Globally Collaborative Environmental Peace Gaming Project with Global University System

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Globally Collaborative Environmental Peace Gaming Project with Global University System

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***Abstract*—The Globally Collaborative Environmental Peace Gaming (GCEPG) Project is a globally collaborative gaming/simulation to help decision makers and train would-be decision makers in conflict prevention and resolution on environmental issues. The Global University System (GUS) is a worldwide initiative to create advanced telecommunications infrastructure for accessing educational resources across national and cultural boundaries for global peace.**

***Keywords*—Global e-learning and e-healthcare, globally distributed computer simulation system, globally collaborative research and development**

I. Development History

A. Pioneering Role:

Since early 1970s to the mid 1980s, Dr. Utsumi played a major pioneering role in extending U.S. data communication networks to other countries and deregulating Japanese telecommunication policies for the use of e-mail (thanks to help from the Late Commerce Secretary Malcolm Baldridge) with foreseeable future of its vital necessity among peace gaming participants [9]. This triggered the de-monopolization and privatization of Japanese telecommunications industries. This movement has later been emulated in many other countries, as having more than one billion email users around the world nowadays. This effort was to establish later a Globally Collaborative Environmental Peace Gaming (GCEPG) (which was initiated by GLOSAS/USA in early 1970s [7]) with globally distributed computer simulation system through global neural computer network (*). His effort helped in extending American and other countries' university courses to underserved developing countries.

(*) In 1981, Dr. Utsumi coined the phrase "Global Neural Computer Network" in which each participating game player, with his/her own computer, database and sub-model, would correspond to a neuron, router to synapses, with the Internet serving as nerves in a global brain. Then Vice President Al Gore used this term in a speech (as the result of one of his staffs at the White House received numerous e-mail messages from Dr. Utsumi's list) and continued with the following words:

> *"The Department of Defense is investing well over $1 billion in the development and implementation of networked distributed interactive simulation. This technology, which allows dispersed learners to engage in collaborative problem solving activities in real time, is now ready for transfer to schools and workplaces outside of the defense sector."*
> *[Speaking to communications industry leaders, January 11, 1994, Washington, D.C.]*

B. Benchmark Demonstration:

After creating the Summer Computer Simulation Conference (SCSC) of the Society of Computer Simulation in 1970 and 1971, Dr. Utsumi demonstrated a global-scale peace-gaming at the conference on "Crisis Management and Conflict Resolution" by the World Future Society (WFS) in New York City, in July of 1986. It was one of the largest and perhaps most successful demonstrations of global gaming/simulation organized so far. The event was a global gaming simulation sessions on a crisis scenario involving the U.S.-Japan trade and economy issues. The multimedia teleconferencing sessions used voice, slow-scan TV, computer text and data, graphics, and a simulation model. Nearly 1,500 persons took part, in New York, Tokyo, Honolulu, and at the World's Fair in Vancouver, B.C. An echelon economist of the United Nations wrote a game scenario, and Professor Onishi in Tokyo supplied his Futures of Global Interdependence (FUGI) model of the world economy, which is the world largest econometric model [3].

Noted U.S. economists (Professor Lester C. Thurow of M.I.T., Provost William Nordhaus of Yale, Mr. Keith Johnson of Townsend and Greenspan Company) were panelists of this event and electronically interconnected with Japanese counterparts for three days of computer-assisted negotiations. Several hypothetical policies were examined. One question raised by the President Emeritus of American Arbitration Association was the effect of raising military expenditures in Japan to the American level while lowering those of the U.S. to the then Japanese level. Simulation ran overnight predicted that the balance of trade would thus be even by the year 2000, with necessity of cooperation, rather than competition, by both countries in the future. This clearly indicated the cost and dilemma of American's nuclear umbrella protecting Japan's economic prosperity, thus threatening American's eco-

nomic prosperity.

