Proposal:

"Global Early Warning System (GEWS) with Cloud Computing Technology"

To be submitted to IBM.

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Project Summary

- *Objectives and method:* **Global Early Warning System (GEWS) Project** will bring together key experts to provide a wealth of knowledge and information on economic and environmental phenomena, matched with advanced computerized mathematical modeling and cloud computing to create peace game platforms focused on world, regional, national or local dynamics. These games can be used to train decision-makers in advanced conflict resolution.

- *Intellectual merits:* Goes to the root causes of conflict, promotes development in ways that overcome bottlenecks of ignorance and misunderstanding. Has access to source-verified high-quality data as a base for objective dialogue that multi-stakeholders in any domain can use to understand the constraints and opportunities they face. Offering different possible scenarios to shape and envision a common future can defuse conflict and encourage cooperation and coordination around real development options that receive wide acceptance. This is cheaper than war. It is cheaper than doing nothing.

- *Broader impacts of proposed activity:* In case of war, natural or human-generated disaster, provides a backup for any destroyed local storage of information. In terms of fast response, provides ubiquitous access to data. Using advanced translation tools, it can be accessed in approximations of local languages, creating communication bridges for international emergency response and early reconstruction teams, also helping their coordinated response and the geo-referencing of victim location.

  Contributions to improved ICT infrastructures can produce the aforementioned benefits in the short term, linking them to long term reconstruction and development goals in optimal and peaceful ways, since knowledge and information-based opportunities are the main potential for development today. Overcoming the digital divide will contribute to inclusive development and to overcoming other material gaps and disparities within and between societies.

- *Review criteria:* For food production and effective resource use, it will help develop precision agriculture, using satellite information to identify best crop soils and plant diseases; provide opportunities for children and youth to use their high technological adoption abilities and learning curve and become early contributors to their communities; help the elderly overcome isolation and facilitate the transmission of their experiences and memories, making them useful to society; create the best opportunities for resilient growth, generating employment opportunities for all in the most sustainable manner; and promote *inclusion* and *resilience* of socio ecological systems.

- *Why only EAGER grants are appropriate for this project:* This project is a good fit for EAGER grants because it is a new approach to interdisciplinary research on environment and development interrelations, using the latest dynamic modeling techniques to encompass the interdependent nature of global development processes. It helps us understand different potential scenarios resulting from diverse sets of interactions of energy, resource, social and economic phenomena, synthesizing the most recent advances in interdisciplinary scientific approaches and using Cloud Computing Technology to generate and disseminate more powerful quantitative scientific system dynamic models. These models can process larger amounts of verified facts and figures than previously feasible, with greater security of storage and access from many remote locations and outcomes that are still untested, since they have only recently become feasible through scientific and technological innovation. As a consequence, it will become possible to train and educate people, specifically the young, in rational analysis and critical thinking. This will enable them to respond more creatively to climate, environmental, social and economic challenges and conflicts. Local communities, regions, nations, continents and international actors and institutions will gain capacity to consider new policy solutions that may contribute to peace and development, creating the knowledge society of the future. Other funding sources are not geared to promote this kind of daring and potentially transformative exploration and are, therefore, inappropriate.

1. Introduction:

The Global Early Warning System (GEWS) with a globally distributed computer simulation system in cloud computing environment is to help decision makers construct a globally distributed decision-support system for positive sum/win-win alternatives to conflict and war, particularly focusing on the issues of environment and sustainable development in developing countries. The idea involves interconnecting experts in many countries via the global Internet to collaborate in the prevention of crisis and developing solutions to mitigate and adapt to already existing world crises or ones in the making, such as the deteriorating environment of our globe, the social and economic stresses among others and to explore new alternatives for a world order capable of addressing the problems and opportunities of an interdependent globe.

The objective of this project is to construct national socio-economic, energy, and environment simulation models for each participating country, which will be interconnected to form a global scale simulation model. It will conduct a globally collaborative gaming/simulation to help decision-makers and train would-be decision makers in conflict prevention and resolution on environmental issues (Utsumi, 2003). Global University System (GUS) (Utsumi, et al, 2003 and Varis, et al, 2003) will assist the model building, maintenance, and administration as well as the gaming execution.

The GEWS is the outgrowth of Globally Collaborative Environmental Peace Gaming (GCEPG) project (Utsumi, 2003), which started in early 1970s (Utsumi, 2008). It was originally proposed by the Prime Minister of the U.K., Mr. Gordon Brown, at the G20 Summit in London in April 2009.

