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Introduction:

There are some fields of science and technology that require specialized facilities to make effective progress at their respective frontiers. For historical reasons some of those facilities have been conceived, built, and operated by the Atomic Energy Commission and its successor agencies, the Energy Research and Development Administration and the Department of Energy. These facilities have included particle accelerators, nuclear reactors, synchrotron light sources, high performance super computers, etc. Each of these facilities and programs were key to the advancement of goals of these agencies and at the same time advanced the state of the art in many fields of science and technology.

As director of the Office of Energy Research (OER) from 1981 to 1987, I was an *ex officio* member of the Department of Energy's (DOE) Budget Review Committee (BRC). Undersecretary Joe Salgado chaired this committee during President Reagan's second term. At one BRC meeting Salgado expressed concern that the unplanned cost growth for securing nuclear materials and for environmental considerations was going to make it difficult to fund some of the regular departmental mission programs and projects. These costs had grown from around \$100 million to around \$1 billion without being in the out-year budget target. That meant these costs had to be absorbed out of existing programs and projects. Some of these would come out of budgets for the Office of Energy Research. I was very distressed and said that if we kept on the present trajectory we would end up with a collection of laboratories and facilities at which everything was secure, everything was cleaned up, and no body was doing anything useful. Following my intemperate outburst, there was a long pause – a really uncomfortable moment of silence. Then Salgado asked what I had in mind? I said that in addition to all of security and clean-up work, we needed a scientific facilities revitalization plan for the energy research labs. OK, he said, "Just what did I propose?" I blurted out that we should put new synchrotron light sources at Berkeley and at Argonne, a relativistic heavy ion collider at Brookhaven, and an advanced neutron source at Oak Ridge National Laboratory. I am not sure that I accurately recall what happened next, but we did go back to complete the budget decisions before us. Salgado asked me to meet with him in a few days to explain why I shouldn't be fired.

Four projects are born:

At that meeting, Salgado asked me to meet with someone in the Office of Management and Budget (OMB) and some members of the Congress to learn what they thought about such a program. Much to my pleasant surprise, almost everyone I talked with had the same message. Namely that it was about time the Department did some sensible long-range planning of this sort. One of the features would be that the annual appropriated funds for these projects would be constant during the time that were being constructed by staggering their start dates appropriately. With those two bridges crossed, the next step was to involve the directors of the four laboratories – Berkeley, Argonne, Oak Ridge and Brookhaven. I invited the respective directors to Washington to explain what I had done and what I expected them to do. I told them that we were prepared to proceed with the four facilities in an ordered and orderly fashion. Berkeley would be first and Oak Ridge was to be last. I told them that the key to making this work was that they agree to the plan and that they support each other's proposal as if the facility in question were to be built at their laboratory.

What is amazing is that this born-of-frustration plan almost worked as conceived. In fact three out of the four projects went ahead as originally planned. They had their challenges and problems, but to the best of my knowledge they are all producing results consistent with their intended purposes. The one that didn't go as planned was the Advance Neutron Source at Oak Ridge, which was to be a substantial upgrade to the High Flux Isotope Reactor - from 100 Megawatts to about 300 Megawatts. And even then, the ANS be morphed into the Spallation Neutron Source (SNS) that is nearing completion.

Superconducting Super Collider:

Of course not everything works out as planned or hoped. The SSC was another major focus of attention for me. To get it started, it was necessary to close down Isabelle at Brookhaven, which was one of my most painful experiences as director. The funds recovered from the close down were used to get the SSC started. Eventually about \$100 million went into a design that resulted in an estimated cost of \$4.4 billion. This was the amount that used in my presentation to President Reagan at a Cabinet meeting on January 26, 1986. After listening to the pros and cons of the proposed plan to build the SSC, the President took out a card and read the following that he said was read to Kenny Stabler during the time that he was quarterback for the Oakland Raiders football team.

*I would rather be ashes than dust*

*I would rather that my spark*

*Should burn out in a brilliant blaze*

*Than it should be stifled in dry rot*

*I would rather be a superb meteor  
Every atom of me in magnificent glow  
Than a sleepy and permanent planet*

The President said that Kenny was asked the significance of this thought, and that Kenny replied that it means, “Throw Deep.”

We all laughed, the President left the cabinet room, but by this story he telegraphed his intention to approve the project at about \$4.5 billion. The next morning he approved the decision memorandum. Not a bad day at all.

Unfortunately the SSC was not built. This shattered the lives and dreams of many friends and colleagues. There are many technical reasons given for its demise. I am sure that they contributed to its ultimate termination, but there may be a more relevant political reason for its termination.

A couple of years ago, I was told about a conversation between the Governor of Texas, the Honorable Ann Richards, and President Clinton early in his administration. He asked her if she wanted to fight for the SSC. She said no. That meant it would no longer an administration imperative, meaning that DOE would not put it at the top of its priority list and thus, that the SSC was most likely doomed.

I devoted several years of my life helping the SSC get funded. I remain disappointed and regard its termination as a major scientific tragedy. Furthermore, I also suffered more directly in that the termination of the SSC resulted in the collateral damage of losing the ANS at Oak Ridge.

What is the take away lesson from the SSC experience? George Santayana wrote, “Those who cannot remember the past are condemned to repeat it.”