The technological revolution that is promised by SDI

Last week, EIR covered the reopened debate on SDI, emanating from LaRouche's proposal. Excerpts of the 1986 Tokyo conference on SDI, including a message by LaRouche.

On April 22-23, 1986, the Fusion Energy Foundation and the Schiller Institute co-sponsored a conference in Tokyo on "The Strategic Defense Initiative: Its Scientific, Economic, and Strategic Dimensions." That conference was probably the last major international discussion of SDI to take place in a public forum, featuring U.S., Japanese, and West German scientific and strategic researchers, retired military from France and the U.S., and the Soviet embassy's attaché for science and technology. Exactly one year, less a day, after this groundbreaking conference took place, the governmental "Get LaRouche" task force shut down FEF.

The presentations and discussions in Tokyo four years ago are as relevant today as they were then. On the one hand, the SDI has been virtually a dead letter since then, as Kissinger's policy has come to dominate the U.S. administration. On the other hand, the initiatives taken by Germany's Chancellor Helmut Kohl with regard to the economic and political reunification of Germany offer the potential for the kind of economic rejuvenation which then presidential candidate Lyndon H. LaRouche envisaged as a spinoff from the development of SDI. It now appears that the Soviets are indeed considering the implications of the original LaRouche proposals in connection with the Kohl initiatives.

We have selected three excerpts from nearly 100 pages of the transcript of the conference proceedings, which illustrate how right LaRouche and his associates' were on the issue of SDI. We begin with the speech of Uwe Henke von Parpart, on the theme "The technological revolution promised by SDI," followed by LaRouche's remarks, and an exchange between Mr. Parpart and the Soviet representative.

Mr. Parpart was the director of research at the Fusion Energy Foundation, Washington, D.C., and is currently on the Scientific Advisory Board of 21st Century Science & Technology *and an editor of the quarterly* Fusion Asia.

. . . Now, what I will report to you about, at least in summary, are several studies that the Fusion Energy Foundation has carried out since 1982 on the economic impact potential of SDI. Nineteen hundred and eighty-two, of course, was the year before the SDI was announced, and the economic impact studies that the Fusion Energy Foundation carried out had a good deal to do with the ultimate decision in the United States to go ahead with the project, because one of the questions that had to be answered was: Is this not only scientifically feasible, but is it economically feasible? And I want to address myself specifically to this issue of economic feasibility, and not only what you might call microeconomic spinoffs, but macroeconomic implications.

I would also like to say here, at the beginning, that I believe that the Soviet Union is not necessarily principally concerned with the military implications of SDI. They have talked about it a great deal, and whatever they talk about a great deal is something that I find one should probably dismiss as not being the essence of the matter. What the Soviet Union has not talked about is the expected strategic-economic impact of SDI.

If you have been watching the United States, how we behaved economically during the 1970s, and watched this from the Soviet standpoint, you probably would have been very, very happy indeed. Because without any external threat, we managed to damage our economy in the United States to such an extent, that the United States manufacturing sector managed no average productivity gain in the entire period between 1972 and 1982. This is a very important thing to understand. We have had some productivity gains in the economy overall, but almost all of those have come from agriculture and not from the manufacturing sector.

Incidentally, to my mind, that is the real problem of U.S.-Japan economic relations. The reason why Japan has a trade surplus is that our own manufacturing sector is not competitive in productivity with the Japanese production sectors—not for any other reason.

Everything else, and this is just an aside, is so much nonsense and fog and smoke, but not the reality. And also as an aside, if I may make one brief statement on this: The idea that the United States is now recommending that you change *your* economic policy in the way *we* did in the 1970s, strikes me as patently absurd. Unless you simply want to travel down the same road that we did, please do not take this advice.

Now, as I said, I believe that the Soviet Union is more worried in a certain sense about the economic impact potential of SDI than about the military potential. There is every indication that if we can bring these new technologies online in the reasonably near future, and if we simultaneously can get collaboration between the United States, Japan, and Western Europe, then we will have a dramatic advantage over the Soviet Union in economic-strategic terms, because our economies are quite capable of transferring military research into applications in the civilian economies.