2. Need:

Human activities are now causing global warming, which will lead to major environmental, social and economic havoc in the years ahead. For the sake of our future generation, it is urgent to curb the sources of such global warming. Moreover, the accelerating trends are high and still raising consumption levels in the industrialized countries; continued population increase in developing countries and the rise of living standards with economic improvement are causing severe strain to resource availability, particularly water in many parts of the world. This will inevitably lead to conflicts of interest among various stakeholders. Examples include bio-fuel vs. food production in poor countries, land grabbing by wealthy nations to feed their population, to name two. There will be many other conflicts on environmental issues in local, regional and global scales.

Subsequently, it is now urgent to educate young people who are now in their teens and twenties who will be the decision makers in the 2030s. Under current scenarios it is likely that most of the United Nations Millennium Development Goals (MSGs) will not be met, hence the trend for more fierce resource competition and potential conflict. The new decision maker generation must therefore be well prepared to cope with those issues. Their training should be evidence based, as it is possible to do using systemic simulation models to play out different policy scenarios and then make informed decisions.

In this area, gaming/simulation is the best tool we have for understanding the world's confrontation prone problems and the solutions we propose for them. Their understanding gained with scientific and rational analysis and critical thinking with the gaming/simulation could be the basis of world peace, and hence ought to provide the basic principle of global education for peace.

3. Purpose:

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.

We will create the **Globally Collaborative Network of the Centers for Conflict Prevention, Management and Resolution (GCN/CCPMRs)** on economic, social and environmental issues in various countries, such as Nigeria, Syria and Bangladesh, etc., which will be interconnected through broadband Internet for conducting the following two-tier system;

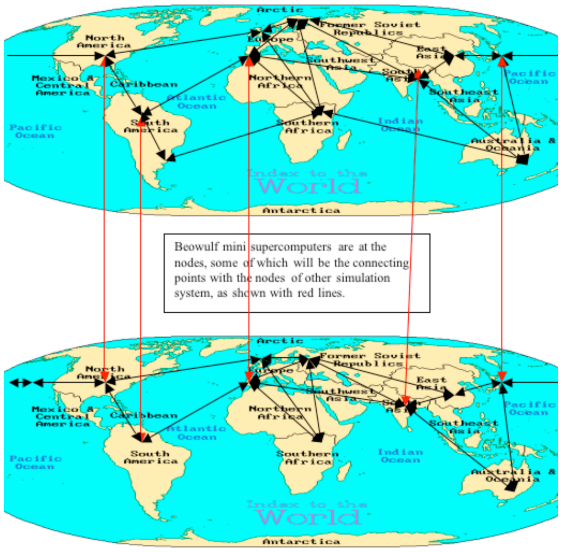
a. One for training young would-be decision makers for understanding interwoven world phenomena with rational analysis and critical thinking, and then in crisis management, conflict resolution, and negotiation techniques basing on "*facts and figures*" and,

b. The other for helping decision makers developing and using a globally distributed decision-support system for policy analysis and evaluation with positive sum/win-win alternatives to conflict and war.

4. Technical Infrastructure:

With the advent of global cloud computing technology, we can develop a socio-economic-environmental simulation system and a climate simulation system in parallel fashion, both of which are to be interconnected in global scale.

Globally Distributed Climate Simulation System (GDCSS)



Globally Distributed Socio-Economic-Environmental Simulation System (GDSEEESS)

Figure 1

Each country model runs all the time, continuously and repetitively, say, from the year 2000 to 2050, as similar to a repetitive analog computer. The graphical presentation of the year 2000 to the present would be the past data, and the one from the present to the 2050 would be the prediction made by the simulation model. The initial conditions at the present would be revised with the fresh input data, say, about the national consensus or GDP (gross domestic product) figure, etc. This makes the simulation similar to the one of a simulator/trainer of a nuclear power plant or petroleum refinery or ethylene plant -- alternatively it could be the engine of a large oil tanker, which President Obama often quotes as analogous to the operation of the United State economy.

Each Global University System (GUS) (which is an associating project) 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.

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 GEWS with time and task schedules will also be formed, which will build fund raising plans for further development.

By using sophisticated university-based mathematical modelling techniques and social science skills of experts, graphic info modelling/mapping and potential "gaming" on key issues and solutions will assist each group's ability for standardized data gathering and situational analyses, and the projection of possible outcomes for more informed decision making and activities.

5. Possible GEWS in Various Countries:

5.1 GEWS/Nigeria:

With the seed fund, our Nigerian colleague has started creating the GEWS/Nigeria for building climate change adaptation capacity (NBCCAC) in the Niger Delta. Its primary aim is to establish a network of collaborative research and capacity building for climate change adaptation in Nigeria, with emphasis on the Niger Delta Marshlands. The Niger Delta is of great significance as it is the region that provides the greatest source of national income for Nigeria (97% of Nigeria government revenue). The violent clashes have limited oil and gas production to about 50% of installed output capacity thereby depleting national income.

