**COMMENTS ON "A PRAGMATIC GOVERNMENT APPROACH TO TECHNOLOGICAL INNOVATION"**

- Philip Speser, J.D., Ph.D -

I share the view that a new initiative in this area is appropriate and believe that your proposal provides an insightful focus for discussion over such an initiative. Although I do have some substantive critiques to offer, our critique of specific aspects, should be taken as reflecting different perspectives and concerns on various issues, not as overall substantive disagreement.

Legislation should be drafted to address specific human needs. Unless these needs are clearly identified, it is impossible to assess whether the legislative approach is appropriate. Goals such as increasing technology transfer, stimulating innovation, or optimalizing utilization of human resources are meaningful only in the context of more basic everyday human needs.

Innovation is neither good nor bad per se. Its "normative" features reflect the consequences innovation has for the lives of people. In order to adequately discuss initiatives designed to encourage innovation, it is necessary to specify the criteria by which innovations will be evaluated.

Insofar as innovation better enables us to meet our goals, it should be encouraged. It is through their impact on our lives that the problems identified in the paper are important. In order to better highlight the relation between problems, solutions, and the ability of the solutions to facilitate our ability to accomplish our goals, we would recommend reorganizing the paper.

The key question for the introduction is: What problems make a new organization necessary? This question must be answered in such a manner as to stimulate the excitement associated with a great adventure, yet without raising fears of establishing a new bureaucracy.

The first part of the answer should be why legislation is needed. As your proposal indicates, is that the Federal government has yet to implement a highly efficient means for stimulating civilian sector technological innovation. Innovation cannot be addressed as a purely technical, purely organizational, nor as a purely financial problem. It is all of these, as well as a management/human relations problem. An initiative to stimulate innovation requires attention to all of these elements in a cohesive and systematic manner. Further, an initiative to stimulate innovation requires sensitivity to **all** parties involved in innovation--from individual inventors to engineers, scientists, technicians, and laborers to universities, technical schools, community colleges, companies, and unions to Federal, State, and Local governments and their agencies to the ultimate consumers of innovative products.

The Federal government has failed to develop a focus for systematically and cohesively addressing the problem of innovation. In order to do so, the second part of the answer should provide clear goals or criteria for the initiative. The current draft begins with objectives such as increasing technology transfer, but fails to ground these in more basic human needs.

I suggested the following criteria for high-tech programs during testimony

on S. 881 before the Senate Small Business Subcommittee on Innovation and Technology. I believe they are appropriate for this initiative as well.

> "We need new technologies which will make our workplaces safer and healthier both for those who work in them and those who live by them. We need new technologies which will provide meaningful and satisfying employment. And we need new technologies which will provide new, high quality, useful, and inexpensive products."

Such an introduction could set up the need for an innovative response to the problems facing innovation. The description of the problems should place more emphasis on the "systemic" and integrated character of the discrete problems. Otherwise why establish to a new entity? It would suffice to implement a variety of new programs in the various agencies.

What is called for, and what we believe the proposal is a good first step towards, is a modest, carefully designed experiment in the stimulation of innovation. As the entire Federal government is the field in which this experiment must take place, this experiment must be designed in a way that does not disrupt the on-going vital activities of agencies and is not skewed by the particular missions and on-going activities of those agencies. Thus, the experiment should take place outside of the existing agencies. As the experiment should be designed to provide a long-need means for the exercise of Presidential leadership in stimulating Federal activities in support of socially-responsible innovation, it is appropriate that an independent office reporting to the President, Congress, and its Board be established.

Two models are particularly helpful in conceptualizing such an entity. The National Academy of Science, the National Academy of Engineering, the Institute of Medicine and the National Research Council are one model; the National Institute of Building Sciences is the other. In both these cases, a research and policy/program development entity is governed by a Board. Membership on the Board is considered an honor. The entities, particularly the Academies, are very high visibility. These are traits that research indicates are important for successul implementation of organizational innovations.

A small, experimental Institute can explore alternative approaches to the Federal stimulation of socially-responsible innovation in a manner that existing, large, bureaucratic agencies cannot. The basic components of such an office are outlined in your proposal. However, whereas the proposal organizes these components into directorates and divisions, we would suggest a much more flexible organization. Whether this specific organization is adopted or not is not the crucial issue. The crucial issue is to move away from emphasizing a "new agency" to something more modest and to more fully explore innovative organizational designs for this Institute.

The goals and criteria under which this Institute would function, of course, must be applied by someone. It would be both theoretically and politically unwise to defer to experts for such judgements. We know enough to know we must improve the Federal effort to stimulate innovation, yet given the current state of our knowledge about how best to stimulate socially responsible innovation, we would be foolhardy to initiate even

minor government reorganizations which relied soley on expert opinion. The collaboration and participation of **all** parties (see the list above) is required in order to develop our knowledge about the innovation process and how the government might best stimulate it. Accordingly, I suggest that the Board presented in your proposal be expanded to include **all** stakeholders and given the responsiblity for ensuring the organizations activities are in accordance with the goals established in the legislation.

