MEETING SUMMARY

CATALYZING UNIVERSITY-INDUSTRY ENGAGEMENT TO PROMOTE THE NATION'S COMPETITIVENESS

GOVERNMENT-UNIVERSITY-INDUSTRY RESEARCH ROUNDTABLE AND UNIVERSITY-INDUSTRY DEMONSTRATION PARTNERSHIP WORKSHOP

OCTOBER 30-31, 2013

Introduction

Strategic university-industry (U-I) relations strengthen the ideas-to-innovation process and are of great strategic importance to leaders in the public and private sectors. U-I research collaborations help advance the nation's commercialization portfolio and increase overall economic competitiveness. Such relationships are challenging to implement due to a variety of factors, including grant and contract conditions (both financial and non-financial), the treatment of intellectual property, conflict of interest, and compliance issues (such as export control). (Boccanfuso, 2014)

Federal, state, and local governments are also seeking appropriate ways to foster these relationships. A number of federal agencies have implemented programs or adopted policies to catalyze and participate in high-value, high-return U-I collaborations.

At this GUIRR/UIDP-hosted workshop, the participants explored the current government-university-industry research, development, and commercialization engagement models, identified specific short- and long-term challenges that are encumbering government-industry-university engagement, and discussed new approaches to university-industry collaborations.

This workshop brought together a strategic set of leaders who have the ability to effect change in their organizations and undertake pilots, demonstrations, and experiments that can impact the way that companies and universities (in conjunction with government) act. Small group breakout sessions were used after each set of plenary presentations and discussions to consider those issues from one of four points of view. The four breakout groups (and their U-I rapporteurs) were:

1. Intellectual Property – How should this matter be addressed? (Jay Schrankler, University of Minnesota, and Dennis Fortner, Northrop Grumman)
2. Metrics – How do we measure the return on investment for U-I collaborations? (Terri Lomax, State University of North Carolina, and Deborah Radasch, Boeing)
3. Roles of Government – Supportive or Directive? (Lana Skirbol, Sanofi, and Kristian Hansen, Novo Nordisk)
4. New Models of Collaboration – Are there ongoing or new pilots worth considering? (Luis Proenza, University of Akron, and Nick Nikolaides, Procter and Gamble)

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This document attempts to present a reasonably accurate and objective summary of what occurred at the meeting. The comments and viewpoints discussed during the breakout sessions and shared by each group rapporteur with the plenary group are those of individual participants and do not represent a consensus of the breakout group members or the workshop participants as a whole.

Keynote Address

The keynote address on October 30 titled "Critical Role of Academic-Industry Partnerships in Future Science and Engineering Research" was given by **Pramod Khargonekar**, the Assistant Director for the National Science Foundation's Directorate of Engineering (ENG). Khargonekar told the audience that his goal for this meeting was to raise questions and issues for discussion, not to provide answers. He reminded the audience of the results of a 2009 Pew Research Center survey which found that 73 percent of Americans polled believe that government investments in basic scientific research pay off in the long run and 74 percent think that government investments in engineering and technology do, too. Khargonekar underscored the tremendous interest in innovation today by highlighting the book ***The Great Stagnation*** by Robert Tyler Cowen as an example of the growing appreciation of the necessity for scientific innovations that bolster national economic prominence and benefit humanity as a whole.

Dr. Khargonekar stated that NSF wants to partner with industry, universities, states, and regional organizations in new ways. The agency also wants to use new models to move the more innovative results into commercialization faster and in greater quantities. During the Q&A session, in response to the query: "What does success look like?", Khargonekar responded that quantifiable metrics would reflect improvements in societal problems, more jobs, longer life expectancy, and a better quality of life.

Meeting & Breakout Group Objectives

The workshop's Co-Chairs, **Terri L. Lomax**, Vice Chancellor for Research, Innovation and Economic Development, North Carolina State University, and **Nick Nikolaides**, Section Head, Corporate Connect + Develop, Procter and Gamble, then reviewed the meeting's objectives and led the plenary group through a discussion about current government-university-industry engagement models and the results of a prior GUIRR/UIDP workshop. During this session, the group considered issues relating to terminology, metrics, intellectual property, collaborative models and openness to new concepts.

During the discussion, a number of concerns over inconsistent terminology were raised. For example, discovery and invention can occur at universities or industry research centers, but industry typically innovates by translating inventions into products.

When considering metrics, many participants noted the difficulty of developing metrics, since they are viewed and used differently by each G-U-I segment. The development of metrics involves individual institutions assessing their risk tolerance and applying risk management to said metrics. The group discussed the idea of putting mechanisms in place to identify and speedily transition promising basic research to commercialization when appropriate.

Several universities are pursuing different approaches to intellectual property (IP) management, and these were discussed. Recent changes in IP based on a more realistic valuation of inventions at several UIDP and GUIRR member universities were also discussed. Several participants stressed that new policies on IP management at universities needs to be flexible to encourage entrepreneurship among faculty and collaboration with industry.