By the very structure of the Soviet economy, they are almost entirely incapable of doing that. The Soviet Union is capable of copying certain military technologies and developing, for example, an almost perfect replica of the F-16 fighter in a relatively short period of time. However, these developments in their military production sector, which are under the control of the GRU (military intelligence), do not usually even so slightly benefit the civilian sector.

In our economies—in the United States, in Japan, and in Western Europe—there is no significant distinction between civilian and military research. Yes, I know that officially there is in Japan, and I know officially there is in Europe, and officially there is in the United States, but if TRW produces something for military purposes, the same engineers will be thinking about civilian applications, and what is true for TRW is true for Mitsubishi.

So, I think we have the capability of technology transfer from military research to civilian research, and the Soviet Union has tremendous difficulties with that. So, their greatest fear must be that if we collaborate in SDI research and development, they will be left far, far behind in overall economic advance during the next decade. The strategic implications of that will be enormous.

The most important strategic thing that could happen in the world today is if the U.S. economy recovers in depth. I don't mean the kind of phony recovery we have had over the last three or four years. Right now, we are simply financing our recovery by extracting capital from the developing sector, which is an extraordinarily strange thing: that the world's largest economy should have become a net capital importer from the developing world. This must be reversed. But if we can revive productivity in the United States, the strategic long-term implications of that will go well beyond any specific military matters that we could be discussing here.

A tenfold productivity increase

Now, in light of this, I would like to also say another brief thing. I was asked recently by a Japanese economic journalist . . . about market demand. I said, "Well, let me ask you a question. If I had asked you in the year 1960: What is going to be the market demand for semiconductor-based products, what would you have said?" And then he laughed, and said, "Well, of course, I would have vastly underestimated this."

The same thing is true for SDI. We cannot predict what will be the market demand. The only thing we can predict, is that the type of technologies and scientific advances now being discussed have the potential of improving average productivities in industrial production about tenfold—that is to say, by about 1,000%. We investigated in our work a very large range of new SDI-implied technologies, and the average productivity gains of introducing these technologies into the production process, ranging from high-energy lasers, to laser welding, to new materials, new structures, new propulsion systems, etc. There was not a single case in which at least a fivefold productivity increase was not realized.

Now please consider that in macroeconomic terms. Any country that realizes a 5-10% annual productivity increase considers itself very, very happy indeed today. If we could get 500-1,000% increases over a 10-year period, this would be the most massive productivity push in industry that we have experienced in the post-World War II period. . . .

The return on research

Now, let me give you some simple and interesting figures which, if you are not aware of them as yet, may at least give you some indications of what SDI implies. . . . But these are essentially the SDI research budget projections as they exist right now. The total for 1985 was about $1.3 billion; 1986, including certain elements of ballistic missile defense not covered by the research budget, gives you $3.7 billion; and then essentially you will be scaling up, by about $1.5 billion every year, so that a total of $32 billion in constant 1986 dollars will be reached by the year 1990.

Now, in 1974, some economic analysts in the United States were asked by NASA to make some estimates of the return on research money that NASA has spent. That is to say, what was the relationship for every research dollar spent by NASA in terms of return to the civilian economy. The estimate ranged between $14 for $1 in research, all the way up to $23. But let's just take the lower figure. Then, the research impact of SDI, if you multiply $32 billion by 14, will give you about $450 billion in overall benefit returnable to the economy, if SDI is successful at a level of productivity enhancement similar to NASA. Since the SDI program is much broader than the space program, and since it implies a much larger variety of different technologies, I think there is absolutely no question that the multiplier 14 is going to turn out to be a relatively conservative estimate. So that gives you at least a general idea of what is involved.

