasetsart University

Chair: Mr. Manu Omsakunt
Rapporteur:
Assoc. Prof. Dr. Chaiyot Tanguthikulchai

1500 - 1530 COFFEE BREAK

1530 - 1700 PLENARY SESSION II: INVITED PAPERS ON
WATER USE AND DEVELOPMENT

Water Use and Development - Canada Experience
by Ms. Catriona Moir, Technical University of Nova Scotia
*Urban Development Impact on Water
and Wastewater Treatment Needs*
by Mr. Bichit Rattakul,
Governor, Bangkok Metropolitan Authority
Water Use / Development Policies and Regulations
by Ms. Chuanpit Dhamasiri,
Governor, Metropolitan Waterworks Authority,

Chair: Asst. Prof. Dr. Tavee Lertpanyavit
Rapporteur:
Asst. Prof. Dr. Sarawut Sujitjorn

1800 DINNER RECEPTION

23 July Tuesday

**0830 - 1000 PLENARY SESSION III: INVITED PAPERS
ON ENVIRONMENTAL IMPACT AUDITING**

***Environmental Impact Auditing Techniques:
Thailand Experience***

by Ms. Nipaporn Watcharasin,
Office of Environmental Policy and Planning

Quality Assurance and Environmental Auditing:

by Dr. John K. Underwood,
Technical University of Nova Scotia

Minimizing Environmental Impact

by Dr. William Hart, Technical University of Nova Scotia

Chair: Prof. Dr. Ronald Goforth

Rapporteur:

Assoc. Prof. Dr. Amnat Apichatvullop

1000 - 1030 COFFEE BREAK

**1030 - 1200 PLENARY SESSION IV: INVITED PAPERS ON
WASTEWATER TREATMENT TECHNOLOGIES**

Wastewater Treatment Technologies:

Thailand Experience

by Dr. Chongrak Polprasert,
Asian Institute of Technology

Advances in Wastewater Treatment Technologies:

Canada Experience

by Dr. Michel Khalil, University of Quebec at Rimouski

Chair: Prof. Dr. Ruben C. Umaly

Rapporteur:

Assoc. Prof. Dr. Vorapot Khompis

1200 - 1330 LUNCH BREAK

**1330 - 1500 PLENARY SESSION V: INVITED PAPERS ON USE
OF COMPUTER TOOLS FOR WATER MANAGEMENT**

Computer Tools for Water Management

by Dr. David Swayne, Department of Computing and
Information Science, University of Guelph

***Impact of Eutrophication and Other Degradation Processes
on Water Quality of Tropical Ecosystems***

by Dr. Jacques Moreau,
Institut National Polytechnique de Toulouse

Chair: Dr. Angelina Galang

Rapporteur:

Dr. Nathawut Thanee

1500 - 1530 COFFEE BREAK

**1530 - 1730 PLENARY SESSION VI: CONTRIBUTED PAPERS ON
WATER RESOURCES MANAGEMENT**

***Watershed Classification: Macro Land Use Planning for
Sustainable Development of Water Resources***

by Assoc. Prof. Nipon Tangtham,
Faculty of Forestry, Kasetsart University

***Impact of Various Land Uses on Water Quality at
Mae Klong Head Watershed Area, Kanchanaburi***

by Dr. Songtam Suksawang,
Royal Forestry Department
Kok River Diversion Schemes

by Dr. Chaitawat Saowapon,
Faculty of Engineering, Chiangmai University

Chair: Dr. David Swayne

Rapporteur:

Dr. Chongchin Polprasert

1900 DINNER

24 July Wednesday FIELD TRIP

0730 ASSEMBLY AND DEPARTURE
0830 - 0930 JIM THOMPSON'S SILK FACTORY
1100 - 1400 LAM TAKONG RESERVOIR
 LUNCH AT THE RESERVOIR
1430 - 1530 SEAGATE WASTE TREATMENT PLANT
1600 - 1700 DAN KWIAN CERAMICS
1730 - 1830 THAI HI-TECH HOUSE, SUT
1900 DINNER

25 July Thursday

**0830 - 1000 PLENARY SESSION VII: CONTRIBUTED PAPERS ON
WATER QUALITY ASSESSMENT**

***Application of Anthropological Assessment in Water
Resources Management***

by Luisa Umaly and Lucas Fernan,
Anthropological Association of the Philippines
Institute of Biology, University of The Philippines
Water Quality of Malabon River

by Dr. Annabelle Herrera,
Institute of Biology, University of the Philippines
***Wastewater in Navotas-Malabon River: Its Impact
on Milkfish (Chanos chanos)***

by Dr. Edna Amparado,
Institute of Biology, University of the Philippines

Chair : Dr. Jacques Moreau
Rapporteur :
Dr. Noppadol Kongritharoen

1000 - 1030 COFFEE BREAK

**1030 - 1200 PLENARY SESSION VIII: CONTRIBUTED PAPERS
ON WASTEWATER TREATMENT**

Wastewater Treatment in Huaxi

Mr. Zhang Chao,
Department of Chemistry, Guizhou University
Removal of Ca, Cr, Ni, Zn Ions by Amidoximated Cellulose

by Asst. Prof. Winai Somboon,
KMIT Thonburi

***The Treatment of the Scalp Industrial Wastewater Using Its
Solid Waste by Trickling Filter Method***

by Mrs. Endang Srirahayu,
Polytechnic ITB, Ciwaruga, Bandung, Indonesia

Possibility of Narrow-leaved Cattail for Wastewater Treatment

by Ms. Supaporn Junrungreang, et al.
Land Development Department

Chair : Dr. Michel Khalil
Rapporteur :
Dr. Narong Akkarapattananagorn

1200 CLOSING REMARKS
Prof. Dr. Wichit Srisa-an,
Rector, Suranaree University of Technology

1230 CLOSING LUNCH



RATIONAL



In pursuance of the mission of Suranaree University of Technology (SUT) of providing academic services to the public and various units, both government and private, the Center for International Affairs (CIA) is launching its series of International Seminars, Conferences and Workshops aimed to provide continuing education opportunities to the general public, specially the engineers, scientists, entrepreneurs, and managers.