This event with combined use of inexpensive delivery systems afforded an opportunity to see how academic departments might become linked across national boundaries for the purpose of joint study, research and planetary problem-solving without expending high cost for satellite video. After this successful sessions, several former high ranking officers of the U.S./Japanese governmental agencies expressed their strong interest in a similar multi-media teleconferencing on a more regular basis to establish an early warning system of the both countries' ever-closely interwoven economic and trade relationships. Systems analysis for systemic change at the global level is a precondition for any significant resolution to today's global-scale problems, as has been advocated by our GLOSAS/USA projects since it was originated in 1972.

It was expected at that time that, in the near future, all the world's politics and economies would use computer models to examine the implications of an action on each of them. We already see the beginning of such models as the FUGI simulation model of the world in Japan. This is equivalent to say 'peace gaming' on the scale of Pentagon's 'war games' (See Fig. 1).

Figure 1: Comparison of War and Peace Games [1]

This is because whatever is needed to end war as a way of solving crises will require large-scale research at universities in many countries that collaborate in peace gaming experiments and demonstrations. No one university, group or national government can do it alone. The effort to extend learning, healthcare and cooperative research possibilities to every corner of the planet "will require substantial collaborative contribution of ideas, expertise, technology, money and resources from multiple sources." Our proposed globally collaborative environmental peace gaming system can become "an educational tool" for students in political science and international affairs. Moreover, such a system can provide motivation for and become a foundation pillar for a Global University System (GUS) that will not only provide better education for the youth of the planet, but that will also promote mutual understanding and peace.

Compared with dominance and exclusivity of analog telecom, Internet with digitized information enables **sharing** valuable telecom media, thus bringing drastic cost reduction – even a few pennies per minutes telephone calls around the world. In addition to this, now emerging GRID technology (which concept Dr. Utsumi initiated [2]) enables **collaboration** of youngsters for their creating new knowledge with the use of virtual reality and virtual laboratories in global scale. Our GUS intends to fully extend those principles to achieve global peace.

C. Series of Videoconferencing and Accolade:

For over a dozen years since 1986, we have organized and conducted once or twice a year a series of innovative distance teaching trials with multipoint-to-multipoint multimedia interactive videoconferences using hybrid delivery technologies, which often spanned the globe and came to be called the "Global Lecture Hall (GLH)" [tm] [Chapter 2 of unpublished [5]] and [7].

Thanks to such efforts and for initiating global e-learning movement since early 1980s, Dr. Utsumi received the prestigious Lord Perry Award for Excellence in Distance Education in the fall of 1994 from Lord Perry, the founder of the U.K. Open University. The two-year senior recipient of the same award was Sir Arthur C. Clarke, the inventor of satellites.

II. Global University System

The Global University System (GUS) [6] aims to create a worldwide consortium of educational and healthcare institutions to provide all world citizens with special emphasis on the underdeveloped world with access to 21st Century education and healthcare via broadband Internet. The philosophy of GUS is based on the belief that global peace and prosperity would only be sustainable through education. Education and job skills are the keys in determining a nation's wealth and influence. The aim is to achieve "education and healthcare for all," anywhere, anytime and at any pace.

It is a network of distance-learning Universities to improve e-learning and e-healthcare services in rural/remote areas of developing countries for the purpose of collaborative learning, systems simulation, and peace gaming. It aims to build a higher level of humanity with mutual understanding across national and cultural boundaries for global peace [10].

GUS helps higher educational and healthcare institutions in remote/rural areas of developing countries to deploy broadband Internet in order for them to close the digital divide. These institutions also act as the knowledge center of their community for the eradication of poverty and isolation through the use of advanced Information and Communications Technologies (ICTs). Learners will be able to take their courses from member institutions around the world to receive a GUS degree, thus freeing them from being confined to one academic culture of a single university or country. In a sense, this is creating a 21st century version of the Fulbright exchange program.

