

Personal Experience in Advising the U.S. Government: 1956-2007+

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Moved by Harald Mueller's fine example, I will try to provide food for thought at the conference. I will not be able to achieve the level of coherence and insight that Harald has shown in his paper, but I do want to point out some differences in personal style as well as the substance of science advising. I refer to a 1992 paper¹ distributed in preparation for this conference. In turn, it refers to several other papers or chapters, especially in books initiated by William T. Golden on science advice for the U.S. President and science advice for the U.S. Congress.

In these earlier contributions I have discussed in some depth my personal experience, but only up to 1992. Since

¹ "Views on Science Advice for the U.S. Government," by R.L. Garwin in TECHNOLOGY IN SOCIETY, Vol. 14, pp. 75-89, 1992.

then, some of the previous controversies have been extended, if not resolved, and new questions have arisen. I make no excuse for the fact that most of my contributions have been in the technical field. I felt that there were substantially more people who could contribute in logical analysis and expertise in legal and policy matters, but that there were relatively few who had the experience and capability that I could bring to the table for the analysis of important technical issues. In addition to analysis, I have often managed to bring new technical approaches and opportunities to the discussion, as in the work of my PSAC—*President's Science Advisory Committee's*--Military Aircraft Panel and Naval Warfare Panel. The Naval Warfare Panel was fortunate to have Captain Elmo R. Zumwalt as its liaison with the Pentagon, and when

Admiral Zumwalt was tapped to be the chief officer of the U.S. Navy (Chief of Naval Operations-- *CNO*) following a brief tour of duty as head of the "brown water Navy" in Vietnam, he wrote me, "I am off and running on CAPTOR mines and cruise missiles." Sitting with the Panel two days each month for a year or more, and seeing things through our eyes as well as those of a U.S. Naval officer, Zumwalt was persuaded that these capabilities were important to the U.S. military. Indeed, his work on the modern cruise missile-- first developed as the Tomahawk for submarine launch and then with the encouragement of Bill Perry, Director of Defense Research and Engineering at the time, evolved to the air-launched cruise missile (*ALCM-B*)-- provided an inherently new capability to U.S. strategic forces.

Unfortunately, by that time the normal bureaucratic momentum had brought the B-1 strategic bomber program into being, which the ALCM had made largely redundant. In the strategic area, when the Air Force wanted to replace the Minuteman III 3-warhead missile with the MX 10-warhead missile (mainly because it was the largest missile allowable under the 1972 SALT agreement), defense intellectuals cast it as a necessity because of the opening of a "window of vulnerability" for the silo-based Minuteman missile. Many unsatisfactory basing modes were posed for the MX, and DDR&E Bill Perry encouraged the JASON group of consultants to the government to work on an option that we had suggested-- the basing of encapsulated

MX missiles horizontally alongside small non-nuclear submarines.

I led that study, resulting in a secret report for the Department of Defense and then in an unclassified paper that Sidney D. Drell and I published in *Technology Review*². Several new concepts are in that paper, including the use of GPS to provide better accuracy for the MX missile launched from sea within a few hundred km of U.S. shores than for the silo-based MX. And provisions were made for achieving these accuracies, even in case of all-out nuclear war with the Soviet Union.

² "Basing the MX Missile: A Better Idea," by R.L. Garwin and S.D. Drell in *TECHNOLOGY REVIEW*, May 1981.
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Other contributors in the same analytical/constructive style are Frank von Hippel with his group at Princeton University, and also Ted Postol, with his small group at MIT. We have sometimes worked together, as did Ted and I in 1999 in pushing boost-phase intercept of potential North Korean ICBMs, instead of the mid-course hit-to-kill intercept favored by the Missile Defense Agency, which is now undergoing continuous deployment and refinement at the annual cost of some \$10 B. This despite our argument that a North Korean ICBM would carry effective countermeasures from the day it first appeared in service, with those simple countermeasures-- aluminum-coated spherical balloons-- being made effective by *antisimulation* of the warhead itself. This means that instead of having *replica decoys* as does the United States for its Mark-5

reentry vehicle, in which high technology is used to provide a quickly inflatable balloon that mimics the Mark-5 RV in every detail, antisimulation involves simply packaging the RV in an aluminum-coated spherical balloon that is collapsed around the RV until the RV is liberated in space and the command given to inflate the balloon.

Ted Postol and I and nine others joined to write a 200-page report on countermeasures³, available on the web. I believe that it is only in the last year or so that MDA has decided that they will at some time need to address the countermeasures. In my briefings and writings beginning in 1999, I argued that although there were possible counters to

³ "Countermeasures," A Technical Evaluation of the Operational Effectiveness of the Planned U.S. National Missile Defense System, UCS-MIT Study, A.M. Sessler (Chair of the Study Group), J.M. Cornwall, R. Dietz, S.A. Fetter, S. Frankel, R.L. Garwin, K. Gottfried, L. Gronlund, G.N. Lewis, T.A. Postol, and D.C. Wright, April 2000.
http://www.ucsusa.org/security/CM_toc.html

these countermeasures, in practice they would be considered seriously only when MDA had judged their system to be fatally impaired by the feasible countermeasures; and then actually to counter them there would need to be a diversion of substantial resources from the system as it is deployed.

Unfortunately, even if those proposing alternatives to or alterations in the committed program have a good practical grasp of what is required, it is very difficult to obtain agreement. After all, there is, by hypothesis, an "agreed program," and once one reopens the question, there are many forces, both repulsive and attractive, that argue for various options. So it is difficult to get consensus on any one of them. Admiral Zumwalt himself felt that the

massive aircraft carrier was obsolete in view of the potential of cruise missiles, but his alternative lost out because he did not stop the routine scheduled building of aircraft carriers in order to clear the way for alternatives.