As a prerequisite to developing new collaboration models, the group decided to look at what models are already in use and to identify characteristics to use when evaluating new models. Some participants cited the need to incorporate speed to market and responsiveness to consumer feedback into the evaluation of U-I models. Participants also discussed the impact that commitment at the institutional level has on successful implementation of new models.

The concept of **"co-creation"** (i.e., multi-sector involvement) from discovery through innovation into commercialization was explored. The discussion raised the concept of **"dual citizenship"** as a possible benefit to both universities and industry. The concept of "dual citizenship" refers to both university and industry sector researchers who are allowed greater

cross-sector interaction, including potential access to IP.

State & International Collaborative Efforts

The next set of presentations addressed how national and state level governments are initiating efforts to spur collaboration by serving as incubators for high-value, high-return U-I collaborations.

Tomas Coates Ulrichsen is a Research Fellow at the Centre for Science, Technology and Innovation Policy (CSTI) at the University of Cambridge. His presentation focused on the latest developments in the UK system, addressing both direct and indirect levers being utilized in the UK to help build up the interface between universities and business. Direct funding, according to Ulruichsen, includes funding streams available to support specific engagements directly, while indirect funding includes changes to faculty incentives and funding of university-based capability-building to strengthen their ability to engage.

Mr. Ulruichsen reviewed the key limitations in England to improving U-I relations and noted that they were very similar to those facing the U.S. He went on to identify areas where improvement has been made over the past five years: there has been greater focus on forming long-term relationships, creating strategic partnerships, and strengthening dialogue between academics and users to understand the capabilities, needs and constraints of both sides.

Both universities and companies are experimenting with ways to improve access to their institutions as well as their IP, but more can be done by universities to enable their institutions to provide "one-stop shopping" access to IP, facilities, equipment, faculty researchers, and students. One controversial initiative being explored in Great Britain is to place greater emphasis on measuring the societal impact of previously funded research when assigning an institutional research quality rating. In concluding, Ulruichsen said that significant strides have been made in strengthening the capability and the capacity for government-university-industry partnerships, but the government needs to continue to play an important role in adopting incentives for U-I engagement.

Anthony Howard and Paul Jackson serve as Manager of Industry-University Partnerships Commercialization and Research Administrator, respectively, in the Office of Technology Investments (OTI) of the Ohio Development Services Agency (ODSA). Their presentation focused on the work of the Ohio Third Frontier, a technology-based economic development initiative which provides funding to Ohio's technology-based companies, universities, nonprofit research institutions, and other organizations. A major goal of the program is to garner funding from other government agencies. Metrics are driven solely by the impact on Ohio economic development. Results thus far have shown that programs with industry investment and governance demonstrate improved sustainability at a rate of 2:1. Because of these results, the program is evolving from a university-centric, fundamental science "push" system to a requirements or technology solutions driven "pull" system led by industry and enabled by universities.

Day 1 wrapped up with the first set of breakout sessions, designed to elicit possible steps to improve current models or processes. The four breakout groups were the Intellectual Property Group, the New Models for Collaboration Group, the Roles of Government Group, and the Metrics Group.

Summary of Day 1 Breakout Sessions

Day 2 started with a few comments by **Susan Sloan**, the Director of the Government-University-Industry Research Roundtable (GUIRR) at the National Academies. Then, **Susan Butts**, past president of UIDP, reviewed the meeting objectives and encouraged the audience to focus throughout the remainder of the day on the development of new ideas and better methods and models to promote our nation's competiveness.

The rapporteurs from the four breakout groups reviewed the top insights or observations from each of the four Day 1 breakout groups. The four breakout groups were the Intellectual Property Group, the Metrics Group, the Roles of Government Group, and the New Models of Collaboration Group.

Intellectual Property Group. Rapporteurs Jay Schrankler and Dennis Fortner discussed how IP management is inherently complex and how it

is necessary to consolidate and prioritize a broad set of issues. They said that since there is no guaranteed financial return from IP, we should consider focusing on different approaches to measuring value other than numbers of patents. Several new approaches were discussed, including Penn State's new IP policy as reported in Keystone Edge and the University of Minnesota IP program. According to the rapporteurs, the presence of business savvy investigators on university campuses is growing, and universities and companies should understand to what extent existing IP is sitting idle in both industry and academia. Universities and companies could develop methods to market this IP to potential developers. The IP group discussed how the development of new models to address IP becomes more relevant as research consortia expand. The Industrial Partnership for Research in Interfacial and Materials Engineering (iPRIME) at the University of Minnesota, which focuses on creating opportunities for professionals in industry to collaborate with students and researchers at the university, addresses the treatment of IP in a consortium.

The subject of how tax laws impact access to foreground IP in industry-sponsored research at universities was raised, and several participants noted that it is possible to structure the use of new tax-exempt bond issues in ways that eliminate this problem. In a broader sense, tax law surrounding IP is complicated and perhaps negotiations could be facilitated if some Frequently Asked Questions (FAQs) about IP related tax laws and legal issues were developed. They also discussed the possibility of developing a more general list of common FAQs around IP. The rapporteurs noted that start-up companies face unique challenges with IP and new models may be needed to help these companies navigate through the issue. One such model could address more standardized language for agreements and IP issues with consortia. Another model might address access to (and the cost of) foreground IP in industry-sponsored university research.

