Government-University-Industry Research Relationships

ISSUE

Is there a need/opportunity for a review of GUI Research Relationships?
## GUI Megatrends

<table>
<thead>
<tr>
<th>Institution</th>
<th>Post WWII era</th>
<th>Post cold war era</th>
<th>Today</th>
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</thead>
<tbody>
<tr>
<td>Federal Research Funding Policy</td>
<td>Large real growth of support for basic research in the physical sciences</td>
<td>Stabilization of government research support for the physical sciences; large growth in life sciences</td>
<td>Relatively flat funding</td>
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<td><strong>DOE</strong></td>
<td>Historical research trust in HEP, NP; Commercialization of nuclear power; post embargo expansion of energy R&amp;D</td>
<td>Research trust continues. Flat funding for alternative energy. Growth of multipurpose labs and user facilities for research.</td>
<td>Consolidation of HEP (only 1 lab); Continuation of trend toward turnkey facilities for naïve users from other fields; Nuclear energy renaissance; renewed interest in alternative energy</td>
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<td><strong>NSF</strong></td>
<td>Basic research, education, Support of PIs</td>
<td>Growth of S&amp;T Centers; Focused research initiatives; Efforts to address K-12 education</td>
<td>As universities broaden their roles, NSF tries to keep up. More research initiatives, efforts to improve education, efforts to create new institutional mechanisms to address national needs, efforts to create focused research programs, e.g., to address industry needs</td>
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<td><strong>NASA</strong></td>
<td>Space exploration</td>
<td>Space Science; Physics in Space; Space Station</td>
<td>Large fixed commitments to shuttle and space station; renewed effort in Space Exploration; Research more focused on fewer initiatives</td>
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<td><strong>DoD OxRs</strong></td>
<td>Basic research for DoD needs</td>
<td>IDLs (DARPA)</td>
<td>Basic research sharply curtailed</td>
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<td>Government Laboratories</td>
<td>Basic research; Mission Support (e.g., weapons)</td>
<td>Experiments with serving industry: CRADAs; Growing role of user facilities</td>
<td>Increasing diffusion of missions; search for new ones; scaling back of basic research labs (SLAC, BNL), Nano Centers, user facilities move toward turnkey mode for wide class of users (even biologists)</td>
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<td>Universities</td>
<td>Education, basic research</td>
<td>Adoption of the research university model (with government funding) by growing number of institutions, adoption of entrepreneurial business model, role in local development, universities become a major economic driver and source of high-tech workforce</td>
<td>Continuing expansion of roles: Research and education, growing role in regional business development, closer ties to local industry, source of highly-trained technical personnel</td>
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<td>Industry</td>
<td>Major basic research labs: Bell, Yorktown, DuPont Central Lab, etc.; Manufacturing a powerful force</td>
<td>Breakup of AT&amp;T, shrinking role of central research labs, shrinking role of manufacturing, high-tech industry replaces manufacturing</td>
<td>Outsourcing of research to universities Acquisition of Technology from VC-funded start-ups</td>
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<td>Finance</td>
<td>Venture capital and the explosion of high-tech startups, and the “information economy”</td>
<td></td>
<td>Shake-out of the dot coms; leveling off of venture capital financing; increased emphasis on stock dividends rather than stock appreciation</td>
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GUI relationships, together with the Venture Capital sector, have emerged as the major drivers of the economy.

What are the key questions on R&D policy from the perspective of each of these four sectors?
Questions for Discussion

**Industry Perspective:** Private industry has increasing need for path-breaking basic research – e.g. elements of IT (transistors, hard disk drives) are approaching fundamental limits. With the decline in in-house industrial research capabilities, industry has outsourced R&D to universities, and has acquired new technology from venture capital funded start-ups.

- Will current corporate R&D business models be adequate to meet the demands for new science and technology? Or could these models fall short of meeting increasing needs?

**University Perspective:** Universities have assumed a larger role as drivers of the economy – as research performers for industry and as the nexus for formation of new VC-Funded start-ups. This economic development role creates political pressures for allocation of federal funding to more entities, but for more targeted purposes.

- Will the increased emphasis on economic development affect the preeminence of U.S. higher education programs? How can the growing university-industry relationship also serve to maintain and enhance the education process?

- Is there a need for increased support for curiosity-based PI research to sustain basic science and maintain diversity in university research portfolios?
Questions for Discussion

**Finance Perspective:** Small businesses accounted for 20% of the nearly $200B (in 2003) of R&D performed by the industry (up from 5%). The growth has occurred primarily in the IT and Biotech industries which are heavily financed with venture capital.

- How has the rise of VC-funded R&D affected GUI relationships?
- Is there a need for adjustments in government policy to improve these linkages?

**Government Perspective:**

- NSF has experienced substantial mission creep, in parallel with university trends, and due to policy and political drivers (e.g. K-12 education, national research initiatives, etc.). How can the alignment of NSF’s missions and resources be improved in this changing environment?

- The National Laboratories continue to search for major new missions, but they have not been seen as a key driver of the economy. Can they, or should they, aspire to become drivers of the economy? If so, how?

- Funding for physical sciences has been relatively flat. The Administration’s American Competitiveness Initiative (ACI) increases funding for targeted areas of physical sciences research and education, similar to the NRC Rising Storm Report (Augustine). Does the ACI adequately address GUI issues?
Potential Role for the BPA

Can BPA leverage its traditional role as a monitor and advisor on U.S. research programs in universities, government laboratories, and industry to:

- assess the situation;
- provide an outlook as to how the picture may continue to evolve,
- alert the government and universities to emerging issues,
- and perhaps suggest some adaptations?