The GUS has group activities in the major regions of the globe in partnerships with higher learning and healthcare in-

1) The term "Peace Gaming" coined by Dr. Utsumi in 1970s is to avoid the occurrence of war compared with "War Gaming" which is to win the war once when it happed. Avoiding war is much cheaper than waging war.

stitutions. They foster the establishment of GUS in their respective regions, with the use of an advanced global broadband Internet virtual private network. These will then connect the universities with secondary and elementary schools, libraries, hospitals, local government offices and NGOs, etc., by broadband wireless Internet at drastically discounted rates. This advanced wireless communication with laptop computer will make e-learning possible for anyone, anywhere, and anytime with capabilities of Internet telephony, fax, voice mail, e-mail, Web access, videoconferencing, etc. This is not only to help local community development, but also to assure close cooperation among higher, middle and lower levels of education (See Fig. 2).

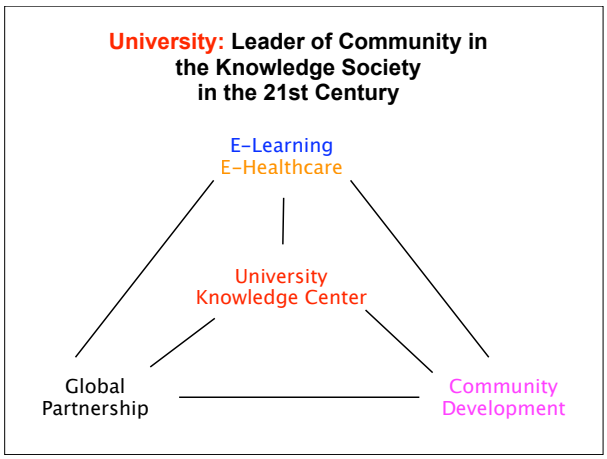

Figure 2: University as Leader of Community

A. Global E-Learning:

The GUS will enhance e-learning to their students and lifelong learners in their community for the development of technical and professional human capital and attendant enlightenment etc., and to ensure the sustainability of global e-learning via links with universities and other academic establishments in North America, Europe, Japan and more industrially advanced countries.

B. Global E-Healthcare/Telemedicine:

GUS will increase access to customized communications and related resources which mobilize and encourage hospitals and e-healthcare centers to use the Internet and hybrid technologies to provide patients online second opinion for various infectious and chronic diseases, including malaria, HIV/AIDS, polio, cancer, heart disease and other conditions. Existing university and community programs will help define communications and medical information management systems, which reduce obstacles to good health management.

Doctors will also be taught (through a train-the-trainers program) how to use computers effectively to order tests and drugs, which has been shown in studies to reduce medical errors and flag patient drug allergies. Nurses will also be taught to use computers to track patients as they go through the primary healthcare centers and hospitals.

Medical records will be computerized, including lab results, drug data and records of office visits in text files, which would be standardized in a format that can be shared. Cross-cutting priority will be to encourage government and donors to develop incentives to encourage health administrators, doctors, health workers to use the Internet.

C. Community Development:

Learners, faculties, and public policy makers can promote community development and many other advances at a local, regional and even on a global scale. GUS consortium member institutions will act as the flagship of their community development, particularly on the facilitation of entrepreneurial initiatives for the creative economy of Knowledge Society in the 21st century.

D. Globally Collaborative Research and Development:

The learners and their professors from participating institutions can partner with colleagues in more advanced countries to form a global knowledge forum for exchange of ideas and information and for conducting collaborative research and development with the use of virtual reality/virtual laboratories on inexpensive Beowulf mini super-computers (clusters of PCs) for experiential/constructive learning and creation of knowledge with the use of the emerging global GRID computer networking technology, which concept Prof. Utsumi initiated in early 1970s [2].

GUS projects are now starting in many countries of Africa, Asia and Siberia and have received inquiries from several other countries for review. We envision to interlink those members through broadband Private Virtual Network to conduct mega-videoconferences as well as related research project, "Globally Collaborative Environmental Peace Gaming (GCEPG)" – see below. The GUS program is a comprehensive and holistic approach to building smart communities in developing countries for e-learning and e-healthcare/tele–medicine.

As a powerful consequential extension of our projects, we will foster creativity of youngsters around the world, and form **Globally Collaborative Innovation Network** (GCIN) [8]. The growth of advanced economies is driven largely by knowledge workers, such as scientists, engineers, managers, professionals and artists. We now need to train the youth of the world to become worldclass knowledge workers with global e-learning and create an environment in which they can collaborate with the use of advanced ICTs and GRID networking technology. This is because the entire global economy increasingly revolves around innovations that flow from the creative classes in collaboration.

