Fueling Innovation

RESEARCH UNIVERSITIES, AND THEIR INSTITUTES AND CENTERS, PLAY A CRUCIAL ROLE IN PRESERVING THE NATION'S TECHNOLOGICAL AND SCIENTIFIC PRIMACY.

by Raymond Levey

Research centers and institutes such as the University of Utah's Energy & Geoscience Institute, home of geologists Royhan and Nahid Gani ("Evolution and Uplift"), are an important facet of a modern research university. Typically, they involve a combination of regular and research faculty, graduate and undergraduate students, postdocs, and professional staff dedicated to advancing some field of knowledge, or addressing a vital scientific question—such as, how will global fuel consumption needs be met for the next century?—using a multidisciplinary approach. Today's complex scientific and technological problems are often too broad to be solved by a single researcher working in isolation. Institutes and centers facilitate collaboration among multiple researchers from a host of disciplines, and provide students with their first exposure to a dynamic environment that more closely resembles today's high-tech professional reality.

During much of the last century, engineering and applied scientific research was synonymous with large, well-respected corporate laboratories—Bell Labs, GE, Dow, DuPont, and Exxon. In addition to fostering innovation and contributing to the body of scientific knowledge, corporate laboratories absorbed class after class of engineering graduates for virtually lifetime employment. This model was replicated in chemical and fuels production, aerospace, communications, pharmaceutics, medical device, and countless other industries. In addition, federally operated think tanks such as those at Livermore and Los Alamos recruited scientists and engineers to focus on highly classified national security issues.

But in the '70s and '80s, corporate downsizing and cutbacks in defense spending irrevocably altered the research landscape. In an effort to trim costs, companies dismantled large internal research operations, preferring to outsource all but those specific projects deemed most essential for bottom-line performance. Further, they dramatically shortened the time horizon for internal research projects and insisted that any remaining internal research be closely tied to existing corporate problems. The need for fundamental research had not diminished, but corporations became increasingly reluctant to risk scarce resources on important but tangential problems.

And that's where university institutes and centers come in.

The Energy & Geoscience Institute (EGI) is just one of many institutes at the U. Housed within the College of Engineering, EGI provides University of Utah students from across campus with their first real-world experience in the broader scientific community. Many students from departments as diverse as Computer Science, Chemical & Fuels Engineering, Geology & Geophysics, Geography, and Chemistry experience their first contact with corporate or government work through research projects performed at EGI. Established in 1995, the institute is the largest cost-shared research consortia program at any university in the world, with 65 member companies from 21 countries.

Research universities, and their institutes and centers, have developed a crucial new role in preserving the nation's technological and scientific primacy, "[drawing] intellectual strength from the core university and providing important financial, human, and physical resources in return," according to James Duderstadt, former president of the University of Michigan. Duderstadt maintains that "the research university of the future will be a magnet for intellectual, scientific and financial capital." The University of Utah's Research Park is an often-cited example of one of the most successful versions of this concept.

Tackling thorny problems—so-called "real world" issues—has become a mainstay of the work performed at specialized university institutions and centers. Take global energy, for instance. In 1900, the world's yearly energy consumption was about 75 million barrels of oil. As of 2007, mankind consumes about 86 million barrels of oil per *day*, the equivalent of 1,000 barrels per second. Technology and solutions for meeting the global energy demand require scientists to develop new ideas or techniques that can be transferred from theory to practice. EGI geoscientists are currently working on energy research projects in East Africa, Argentina, Brazil, the greater Black Sea region, Caspian, Circum Arctic, Gulf of Mexico, India, Indonesia, Libya, the Middle East, the North Sea, Russia, Southeast Asia, and Trinidad.

And what should not be overlooked is the role of institutes in offering an opportunity to recruit international faculty, bringing together experts from around the globe to solve these problems. EGI's current 90 scientific staff hail from 18 countries, speak 16 languages, and maintain strategic alliances with more than 40 international organizations in Europe, Africa, Austral-Asia, the Middle East, and South America.

So if Duderstadt is to be believed, we can continue to expect great things from university institutes and centers. Solutions for "real-world" problems now come not from privately funded, corporate sources, but from EGI and other centers affiliated with institutions of higher learning charged with tackling today's biggest challenges.

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