

Mitigating Catastrophic Risks -- Past and Future Efforts

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Permanent Monitoring Panel - Mitigation of Catastrophic Risk, World Federation of
Scientists

Annual PMP-MCR Meeting (via Zoom)

Theme: *Communicating Risk to Governments and People*

August 17, 2021 14:05-14:25 GMT

Our PMP's topics today –Mitigating Catastrophic Risk:

1. Novel Coronavirus Mitigation
2. Engineering a Resilient Infrastructure
3. Planetary Resilience from Near-Earth Objects
4. Arms Control: A Role for Joint Risk Analysis?

A bit of background of the PMP-MCR and of the four problems.

Recent experience with attempted communication in these and similar areas.

Summary and launch.

Approximate spoken text:

History of Ettore Majorana Centre: <http://www.ccsem.infn.it/ef/locations.html>

My own major involvement with catastrophic risk probably began in 1951, when I selected from existing ideas at Los Alamos for the first hydrogen bomb; it was built largely according to my design and tested successfully on November 1, 1952, at a yield of almost 11 megatons energy release – about 500 times the energy output of the nuclear weapon used against Hiroshima or Nagasaki – about 0.02 megatons each.

I moved on to other things in my summer consulting at Los Alamos, and after joining IBM in 12/52, I worked about half-time for a year (Project LAMP LIGHT) in understanding the threat posed to North America when the Soviet Union augmented its stock of nuclear weapons carried by long range bombers with thermonuclear weapons on aircraft -- and missiles. The field of arms control and assessment became a major part of my life.

Our Permanent Monitoring Panel on Mitigating Catastrophic Risk – PMP-MCR -- came about independently. In January, 1957, Leon Lederman and I at Columbia University demonstrated with the use of the pi-mu-e decay chain, that mirror symmetry did not exist in the physical world of weak interactions. We continued with experiments with polarized muons to advance knowledge of the field of elementary particles. Many then studied the chemistry and physics of condensed matter by the influence of the local environment on the now readily observable spin of the muon.

In a sabbatical year at CERN, 1958-9. Leon organized a group to further refine our knowledge of g-2 for the muon, something that even our first experiment published 02/15/57 detected and measured roughly. I assumed the leadership of the group during my own sabbatical from IBM the following year, also supported at CERN by the Ford Foundation, and among the six authors was Antonino Zichichi, who has since had a remarkable career, and not only in physics.

Our experiment was published in 1965, but unknown to me, Nino had already been hard at work in other fields and in 1962 established the Ettore Majorana Foundation and Center for Scientific Culture -- ECCSEM, in Erice Sicily. Well, not entirely unknown to me, because I was a founding member of the board.

The ECCSEM grew rapidly to be the site of many week-long courses, and Nino's restless mind pushed further, to influence not only science and its consequences, but the entire course of humanity and civilization as well. Thus I participated in three few-day seminars in August 1981, -2, and -3, "How to Prevent a Nuclear War." Among the Americans present were Edward Teller, Eugene Wigner, "Pief" Panofsky, Spurgeon Keeny, Jack Ruina, and myself. We had also eminent statesmen such as former Italian prime minister Fanfani, Solly Zuckerman from Britain, and also scientists from the Soviet Union – such as Evgeny P. Velikhov and Peter Kapitsa.

Other topics arose in ECCSEM context, including the Health of the Mediterranean and at about the time of the 09/11/2001 attack on the World Trade Center in New York, the Center turned to the question of countering terrorism. Our PMP soon split into two linked PMPs, the first tasked with understanding how to prevent the adherence of individuals to terrorist organizations, and the second, which I chaired, to mitigate the consequences of terrorist acts. The work of all in Erice was made possible by an able staff, for many years led by Claude Manoli.

Although we worked hard and provided several reports and outputs that we tried to communicate to governments and people, I doubt that we were very successful.

At the time, we did not have all the tools of modern information technology – IT. Now with IT in abundance, we have the problem of an overwhelming amount of information available – bad information, fake information, very good information, but in any case, the competition for the attention of the intended recipient, typically, someone in government service with the job of informing a person in a higher level that something needs to be done, can be done, and must be done, and how to do it. Among the topics for my PMP MTA (mitigating terrorist acts) was terrorist-induced epidemics, and we expanded this as much as we were able to include natural epidemics such as influenza.

We did this, not only because it would be valuable to reduce the annual toll of sickness and death (in the United States alone, an average of 35,000 per year from "normal" seasonal flu), but because battling seasonal flu would test and refine the techniques that we were considering and advocating for countering disease spread initially by terrorists.

Other PMPs were dealing with other matters. Here is a pointer to and an excerpt of a 2006 presentation I gave in Erice on mitigation of an epidemic.

["Conquering Pandemic Flu by Practical Measures,"](#) as adopted by the Mitigation Sub-Group of the Permanent Monitoring Panel on Terrorism of the World Federation of Scientists, Erice, Sicily, May 22, 2006. Membership of the Sub-Group on Mitigation Aspects: Dr. Diego Buriot, Dr. Kevin Clark, Professor Baruch Fischhoff, Professor Richard L. Garwin (Chairman), Professor Pervez Hoodbhoy, Dr. Sally Leivesley, Professor Ron Manley, Professor Richard Wilson.

