

National
Academy of
Science and
Technology



24th Annual Scientific Meeting

**Enhancing Philippine
Science and Technology
Thru ICT**

Videoconference

July 3, 4 & 5, 2002

MANILA

Case Room; 5/F, Tower II
RCBC Plaza, Ayala corner
Sen. Gil Puyat Avenue, Makati City

CEBU

Audiovisual Room, Engineering Bldg.
University of San Carlos
Talamban Campus, Cebu City

DAVAO

Audiovisual Room
Ateneo de Davao University
E. Jacinto Street, Davao City

National Academy of Science and Technology



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*Republic of the Philippines
Department of Science and Technology*

My warmest congratulations to the National Academy of Science and Technology (NAST), Philippines on your 24th Annual Scientific Meeting (ASM) which is a major event of the 2002 National Science and Technology Week. Your theme, *"Enhancing Philippine Science and Technology thru ICT"*, buoys up this year's NSTW.

The series of videoconference activities, to be held simultaneously in Manila, Cebu, and Davao, showcases our capability not only to link our people and share our resources but also to demonstrate the advancements we have made in S&T, particularly in ICT.



We therefore commend the Academy and the Steering Committee for adopting innovations which will allow our fellow Filipinos in the regions to participate in the activities in the Manila. NAST's untiring efforts show self-invoked obligations in helping us promote and develop a culture of science in the country.

Mabuhay kayong lahat!


ESTRELLA F. ALABASTRO
Secretary

*Republic of the Philippines
National Academy of Science and Technology*



As the country's highest advisory and recognition body for science and technology, the National Academy of Science and Technology (NAS-T) realizes the tremendous potentials of ICT and its promising role in nation-building. Hence, the Academy has pursued innovations in its activities including the holding of videoconferences linking Manila, Cebu, and Davao, as a prelude to the 24th Annual Scientific Meeting.

It is hoped that these videoconferences addressing today's crucial S and T concerns will provide the basis for the formulation of recommendations for an action agenda to assure that the blessings of science be enjoyed by all.

We thank the Steering Committee for the 24th Annual Scientific Meeting, for their perspicacity and perseverance in pursuing a proactive program in support of Her Excellency Gloria Macapagal-Arroyo's determined efforts to fulfill the Filipino's aspiration for a better life and to foster national development and global competitiveness.


PERLA D. SANTOS OCAMPO, M.D.
President



*Republic of the Philippines
National Academy of Science and Technology*

On behalf of the National Academy of Science and Technology (NAST) I welcome you to our 24th Annual Scientific Meeting (ASM) with the theme *"Enhancing Philippine Science and Technology thru ICT"*.

Tasked to give advise and recognition, the Academy always serves as an instrument to provide the proper venue where the latest S&T issues and concerns are brought to the knowledge of everyone concerned. As such the ASM has become both a tradition and celebration. It has become the country's leading forum for all scientific and technological breakthroughs in researches conducted by Filipino scientists and technologists.



With these videoconferences, we hope that the scientists, technologists, and researchers, including those from the private sector and academe will be able to participate and share inputs in order for us to reach a common objective that will benefit the nation.

Congratulations to my fellow Academicians and to the rest of the Steering Committee for a job well done.

Mabuhay po tayong lahat.

JOSE O. JULIANO
Secretary and Chair
ASM Steering Committee

Republic of the Philippines
National Academy of Science and Technology



Let me extend my sincerest thanks to the members of the Academy and the Steering Committee for paving the way for innovations to set in at this time where changes come as fast as the speed of light.

The holding of the videoconference as part of the 24th Annual Scientific Meeting is geared to enjoin the science workers from the field, laboratory, and the academe in one common activity. At the same time, it aims to provide a venue for demonstration of the breakthroughs in science and technology in the Philippine setting.

Through this videoconference, we at the Academy hope that we will be able to encourage participation from all sectors of society especially those that have direct involvement in the promotion and utilization of scientific and technological substance and outputs.

Once again, my thanks to all the members of the Academy and the Steering Committee for being resolute, and the same goes to all who extended support for us to realize this videoconference.

Mabuhay po tayong lahat!

CEFERINO L. FOLLOSCO
Chair, ASM Steering Committee



*Republic of the Philippines
National Academy of Science and Technology*

The Annual Scientific Meeting (ASM), a forum being conducted by the National Academy of Science and Technology every year, has earned the distinction of being the most prestigious scientific conference in the Philippines. This year's theme, "Enhancing Philippine Science and Technology thru ICT," recognizes the critical role of Information and Communications Technology in the socio-economic development of our nation.

During the week before the ASM, NAST has also organized a three-day series of video-conferences interconnecting Manila, Cebu and Davao through the Internet, and enabling more members of the science and technology community nationwide to participate in this year's activities. We hope that this innovation will not only benefit those who are able to attend the video-conferences but will also effectively demonstrate a special ICT application in support of science and technology development.



Mabunay ang NAST!


WILLIAM T. TORRES, Ph.D.
Chair, Videoconference Committee

NAST History

The National Academy of Science and Technology (NAST) originated as the brainchild of several scientists in the University of the Philippines Diliman. Among the notable members of this small group were Dr. Joventino D. Soriano, a cytogeneticist; Dr. Gregorio T. Velasquez, a physicist, his wife, Dr. Carmen C. Velasquez, a parasitologist; Dr. Edgardo D. Gomez, a marine biologist; Dr. Edito G. Garcia, a public health specialist.