Using System Dynamics methodology, a Niger Delta Energy and Climate Change Impact model will be developed to aid policy planning and management of the environment, which will then be integrated with the Nigerian National Economy Model being developed by the Millennium Institute and this is to be ultimately linked to the Global Early Warning System (GEWS) involving national models from various countries around the world. The simulation models developed will be useful planning tools for policy makers and educating young would-be decision makers in programs run in partnership with several universities around Nigeria.

We also plan to conduct a gaming/simulation demonstration on the verification of energy policies proposed by former Vice President, Mr. Al Gore and President Barack Obama (both Nobel Peace Laureates) to replace fossil fuel with renewable one (e.g., wind and/or solar energy) to generate electricity in the USA in ten years in relation to appropriate allocation of oil revenue in Niger Delta of Nigeria. If their policies would succeed, there would be no revenue to the Nigerian government. What would also be the consequences to other economic and social structures in the US and in other countries, particularly Nigeria? Would this be a viable direction with global perspectives? This event may be performed at:

(a) **Global Symposium on: *Climate Change and International Peace and Security,* Global Challenges and Global Solutions: Interdisciplinary Approaches** at the School of International and Public Affair (SIPA) at Columbia University, or
(b) United Nations Headquarters in Manhattan — for UNDP staff, or
(c) Polytechnic Institute of NYU in Brooklyn.

5.2 GEWS/Syria:

With the seed fund from the Italian government through the CICR of Columbia University, our Italian colleague is now organizing a planning workshop in Rome to create GEWS/Syria. He also expects to have help from the Millennium Institute for his simulation modeling, particularly for the water-usage along Jordan River Basin by the people of Syria, Lebanon, Palestine, Israel, and Jordan. His project will then have those people create their own GEWS, which will be interlinked together to form the Middle East Early Warning System (MEEWS).

5.3 GEWS/Bangladesh:

Our Bangladeshi colleagues are now constructing their country models with our assistance, which will aim the domestic and international policy analysis and evaluation for poverty alleviation, energy security and preventing and management of disasters due to the climate change, such as by heavy rainfalls, devastating storm and increasing droughts, particularly for the people who live in the coastal regions and the nearby islands.

This project will develop capacity of the people for disaster risk management in Bangladesh. It is necessary to address the need for development of professionalism among the key actors and stakeholders engaged in the field of disaster management and to bring a change in their mind-set from post-disaster response to pre-disaster preparedness.

6. Interlinkage of Simulation Models:

6.1 FUGI (Futures of Global Interdependence) global modeling system:

The FUGI global model is one of the most complex global models around the world as classifying the world into 192 countries and 8 UN regions. Each country/regional model is globally interdependent through direct linkages of the world trade matrices, export/import prices, primary commodities prices, foreign exchange rates, official

development assistance, private foreign direct investment, external debt, interest rates and etc. It is also globally interdependent through indirect linkages such as population changes, economic development policies, energy policies, environmental policies, etc.

Prof. Akira Onishi of Foundation for Fusion of Science and Technology (FOST) in Japan has agreed to replace each country model in his FUGI world model (mostly made by econometrics (Onishi, No date-1 and No date-2)) with the one of the models preferred by the participating countries — either made by system dynamics, econometrics or input-out methodologies, as far as they produce time-series (Excel type) tables.

6.2 System dynamic models of Millennium Institute:

The Millennium Institute (MI) in Washington, DC is now consummating a contract to construct models of national energy model (by system dynamics) of 15 Economic Community Of West African States (ECOWAS) member states. MI plans to construct national economy models of 100 countries in the next two-year period. MI has already conducted a seminar of system dynamics in Dhaka, Bangladesh in early October 2009. MI will assist modeling for our colleagues in Nigeria, Lebanon, Syria and Bangladesh, some of who are now applying funds for constructing their country models with our assistance. We also assisted our overseas colleagues to get seed fund from the Italian government through the Center for International Conflict Resolution (CICR) of Columbia University for creating their GEWS'.

MI's Threshold 21 Model <http://www.millennium-institute.org/integrated_planning/tools/T21/T21_sf.html> works with VENSIM continuous system simulation program for system dynamic methodology under Windows family programs.

6.3 Use of IBM/Cloud Computing Services:

As soon as the availability of IBM cloud computing services for this project is confirmed, Prof. Onishi will implement his FUGI model into it and Millennium Sinstitute do the same for their Nigerian and the US national energy-economic models.

