

# "Technical Realism" *or* "Political Realism" ?

André Gsponer

June 21, 2000

Dear Christopher,

Thank you very much for your prompt and extensive answer to my comments on your new report on NIF. As you have clearly understood, I would not have written these comments if two months before another report ("The decision on national missile defense") would not have been published. Both reports, as you confirm in your answer, are based on the same disarmament-lobbying strategy, which you and others consider to be the best possible considering the U.S. government system and the American political context.

My claim is that this strategy (i.e., primarily focusing on cost and technical flaws) has consistently failed in the past twenty to forty years, and that we may develop better strategies in order to achieve our goal: real progress towards genuine nuclear disarmament. In particular, we have to face the fact that we have not been able to get our MAIN MESSAGE across (to the public, the politicians, the diplomats, the scientists, etc), i.e., that ICF will lead to a new generation of nuclear weapons, that some limited BMD can be made to work, and that both will enhance rather than deter nuclear proliferation.

In my view, this is to a large extent the result of the emphasis given in the arms-control/disarmament literature to the possibility that any risky enterprise is either bad, premature, or even nonsense – in which case the conclusion is that we may just as well STOP worrying about it because sooner or later rising costs will kill it.

I think that we have to get out of this perspective, take the more cautious approach that things may work, and concentrate on the nuclear proliferation implications that most probably will not soon be part of the major conclusions of a review by the National Academy of Science (or any other officially appointed panel) on NIF, BMD, etc.

Again, I am stressing that your report is extremely valuable. But at same time I wanted to share with you my concerns with the underlying disarmament-lobbying strategy.

I am copying this reply to your answer to the twenty or so e-mail addresses that were on the announcement you sent me on June 14, and to a few more. My goal is not to open an "internet forum" on the subject (I would not have the time for that) but to give an opportunity to some of these correspondents to react to our exchange so I can get a feeling on how much I am isolated or not with regards to my ideas on how to improve our strategy towards making real progress towards nuclear disarmament.

All the best,

Andre.

*Post scriptum:*

This exchange is the continuation of a long time debate I have on the question of "disarmament-lobbying strategy", or if you prefer "technical realism" versus "political realism". In 1982, for example, I went to M.I.T. to meet with B.T. Feld and Kosta Tsipis in order to gain their support for the publication in a peer-reviewed journal of a commentary (by me and another physicist) on an article (by several M.I.T. scientists) on missile defense technology that contained several serious errors and omissions. It came as a shock to me (especially since I was a young scientist) that prominent figures of the disarmament community would claim that the technical quality of the argumentation was of secondary importance, mainly because in the US political context there was a danger that the "military techno-optimists" would say that "even the opponents agree that IT MAY WORK!" Almost twenty years later the missile defense systems that were the subject of our dispute are still under development and substantial progress has been made. Moreover, even long time critics of BMD (e.g., Richard Garwin) appear now to be in favor of the kind of "modest" missile defense systems (i.e., boost phase intercept, etc) that I and others had found to be feasible (see "US Missile Defense Goes International," International Herald Tribune, May 30, 2000). Since it is my conviction that the Department of Defense has never believed in any hundred percent perfect missile shield, the "opponents" have therefore spent most of their energy shooting at the wrong target, while behind the smoke screen the more realistic systems were progressing steadily.

*From: Christopher Paine <chrispaine@earthlink.net  
Organization: Natural Resources Defense Council  
To: "andre.gsponer" <gsponer@vtx.ch  
Subject: Re: Comments on new NRDC report on NIF*

*Dear Andre,*

*"The key point to understand is that NIF (just like SDI in the early 1980s) is much more a scientific experiment (performed with unproven technology) than an engineering project (in which proven scientific concepts are applied)."*

*Of course, you are correct, but this was not the way that LLNL and DOE and even the National Academy of Sciences described and sold the project to Congress and the public, and thus there is an "expectations gap" that can be exploited to foster opposition to the project.*

*"The only DECISIVE technical argument that could be used against the NIF would be the discovery of a fundamental scientific obstacle (which has not been found yet, despite the fact that NIF has many enemies, both within and outside the weapons labs)."*

*Andre, if "decisive" technical arguments regarding scientific feasibility are the only admissible ones, then we might as well all build giant solar collectors in our backyards to generate electricity from moonlight! That is certainly feasible, but is it sensible, rational, cost-effective? In the American political context, these kinds of arguments not only matter – they are usually the decisive ones. How much is an "ignition demonstration," with little or no net gain, worth to the taxpayer, or even to the weapons establishment, which is starting to have doubts of its own about the NIF. In 1990, the NAS rejected ignition drivers costing on the order of a billion dollars on the grounds that such machines were too costly and too great a technical risk. Now an ignition-ready NIF will cost at least \$4 billion, with unknown but presently marginal prospects for success. I am a little surprised that you would find something wrong with pointing *this* out.*