GUS is headquartered at the Global E-learning Center at the University of Tampere in Finland, under the direction of the UNESCO/UNITWIN Networking Chair Program, held by Dr. Tapio Varis [10]. Those institutions affiliated with GUS will become members of this Program.

Currently institutions with faculty members who are participating in GUS development projects are numerous around the world. The officers of the GUS are: P. Tapio Varis, Ph.D., Acting President, (University of Tampere, and a former rector of the United Nations University of Peace in Costa Rica); Marco Antonio Dias, T.C.D., Vice President for Administration, (former director of Higher Education at UNESCO); Takeshi Utsumi, Ph.D., Founder and Vice President for Tech-

nology and Coordination, (Chairman of GLOSAS/USA). The trustee members are: Dr. Pekka Tarjanne, (former Director-General of the ITU) and Dr. Federico Mayor, (President of the Foundation for Culture of Peace and a former Director-General of the UNESCO). The special advisors are: David A. Johnson, Ph.D., (Professor Emeritus, University of Tennessee), Fredric Michael Litto, Ph.D., (President of the Brazilian Association of Distance Education at the University of Sao Paulo), W. R. (Bill) Klemm, Ph.D. (Texas A&M University), Joseph S. DiGregorio, Ph.D. (Georgia Institute of Technology, retired), Dr. Paul Lefrere (U.K. Open University), Dr. Amit Maitra (Lockheed Martin Defense Enterprise Solutions & Services), Prof. John M. Eger (San Diego State University).

III. Globally Collaborative Environmental Peace Gaming Project

The Globally Collaborative Environmental Peace Gaming (GCEPG) project with a globally distributed computer simulation system, focusing on the issue of environment and sustainable development in developing countries, is to train would-be decision-makers in crisis management, conflict resolution, and negotiation techniques basing on "facts and figures."

A. Needs:

Economic interdependence among nations and cultures is spawning a global economy. Globalization also highlights clashes of divergent cultures and belief systems, both political and religious. If global peace is ever to be achieved, global-scale education, with the use of the modern digital telecommunications, will be needed to create mutual understanding among nations, cultures, ethnic groups, and religions. The Internet is the future of telecommunications and can be a medium for building peace.

Human activities are now causing global warming, which would lead to disastrous havoc in the years to come. For the sake of our future generation, it is an urgent task to start carving such global warming. However, this will inevitably encounter with conflicts of interests among various stakeholders, e.g., bio-fuel production vs. food shortage in drought-stricken, starving poor African countries, etc., to name but a few.

B. Objectives:

The idea involves interconnecting experts in many countries via the global Internet to collaborate in the discovering of new solutions for world crises, such as the deteriorating global environment, and to explore new alternatives for a world order capable of addressing the problems and opportunities of an interdependent globe. Gaming/simulation is the best tool we have for understanding the world's problems and the solutions we propose for them. Systems analysis for systemic change at the global level is a precondition for any significant resolution of today's global scale problems. The understanding gained by scientific and rational analysis and critical thinking based on 'facts and figures' would be the basis of conflict resolution for world peace, and, hence, ought to provide the basic principle of global education for peace.

As focusing on the issue of environment and sustainable development in developing countries, this project will train local experts for leadership development, in relation to strategic use of technologies and cooperation among stakeholders for more effective advocacy, informed policy, public understanding and participation and concrete community development.

With global GRID computer networking technology and Beowulf mini-supercomputers using cluster computing technology, we plan to develop a socio-economic-energy-environmental simulation system and a climate simulation system in parallel fashion, both of which will be interconnected in global scale (See Fig. 3).

