Session III: What makes sense for a multidisciplinary center

Brief opening remarks for the final session of the January 29, 2004 NRC workshop on University Research Centers of Excellence on Homeland Security

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I've been asked…

…by the organizers to make a few opening remarks to kick off this third session which is intended to develop an understanding of what makes some of the ideas that have been suggested in Sessions I and II more appropriate for university-based research programs than others.

Specifically, I've been asked to say a few words about "special features of university research that supports public policy."

I presume…

…that I've been assigned this task because since 1977 I have been Head of the Department of Engineering and Public Policy (EPP) in the Engineering College at Carnegie Mellon.

EPP addresses policy problems in which the technical details are of central importance.

- Joint faculty appointments with all five traditional engineering departments and four social science units in three other colleges.
- BS double majors with 5 traditional engineering departments and CS.
- Ph.D. for technical people to pursue policy research careers.
- Research in energy and environmental systems, IT and telecommunication policy; health safety and environmental risks; technology policy including management of technical innovation; domestic security aspects of engineered civil systems.
- Address these problems in the developed world and in China, India, and Brazil.

There are a number of similar engineering-based efforts, including:

The Engineering Systems Division
TPP/TMP at MIT

The Department of Management Science and Engineering at Stanford

The Energy and Resources Group at U.C. Berkeley

The Department of Systems and Information Engineering at University of Virginia

…and a few others. There are also a number of management- and social science-based efforts.

One common feature of all the successful programs…

…is that each has evolved in a way that is a strong function of the local culture and institutional realities. Several of the programs that have failed did not adequately consider the importance of tuning the program design to local circumstances.

Insight 1: One size will not fit all. Programs that are stable and successful in the long run must be shaped to be compatible with their local instructional setting.

Academic institutions…

…are very good at talking the interdisciplinary talk when there is money to be had. Too often, however, once the money is in hand, and especially once the money begins to go away, individual investigators and departments revert to their normal set of activities.

Insight 2: It takes many years to build a successful interdisciplinary research group. People have to learn each other's vocabularies, literatures, styles of thought, etc. "Repeat play" is essential.

Those involved in evaluating proposals for interdisciplinary research centers should look for key indicators of past success - such as a track record of joint publication among the investigators.

There are two basic models…

…for interdisciplinary university-based centers.

Model 1: A unit outside traditional academic departments that is managed by the university, perhaps draws on some of the university's faculty, staff, and students, but is not integral to the core academic activities of the institution and its departments.

Model 2: A unit that is integrated into the core academic activities of the institution and its departments.

Each has pros and cons.

Pros and Cons of Model 1

Pros:

- Can be rapidly implemented in most institutions.
- Can easily add non-tenure track staff.
- Can attract some faculty and students with economic support.
- More likely to work the problems as defined by the funding agency.

Cons:

- Unlikely to engage fully the broad range of the intellectual and critical resources of the university.
- May be risky for junior faculty.
- Unclear that a university has a strong comparative advantage over other organizations such as RAND, IDA, MITRE, etc.

Pros and Cons of Model 2

Pros:

- More likely to involve a wide cross-section of top-flight faculty across a range of disciplines.
- More likely to engage in critical assessment and definition of the key problems.
- More likely to yield a sustained effort that will produce MS and Ph.D. professionals who will go on to careers working in the field.

Cons:

- Hard to organize if the university does not already have a track record of interdisciplinary research and education (promotion and tenure of junior faculty etc.).
- May take longer to get up and running.
- Will run on the multi-year life-cycle of MS and Ph.D. education.

Models…(Cont.)

Insight 3: The kind of model adopted for a university research center of excellence on homeland security should depend on DHS's objectives and on the host institution.

For many host institutions, Model 1 will be faster and more feasible. It is also more likely to follow specific DHS-specified programmatic objectives.

If DHS wants a sustained production of graduates who will work in this field, and the benefits of the critical interdisciplinary contributions of a wide range of leading faculty, Model 2 is superior.

Most problems are not just technical

Many key problems in domestic security have important technical components - but economic, social, organizational, management issues often hold keys to success, e.g.

Cyber security	
Better encryption technology.	Key management; export control; balancing security and privacy.
Bio-terror	
Technology for rapid early detection.	Managing false positives; risk communication; integration with public health.

In the long run…

…I believe that our nation will best be served by a broad systems approach. While some technical issues can be adequately addressed in isolation, and some social/policy issues can similarly be addressed in isolation, in most cases, we will need an approach that integrates the two so that:

Technical solutions are socially realistic.

Multiple, often conflicting, social objectives are appropriately identified and balanced in the design of new systems and programs.

Systems approach

Insight 4: At least some of the Centers that DHS creates should be based on Model 2 (i.e., be integrated into the core academic activities of the institution and its departments) and should adopt a broad interdisciplinary system's approach that includes natural science and engineering, social science, policy analysis and management.