And here is a portion of my presentation on 05/22/2006:

052106V4f Conquering Pandemic Flu by Practical Measures.doc Conquering Pandemic Flu by Practical Measures
Over the past year, much public attention has focused on pandemic influenza, such as might arise from reassortment of the Type A (H5N1) avian flu that has been spreading from Southeast Asia, but expert consensus is stronger that a flu pandemic is likely than is the judgment that it will derive from H5N1. Even a recurrence or an image of the 1917-18 H1N1 "Spanish flu" that killed some 50 million people world wide would be a disaster in the modern age of specialization and globalization, and such a pandemic that occurred in the next few years could not be much eased by available stocks of vaccine or antiviral drugs. If the pandemic had the lethality (perhaps overestimated at 50%) of the present H5N1 for which there is no evidence of human-to-human transmission, it could kill a billion people or more, but there is no reason to believe that this lethality would be preserved in the transformed virus capable of such transmission and hence pandemic behavior.

Annexes (3):

Pandemic Mitigation Factors By Population Sectors

Mitigation Factors	By Governments	By Industry	By Individuals
Hand washing or sanitization	Population education	Employee education and stock extra soap, gel	Family education and implementation
Use of masks	Population education	Employee education and stock	Family education and implementation
Reduced contact, elbow bump, cough etiquette	Population education	Employee education and practice	Family education and implementation
Accurate information	CDC/WHO data	Company intranet	-internet or media -response dependent
Modeling	Predictive modeling		
Training/practice	Plan development and implementation	Employee education and practical exercises	Family education and exercises
Air exchange rate	Building codes	Cost versus benefit	Economics
Availability of utilities	-Public versus family issue for employees -Contingency plan in place and practiced -Electricity is critical	Plan is electricity dependent	Actions dependent on availability of electricity for receipt of information and guidance
Media education and factual materials	Public service announcements	Media editor training	Family training
Police and fire protection remains operational	Public versus family issue for officials		

20 May 2006

Pandemic Mitigation Factors Chart, 20 May 06.doc Provided by Alan Leigh Moore

Buriot, DT, *Influenza Pandemic: Predictability and preparedness*, May 17, 2006

Leivesley, Sally, *Maximising pandemic survival in the community: social networks, media and public policy*, May 17, 2006

Ever since 1955 or so, I have worked with the US government to prevent nuclear war, and on defense technology and management, and since 1980 with the Committee on International Security and Arms Control -- CISAC – of the US National Academy of Sciences, specifically meeting with Soviet scientists and other individuals to understand and reduce the prospect of nuclear war. The CISAC effort was expanded in 1988 to bilateral sessions between the CISAC members and Chinese scientists and engineers who built their nuclear weapons, and both “dialogs” continue to this day – more effectively, I believe, by Zoom than in the previous in-person meetings.

WRAPPING UP

I am more involved with the current pandemic than I am with the other three topics, although I have also over the last year spent hundreds of hours in Zoom sessions with Russian colleagues on arms control and with Chinese as well.

On engineering infrastructure resilience as well as planetary defense, I have participated in these PMP sessions as well. But, fortunately, you don't need to rely on my knowledge in these fields because you will hear from the team leaders themselves.

Finally, I close with an example from my own experience of the difficulty – even opposition to – communication with governments and people, in regard to civil nuclear power. In this field there are substantial segments of government and industry who do not want a free exchange of communication among knowledgeable people, and as with Covid-19, there are barriers introduced by the existing structure and activities of organizations whose nominal function it is to handle this rapidly emerging threat. In any case, here is a pointer to my experience in the nuclear power sector, together with a portion of one slide from my 2008 presentation in Barcelona.

https://fas.org/rlg/071908_ESOF-1as.pdf

Can operators and analysts have confidence?


- **October 2003 WANO session, "... a terrible disease that originates within the organization..." and can lead to "a major accident..." that could "destroy the entire organization."**
- **Sellafield THORP shut down since April 2005**
- **Chernobyl Forum Report of September 2005 that predicts only 4000 deaths total from Chernobyl—by considering only the exposure of 60,000 person-Sv and not the 600,000 person-Sv established by the 1993 UNSCEAR report. Argue instead that the corresponding 24,000 cancer deaths are much less than those due to 10,000 GWe-yr of coal-fired plants**

[World electricity generated in 2018: 28,700 TWh, of which 38% was from coal (https://en.wikipedia.org/wiki/World_energy_supply_and_consumption). So 10,900 from coal – about 1,243 GW-yr; the “10,000 GWe-yr” in my 2006 presentation is about 8 years of world’s coal-fired electricity production.]

And now for discussion and for the more substantive part of this PMP session.

Final prepared words:

U.S. messaging re the pandemic. In early 2020 rapidly taken over by the White House so that CDC was not communicating. On March 11, 2020, CDC leader, Dr. Robert R. Redfield testified to a Committee of the U.S. House of Representatives,



01:00:07 **MR. COOPER**
ARE THERE ANY PLANS TO HAVE DRIVE-THRU TESTING IN AMERICA SO WE DO NOT PANIC EMERGENCY ROOMS WHEN PEOPLE COME IN AND COUGH?

01:00:15 **DR. REDFIELD**
NOT AT THIS TIME. I THINK WE'RE TRYING TO MAINTAIN THE RELATIONSHIP BETWEEN INDIVIDUALS AND THEIR HEALTH CARE PROVIDERS.

This shows an absence of understanding of basic numbers of telephone calls, and orders of magnitude lack of capacity of physicians (health-care providers).

But that is only a minor example of the internal lack of planning and understanding.