After a series of impromptu meetings held at the UP Institute of Small-Scale Industries, the task of preparing a formal proposal for a science academy was assigned to Dr. Soriano. In May, 1976, the proposal was submitted to Dr. Melecio S. Magno, who had been appointed Chairman of the NSDB with Cabinet rank. Chairman Magno fully endorsed the plan for a government-funded academy of science.

On October 6, 1976, a presidential decree creating the National Academy of Science was signed by President Ferdinand E. Marcos (P.D. 1003). However, it was only on December 17, 1976 that the enabling legislation was promulgated by President Marcos and endorsed Presidential Decree No. 1003-A, *"Creating the National Academy of Science and Technology"*. The two decrees – P.D. 1003 and P.D. 1003-A – were basically the same except for the title and the expanded membership. However, P.D. 1003-A came to be known as the enabling legislation that started the Academy. NAST has been mandated to recognize outstanding achievements in science and technology and to serve as a reservoir of competent scientific and technological manpower for the country.

In 1982, through Executive Order 818, the Academy was also formally charged with the function of advisory body of the President of the Republic of the Philippines and the Cabinet on policies concerning science and technology in the country.

NAST MANDATES

- ❑ To recognize outstanding achievements in science and technology as well as provide meaningful incentives to those engaged in scientific and technological researches (P.D. 1003-A)
- ❑ To advise the President and the Cabinet on matters related to science and technology (E.O. 818)
- ❑ To engage in projects and programs designed to recognize outstanding achievements in science and promote scientific productivity (E.O. 818)
- ❑ To embark on programs traditionally and internationally expected to an academy of science (E.O. 818)

NAST Functions

ADVISORY FUNCTION

In any nation, the science academy plays an important role as an adviser to the government and the science community. It is the body that the government turns to for disinterested advice on science and technology. The Academy, through its advisory activities, addresses issues and concerns on S&T at national and local levels.

Suggestions on S&T issues and concerns for roundtable discussions are welcome, but are subject to final decision of the NAST Executive Council.

RECOGNITION FUNCTION

The Academy recognizes outstanding achievements in science and technology, primarily those made by Filipino scientists in all fields of science. Along with this, the Academy provides meaningful incentives to those engaged or would like to engage in scientific and technological endeavors.

Deadline for submission of nominations is on the last working day of November.

SCIENTIFIC LINKAGES

As early as 1978, the Academy started forging international and national scientific linkages with other science, engineering, and technology academies and similar organizations. NAST commitment to international and national linkages aimed at: (1) promoting collaborative efforts among Filipino scientists, and between Filipino and foreign scientists; (2) promoting and encouraging scientific cooperation through Scientist Exchange Visit Program under the memorandum of agreement between NAST and a foreign science academy; (3) endorsing participation in international conference, meetings, fora, seminars, workshops, and similar scientific activities; and (4) publishing and exchanging scientific literatures.

Website addresses: TWAS (<http://www.ictp.trieste.it/~twas/>);
RSL (http://www.royalsoc.ac.uk/gf_sea.htm); AASA (<http://www.aasa-net.org>);
US-NAS (<http://www.national-academies.org>); MSA (<http://www.msa.org.my>)

Scientists can avail of various grants for scientific and technological undertakings, including fellowships, research grants, study visits, and grants for other possible collaborating projects.

Program

July 3, 2002, First Day
WHOLE DAY

AGRICULTURAL SCIENCES DIVISION and BIOLOGICAL SCIENCES DIVISION

8:30 A.M. to 5:00 P.M.

Moderator: Academician Emil Q. Javier
Coordinator: Academician Rafael D. Guerrero III

8:30 – 9:10 ***“Compatibility of GMOs to Sustainable Agriculture”***

Speaker: **DR. ELISEO D. PONCE**
Executive Director
Bureau of Agricultural Research
Department of Agriculture
Elliptical Road, Quezon City

9:10 – 9:50 ***“The Promise of Stem Cell-Based Therapies: An Update”***

Speaker: **DR. MARILUZ MOJICA-HENSHAW**
Associate Professor
Department of Biochemistry and Molecular Biology
UP Manila, Ermita, Manila

9:50 – 10:05 Panel: **DR. HONORATA G. BAYLON**
Head, Bone Marrow Transplant
National Kidney and Transplant Institute
East Avenue, Quezon City

10:05 – 10:20 **DR. JORGE G. IGNACIO**
Consultant, Section of Medical Oncology
Philippine General Hospital
Taft Avenue, Ermita, Manila

1:30 – 2:10 ***“Bioterrorism” (Biological Warfare Scare: Understanding
what it is and what is not)***

Speaker: **DR. NINA GLORIANI BARZAGA**
Director, Institute of Biotechnology and Molecular Biology
National Institutes of Health, UP Manila
Ermita, Manila