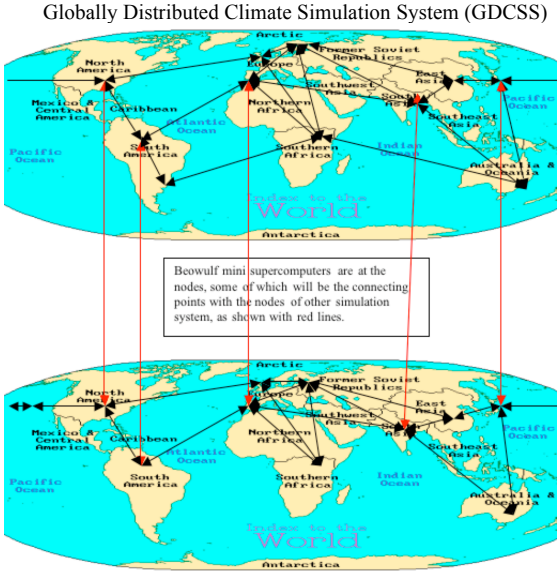

Figure 3: Globally Collaborative Environmental Peace Gaming

We will then create the **Globally Collaborative Network of the Centers for Conflict Prevention, Management and Resolution (GCN/CCPMRs) on Environmental Issues** in various countries, which will be interconnected through broadband Internet for conducting the following two-tier system;

a. One for training young would-be decision makers for understanding interwoven world phenomena with rational analysis and critical thinking, and then in crisis management, conflict resolution, and negotiation techniques basing on "**facts and figures**" [7] and
b. The other for helping decision makers constructing a globally distributed decision-support system for positive sum/win-win alternatives to conflict and war.

Each GUS of various countries will maintain the sub-models of their countries autonomously – along with construction and maintenance of its databases, modification of their sub-models, and supply of game players in cooperation with their overseas counterparts through the global Internet.

C. Examples of Policy Analysis:

The quantitative policy analysis of globally collaborative GCEPG project [7] will focus on the sustainable development of socio-economic-energy-environment system in Japan, the US, China, Russia, and the other relevant countries. Researchers in those countries will construct their simulation

models, which will be interconnected through broadband Internet to form Globally Distributed Socio-Economic-Energy-Environmental Simulation System.

Some of envisioned examples are;

1. Former Vice President and Nobel Peace Laureate, Mr. Al Gore recently proposed to replace fossil fuel with renewable one to generate electricity in the USA in ten years <http://tinyurl.com/66sk9d>. Would this be a viable direction? If so, what would be the consequences to other economic and social structures in the US and in other countries, particularly Nigeria? – see below.
2. Dr. Rajendra Pachauri, Chairman of the Nobel Peace-winning Intergovernmental Panel on Climate Change (IPCC), recently advocated reduction of meat-eating for mitigating climate change <http://tinyurl.com/6etakf>. How would this affect human health and social structure in the US as well as in other countries?
3. Energy security with the deployment of gas pipeline from Tomsk, Siberia to China, and the construction of hydroelectric dam in the Republic of Altai, Siberia. This gas pipeline will affect the socio-economic developments of Siberia, China, and hence the ones of Japan, the US, Europe and others. Japan will increasingly depend on the energy (oil and gas) supply from Russia, and uranium from Kazakhstan. The construction of hydroelectric dam in the Republic of Altai Siberia will affect the five UNESCO World Heritage sites in the Republic, which attracts an increasing number of tourists (400,000) into small town of Gorno-Altaisk with only 9,000 residents. The goal of this study will be to find a sustainable solution for this complex societal problem -- a solution that is acceptable for all parties without harming the environment and the quality of living in the Altai Region of Siberia.
4. Economic and community development in Niger Delta Region of Nigeria, along with low-sulfur content crude oil production which 40% is exported to north America for electricity generation, which may be replaced with renewable energy sources if Mr. Al Gore's proposition would succeed – see above -- thus a vital interest of the United States as well as Nigeria.

There would be many other conflicts on environmental issues in local, regional and global scales. They will be more severe and fierce as getting close to the 2050, which is the target year of the United Nations Millennium Development Goals (UN/MDGs), since many of its items are expected not meeting with the goals. The decision-makers in those years would be the youngsters in 10s and 20s nowadays. They must then be well prepared to cope with those conflicts with rational analysis and critical thinking basing on the facts and figures.