With the collaboration of the Canadian Universities of Technology Consortium (CUTC), specially the Technical University of Nova Scotia, and partial financial assistance of the Canadian International Development Agency (CIDA), SUT is organizing an international seminar - workshop on **"Advances in Water Resources Management and Wastewater Treatment Technologies"** on 22-25 July 1996.

Freshwater, either as surface or ground water, is a vital renewable community resource that is limited in amount and is subject to conflicting and ever increasing demand. An equitable distribution for domestic, industrial, agricultural and recreational uses is not always easy to attain.

Proper water resources management which involves both quality and quantity assurance is a complex and enormous task requiring integrated activities of many sectors of the community and various government agencies. It involves different activities from provision of high quality potable water supply for domestic consumption to management of dams and reservoirs for agricultural and energy generation purposes, control of canals and drainage systems to prevent floods and conserve rain water, protection of ground water from salt water intrusion and seepage of wastes to even forest conservation.

Although there are usually local, national and regional water authorities, the integrated water resource management is a concern of many institutions and agencies. Data must be collected and analysed, researches undertaken, policies formulated, resources managed and wastewater treated. All these activities and many more would require corresponding trained manpower, a management information system and efficiently functioning organizational structure.

Equally important is the issue of wastewater management. Sewage and industrial waste effluents must not pollute the aquatic ecosystems which are usually used as discharge points of these wastes. Technologies must be developed and applied so that polluting properties of wastewater could be minimized if not completely removed. It is through these recovery and treatment processes that sufficient quantity and good quality water can be assured.



SEMINAR WORKSHOP
ON "ADVANCES IN
WATER RESOURCES
MANAGEMENT AND
WASTEWATER
TREATMENT
TECHNOLOGIES"
22-25 July 1996



6 th Anniversary
SURANAREE UNIVERSITY
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INTERNATIONAL



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Please check and fill the blanks.

I will ☐ / will not ☐ present a paper or poster

Title.....

I am willing ☐ / not willing ☐ to share Hotel Room : Single room : Additional US\$ 100

I will arrive in Korat on.....(date) at.....(time)

by ☐ Plane ☐ Bus ☐ Train ☐ Private Car

I will ☐ / will not ☐ stay on for the International Colloquium on Science Park (25 July.)

Participants of the Seminar who may want to attend the Colloquium

will be required to pay an additional fee of US\$ 100.

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INTERNATIONAL COLLOQUIUM ON SCIENCE PARK FOR MEETING TECHNOLOGICAL

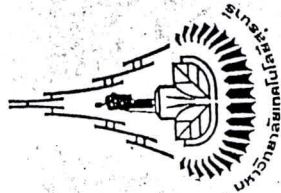
CHALLENGES OF THE 21ST CENTURY

26 JULY 1996

PROGRAM

0730-0845	REGISTRATION	1200-1300	Lunch
0900-0910	OPENING AND WELCOME REMARKS Prof. Dr. Wichit Sriratan, Rector	1315-1430	PANEL PRESENTATION (continued) <i>Technology Transfer from Universities and Research Centers to the Private Sector</i> : Case study: Quebec-Canada Dr. Michel Khalil, University of Quebec at Rimouski <i>Industry-University Linkage: INP de Toulouse's experience</i> Dr. Christophe Hamoud, Institut National Polytechnique, Toulouse.
0910-1000	KEYNOTE ADDRESS <i>University/Industry Technology Transfer A Process That Really Works!</i> Dr. E (Ted) Rhodes, President, Technical University of Nova Scotia		
1000-1015	Break		
	PANEL PRESENTATIONS	1430-1500	PAPER PRESENTATION
1015-1200	<i>British Experiences in Science Park Operation and Management</i> Mr. George Hunter, Chief Executive Belasis Hall Technology Park <i>The Science Park of Labege Innopole</i> : From High Tech. Development To Social Integration Dr. Alain Gares, Director General SICOVAL Innopole-Labege, Toulouse <i>University / Industry Linkage in Thailand: Critical Concept of Education Reform</i> Dr. Peter Brimble, Brookers Co., Ltd. Bangkok Dr. Chairit Sriratan, Chulalongkorn University	1500	<i>TECHNOPOLIS: SUT SCIENCE PARK</i> Asst. Prof. Dr. Weerapun Sriboonlue Vice Rector for Development, Suranaree University of Technology
		1515	CLOSING REMARKS Asst. Prof. Dr. Weerapun Sriboonlue Vice Rector for Development, Suranaree University of Technology
			Coffee Break





Sixth Anniversary

Suranaree University of Technology (SUT)

International Colloquium

" Science Park for Meeting Technological
Challenges of the 21st Century "

Saranithed Conference Room

Suranaree University of Technology

Nakhon Ratchasima, Thailand

26 July 1996