- 2:10 – 2:25 Panel: **DR. MANUEL M. DAYRIT**
Secretary
Department of Health
San Lazaro Compound
Sta. Cruz, Manila
- 2:25 – 2:40 **MGEN. MELCHOR P. ROSALES**
Executive Officer
National Disaster Coordinating Council
Camp Gen. Emilia Aguinaldo, Quezon City
- 2:40 – 3:20 ***“Perfectly Natural, Invariably Fatal: Biology of Prions”***
- Speaker: **DR. FLERIDA A. CARIÑO**
Associate Professor
Institute of Chemistry
UP Diliman, Quezon City
- 3:20 – 4:00 ***“Prion Diseases in Animals”***
- Speaker: **ACADEMICIAN SALCEDO L. EDUARDO**
Dean
College of Veterinary Medicine
UP Los Baños, College, Laguna
- 4:00 – 4:15 Reactor: **DR. DANILO B. LARGO**
Chair, Biology Department
University of San Carlos
Talamban, Cebu City
- 4:15 – 4:45 **Discussion of the recommendation on the theme.**

Session Coordinators:

- | | | | |
|-------|---|---|---|
| Cebu | : | Dr. Victorina H. Zosa
Director of Research
University of San Carlos
Talamban, Cebu City | Dr. Jesus V. Juario
Dean, UP Cebu College
Gorordo Avenue
Cebu City |
| Davao | : | Ms. Madel Moran-Morados
Regional Director
DOST Regional Office No. XI
Bajada, Davao City | |

July 4, 2002, Second Day
MORNING

CHEMICAL, MATHEMATICAL AND PHYSICAL SCIENCES DIVISION
8:30 A.M. to 11:30 A.M.

Moderator: Academician Apolinario D. Nazarea
Coordinator: Academician Bienvenido F. Nebres, S.J.

8:30 - 9:10 ***"The Status of Parallel Computation and High Performance Computing in the Philippines"***

Speaker: **DR. RAFAEL P. SALDAÑA**
Director
High Performance Computing Laboratory
Ateneo de Manila University
Loyola Heights, Quezon City

9:10 - 9:50 ***"Perspective on Interconnection Networks in the Philippines"***

Speaker: **ENGR. DENIS F. VILLORENTE**
Officer-in-Charge
Communications and Engineering Division
Advanced Science and Technology (ASTI)
UP Diliman, Quezon City

9:50 - 10:30 ***"Bioinformatics from the Computational Point of View"***

Speaker: **DR. JOHN PAUL C. VERGARA**
Associate Professor
Ateneo de Manila University
Loyola Heights, Quezon City

10:30 - 10:45 *Reactor:* **DR. ENRIQUE M. AVILA**
Regional Director, DOST Region VIII
Candahug, Palo, Leyte

10:45 - 11:15 **Discussion of the recommendation on the theme.**

Session Coordinators:

Cebu Engr. Rene Burt Lianto
Regional Director
DOST Regional Office No. VII, Cebu City

Davao Ms. Madel Moran-Morados
Regional Director
DOST Regional Office No. XI, Davao City

July 4, 2002, Second Day
AFTERNOON

ENGINEERING SCIENCES AND TECHNOLOGY DIVISION

2:00 P.M. to 5:00 P.M.

Moderator: Academician Angel L. Lazaro III

Coordinator: Academician William T. Torres

2:00 - 2:40 ***"Confronting Global Challenges in Engineering"***

Speaker: **MR. GERRY C. ABLAZA JR.**
President and CEO, Globe Telecom, Inc.
Globe Telecom Plaza, Mandaluyong City

2:40 - 3:20 ***"Capacity Building for Engineers"***

Speaker: **ACADEMICIAN REYNALDO B. VEA**
President
Mapua Institute of Technology
Muralla Street, Intramuros, Manila

3:20 - 4:00 ***"Enhancing Philippine Engineering Through ICT"***

Speaker: **ACADEMICIAN WILLIAM T. TORRES**
President
Mosaic Communications, Inc.
Suites 601-602, The Peak Tower
107 Alfaro Street, Salceda Village, Makati City

4:00 - 4:15 Reactor: **DR. PERICLES P. DACAY**
President, Dacay Construction
Cebu City

4:15 - 4:45 **Discussion of the recommendation on the theme.**

Session Coordinators:

Cebu : Engr. Luz G. Paco
Dean, College of Engineering
University of San Carlos
Talamban, Cebu City

Davao : Dr. Nenita A. Malaluan
Chair, Engineering Division
Ateneo De Davao University
E. Jacinto St., Davao City

July 5, 2002, Third Day
MORNING

HEALTH SCIENCES DIVISION

8:30 A.M. to 11:30 A.M.

Moderator: Academician Ernesto O. Domingo

Coordinator: Academician Quintin L. Kintanar

8:30 - 9:00 ***"The Philippine Research, Education, and Government
Information Network (PREGINET)"***

Speaker: **ENGR. DENIS F. VILORENTE**
Officer-in-Charge
Communications and Engineering Division
Advanced Science and Technology (ASTI)
UP Diliman, Quezon City

9:00 - 9:30 ***"Standards for Health Information in the Philippines"***

Speaker: **DR. ALVIN B. MARCELO**
Chair
Medical Informatics Unit
UP College of Medicine
Ermita, Manila

9:30 - 10:00 ***"Protecting Health Data"***

Speaker: **DR. INOCENCIO DANIEL C. MARAMBA**
Medical Informatics Unit
UP College of Medicine
Ermita, Manila

10:00 - 10:30 ***"Updates on Telemedicine"***

Speaker: **DR. AYEDEE ACE M. DOMINGO**
Director
National Telehealth Center
PGH, Taft Avenue, Manila

10:30-10:45 Reactor: **DR. FIDENCIO G. AURELIA**
Chief of Hospital
Bayawan District Hospital, Cebu City

10:45 - 11:15 **Discussion of the recommendation on the theme.**

Session Coordinators:

Cebu : Dr. Angelita A. Salarda
Medical Specialist III
Department of Health Region VII
Cebu City

Davao : Dr. Dolores G. Castillo
Director
Department of Health
Region XI
Davao City

July 5, 2002, Second Day
AFTERNOON

SOCIAL SCIENCES DIVISION

2:00 P.M. to 5:00 P.M.