D. Principles of Gaming/Simulation:

(a) Iron rule of simulation – "**Make simulation as close to simuland as possible**,"
(b) Greyhound Bus' Motto – "**Leave Driving to Us.**"

Both of which necessitate division of functions to collaborative stakeholders and experts of their fields and countries who would be interconnected with a globally distributed simulation system (See Fig. 4).

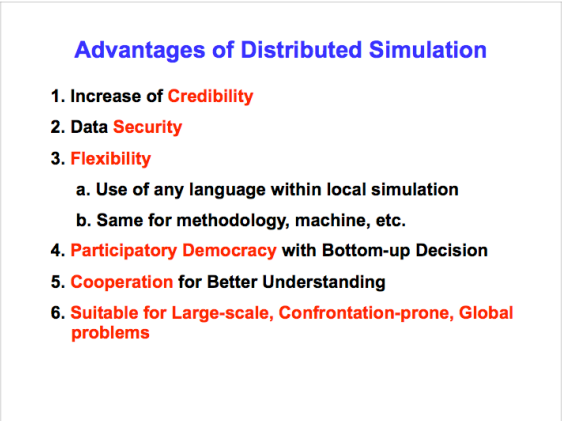

Figure 4: Advantages of Distributed Simulation

Based on the review of the past attempts and experiences with model acceptance and validation, meaningful and credible simulation has to be implemented as a modeling network composed of a large number of locally developed and verified models. No single model, developed by a local group of experts has a chance for universal acceptance when it deals with controversial and confrontation-prone area such as global resource allocation and economical policies.

The basic premise of policy analysis and assessment is "prediction," which is also the most common denominator of various simulation models. Hence, all of the simulation models (by either System Dynamics, Econometrics, Input-output methodologies, etc.) would produce time-series table.

E. Methodologies

Followings (but not limited) are major simulation methodologies we will use;

1. Dynamic Methodologies:
   a. Econometrics
   b. System Dynamics
2. Static Methodologies:
   a. Input/Output Method
   b. Linear Programming
3. Communication-oriented Methodologies:
   a. Policy Delphi
   b. Cross-Impact Matrix Analysis (Probabilistic System Dynamics)

F. Unavoidable Difficulties:

We will anticipate following difficulties to conduct our project;

(a) Time difference among participating parties for global gaming/simulation – due to the roundness of globe,
(b) Latency of slow speed Internet for communicating among distributed simulation models – particularly through geo-synchronous satellite,
(c) Head-scratching time of game players for democratic decision-making with consensus, etc.

In addition to the above, strangely, there is currently a deep disciplinary division between climatologists and socio-economic-environmentalists preventing close dialogue and cooperation between them [4].

Subsequently, we will firstly construct globally distributed socio-economic-energy-environmental simulation system (GDSEEESS) through broadband Internet with a hope that it would later be interlinked with globally distributed climate simulation system (GDCSS).

G. Project Management:

A sustainable solution can be found by an integrated approach of multidisciplinary qualitative and quantitative policy analysis of global interrelations and interdependencies among the involved countries and in discussion with all the integrated stakeholders. By including the knowledge, power and emotion, the energy problem will be analysed according to the directions of the COMPRAM method [1], as handling complex societal problems. Based on this analysis, sustainable policy decisions can be made.

This project will then demonstrate integrated and synergistic approach among grassroots, government, university, stakeholder, etc. Use of graphic info modeling/mapping and potential "gaming" on key issues and solutions will assist each group's ability for standardized data gathering and situational analyses, projecting out possible outcomes for more informed decision making and activities. It brings together most sophisticated university-based mathematical modelling techniques and social sciences skills of experts and regular people who can then more easily see--at a glance--how issues and outcomes can impact and interact each other.

H. Plan of Actions:

With a series of workshops for this multi-lateral, multi-year project, we will devise asynchronous, interactive coordination of globally dispersed, dissimilar simulation models of socio-economic-energy-environmental system through broadband Internet as focusing on the sustainable development of participating countries. We will utilize the existing models as much as possible; otherwise, researchers will construct their country models. Those models will form an Open Model Network (OMN) with appropriate tables of variables which will be interconnected each other. The organization and management structures of the proposed GCN/CCPMRs with time and task schedules will also be formed, which will build fund raising plans for further development.

