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To: "Dr. Baruch Fischhoff - Chair, National Academy of Sciences Study on Social & Behavioral Science and Improving Intelligence for National Security" <baruch@cmu.edu>, "Dr. Myron Gutmann - NSF Assistant Director, SBE" <mgutmann@nsf.gov>

From: Lloyd Etheredge lloyd.etheredge@policyscience.net

Subject: The Early Warning Systems chapter: Lacunae?

Dear Dr. Fischhoff and Colleagues and Assistant Director Gutmann:

I suggest that the National Academy of Sciences develop appropriate methods and include a systematic inventory of needed Early Warning Systems in your Report.

I. Rationality, the National Interest, and EWS Networks/Systems

Our National Intelligence Council/DNI, in its early public forecasting projects, was reluctant to speculate about "surprises." It focused on the most likely scenarios. Today, for \$75 billion/year, we ought to have an inventory of things to worry about, and somebody [or a network of people] with a rational (expected value?) level of funding to monitor change and sound an alarm, when an alarm is justified.

I hope that you will recommend this standard and initial tasks.

[In reality, *pace* the early NIC, it may be the less likely/more surprising scenarios that - as a class - often will be more likely. Ithiel de Sola Pool, in his famous "The Art of the Social Science Soothsayer," wrote that if there are three possible future outcomes, probabilities $A=.3$, $B=.3$, and $C=.4$, you should make two rational forecasts and bets - on C. as the most likely outcome, and that you will be wrong (since the likelihood that it will be either A or B is .6)]

[The world already does have several good Early Warning Systems for unlikely events in the physical sciences. For example: weather and climate forecasting and extreme weather/environmental events (including tsunamis); and [e.g., via CDC and WHO] global public health networks for epidemics and emerging or

re-emerging infectious diseases.] <1>

In addition to your specific list, I suggest a generic investment in spotting new forces getting underway:

II. A Generic Investment: Observatories for Social and Economic Change

I do not have an assured solution to the unexpected/surprise problem - perhaps it is logically unsolvable. However a generic investment to identify and understand new forces and reduce the rate of sudden, unexpected bad news might be for the DNI - perhaps in connection with a content analysis initiative - to recapitalize part of academic social science by networks of Observatories for Social and Economic Change. These Observatories would be funded [in the US and other locations] to permit academic researchers to observe, write about, understand, and forecast whatever the researchers find to be of interest in a changing world. Early warnings that the US government will need may begin as changes within the purview of these Observatories.

I would suggest an immediate and urgent startup of ten Observatories, with their funds to focus initially on the global economic crisis and new macro-economic/finance models; and also to develop content analysis and study political changes in response to growing economic hardship, including new UDC political instability and recruitment to youth violence. A total of 10 Observatories might be created, with several core positions and 15-20 annual slots for visiting Fellows, graduate student research, post-docs, Visiting journalists writing books, etc. About 250 FTE's in the DNI budget purview of N = 200,000. The Observatories also will receive core support to acquire data, organize online data systems and research networks (including work stations and wiki-based knowledge management in evolving areas of interest) and research travel.

After several years, following this emergency response [economics, violence, content-analysis restart], Observatories could evolve many interests. For example: 1.) Re youth cohorts: One of the interesting changes has been the hacking of US teenage action/adventure video games to swap Arab heroes into the games, fighting against American-looking invaders. Where are the markets and how rapidly are they growing? 2.) Another set of changes are theological, within Islam; 3.) Another change is the evolution of advertising with cross-over points that are suddenly leading to the erosion of print media and financial support (in all countries) for direct overseas news reporting. And there may be sudden global

shifts to "policy argument"/Fox News/yellow journalism and geo-political sensationalism getting started. . . .

I think this could be a worthwhile experiment, across the next decade. The standing assignment of these Observatories will be to study the world's communication media and other develop other sources of data (including their own funded travel and interviews) to observe, and write about, whatever is changing in the world that they find interesting and notable (including cultural changes). <2> They will begin to create and connect dots.

III. Two Specific EWS Projects

I also have two specific ideas for new global Early Warning Systems to pass along:

A.) Radiation events. While we have several national warning systems to be activated quickly by a nuclear event - a bomb or reactor accident - these systems are not yet worldwide. Many years ago I taught a MIT freshman seminar on Three Mile Island and crisis decision making: the US government had an Inter-Agency Radiological Assistance Plan for rapid inter-agency coordination, but in the new Carter White House nobody knew that there was a Radiological Emergency national plan or that there was a telephone number to call. Where do we stand, globally? Part of our domestic emergency response plan is to rush potassium iodide tablets (properly labeled, including warnings about pre-existing conditions) to populations ahead of the fallout, since radioactive iodine accumulates in the thyroid and filling-up the thyroid with potassium iodide can steeply reduce health damage, especially to children, women who are pregnant, or who might be pregnant.

With planning - and government officials in these countries who know about the plans - a couple of hours of early warning can be useful and life-saving, especially in getting supplies distributed to children across the Middle East - including in friendly countries like Jordan and Turkey and to American citizens in the region - and in other areas of the world without advanced public health communication systems.

B.) Global EHR Early Warning Systems: New Medication and Treatment Effects. When new drugs and treatments are authorized in America, they typically only have been found to be safe and statistically effective, beyond placebo, in randomized clinical trials using under-65 (younger) adult populations who are healthy

except for the condition being studied. However new drugs typically are prescribed to older populations, often with multiple conditions, and to patients who might be taking 8-10 other medications for these conditions. Thus we eventually learn - alarmingly, in the case of hormone replacement therapy for women - that there are complex interactions and the drugs have unexpected patterns of benefit and harm based on interactions that only become detectable with very large N statistical analysis of observed experience [including data, for example, re age of onset of menopause]. We also know that, for many conditions, the first prescribed drug (of several available drugs) and dosage level are unlikely to be the [ultimate] best choice. Thus, we ought to build new early alert systems: Based on global networks of large N Electronic Health Records [EHR] (and adding new genomic data, etc.), we can avoid unnecessary damage, accelerate learning, and improve the likelihood of good choices, for US citizens and worldwide.<3> And - a recommendation via the behavioral and social sciences - create strong public norms and global culture concerning shared humanitarian concerns.

Lloyd Etheredge

<1> There also are NASA-sponsored networks to look for large asteroids or other objects on a collision path with Earth.

<2> During the Cold War, in Eastern Europe and the FSU, we now know that jazz and rock-and-roll actually made a strong and attractive political argument, to several youth generations, about the humanity and nature of freedom in the West. And perhaps more directly and effectively that VOA political news alone - i.e., in an institution where cultural/entertainment programs were originally judged to be secondary. Studying the evolution of jazz in China, for example, could help to identify political opportunities as well as understand the fascinating evolutions of Chinese culture.

<3> For example, we are just learning that children with H1N1, especially with other conditions like asthma, die at a much higher rate if they are treated by the standard sequence of drugs for patients hospitalized with earlier flu infections. Even with 20+ million people already infected in the US, we are just beginning to see the (late) emergence of this early warning system. There is nothing - yet - equivalent for quick learning about new drugs and treatments, worldwide; although there are very good collaboration systems to review printed research that is delayed several years after the medical events (e.g., www.cochrane.org).

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