Moderator and Coordinator: Academician Andrew B. Gonzalez, F.S.C.

2:00 - 2:40 ***"Experience of Open University in Distance Learning"***

Speaker: **DR. FELIX R. LIBRERO**
Chancellor, UP Open University
Los Baños, Laguna

2:40 - 3:20 ***"Filipiniana On Line: Knowledge Production Through ICT"***

Speaker: **PROF. PRISCELINA PATAJO-LEGASTO**
Asst. Vice President for Public Affairs and
Director of the UP System Information Office
UP Diliman, Quezon City

3:20 - 4:00 ***"ICT Intervention Programs in Science Education"***

Speaker: **DR. ESTER B. OGENA**
Director
Science Education Institute
Bicutan, Taguig, Metro Manila

4:00 - 4:15 Reactor: **DR. FELIZA U. ETIMADE**
Consultant, UP College-Visayas
Cebu City

4:15 - 4:45 **Discussion of the recommendation on the theme.**

Session Coordinators:

Cebu	Dr. Victorina H. Zosa Director of Research University of San Carlos Talamban, Cebu City	Dr. Socorro Gutiano Office of the Director Office of Population Studies University of San Carlos Talamban, Cebu City
Davao	Dr. May B. Ursos Ateneo de Davao University E. Jacinto Street, Davao City	

Abstracts of Papers

Agricultural and Biological Sciences Division

THE COMPATIBILITY OF GMOs TO SUSTAINABLE AGRICULTURE

Eliseo R. Ponce* and Saturnina C. Halos
Director, Bureau of Agricultural Research
Department of Agriculture

Senior Project Development Adviser
Bureau of Agricultural Research
Department of Agriculture

GMOs or genetically modified organisms offer opportunities to support sustainable agriculture. The GM technology can be harnessed so that crops rather than the farm environment are altered to suit their environment. Experience with GM crops shows promising trends. Recent studies indicate that GM crops substantially reduce pesticide use and incidence of pesticide poisoning in farms. Farmers rapidly adopted GM crops because of perceived economic benefits. Bt crops compared with application of pesticides promote more biodiversity. Herbicide tolerant crops reduce soil cultivation. The current practice of transferring a single trait into as many popular varieties as possible ensure crop diversity at the farm level. In the pipeline are GMOs being designed to grow better on existing environments with fewer or zero inputs. Naturally occurring microbes and viruses are being designed to help crops and aquaculture species fend off pathogens and pests without affecting other components of the ecosystem. However, public sector R&D must be fully supported to develop environment friendly crops suitable to stressed environments where most of our farmers practice and to ensure safety of the GM technology. Public education and information in biotechnology must be enhanced to support biotechnology R&D and GM technology diffusion.

Keywords: GMOs, sustainable agriculture

THE PROMISE OF STEM CELL BASED THERAPIES: AN UPDATE

Mariluz P. Mojica-Henshaw
Associate Professor, Department of Biochemistry & Molecular Biology
College of Medicine, University of the Philippines Manila

Stem cell-based therapies rely on the unique ability of stem cells to self-renew and to generate a number of specialized cell types. These characteristics offer the possibility of growing large numbers of cells in culture which can be used as replacement cells in damaged tissues or as a vehicle for delivering genes/drugs to specific tissues in the body, damaged tissues or as a vehicle for delivering genes/drugs to specific tissues in the body. Stem cell-based therapies, therefore, have the potential to cure diseases like diabetes, Parkinson's disease, myocardial infarction, and cancer. A number of sources of stem cells have been identified. These include the embryo, fetal tissues, umbilical cord blood and adult. Several methods have been developed to isolate, characterize and grow these cells in culture. Stem cells from the different sources

have different characteristics and growth requirements in culture. Among these, stem cells from adult bone marrow are the most studied and most frequently used. Hematopoietic stem cells from adult bone marrow used in the clinical setting in the treatment of leukemias and lymphomas, in restoring blood and immune cells destroyed by chemotherapy, and in the treatment of some autoimmune diseases. More recently, hematopoietic stem cells have been tapped for use in gene therapy. This has been met with a number of technical challenges involving gene delivery and appropriate gene expression within the cell. A better success rate is anticipated as more efficient methods of gene delivery are developed, alternative sources of stem cells are tested, and regulatory mechanisms involved in self-renewal are identified.

The development of stem cell-based therapy for a specific disease is premised on the idea that purified stem cells grown in culture can be directed to differentiate into a specific cell type prior to use. Different laboratories have shown that mouse stem cells can be directed to differentiate into neurons, heart muscle cells or pancreatic islet cells. The cells, once transplanted into the recipient must be able to survive, make the appropriate connections with the surrounding cells, and restore the function of the damaged tissue. In a rat model of Parkinson's disease transplantation of stem cell-derived neurons into the brain relieved symptoms associated with the disease. Parallel studies in humans with Parkinson's disease have been encouraging although with limited success. It appears that the stem cell source and the degree of differentiation of the developing neuron are important in determining the success of the stem cell transplantation.