Our first milestone of this project is to make the GCN/CCPMRs as one of the Research and Training Center (RTC) programs of the United Nations University (UNU) with the collaborative efforts of the Earth Institute (EI) of Columbia University, Millennium Institute (MI), New York University/Polytechnic Institute (NYU/PI), International Communication of Negotiation with Simulation (ICONS) of the University of Maryland, GLOSAS/USA, and Global University System (GUS)/UNESCO/UNITWIN Networking Chair Program at the University of Tampere, Finland, etc.

If accepted, as the mandate of the UN/RTC, this project will help decision-makers at the various agencies of the United Nations. Each RTC in various countries will also;

(a) Emulate environmental education activities of the EI,
(b) Emulate modeling activities of the MI,
(c) Emulate ICONS of the University of Maryland,
(d) Collaborate with GLOSAS/USA along GUS.

It may be wise to select countries for inviting and joining into this GCN/CCPMR project, e.g., Russia/Siberia, China, Japan, European, Asian and African countries, etc., through the UNU/RTC program. See participating organizations and individuals (tentative) in <http://tinyurl.com/65wrk7>. Participants will be connected through Internet via text, audio-, and video-conferencings.

IV. Expected Output

It is expected that GUS will provide the following benefits to students and participating universities:

- Broadband Internet connection, supporting modern distance education via the World Wide Web
- Help member universities build a network of facilitators to support e-Learners
- Learners may take courses from different member universities, obtaining their degree from the GUS, thus freeing them from being confined to one academic culture of a single university or country
- Learners and faculties can promote the exchange of ideas, information, knowledge, and joint research and development of Web-based teaching materials
- Researchers in developing countries can partner with colleagues in more advanced countries, and perform joint collaborative research and development with the use of virtual reality/virtual laboratories for experiential/constructive learning and creation of knowledge through the emerging global GRID computer networking technology
- Learners, faculties, and public policy makers can promote community development and many other advances at a local, regional and even on a global scale.

V. Dissemination

Our projects focus on the content delivery through broadband Internet (satellite, terrestrial, wireless, etc.) for eradication of poverty and isolation in remote/rural areas of developing countries, particularly on the intercultural mutual understanding for attaining global peace.

This is to construct information and knowledge societies, and to bridge the knowledge and digital gap that exists between developed and developing countries, as promoting free exchange of ideas and knowledge; to maintain, increase and disseminate knowledge through our work in education, the sciences, culture and communication.

The results of this project will be disseminated throughout the community of the UN/RTCs in participating countries to add to the general body of knowledge or methodology in dealing with the global warming by the following procedures;

(a) Through the design of socio-economic-energy-environment problem and solutions framework, into the nation's education curricula and system,
(b) Through the electronic media, and
(c) Presentations at relevant conferences and in journals.

The success of the workshops mentioned above will also be publicized over the Internet and with press release to attract further support from other contributors.

VI. FUNDING

GUS and GCEPG projects will combine (1) the Japanese government's Official Development Assistance (ODA) funds and (2) Japanese electronic equipment (computers, tranceivers, dish antennas, etc.) with (a) the Internet technology and (b) content development of North America and Europe, to help underserved people in rural and remote areas of developing countries by closing the digital divide.

VII. CONCLUSIONS

The GUS and GCEPG programs are a comprehensive and holistic approach to building smart and creative communities in developing countries for e-learning and e-healthcare/telemedicine. Initiatives are underway to create the necessary infrastructure and educational liaisons, and some near-term educational access is expected. Early efforts have included international teleconference technology workshops that have tested the satellite/wireless technology that will be used in GUS.

GUS and GCEPG are clearly ambitious programs that cannot be achieved by any one group, university, or national government. The programs require substantial collaborative contribution of ideas, expertise, technology resources and funds from multiple sources. Those who value the vision of GUS and GCEPG are invited to join this great and noble enterprise.

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