Cluster Resource Requirements				
I.	**FUGI (Futures of Global Interdependence) global modeling system:**			
	A.	Hardware		
		1.	Memory space	1.5 GB
		2.	Disk storage	0.5 GB
	B.	Software:		
		1.	Operating system	Windows family (XP/VISTA/7)
		2.	Simulation language	Intel Visual FORTRAN Compiler (10.0.025 later) and C++
II.	**Threshold 21 (T21) Model of Millennium Institute**			
	A.	Hardware:		
		1.	Memory space	256 MB RAM
		2.	Disk storage	50 MB (30 MB for Vensim and 20 MB for T21)
	B.	Software:		
		1.	Operating system	Windows family (XP/VISTA/7)
		2.	Simulation language	Vensim continuous system simulation program
				This Vensim may expand to Mac operating system in the near future.

Table 1

6.4 Interlinkage of Variables:

A central database <http://tinyurl.com/avqlkc> will serve for the inter-linkage of variables among participating distributed simulation models. Such central database, when completed as a whole, may correspond to a mini electronic United Nations (i.e., eUN), and would provide us with global picture of world phenomena.

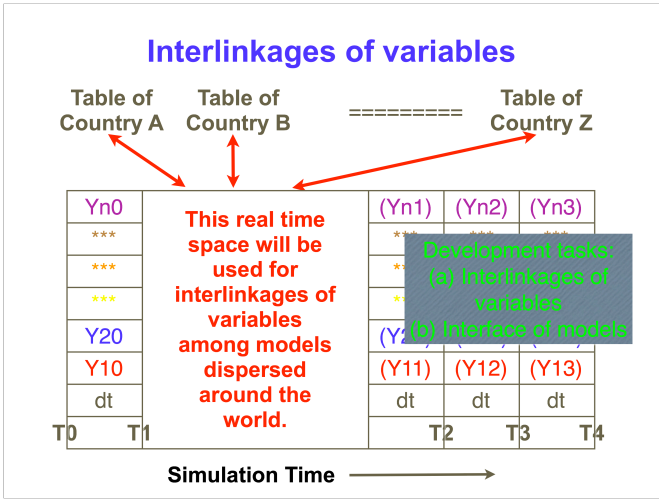


Figure 2

7. Planning Workshop:

This workshop will be held one month after the grant availability, and will be the first step in the global launching of this GEWS program. The experts will meet in person and through remote communications to discuss over-all plan of this projet (see Section 5 above) and the preparation of the gaming/simulation demonstration mentioned in the Section 5.1 above.

8. Beneficiaries:

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 Center for International Conflict Resolution (CICR) and 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, Foundation for Fusion of Science and Technology (FOST) in Japan, and Global University System (GUS)/UNESCO/UNITWIN Networking Chair Program at the University of Tampere, Finland.

If accepted, as the mandate of the UNU/RTC, this project will help decision-makers at the various agencies of the United Nations. At each center of GCN/CCPMRs in various countries, this project will also train local experts and young would-be decision-makers among grassroots, government, university, etc., 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.

9. Dissemination:

The results of this project will be disseminated throughout the community of UNU/RTCs 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 by targeted press releases to attract further support from other contributors.

10. Conclusions:

The ultimate goal of our project is to promote global peace by promoting mutual understanding among young would-be decision-makers, by having them engage in Peace Gaming for conflict resolution of various environmental issues in local, regional and global scale with the extensive use of most advanced Information and Communication Technologies (ICTs). Education of young people and adults on a global scale is the **best** future investment for global

peace and progress. Senator Fulbright once said that *learning together and working together are the first steps toward world peace*.

We will also foster creativity of young people from around the world by enabling those in developing countries to work with colleagues in advanced countries and perform joint collaborative research with use of virtual laboratories for hands-on experiential/constructive learning and creation of knowledge through the global GRID technology, thus forming Globally Collaborative Innovation Network (GCIN) (Utsumi, 2006).

11. Participating Institutions:

Bangladesh

1. **Association for Advancement of Information Technology (AAIT)**
2. **Bangladesh Disaster Preparedness Centre (BDPC)**
3. **Bangladesh University of Engineering and Technology (BUET)**
4. **BRAC University**

Canada

1. **International Society for Systems Science**
2. **University of Ottawa**

Japan

1. **Foundation for Fusion of Science and Technology (FOST)**

Netherlands

1. **International Research Society on Methodology of Societal Complexity**

Nigeria

1. **African University of Science and Technology** (To be invited)
2. **Obafemi Awolowo University** (To be invited)

Russia

1. **Novosibirsk State University**
2. **Russian Academy of Sciences**

Turkey

1. **Bogazici University**

United States of America

1. **Columbia University**
2. **GLObal Systems Analysis and Simulation Association in the U.S.A. (GLOSAS/USA)**
3. **McLeod Institute of Simulation Sciences (MISS) at California State University at Chico**
4. **Millennium Institute,** (Co-Principal Investigator)
5. **Polytechnic Institute of New York University**
6. **Tenure and Ecology LLC,** (Consultant to GLOSAS/USA)

Table 2

12. References:

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http://tinyurl.com/kofpf

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