Significant progress has been made in the development of stem cell-based therapies over the past decade. However, more studies are needed to determine the long-term effects of these therapies. In particular, areas that need to be addressed include the immunogenicity and safety of stem cell-derived transplants. Ethical issues involving the derivation and use of embryonic and fetal tissue stem cells also need to be resolved.

BIOTERRORISM

(Biological Warfare Scare: Understanding What It is and What Is Not)

Nina Gloriani Barzaga

Director, Institute of Biotechnology and Molecular Biology
National Institutes of Health, University of the Philippines Manila

Following the September 11, 2001 terrorist attack on the World Trade Center and the Pentagon in the USA, Dr. Gro Harlem Brundtland, Director General of the World Health Organization issued the following statements:

"We must prepare for the possibility that people are deliberately harmed with biological or chemical agents, and that any deliberate use of agents such as anthrax or smallpox should be contained by an effective public health response."

The first step towards the so-called "preparedness" is understanding what this "Biological Warfare" is all about, how the threat relates to many other infectious diseases that have the great potential to spread internationally and quickly. This paper focuses on the frequently asked questions or FAQs that the World Health Organization and the Center for Communicable Disease Control try to address. These FAQs are the following:

- 1 Which agents are most likely to be used to create a deliberate outbreak?
- 2 How are these agents applied to create a deliberate outbreak?
- 3 How would governments find out that an attack had taken place?
- 4 What kind of monitoring system is in place for infectious disease outbreaks?
The tasks of the Global Outbreak Alert and Response Network will be explained
- 5 What treatment is available?
- 6 Would mass vaccination be an option in the case of a disease outbreak?
- 7 Should people be vaccinated now as a prevention?
- 8 What should national governments be doing now?

Three of the biological agents most likely to be used as biological weapons will be discussed. These are Anthrax, Small pox and Bubonic plague.

PERFECTLY NATURAL, INVARIABLY FATAL: THE BIOLOGY OF PRIONS

Florida A. Cariño
Professor, Institute of Chemistry
University of the Philippines Diliman

Prions are infectious proteins believed to cause invariably fatal neurological damage in both humans and animals. There are presently no vaccines nor medicines that will prevent the disease, and no treatments are available to halt or mitigate this meat-borne disease. Although the number of affected individuals is low, remarkable attention has been directed towards prions because these agents are remarkably resistant to heat and chemical treatments. Standard decontamination procedures like UV irradiation and high temperatures have minimal effects on prion infectivity. Prions have a unique biology. The prion protein is a product of a cellular gene in the host organism. The normal protein is expressed in most cell types, but expression is predominant in the brain. Normal and infective proteins share the same amino acid sequence, but differ in their three-dimensional structures. The exact mode of replication of the infectious proteins is not yet fully elucidated, but present evidence indicate that normal proteins are converted to the infectious form. The molecular mechanism of such a conversion is believed to proceed via some form of protein-protein interaction.

PRION DISEASES IN ANIMALS

Academician Salcedo L. Eduardo
College of Veterinary Medicine
University of the Philippines Los Baños

Prion diseases refer to a group of invariably neurodegenerative diseases in human and animals also known as spongiform encephalopathies. These are caused by proteinaceous infectious particles that lack nucleic acid called *prions*. This paper is a review of those occurring in animals and human spongiform encephalopathies are excluded.

Those occurring in animals include scrapie or ovine spongiform encephalopathy, bovine spongiform encephalopathy (BSE), transmissible mink encephalopathy (TME), chronic wasting disease of mule deer and elk, and feline spongiform encephalopathy. These diseases share many characteristics of long incubation period (from months to years or decades), clinical course also lasts for weeks to years resulting to death and lesions for the most part, are restricted to the central nervous system. Changes include neuronal degeneration with neuronal vacuolation (spongiform degeneration), reactive astrocytosis and often "amyloid plaque" formation. It has been recognized that variations exist for several of the spongiform encephalopathies as to disease incidence, breed and species susceptibility and incubation time. Except of scrapie and BSE, information on the other animal spongiform encephalopathies is wanting. The occurrence, host range, signs, histo-pathology, transmission and diagnosis especially for scrapie and BSE are presented and discussed. It has been suggested that BSE has resulted from ingestion by cattle of meal & bone from scrapie infected sheep. TME is also considered to have resulted by the same route. It is also believed that bovine to bovine transmission results from feeding with bovine meal & bone meal. Thus the ban on the use of meal and bone meal from ruminants has reduced the occurrence of BSE.

There is no direct evidence that any of the animal spongiform encephalopathies is transmissible to humans. However, cases of a new variant Creutzfeld-Jacob Disease (vCJD) which occurred in teenagers and young adults in Britain and France revealed lesions of neurologic changes not previously seen in CJD cases of adults in the United States, Australia or Japan. These changes (numerous amyloid plaques) are similar to those seen in macaques inoculated with bovine prions.

Chemical, Mathematical and Physical Sciences Division

THE STATUS OF PARALLEL COMPUTATION AND HIGH PERFORMANCE COMPUTING IN THE PHILIPPINES

Rafael P. Saldana
Director, High Performance Computer Laboratory
School of Science and Engineering
Ateneo de Manila University

In technologically advanced countries, solving scientific and technological problems using computer modelling, simulation, and data analysis require supercomputers or high performance computing systems. Conventional supercomputers are very expensive and beyond the budgets of most university research groups especially in developing countries such as the Philippines. However, recent advances in cluster computing technology and parallel computation on Linux based systems make the cost of supercomputing very low compared with conventional supercomputing platforms.