In the year 2000 the National Reconnaissance Office had its 40th anniversary and I was named one of ten Founders of National Reconnaissance. Three of us are still alive--Bill Perry, Sid Drell, and myself. In the mid-1960s, the PSAC Military Aircraft Panel that I led throughout the decade and longer argued that for the ground-attack role of aircraft, by far the greatest effectiveness would be achieved by "bombing by navigation." That is, targets would be located in a global navigation grid, and munitions would be delivered to the desired point in a global navigation grid--

that point occupied by the target to be destroyed. Moving targets could be handled by plotting and updating their trajectory in this global grid, extrapolating during the flight time of the bomb, for instance, by continued observation, taking into account that for the most part such moving targets are traveling on roads and so are constrained in two dimensions, with only the distance along the road varying with time. It was this concept as well as other utility that drove us to push very hard for the development and deployment of the Global Positioning System—*GPS*. You might imagine my dismay when in 1980 the Chief of Staff of the Air Force reprogrammed the total GPS budget of \$2 million to other uses. In 1971, as an outgrowth of the Military Aircraft Panel, I led a PSAC Air Traffic Control Panel to study and advise on civilian air traffic control for

the United States-- both domestic and international. This report strongly favored an all-satellite system that would provide the three fundamental services of navigation, position monitoring, and communication to as many as 50,000 aircraft aloft at one time. This report was actually suppressed by the Federal Aviation Administration, the Science Advisor at that time being very weak, although our canny Executive Secretary of the Panel managed to arrange for the report, although unpublished, to be made available through the National Technical Information Service-- NTIS-- where I believe it can still be ordered either on microfiche or in hard copy⁴ We have in the past week

⁴ "Improving the Nation's Air Traffic Control System," a Report of the Ad Hoc Air Traffic Control Panel of the President's Science Advisory Committee (R.L.-Garwin, Chairman), 200 pages. (Available from the NTIS as PB-240-652/8GA.).
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scanned the document so that it is available as a PDF file (large because it is an image file) on my website⁵.

Because when I joined IBM in December 1952, I had already had three summers of consulting with the U.S. government on matters of security and technology, I requested that IBM put into my employment contract that I would have 1/3 of my IBM time free to work with the U.S. government. IBM honored that commitment for the 40 years I was actively employed, and thus I was able to have great freedom in my activities with the U.S. government and never needed to look for contract support for the analyses and proposals that I was able to make from 1952 to 1993 and even to the present. The down side, however,

⁵ "Improving the Nation's Air Traffic Control System," March 1971, at www.fas.org/RLG/022407 Personal Experience in Advising_p2.doc SCIENCE ADVISING ON SECURITY ISSUES

was that I had only secretarial support at IBM-- no group, no fellows or students working with me on these matters, although I did have people obtain their Ph.D. with me in physics. I see now that one has a better legacy and perhaps even a greater output if one makes the effort to have a group at a more conventional base such as a university or a national laboratory. Or perhaps not.

Another insight from reading Harald's paper is a difference in personal style that I have noticed also in contrasting my mode of operation with those of others in the United States. I do not have a close personal relationship with any of the people whom I have advised. I did have dinner once at the home of Senator Ted Kennedy, but it came about by accident because I was on an air shuttle flight from New

York to Washington that was delayed many hours in flight--so it must have been around 1968--and my seat companion was Stephen Breyer, now a Supreme Court Justice. Through the long hours on board, we struck up a conversation and it turned out that we had a similar background in public policy. In fact, I had played a role in having the U.S. airlines required to avoid involuntary overbooking by offering compensation to those who voluntarily gave up their seats on an airplane, and ultimately having an auction to make available as many seats as there were passengers who had been confirmed and who still wanted to fly. We found this interaction interesting, and he invited me on behalf of Senator Kennedy to join them at dinner that evening, where we found the others already largely finished with theirs.

I now provide a specific example—the one topic that was made public among those considered by the State Department’s Arms Control and Nonproliferation Advisory Board, *ACNAB*, that I chaired from 1994 to 2001. In order to provide an option to the public and broadly to the US Government that we had developed over several years in the *ACNAB* sessions (two days per month) that had John Holum—ACDA director—as its audience, Holum authorized the presentation to a Committee of The National Academies on “Antipersonnel Land Mines Alternatives” of our approach⁶ to achieving the humanitarian goals of the Ottawa Convention, extending them to anti-vehicular landmines that are not controlled at all by Ottawa.

⁶ “Elimination of the Longterm Humanitarian Hazard of Stockpiled Antipersonnel Landmines” January 12, 2000.
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Perhaps it is because I have been involved in so many things and different groups that I've not been available, and also because my headquarters has been at the IBM laboratory, where I was isolated in this kind of activity, so one did not have political or executive branch personnel coming to talk to classes or to the policy-oriented groups that one finds at think tanks or universities. In addition to Ted Postol and Frank von Hippel, Sid Drell who does more in the way of policy than he does these days in technical analysis, are highly effective in their personal relations with the people who count. In recent years, Dr. Drell has been a Fellow of the Hoover Institution at Stanford University, which has a steady stream of visitors and a staff that is connected to decision-makers. Drell has also taken the initiative to have important conferences at Hoover, one of

which resulted in a recent Op-Ed in the Wall Street Journal⁷.

In summary, all I can say is that I hope that these historical facts and reflections have been worth your time. I think that what we do, in our different ways, is of critical importance, and it is my hope that the universities and institutes will be effective in strengthening such activities and the receptivity of those who are involved.

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⁷“A World Free of Nuclear Weapons” by GEORGE P. SHULTZ, WILLIAM J. PERRY, HENRY A. KISSINGER and SAM NUNN, The Wall Street Journal, January 4, 2007.