

Panel on Leveraging Funding from Industry

ENG Advisory Committee Meeting, Spring 2013



Introduction

Global R&D funding has grown vigorously in the last decade. In 2009, worldwide R&D expenditures totaled an estimated \$1.3 trillion, compared to \$641 billion in 1999¹. This resulted in the fast pace of emerging technologies. In 2010, USPTO granted 219,642 patents, a significant increase from 2001 when only 166,033 patents were granted.

Although the U.S. remains atop the list of the world's R&D performing nations, global competition, especially from Asia and Europe, is increasing. In 2009, U.S. R&D expenditures accounted for roughly 31% of the worldwide total, down from 38% a decade ago.

The U.S. federal government remains by far the primary source of funding for basic research, accounting for about 53% of all such funding in 2009. However, with recent fiscal debates, budget uncertainty looms over long-term federal investments in research. On the other hand, businesses have provided \$16.5 billion in funding devoted to basic research, which accounted for about 22% of the overall funding for basic research.

With the fast pace of emerging technologies, more global competition, and federal budget uncertainty, it is becoming increasingly important to stimulate partnerships between academic and industrial research communities and leverage funding. These partnerships will (1) facilitate communication between academic and industrial research communities and enable further understanding of the basic research needs of industry (“market-pull”); (2) foster economic growth by leveraging academic research capacity and mitigating market failures related to research and innovation (“technology-push”); (3) provide opportunities to our students with relevant industrial experience and be better prepared as next-generation scientists and engineers; and (4) increase our global competitiveness in research and innovation.

In this panel, we will discuss:

- What are the challenges/opportunities for academic-industrial partnerships?
- What role can NSF play to:
 - motivate more industry-inspired fundamental research;
 - facilitate collaboration between academic and industrial research communities;
 - provide more industry-relevant educational opportunities; and
 - stimulate the academic community to leverage funding from industry and to increase our global competitiveness?

¹ Science and Engineering Indicators 2012 Digest, National Science Foundation

Panelists

OLIVIER CADET is Director of Logistics Excellence, Air Liquide Industrial U.S., and an I/UCRC Industrial Advisory Board member. In 1998, Cadet began his career within the Engineering and Field Support group with the drilling division of Schlumberger (now Transocean). For the six years he worked in Oilfield Services Industry, Cadet was based in Scotland, Brazil and the U.S. His responsibilities included the development and upgrade of dynamic positioning systems on offshore drilling rigs.

In 2004, Cadet joined Air Liquide's Research and Development as a Research Scientist primarily working on the development of a compressor efficiency monitoring tool. In 2007, he took the role of Manager of the Process Control group at Air Liquide's Delaware Research and Technology Center, and eventually progressed into the Program Director for Process Control & Logistics worldwide research activities. In 2011, Cadet joined the Industrial IT division of Air Liquide in for the Americas zone. Based in Houston, he worked on the business development of logistics optimization solutions to improve the efficiency and reliability of operations. In November 2012, Cadet was appointed to his current position of Director of Logistics Excellence. In this role he and his team are driving safe, reliable and efficient delivery of bulk gases to Air Liquide's Customers in the U.S.

Since 2010, Cadet has been the chair of the Industrial Advisory Board for the Center for Excellence in Logistics and Distribution (CELDi), an NSF Industry/University Cooperative Research Center. Olivier holds an electrical engineering degree from the Grenoble Institute of Technology (Grenoble INP) in France.

CLAIRE GMACHL received the Ph.D. degree (sub auspices praesidentis) in electrical engineering from the Technical University of Vienna, Austria, in 1995. In 1996, she joined Bell Laboratories, Lucent Technologies, Murray Hill, NJ, as Post-Doctoral Member of Technical Staff to work on Quantum Cascade laser devices and microcavity lasers. In March 1998 she became a Member of Technical Staff in the Semiconductor Physics Research Department and a Distinguished Member of Staff in 2002. In September 2003, Gmachl joined Princeton University as an Associate Professor in the Department of Electrical Engineering and adjunct faculty to PRISM; since July 2007 she is Full Professor at Princeton University, and a Eugene Higgins Professor of Electrical Engineering since 2011. Her group's research is focused on mid-infrared photonics, especially high performance and innovative Quantum Cascade lasers, semiconductor band-structure engineering, and novel materials for the mid-infrared.

Gmachl is the Director of MIRTHE, the NSF Engineering Research Center on Mid-InfraRed Technologies for Health and the Environment, established in 2006. This six-university center develops mid-infrared trace-gas sensors for applications in the environment, health, and security through a cross-disciplinary approach that spans from applications and policy, to systems engineering, device development, and material science.

Gmachl has authored and co-authored more than 250 publications, has given more than 100 presentations at conferences and seminars, and holds 26 patents. She has won an E-council/GEC Excellence in Teaching Award in 2012, and a Princeton University graduate mentoring award in 2009; she was an Associate Editor for Optics Express and a member of the IEEE/LEOS Board of Governors. Gmachl is a 2005 MacArthur Fellow. She is a member of several professional societies.

TERRI L. LOMAX is Vice Chancellor for Research, Innovation, and Economic Development and also Professor of Plant Biology at North Carolina State University. She came to NC State in fall 2006 as Dean of the Graduate School and Associate Vice Chancellor for Research. Before arriving at NC State, she was on assignment from Oregon State University to NASA Headquarters in Washington D.C., where she served first as Director of the Fundamental Space Biology Program, then as acting Deputy Associate Administrator for Exploration Systems Research, and finally as Senior Policy Analyst, and Senior Education Advisor. As a professor in the Center for Gene Research and Biotechnology at Oregon State for 19 years, she founded and directed both a K–12 science outreach program, Science Connections, and the Program for the Analysis of Biotechnology Issues, which brought balanced information on topics such as genetic engineering to the public, press, and policy makers.

Lomax's research has focused on understanding how hormones regulate plant growth and responses to the environment, from the molecular to the cellular to the whole plant physiological level, including measuring the response of tomatoes to spaceflight conditions. She has also studied university–industry relationships and the public good with respect to agricultural biotechnology.

J. CHRISTOPHER RAMMING, Director, University Collaboration Office, Intel Labs, has been with Intel since November 2008. For much of that time he has been responsible for establishing and leading the Intel Labs Academic Research Office, which focused on interdisciplinary hypothesis-driven university programs. Recently he has been appointed to lead the Intel Labs University Collaboration Office, which comprises both the Intel Science and Technology Center (ISTC) program and the Intel Collaborative Research Institute (ICRI) program, both of which engage in large-scale exploratory research. Prior to Intel, Ramming served as a program manager in DARPA's Strategic Technology Office. In that role, he was responsible for designing and managing R&D programs to create and exploit high-risk/high-payoff technology opportunities with special emphasis on new approaches to mobile ad-hoc networking and group decision analysis. Ramming also worked at AT&T/Bell Labs Research where he focused on telecommunications-related software, services, and languages. Ramming has a background in computer science with degrees from Yale and UNC Chapel Hill.