Now, the other point is this: We know historically that the relationship between research and development, and procurement cost in military matters, is about 1 to 20; that is to say, for every dollar that the Defense Department spends on research, if the weapons system gets developed, you will spend about $20 for procurement. So that would give us a very rough estimate of what the total deployment cost of SDI would be after 1990—that is, roughly in the range of $500-600 billion. We may say it's going to be less, it may be somewhat more, but basically if you want any estimate at all that makes sense, I would say $500 billion overall is a reasonable assumption. So, that is the simple financial scope of SDI.

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The present top 10 SDI contractors in the United States are: Boeing, Lockheed, McDonnell Douglas, LTV, Teledyne, Rockwell International, TRW, Hughes, Avco, and Litton. The contract total for 1983-84 was $1.5 billion. I don't think there is a single surprise there. Even if you did not know it, you could have guessed it. But it makes the point that I made before: All of these companies, of course, are also massively involved in civilian research and development, and the internal transfer of technologies form the defense side to the civilian side is something that can happen very rapidly and very readily.

Technology spinoffs

Now, in order to assure that technology transfer from the military to the civilian sector in SDI does occur, as Mr. Zondervan pointed out this morning, the SDI Office has created a special office for innovative science and technologies. The specific areas of research are listed here, and the reason I put up this list, is to give you a sense of the scope of SDI research.

1) Reliability of electronics: This means, for example, fully self-correcting chips and circuits.

2) Nonlinear optics: beam combination, phase conjugation technologies, investigation of penetration of beams through the atmosphere, which in turn will give us interesting insights into atmospheric science itself.

3) Short and ultra-short wavelength lasers and free electron lasers: As pointed out before, the x-ray laser is not necessarily pumped by nuclear explosive devices, but can be pumped by a different laser, by a more conventional type of laser. And probably the major advances in biological and especially in cancer and related research that we will get by being able to use x-ray holography will allow us to actually look at the living cell; we will not have to kill biological cells any longer in order to investigate them. This will be dramatic, and will probably foreshadow some of the most dramatic advances ever in biological research.

4) Advanced accelerators.

5) Power sources.

6) Advanced materials and structures.

7) Energy-materials interaction.

Let me focus on points six and seven. These different materials composites that are being investigated by SDI, in just two or three years of research have produced new results which nobody was able to predict, even a short time ago. But most important, we are now testing these materials under very, very extreme conditions. That is to say, we take any new advanced material and we are hitting it with a high-power laser or a particle beam, rather than ordinary stress testing. And we are learning enormous amounts about new materials. You saw Mr. Zondervan this morning show the Titan booster that was hit by a laser—a very small laser, not very powerful. Every scientist who observed that experiment was absolutely astonished by the effect. It was expected that the laser might burn a hole, that it might produce a crack. Nobody had expected, however, that the laser would actually explode the booster; it was a totally unexpected effect. It shows you that, when we are testing new materials in this extreme environment, we will be able to make advances that had not been expected.

Most likely we will, in a very short time, have new types of materials which will permit the construction of self-supporting airframes—we will no longer have to put sticks into the wings. And the advances in aircraft technology that could be gotten from that are extremely significant—they might reduce the cost of airplane construction by more than 50%.

8) Survivability, hardening: "Hardening" is a very interesting point, because it addresses the question of building engines, various kinds of engines; not only for spacecraft, but engines for an ordinary automobile, that may possibly be surface-hardened without having to do hardening of the entire cylinder or the cylinder head. There are major advances possible in this field.

9) Ultra-high-speed computing: I think the most interesting ideas and concepts here will be in optical computing for which Bell Laboratories and other laboratories in the United

States now have major SDI contracts. To give you an idea, we are talking about, even the moderate range of SDI, about 5 giga-ops [operations per second], for those of you to whom that means something. And in overall battle-management, on some occasions, we might have to go up to 1,000 giga-ops, so the advances in computing speed and in necessary associated software architectures required are major, if they do occur, obviously the economic implications are almost entirely impossible to estimate.

In 1984, there are 4,800 scientists directly employed in SDI-related work. By 1987, this figure will have grown almost fourfold to 19,000. By 1990, it will again increase three times; and during the actual deployment phase, we will probably have at least 160,000 scientists and engineers involved in SDI-related work. This would be almost double the number of scientists and engineers involved in the Apollo project at its high point in 1966.