One possible mode of organization is: a single Director for the Institute would be appointed by the President. He/she would oversee both a matrix and a non-matrix side of the Institute. On the matrix side, he/she would be assisted by five types of staff (research specialists, project specialists, portfolio specialists, information specialists, and administrative specialists). Such functions (mentioned in the proposal) as research and policy analysis at the request of the President, the Interagency Coordinating Council, and NTIS would constitute the non-matrix side. (We would include all of NTIS, and place greater emphasis on functions such as tracking and reporting of scientific and technological developments regardless of their country of origin and regardless of whether they occur in the private, public, or academic sectors.

We would define the jobs of specialists on the matrix side as follows: Research specialists would conduct or supervise basic research on innovation and do program evaluation. Project specialists would coordinate multi-performer experiments (university-industry centers, process technology research, etc.). Portfolio specialists would be appointed for limited terms (on the NSF program manager model for the scientific disciplines) from persons active in stakeholder groups and would have a fixed budget to distribute to participants in the projects developed by the the Institute. Information specialists would provide information and technology transfer. Administrative specialists would handle the details of efficient operation.

The matrix part of the Institute would organize itself into teams (for all matrix-utilizing functions) comprised of all five types of specialists. The specific operational activities, found in the proposal would re-emerge as possible activities of the office, not legislated, mandated activities. However, the legislation would specify transfer of program personnel and budgets from currently existing Federal programs as specified in the proposal. This procedure would facilitate cross-fertilization and learning curve advantages based upon previous experience. For each program transferred a specific need and the reasons why the program addresses the need would be included in the proposal. A cap of 50 persons for the staff and a Federal appropriations cap of $100 million per year would be established for these activities. Additional funds could be raised by the Institute through royalties (see below).

The other part of the Institute would provide it with an information/technology transfer mechanism. In order to facilitate access, it is appropriate that this part be more structured. In addition to dissemination via print, electronic, etc. mediums through NTIS and your proposed regional information centers, great emphasis should be placed on face-to-face transfer through the technology extension centers, conferences on the model of the NSF's HIGH TECH '83 and '84, and the Interagency Coordinating Council. Research strongly suggests personal contact is one of

the most effective transfer mechanism. As with the matrix part of the Institute, the staff and budget for these functions would initially be from transferred resources. No appropriation cap should be set on these functions, as policy considerations may make greater dissemination efforts important and the hope of funding will encourage participation by constituency groups. Funds could also be raised through user fees (see below).

Each year, the staff specialists on the matrix-side would develop proposals for new projects or for the continuation of on-going projects requiring in-house re-authorization. Staff assignment to projects would be made by the Director. Project teams would combine all types of specialists. These proposals, after review by the Director, would be presented to the Board for ranking and approval.

The Board would be authorized to set royalty rates which would apply in case office-funded projects seeking to encourage development of commercially successful innovations, thus providing a pay-back or "user fee" mechanism. The Board could also establish requirements for matching funds, taking into account the ability various potential participants to provide matching funds. (Small firms or independent inventors lack the discretionary income found in larger firms.)

Such a structure would be compatible with a highly flexible, small organization. Thus, it would be able to adapt as it explored various alternatives to stimulating civilian sector innovation.

Such a structure is likely to find support among constituency groups. Preliminary examination of empirical research we are currently conducting suggests that it is possible to design an initiative which would be attractive to all of these parties. It appears that consensus is likely on the utility of high-level, multi-sector panels. Even the popular literature is full of calls for forums or new partnerships bringing together all the parties active in innovation.

Forums are not enough. Our preliminary examination suggests that there is also agreement over the importance of leveraging mechanisms which would provide the power needed to catalyze innovation. Such mechanisms would be the provision of funding for targeted basic and advanced applied research on all aspects of innovation (including the innovation process itself) and for the establishment of experimental cooperative ventures and technology transfer mechanisms.

Your proposal should generate the excitement appropriate for a great historic effort. We believe that it is helpful to play up the important contributions that technological innovation can make to accomplishing the Constitutional objective of promoting the general Welfare." High-tech does stimulate excitement. Give examples of dramatic breakthroughs which have come with government aid and of breakthroughs we can anticipate if we are efficient in stimulating innovation. High-tech also encourages dreams. Given some idea of the kind of society which can emerge, i.e. meaningful jobs, elimination of drudgery, life-long learning, a 30 hr. work week, whatever. Also raise the other side, the consequences of not keeping up with foreign competition, etc.

The proposal should indicate that a new initiative is long overdue. Research strongly confirms that Federal government activities have a major impact on innovation rates and the character of innovations. Research also indicates that government activities are less apt to stimulate spin-off economic benefits in the past. We believe that some indication of the existence of a substantial body of literature is appropriate. It should be clear that the Senator is not engaged in "blue sky" dreaming but in a responsible and responsive reaction to "scientific" and "popular" insights.

We are at a crossroads. Either we continue as we are -- a solution which seems to please no-one -- or we explore new approaches. Your proposal can be developed into a modest, yet historically significant one which will enable us to do just that without increasing the Federal deficit or establishing any new regulatory burdens on our emerging national innovation system.