In the Philippines, a number of science and engineering departments in different universities have begun experimenting with Beowulf clusters or a pile of personal computers connected in parallel through a high-speed network. An example is the High Performance Computing Laboratory of the Ateneo de Manila University which built the AGIL High Performance Computing System intended for computa-

tional science and engineering (CSE) applications

This paper provides an overview of parallel computation on Linux-based high performance clusters. It also discusses recent initiatives by several scientists and engineers engaged in parallel computation and high performance computing in the Philippines.

Keywords: parallel computation, supercomputing, high-performance computing, computational science and engineering, Beowulf cluster, AGILA HPCS

PERSPECTIVE ON INTERCONNECTION NETWORKS IN THE PHILIPPINES

Denis F. Villoriente

Advanced Science and Technology Institute (ASTI)
Department of Science and Technology

Information networks, of which the Internet is the best known and most popular, are important and very strategic to a country's economy and its people. Competitive advantages are derived by those who have near instantaneous access to relevant information. Thus, a measure of the value of a network to its user is how well that network is interconnected with other networks and thus to the information resources available on them.

In this paper, we discuss the Philippine internet from the perspective of its interconnectedness. We also offer some recommendations on interconnection of networks run by government, research and education institutions to improve the science and technology capability of the country.

BIOINFORMATICS FROM THE COMPUTATIONAL POINT OF VIEW

John Paul C. Vergara

Chairman, Department of Information Systems and Computer Science
Ateneo de Manila University

Bioinformatics is a rapidly developing field that combines computer science and mathematics with the life sciences. The field has emerged from the necessity of acquiring, storing, and analyzing large amounts of biological data from medical, agricultural and scientific applications.

This talk will provide an overview of bioinformatics and review some problems and tools that are important in the sequencing and analysis of genomes. Among the problems discussed are those that deal with sequence alignment, genome comparison, phylogenetic tree reconstruction, and microarray technology. Some emphasis will be given on the often contrasting perspectives of the biologist and the computer scientist when it comes to approaching these problems.

Engineering Sciences and Technology Division

CONFRONTING GLOBAL CHALLENGES IN ENGINEERING

Gerardo C. Ablaza Jr
President and Chief Executive Officer
Globe Telecom, Inc

Within the Globe Telecom, Inc. and our industry, we have seen many challenges that have far reaching implications for our competitiveness. Global trends in science and engineering can be discussed at a very high level.

Four global trends that have already reached popular headlines will have direct influence on our country: (a) nano scale technologies, (b) the rise of IP or the Internet Protocol, (c) genetics, (d) environmental engineering. Work on these fields has the potential to radically transform electronics, communications, medicine and our environment.

In telecommunications, the collapse of the dot-com craze and the severe debt burdens on telecommunications companies worldwide have led to sharply lower purchases of equipment as well as a dramatic slowdown in research. In our country, we have been fortunate that telecommunications has continued to be a key driver of economic growth, especially with the intense competition for customers among the GSM operators. The resulting pressure to grow networks and cover as much of the Philippines as possible has led to requirements for engineering resources, at the very least in radio, transmission and switching, but as importantly, in IT and systems integration fields. Today, this pressure to get and keep the best talent in electronics, communications and software engineering fields remains.

CAPACITY BUILDING FOR ENGINEERS

Academician Reynaldo B. Vea
President, Mapua Institute of Technology

The goal determines the level of effort. A goal of achieving world-dominating engineering prowess, for example, will require capacity-building efforts markedly different from a goal of being the best in some small niche. A goal of being a generator of new knowledge and innovations would require different level of exertion from a goal of being the global supplier of an army of ICT-savvy engineers. The definition of objectives should therefore be the first order of the day.

But be that as it may, the elements of capacity building may be discussed in a general way. Whether an element may be included, and in what level of intensity, remains to be determined based on objectives.

An engineer may be called upon to perform a host of functions: design, survey, construction, manufacturing, operation, evaluation, consulting, teaching, research, etc. The basic elements of his empowerment in being able to do most if not all of these are understanding of basic principles, engineering knowledge and skills. How we make sure that our engineers acquire these is the basic challenge in capacity-building. How we provide and utilize ICT tools in this process is our concern.

The process begins, but does not and should not end, in our schools. The professional life of an engineer should be one of continuous study, learning and honing.

Most quarters have accepted that the demand for lifelong learning will increase in the years to come. This belief, together with our schools' desire to use new educational technology, fuels the development of

ICT applications in e-learning. There may be plenty of hype but there indeed are ways by which computers and networks have proven effective in the teaching and learning process. Simulation software has been a bright spot. The Web has become a tool for the efficient and quick interaction of teachers and students. Beyond this, the Web has also started to enable schools to share their libraries and other educational materials and even their faculty with other schools around the world. This has put in the hands of scholars an amazing wealth of knowledge and resources that enables them to become better students and teachers.

In an era of global outsourcing of engineering services it behooves all engineering schools to impart to its students the most advanced problem-solving methodologies and tools, including engineering software.