So, not only are there new technologies, new materials, and new computers to be gained from SDI, but, if you will, also new scientists, new people, and new talent. And in the long run, that is more important than any specific scientific advance, or new gadget that we could create.

Historical models

In order to test our ideas, we looked at the U.S. war economy between 1942 and 1945. . . . We looked at overall productivity in terms of the relationship of output to unit labor input in totals. In the initial period of the war, when the United States primarily resupplied Britain but was not itself involved in the European side of the war, no new technologies were being introduced into military production. Under those conditions, productivity in the relevant production sectors actually went down. The reason is relatively simple: We tried at that point to produce many things very quickly with inadequate means. We put a lot of people to work on military production, but did not give them adequate tools to actually carry out the job. However, by 1942, certain entirely new technologies and methods were being used for military production. And the productivity gains that the U.S. economy made, especially in the course of 1943-44, were absolutely astonishing, outdistancing anything, at least in recorded U.S. economic history. Of course, this was under very special wartime conditions, and you may have to correct for this, but basically it gives you a sense of what happens when you retool in depth in economic infrastructure. . . . Until 1942, we were actually still at a level of productivity growth that was below breakeven. Right after that, productivity increased at a very rapidly increasing exponential rate. Without going into the details of our study of SDI-implied technologies and their productivity impact, something quite similar to these types of productivity gains are very much implied by what SDI is actually all about. This is what I think we should all reflect upon when we're discussing economic and technical collaboration in the SDI context.

Some SDI projects

Now, I want to run through a series of relevant technologies very quickly to show you some of the major points.

Taking the years from 1850 and, let us say, the year 2000, you will be struck by what interesting wavelengths of the electromagnetic spectrum industry characteristically operated on. Until very recently, we basically used only the infrared range of the spectrum: We will be able to concentrate energy better for production. That is the major thing implied by all of this. Or to put it differently, we will reach higher energy-flux density, more energy per unit time and per unit area. That is all that productivity ultimately is about: How can we use energy and concentrate it in order to make production more efficient?

The Shiva laser at Lawrence Livermore is going to be used to attempt to produce commercial energy from thermonuclear micro-explosions. A similar program—and in fact by now, a larger program, as Professor Cox pointed out earlier—is now actually under development at Osaka Laser Engineering Laboratory. But fusion energy, obviously, as you all know, is ultimately the principal energy source that we will have to count on on this planet, maybe not tomorrow, maybe not even 10 years from now, it's not all that important. But clearly, the beam developments in SDI will speed up the time when so-called inertial fusion is going to come on-line.

In the process, we will be bringing on-line things like flexible laser-based machine-tool stations. I don't think I have to explain too much about this to this audience. These kinds of devices are now under development in Japan. We can only expect that lasers, especially high-energy lasers, will become a lot cheaper to produce and a lot more readily available, and better understood in the near future, so that these developments can proceed.

A laser built by, I believe, Avco Laboratory, is now used for production metal-cutting. Again, nothing particularly new. The interesting thing in SDI is materials-energy interaction studies: We're learning a tremendous amount about what is actually the best way of using lasers, especially with very hard materials.

We will also be introducing a plasma steel-making furnace, in which you can produce in a few seconds the amount of steel that normally would take several hours to produce. Especially for specialty steels, this is very important, and again, it is now being pursued in the context of SDI, precisely in order to produce certain types of specialty steels that cannot be easily produced otherwise.

As was indicated earlier, we might be able to drive an x-ray laser, not with a nuclear explosion, but perhaps with a small fusion reactor. The SDI Office has given out about 20 contracts to universities and other laboratories for the development of very compact fusion devices.

The Soviets some years ago developed a concept for a magnetohydrodynamic power generator based on thermonuclear reactions. This was published at that time by E.P. Velikhov, a top Soviet laser and fusion researcher, who is now one of the people in the Soviet Union who goes around the world and says that SDI is not scientifically feasible. Thank you very much, Mr. Velikhov.