*In our system of government and political context, arguing that some fundamental technical advance – such as microfusion energy – is ultimately feasible but should be rejected solely on moral-political grounds, is the WEAKEST argument one can make. Since we already know from Halite-Centurion that x-ray driven capsule ignition and modest gain is feasible with a driver in the range of 50-100 MJ – provided very challenging problems with laser-plasma interactions at longer wavelengths could be overcome – this debate is not about the fundamental sci-*

*entific feasibility of ignition but rather about the correctness of the calculations underlying the target physics and driver engineering of the NIF, and whether the reduced target/energy scale selected for the NIF will work. Yes, no one has yet "proven" that it won't work, but there is classified experimental evidence that certainly suggests that a certain minimum scale target and absorbed energy is required to quench R-T instabilities and prevent excessive energy losses from the capsule, and that NIF looks as though it is too far down this scale.*

*Also, what is the point, really, in spending \$4 billion plus on what everyone admits will be, at best, a marginal "ignition demonstration" with a driver technology that cannot be scaled-up or adapted for IFE. In the American context, we cannot defeat the potential military applications of microfusion sources by arguing that the quest for fusion energy is inherently wrong. I don't think that argument is going to work very well in Germany or Japan either.*

*We can argue effectively that the present attempts to build such grotesquely expensive machines are technically premature and much too costly for what they will realistically be able to deliver, that there are far more fruitful areas of science and technology in which to expend scarce research funds, and that the immediate consequences of the US-French efforts will not be progress toward fusion energy, but rather a wider knowledge of TN bomb physics.*

*Thanks for writing, and I'm off to LA to research TRW's technical fraud in NMD testing. You and I will probably disagree there also. It is precisely when evidence of such serious technical difficulties and rigged tests began to surface that we finally achieved some traction on the "rogue state" NMD issue. And historically, you are way off base when you argue that technical and cost arguments have failed the arms control movement in the past. On the contrary, even a cursory reading of history will show you that technology and cost arguments were decisive in achieving the ABM Treaty, and more recently, in preventing the deployment of strategic defensive systems despite the expenditure of some \$60 billion on SDI R&D.*

*It seems to me that your desire to shift the defense and security debate to moral and political fundamentals – which I agree is where it properly belongs – is leading you to concede far too easily the feasibility of some of the technical visions offered by the military techno-optimists. While your argument that a given forward leaning technology has yet to encounter an identifiable showstopper "in principle" may be true in the abstract, this is fortunately not the criterion for allocating resources, or even establishing "feasibility," in the real world. The unique historical circumstances of the Manhattan project – a revolution in physics immediately preceding a*

*dire global struggle on an unprecedented scale — are not likely to be repeated, and thus the journey from theoretical/experimental insight to successful engineered system for any "fourth generation" weapon is likely to take far longer, and any such effort will have to compete for resources with other worthy defense and scientific objectives, providing the very kinds of openings that we have always exploited.*

*No, what you seek is a revolution in American geopolitical thought and culture, which is earnestly to be desired, but will not happen any time soon. In fact, with Helms and the other Republican primitives in control of the Senate, the pendulum has swung quite far the other way, as you know. And I don't think we can bring it back by ceding any technical ground to the "unilateralist-militarist-techno-optimists." On the contrary, when they make inflated claims, we should puncture them at every opportunity, thus undermining their credibility with the public and allowing the submerged realities of our global security predicament up to the surface of the public debate, which is what we both want.*

*Precisely because you are a scientist, I would hope that you would participate, with Postal and Garwin and the others, in this effort to deflate the claims of the military techno-optimists, and restore some sanity to the national and international debates.*

*All the best, Christopher.*

Dear Christopher,

I have read most of your report "When peer review fails: THE ROOTS OF THE NIF DEBACLE" that was attached to the e-mail announcement that you sent out on June 14, 2000.

In what follows, I am going to make a number of comments which are very similar to those I made on the recently published report "Pushing the limits: THE DECISION ON NATIONAL MISSILE DEFENSE" by Stephen Young (CRND, May 2000). In effect, in both cases, little can be said on either the technical content or the quality of the report – which are excellent. The trouble is, in both cases, that the analysis appears to be strongly influenced by the premises that (1) NIF or BMD are too expensive and (2) that NIF or BMD will never work.

While both premises might ultimately prove to be correct, and while NIF could possibly not recover from the current debacle, there is a much stronger possibility that (1) the economic argument is not relevant and (2) some downgraded or upgraded version of NIF/BMD will work. As I am strongly against the construction of NIF and of any BMD system, and because I feel that it is counterproductive to put forward arguments that could be wrong, I would like to develop my point of view and give some suggestions, hoping that you will find them useful.