After schooling, engineers depend, among others, on the colleagues in professional societies to keep up with developments in their fields. ICT is increasingly becoming an indispensable tool to get the vital pieces of information from local and global sources. For capacity building our engineering societies must be thoroughly wired and able to help their members navigate electronically through the mass engineering data and information available worldwide. This would ensure the use of the state-of-the-art in problem solving.

If heightening engineering R&D capability is among our objectives then ICT can play a natural role in capacity building. The many-to-many nature of the internet has dramatically facilitated collaborative research work. It has enabled scientific projects that never sleep. Researchers can now share electronic fora that allow great number of enquiring minds to focus simultaneously on any given topic. Experiments could be set up, theories proposed and data reported very quickly. The lag time between conferences and publishing has simply evaporated. With electronic publications, the tradition of circulating preprints only to a small exclusive group of researchers in big, prestigious laboratories has been broken. Laboratories everywhere, including those in the Philippines, can join the fray.

Some aspects of capacity building for engineers may only be weakly related to ICT at the moment. For example, the need to strengthen the understanding of fundamental scientific principles and the facility with advanced and mathematical tools, the need to develop communication skills, the need to relate engineering to the universe of knowledge, the development of engineering judgment, etc. But even in these matters one can see how ICT can possibly fit in.

ICT will be no panacea but it will be indispensable to engineering capacity building.

ENCHANCING PHILIPPINE ENGINEERING THROUGH ICT

Academician William T. Torres
President, Mosaic Communications, Inc.

Engineers have been using ICT mainly for communication, information processing and visualization. Their main tools are personal desktop and laptop computers and peripherals as well as application software that they themselves developed or they acquired from others. With the advent of computer networking, the Internet and the World Wide Web, more sophisticated ICT tools have become available, including project management and decision support systems, knowledge integration and software that support complex engineering design processes. To be competitive in the market, Filipino engineers have to have access to these tools. But because they are quite expensive to acquire and to maintain, there is a need to create mechanism(s) to share them so that the costs can be distributed among many users.

This presentation will deal with how to enable the sharing of common ICT resources among Filipino engineers together with their suppliers, partners and clients over the Internet and the World Wide Web.

THE PHILIPPINE RESEARCH, EDUCATION, AND GOVERNMENT INFORMATION NETWORK (PREGINET)

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Advanced Science and Technology Institute (ASTI)
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The Philippine Research, Education and Government Information Network (PREGINET) Project is an initiative of the Advanced Science and Technology Institute to establish a nationwide broadband research and education network. Funded by the Department of Science and Technology, PREGINET is expected to improve the science and technology infrastructure of the country by interconnecting research and education institutions who require such an infrastructure for applications related to distance education, telemedicine, bioinformatics, agriculture and earth monitoring, among others. PREGINET is also designed as a testbed for the development, testing, and deployment of next generation network technologies and services. The accomplishments, status and future plans for the project are discussed in this paper.

STANDARDS FOR HEALTH INFORMATION IN THE PHILIPPINES

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Recognizing the important role information technology will play in the health care industry, the National Institutes of Health Manila (NIH) created the Computer Research and Information Technology for Health Program (CRIT). As its pioneering project, the CRIT moved to convene the major stakeholders in the industry and form a study group to determine standards for health information in the country. In particular, the study group aimed to formulate sets of recommendations for the standardized method of collection, storage, transmission, and dissemination of health data throughout the country.

This paper contains the recommendations of the Study Group. It will be divided into three major parts: the recommended standards for data elements, the recommended standards for data interchange, and the recommended coding systems and terminology. This paper will be initially released as a draft that will be subsequently reviewed and criticized by stakeholders in the local healthcare industry.

New technologies have appeared since the publication of this paper in 1999. Specifically, the Extensible Markup Language (XML) specification by the W3C consortium provides a framework for interoperability that surpasses the current recommendation of this paper. It is the plan of the NIH-CRIT to revise the SHIP to integrate the benefits of XML before the end of 2002.

PROTECTING HEALTH DATA

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UPDATES IN TELLEMEDICINE

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The vision of the National Telehealth Center is to be the center of excellence for e-health and telemedicine in the Philippines. Major achievements in the past year include the development of the STRATEGIC PLAN for the NATIONAL TELEHEALTH CENTER, a teler dermatology application, a teleradiology system, and design of the Community Teleservice Center. Major applications areas are teleconsultation, distance education, software application development. Teleconsultation includes the development of a videoconferencing setup, customized development of videoconferencing software, protocols and policies on standards in care over e-mail or Internet, data security and privacy standards. Distance education involves the development of distance education modules using Internet technologies such as Flash and streaming audio and video. The Center also aims to conduct software application development based upon open source technologies, such as Linux, PHP, PostgreSQL, and Java. Applications to be developed include geographic information systems and clinical information systems. A landmark research in telemedicine and teler dermatology in particular in the PGH and the Philippines was accomplished with the PGH Section of Dermatology. A teler dermatology application was developed using Linux, PHP, and PostgreSQL. The study compares the diagnostic results from traditional face-to-face dermatology consult and teler dermatology consultation using store-and-forward technology. It assesses the acceptability of this technology to patients and healthcare providers. The results shows that teler dermatology is an accurate tool for diagnosis of dermatologic conditions. Agreement is high between SAF and FTF diagnoses. This study also shows that health care providers are open to this new form of consultation. However, in contrast to findings in other countries, this study indicates that there seems to be hesitation on the part of the patients to use the technology. A similar application for a web-based teleradiology system was also developed with the Department of Radiology which compares store and forward technology with traditional negaroscope assessment. The design of a community teleservice center is being conducted with the cooperation of the Philippine Council on Health Research, Development and the Department of Transportation and Communication.

