December 30, 2006

To: Walter Anderson

From: Lloyd Etheredge

Re: How the UN Can Accelerate Scientific Innovation & Solve Urgent Global Problems

Proposal

A regularly scheduled "Inventions Wanted . . ." global colloquium series using Internet technology. In each "Inventions Wanted . . ." program leading scientists, engineers, or mathematicians will brief a global peer audience about the inventions or breakthroughs they are trying to achieve that can help to solve urgent global problems - and (especially) where they are stuck. The series will be designed as an experiment in global problem-solving and accelerating the international creative process by linking-up interested scientists (across disciplinary and national boundaries) in academic and corporate settings, students, inventors, and other science-oriented people with a shared focus, opportunity, and invitation to participate.

Background

Historically, crossbreeding communication networks spark creativity and rapid-discovery science.[1] One of the most exciting uses of the Internet is to build upon this lesson and experiment with large-scale (global) collaboration systems to accelerate the creative process.[2]

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[1] Donald T Campbell, "Blind Variation and Selective Retention in Creative Thought as in Other Knowledge Processes," *Psychological Review* 67 (1960).
Randall Collins, *The Sociology of Philosophies: A Global Theory of Intellectual Change* (Cambridge, MA: Harvard University/Belknap Press, 1998), pp. 523-69.

[2] When scientific communication relies upon print publications the tidal wave of information for scientists in the most advanced and well-funded countries turns to a drought that limits accomplishments of scientists and students elsewhere. Research scientists in all countries typically have routine access to Internet links and can use these new initiatives to access leading edge ideas, one to two years before print publication, and participate more actively in the creative process. They also will have access to information from current

[3] Scientists also have a special pleasure in thinking about scientific challenges: a well-designed, high visibility, "global Tuesday brownbag" would be an exciting UN-encouraged program that nobody would miss and that would be widely talked about.

- Psychologically, we now know that two of the key ingredients in creative accomplishment are motivation - a sense of responsibility or desire to solve a problem - and an opportunity to be involved in the process.

Getting Underway

Now no single scientific organization has the mandate to create an "Inventions Wanted . . ." science colloquium project to accelerate, on a global scale, the creative process in addressing urgent problems.[4] However, scientists are eager to learn what other scientists are doing and to be challenged. The idea only requires a catalyst - e.g., an invitation from the Secretary-General to one or more leading multidisciplinary/ international scientific

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invisible colleges that is not easily available to scientists without the funds to travel regularly to international conferences.

The potential for enrollment and cross-fertilization can be extraordinary: A current briefing about strategies and problems of developing a malaria vaccine might suddenly bring new ideas to the attention of a senior researcher in Kenya, a graduate student at Moscow University, a biochemist in southern China, a R&D startup in India, a geneticist at Berkeley, a mosquito specialist ("innoculate the mosquitos") at NIH.

[3] Several well-established scientific Websites that provide lectures to desktop PCs of scientists worldwide are the New York Academy of Sciences Science Without Borders initiative (www.nyas.org), and the National Institutes of Health (US) (www.videocast.nih.gov). The desktop television screens are small, but the audio is good; slides and charts can be displayed in larger windows; papers and abstracts also are available.

[4] Two decades ago the late Akio Morita, co-founder of Sony, proposed to the Trilateral Commission that a parallel project of technologists be undertaken to tackle urgent global problems. His suggestion was made before the Internet made it easy to create global desktop colloquia series.

organizations to get a project underway.[5]

This project requires a first-rate team, with expertise in the writing, production, direction, editing (etc.) of video programs, besides distinguished scientific leadership and planning. One possibility is that the Secretary General could select an urgent, high profile problem (e.g., Renewable Energy) and ask the President of the New York Academy of Sciences (Ellis Rubinstein) or the President of the American Association for the Advancement of Sciences (John Holdren, at Harvard) to organize an initial "Inventions Wanted . . ." series focusing on Renewable Energy inventions and breakthroughs. And, then, also address how to evaluate the project, refine the design, and use the programs to support large-scale collaboration systems.[6] Having absolutely first-rate scientific leadership will be vital, as any lapses in scientific quality or perceived politicization will kill the project.

The Priority of Topics

Re criteria that could be used to establish the priority of topics:

- the potential of a breakthrough to contribute to a solution of an urgent global problem within the purview of the UN.

- the availability of leading scientists, engineers, and mathematicians willing to be involved to develop a global briefing for other scientists.

- The potential benefits of fresh thinking and ideas drawn from across disciplinary

[5] Once underway financial support should be easy to obtain from governments, foundations, R&D-oriented multinational corporations and other sources.

[6] The New York Academy of Sciences began its Science Without Borders initiative following the recommendation of a study group chaired by Dr. Joshua Lederberg, former President of Rockefeller University, for UNESCO and WHO; he is a leading member of the NYAS; Dr. Lederberg also might be available to give advice and would be an excellent person to consult.

boundaries and from outside already-established networks of communication.

- The potential benefits of enrolling new researchers and students to explore lines of investigation that exceed the manpower currently working on the problem.

- The existence of important theoretical issues or a class of important problems for which a breakthrough would have wide impact.

Further Discussion & Examples

- It might be interested to invite R&D-oriented companies (e.g., the international automobile industry) to suggest research areas where breakthroughs and inventions would make a vital contribution - e.g., photovoltaics, synthetic fuels, battery design, plastics, pollution-free manufacturing. And to specify the inventions/performance targets they need to achieve a revolutionary impact - e.g., a 50% increase in the efficiency of fuel cells, etc. [7]

- Another example: It would be attractive to gene-splice seaweed and cash crops, thereby being able to plant the deserts, irrigate with salt water, remove the salt biologically - and make the deserts bloom. A few people are trying to do this, but everything they have invented tastes terrible . . . and by that begins a global process of scientific engagement and creative potential . . . Put it on the Internet, on the global Tuesday brownbag, and you may inspire a graduate student to do a thesis topic that solves the problem - or inspire a newly-retired Baby-Boomer scientist looking for an interesting and worthwhile project. Or discover a unique species of seaweed, known only to specialists in a remote location of

[7] While scientists may not reveal everything about their research ideas, there is a well-established quid pro quo process by which researchers engage in useful partial disclosure. With a written record and a global audience, scientific priority will be recognized by global networks of peers who know that scientist x was the first to suggest a new line of thinking. And researchers can use these colloquia & followups to advertise (implicitly) to interested viewers at R&D-oriented corporations & venture capitalists for funding of their work or for consultantships.

northern Japan, that would be an ideal candidate for experimentation.

- The next week, a Tuesday session could focus on new ideas for a breakthrough in desalinization technology.

- Another example: the possibility of tapping zero-state energy in the universe (which nobody knows how to do).

- Another example: It is typical to discuss soil chemistry by reference to inorganic chemicals - e.g., "This soil needs more nitrogen or phosphates" - and the application of chemical fertilizers to effect a change. However scientific analysis of highly fertile soils now shows that a wide range of microbes can make a contribution. One research project has recommended that a selection of 27 different microbes now might be packaged together in a nutrient solution, sprayed onto soil, multiply, enjoy a life in ecological balance, vastly enhance soil fertility, and reduce the need for commercial fertilizers to 1/3 or less.[8]

[The special excitement of such a high-visibility global colloquium - as any scientist will recognize - is that the mixture, SC27, is only a *first draft* . . . and research scientists and undergraduates, backyard inventors and venture capitalists around the world can immediately begin to use SC27 as a jumping-off point, testing how it could be improved upon for different initial soil and climate conditions, crops, and other variables.]

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[8] Initial marketing by Martin Marietta Technologies.