Since I am a physicist, and because I have worked on the technical aspects of NIF (and BMD) since more than 20 years, let me start with the technical argument:

(a) I am convinced, (not by faith, but as a result of a study of the physics) that there is at present no fundamental scientific reason why ignition should not be possible at NIF. There are many technical difficulties, and a number of them are mentioned in your report, but they may be overcome. In particular, the main components of NIF (the world's largest optical table and target chamber) can be used for trying a vast number of options, and the 192 beam lines can be furnished with a variety of laser systems. The key point to understand is that NIF (just like SDI in the early 1980s) is much more a scientific experiment (performed with unproven technology) than an engineering project (in which proven scientific concepts are applied). The only DECISIVE technical argument that could be used against the NIF would be the discovery of a fundamental scientific obstacle (which has not been found yet, despite the fact that NIF has many enemies, both within and outside the weapons labs).

(b) Scientific peers, which may be outsiders (i.e., as you suggest, "independent academic and public interest scientists"), or which may not be aware of all technical difficulties, have generally to rely for their review on feasibility arguments based on the existence or non-existence of fundamental obstacles. In my view, the fact that NIF has passed a number of reviews shows that such obstacles have not yet

been found.

(c) History of science and technology shows that opponents using scientifically unsound arguments against plausible developments were generally wrong (aircrafts will never fly, the atomic bomb will never work, etc). Conversely, the Manhattan project was possibly the first very large scientific development ever undertaken on the main premise that there was no FUNDAMENTAL obstacle in the way. Moreover, since there was no such obstacle, the German could have made the atomic bomb before the U.S. Today, we are still very much under the influence of the success of the Manhattan project, and the U.S. still wants to remain the world leader in military technology: if the NIF is a failure, then nobody will be able to ignite a fusion target and the U.S. will remain at the top, at least for a time...

(d) It is precisely because ICF based systems such as NIF may work that the arms-control/disarmament community should be alarmed and oppose them. As you rightly say (towards the end of your list of recommendations) "a prolonged and relatively open search for ICF ignition (has implications) on the PROLIFERATION of science and technology for thermonuclear weapons." What is worse, ICF research has implications for fourth generation nuclear weapons ( <http://www.fas.org/nuke/hew/News/AnnounceReviews.html> ). Moreover, ICF research is linked to developments such as the superlaser (e.g., the LLNL "Petawatt"), which enabled a factor of one million increase in the instantaneous power of tabletop lasers, possibly the most significant advance in military technology of the past fifteen years. This increase is of the same magnitude as the factor of one million difference in energy density between chemical and nuclear energy! Today, Germany has become the prime partner of LLNL for the development of this technology (See "Science and Technology Review", March 2000, pages 3-12, <http://www.llnl.gov/str/> ).

Concerning the economic argument, which is linked to several widespread misconceptions about the "economics of scientific development", a good introduction is provided by a millennium essay published in NATURE, vol 404 (27 April 2000) page 935 by Terence Kealey: "Science grows at twice the rate of the economy – so you have to do four times as much science to get twice as rich." In other words, because of the law of diminishing returns, one necessarily has to continuously QUADRUPLE the investment in research and development if one wants to maintain the same doubling time, in economic wealth, military power, ... or laser beam energy!

Therefore, the question is not the cost of NIF, but rather the cost the U.S. is ready to pay to maintain its military lead over the other nations, as well as the cost the US may have to pay in the future by continuing to fuel the nuclear arms race instead of starting to negotiate in good faith a nuclear disarmament.

At present, there is no sign that the U.S. will stand down and come to the negotiation table. One reason for this is the lack of education of the scientific and political communities (not just in the US of course) about the dangers of an unchecked scientific and technical development. The demise of the "Office of Technology Assessment," just a few years ago, is an illustration that the current trend is not towards a rational approach to these problems. If the "Natural Resources Defense Council" is to play an effective role it cannot base its argumentation on the premises that "it may never work" or that "it is too expensive". These have been the dominant arguments in the past FORTY years against ABM/BMD/SDI/NMD/ETC, and have not been effective...

In conclusion, I would suggest a different approach. For instance, it seems to me that: (1) The more cautious path which would start from the premise that "it might work" should be taken. (2) The collaboration with fully trained active natural scientists should be expanded—Ideally, the disarmament community should be able to have its own independent expertise on key technical issues. (3) The nuclear weapons proliferation aspects, both vertical and horizontal, should be most strongly emphasized—The fact that Japan, and more recently Germany, have joined the race should not be interpreted as a proof that ICF technologies are inoffensive. (4) The collaboration with political and natural scientists from outside the U.S. should be strengthened—The implications of NIF are global. (5) Finally, and most important in the long run, the underlying problem of the mastering of the scientific and technological development process should be addressed in such a way that truly effective and durable policies for the control of armaments have a chance to emerge before it is too late—This is extremely difficult in the present political climate, which is why I think that taking the cautious path might be more productive in the short term as well.

Best regards,

Andre