Social Sciences Division

BRINGING QUALITY EDUCATION RIGHT AT THE DOORSTEPS OF THE FILIPINO LEARNER: THE UP OPEN UNIVERSITY EXPERIENCE

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This paper begins with a description of the Philippine education pyramid as basis for the argument that distance education is a viable alternative delivery system for educational services to Filipino learners, then highlights the beginnings of distance education in the Philippines. The focus of the paper, however, is the UP Open University: its history, organization and management, and its procedures in the development and delivery of courses and academic degree programs. The paper also discusses the various degree programs and nonformal courses offered, and a discussion of the UPOU experience over the last 7 years. The paper ends with a summary of lessons learned from this experience.

"FILIPINIANA ONLINE" KNOWLEDGE PRODUCTION THROUGH ICT

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The dynamism of knowledge production on the Internet is a critical reality that scholars, academicians, scientists & artists who are involved in the dissemination of knowledges and information must acknowledge if they want to continue to overdetermine the shape of their respective societies today. In terms of the humanities and social sciences, in particular, there are 29,910 websites on Philippine Culture which incessantly construct their own discourses on the Filipino and Philippine social practices. Topics address various interests of different audiences here and abroad. Ethnic cuisine, wedding facts and trivia from www.weddingsatwork.com, first hand accounts of somebody from the Foreign Service while he was on tour here from cyberbayan.org, 10 Bornean datus landing in Panay from Philippine Culture and Info's website-philinfo.com, Philippine Folk Arts from Kamayan ng Lahi, Philippine Centennial Series from the Philippine History Group of Los Angeles, articles from the Psychological Association of the Philippines, Philippine Gay Culture from Binabae to Bakla from amazon.com gay culture, Philippine Media in the 1990s from the Philippine Center for Investigative Journalism, Philippine Martial Arts from kalislat.com, the conditions of elderly Filipinos from asienhaus.de, the Loyola schools from ateneo.edu, knowing...being...believing in pinoy from nativeswish.com, Philippine culture at work and play by japanupdate.com, Marawi City from clickmindanao.com, Asian-American film database from asianamericanfilm.com, Philippine Literature in Spanish from pinoyhangout.com, Filipino Facts, Recipes & Phrases from webskills.outreach.isf.edu, Carlos Bulosan from tribo.org, from Cultural Center of the Philippines, the UP System and the Constituent Universities from UP System website up.edu.ph, Philippine Culture by Filipina Ladies from all-filipina.com, the social structures of Mt. Pinatubo from scs.kyushu-u.ac.jp, Philippine news sites, outstanding Pinays and Pinoy from pinoycityusa.com, Philippine Churches from hawaii.edu, Simbang Gabi from the Philippine Embassy in London, the President's Report from erap.com. The Internet has a way of flattering out Philippine hierarchical discourses. Official pronouncements of the various branches of government, reports from ngos, articles from professional and private organizations are all equally accessible through the click of a mouse. No distinctions are made between private/personal and public, between commercial and academic; between official and informal, between US/UK European/Australian/Asian-based communities of Filipinos and those here, between knowledges and information, between fact and wild imaginings. The Internet has truly democratized access to information & knowledges. Therefore, the Internet is an arena that we have to aggressively enter. Through the UP Open University, then under Chancellor Ma Cristina Padolina, my Filipiniana Online Team of researchers, writers & multimedia artists constructed a course on Philippine Culture that was offered on the web as early as Second Semester, 1999-2000. Accompanied by the Filipiniana Reader (a printed anthology of critical essays on Philippine Theater, Art, Literature & Popular Culture) and a Filipiniana CD, Filipiniana Online sought to contribute to the twin projects of nation-formation and identity-construction. To build a sense of "Filipino-hood" and a concept of nation that recognized the diasporic nature of Philippine Society was our political agenda. These goals were effected through the interactive structure of Filipiniana Online — i.e., threaded discussions facilitated by four specialists in each of the modules of Philippine Theater, Literature, Art & Popular Culture as well as a digital library that gave participants hyperlinks to other websites on Philippine Culture and History. Thus, its online nature, enabled participants from different Filipino communities here and abroad to participate in discussions and projects (i.e., the final requirement included the construction of websites, compact disks, VHS, papers on any of the topics that resulted from the discussions). Filipiniana Online is now a post-baccalaureate course called Cultural Studies 250 which shall again be offered in August 2002 through the UP Open University.

ICT INTERVENTION PROGRAMS IN SCIENCE EDUCATION

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This paper presents the various information communications technology programs implemented by the Science Education Institute (SEI). These programs are focused on the following concerns: developing the environment for learning, developing teachers' capability, developing ICT infrastructure, enhancing youth ICT competitiveness, web-based services, and international assessment. The following programs will be discussed: the Mobile IT Classrooms, Computer Literacy Program, ICT Learning Assisted Program, Development of Computer-Based Teaching (CBT) Modules, Intel Teach to the Future Program, Model ICT Learning Centers, Young Web Designers Competition, Computer Programming Competitions, STEDNET, and the Scholarship Administration System. The Philippine participation in the Second Information Technology Study in Education - Module 2 (SITES-M2) will likewise be discussed.

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