In fact, I will relate a brief story which is interesting. I was at a fusion conference in Leningrad in the summer of 1981, and then visited the Lebedev Laboratory in Moscow, where they do a lot of their laser research. In the evening, I had dinner, I was invited by some Soviet scientists—I think I should perhaps not name names—but in any case, they told me over dinner, "Look, wouldn't it be a great idea to use lasers for ballistic missile defense?" This was in August 1981. And I looked at them, and thought, "Yes, probably it's a good idea, we better think about it fast." So, Soviet scientists have been thinking about this without any question in more detail and with more precision than we have in the United States for a longer period of time. Anybody who doubts that, should simply question some of your own scientists and ask them what Soviet scientists know about that from their own standpoint in scientific conferences.

One aspect of magnetohydrodynamic devices is so-called super-capacitors: Capacitors today can store about 100 joules per kilogram. SDI has now demonstrated capacitors that can store up to 20,000 joules per kilogram, so you can see energy storage is going to make some major steps forward. What that means for industry again, I think I do not have to elaborate.

New materials are being used for rocket nozzles that are flexible and can be moved in order, for example, to withstand very concentrated energies, and be used to move a battle station around.

A new type of gyroscope has been developed to replace the present type of gyroscope, based on fiber optics. This, of course, is another area in which, in fact, Japanese industry has a significant lead over other world industries, in fiber optics—not specifically with regard to gyroscopes. In fact, your space agency doesn't like gyroscopes, because there are some people who say that if you put a gyroscope in somewhere, it might be used for military applications.

I cannot go into more details, but I think it should be clear that what is implied in economic and technical terms by SDI research is broader than any similar research program in the past. Therefore, quite apart from all specifics, to jump into this at this point, I think is the right thing to do. More importantly, I would like to emphasize that there have been some people in our government who have themselves questions whether SDI might survive the Reagan administration. I think if you see the kind of research that is now going on, the kind of efforts that are now being made, it doesn't ultimately matter what happens after the Reagan administration. On these kinds of programs, I do not think there is any way of turning back.

LaRouche's 1982 SDI proposal

Lyndon LaRouche conveyed his thoughts in writing to the participants at the Tokyo conference.

Twenty-four years ago, Soviet Marshal V.D. Sokolovsky wrote his shrewd insight into the flaws of the U.S. ballistic missile defense program then being developed. He foresaw that high-speed interceptor rockets and related kinds of so-called kinetic-energy weapons could never provide an effective defense against offensive ballistic missiles. He foresaw that only by using what we described then as advanced physical principles, such as laser weapons, could defense obtain the superiorities in firepower and mobility needed to supersaturate a strategic thermonuclear offense.

It is a matter of physics principles and therefore, also valid for the United States, that a strategic defense based upon what are called new physical principles, will have at least a 10 to 1 superiority in firepower, mobility, and cost over a ballistic missile offense.

Many techniques for deploying beam weapons have been discussed, including the techniques of strategic defense which my associates and I first proposed in 1982. During my discussions with French military officials in 1982, those officials asked me if it were not true that what I was really proposing was not any single set of defense systems, but rather that I was projecting very high rates of technological attrition in defensive systems over the decade ahead. I responded that the French military's assessment of my proposal was correct. As rapidly as one set of defense weapon systems is deployed, work will begin to develop effective countermeasures against such systems. To overcome those countermeasures, improved defensive systems must be deployed.

The most critical feature of my 1982 proposal for a U.S. strategic defense initiative was my assessment of the economic feasibility of sustaining the costs of such a defense policy. A few, but not most of the military features of my proposal, were original to me. The Soviets have been committed to their own version of SDI since 1962. So, if we pursue SDI we can therefore concentrate on the economic benefits to our economies.

The starting point of my economic analysis is not unfamiliar to Japan. My standpoint is broadly identical to that of such exponents of the American System of political-economy