Metrics Group. Terri Lomax and Deborah Radasch, the group rapporteurs, discussed the need for consistency in our use of terminology as a prerequisite to many of the other ideas being discussed. According to the group rapporteurs, funding entities are attempting to measure and document the leveraging of funding and resources and the resultant economic development/impact of the research. A comprehensive and thorough study could assess how to best accurately and equitably measure economic impact. Various organizations within the federal government currently measure the economic impact generated by the technology transfer of research in federal laboratories to private industry for commercialization. Such methods could serve as a model for the broader innovation ecosystem. UIDP might play a role in developing key terms and their definitions and identifying key stakeholders in various forms of G-U-I collaboration. Quantifiable value added for return on investment (ROI) may be different between sectors and these added values should be identified for common forms of collaboration.

Typically, some group members stated, in terms of ROI from cross-sector collaboration programs, the university participant's risk exposure is lower than the industry participant; hence, differences in risk assessment need to be addressed as well. A suggestion was made to develop a menu of short term metrics, primarily for industry, to permit timely programmatic decision-making. Regarding patents, many group members said that the number of patents alone could be misleading. What has the patent done to improve or sustain the world we live in? Positive impact to critical infrastructure, such as power grids and sustainable water sources, were highlighted as being examples of the type of impact that should be measured. It was noted that NSF already conducts a higher education R&D survey. This raised the question, "How could this survey be tweaked to obtain more relevant data across both universities and industry?"

Roles of Government Group. Lana Skirboll and Kristian Hansen, the group rapporteurs, noted that federal and regional governments continue to play a critical role to instill the need for and support greater competiveness. Pipeline investment programs could provide greater research experience for teachers and students, both high school and undergraduate. They suggested that government and industry might join forces to create apprenticeship programs modeled on those in Europe. One approach proposed was a researcher working part-time in industry at the same time as he/she is earning a PhD at a university. Such a program is active and accounts for about 10 percent of fellowships

in Denmark. Also, industrial postdoctoral schemes with public co-funding are used in several European countries and may serve as a template for the United States. The DIAMAP, a European Union (EU) database model, was mentioned as an example of government helping smaller companies be more aware of ongoing complementary research. They also said that support to develop expertise databases, such as the DIAMAP, for use by both academic and industrial researchers, would be valuable. Finally, an idea was proposed that a co-creation grand challenge consider incorporating foundations and national labs to partner with U-I consortia.

New Models of Collaboration Group. Luis Proenza and Nick Nikolaides, the group rapporteurs, reported that the group considered the need for new models to support the concept of industry-sponsored Academic Centers of Excellence (ACE), to include accommodating "reverse technology transfer", whereby industry-owned IP may be shared and further developed in the university research center. One such model could facilitate a state/federal/industry/university aligned approach to a megatrend of common interest. Other models could expand the concept of "dual citizenship" through new talent exchange pilots/programs or explore applying the concept of Solicitation as a Service (SaaS) to aid small businesses access to and use of research.

The rapporteurs noted that the concept of "co-creation" was expanded; co-creation in this context means all the relevant stakeholders are collaborating across the value chain from concept generation to marketing the new product or service. One participant highlighted the need for an international perspective and stated that the role of government(s) will be critical to facilitating the international collaborations necessary for co-creation. A Boeing initiative which brings junior faculty into the company for one year and the NSF Grant Opportunities for Academic Liaison with Industry (GOALI) program were identified as examples of the "dual citizenship" concept. New models are still needed, some group members observed, to ease the transition from the pre-competitive to the competitive phase, to address the negative implications of that transition for academic freedom, to tackle the issues surrounding IP/exclusivity/export control issues with foreign students, and to incorporate speed to market and responsiveness to consumer feedback. However, other models have already been initiated and are available for analysis. One industry supported ACE model, the Timken Engineered Surfaces Laboratories (TESL) at The University of Akron, is designed to speed the path between discovery and commercialization with students, faculty, and industry partnered in the process. The initiative is also an example of "reverse technology transfer," in that Timken maintains exclusive IP rights in fields of use relevant to its business, while Akron has rights in other fields of use. In the Ohio Third Frontier "pull versus push" model, Ohio-based industry "pulls" research support from Ohio state government sponsored research programs by proposing initiative research areas to government versus responding to government initiated proposals. A comment was made that for any new model, it is necessary to assess infrastructure costs for its operation.

The Role of Federal Agencies

The late morning Day 2 meeting presentations on "Setting the Stage" were given by the National Science Foundation's Grace Wang and Larry Hornak. **Grace Wang** has been the Division Director of Industrial Innovation and Partnerships (IIP) Division at the NSF since February of 2012. Wang opened her presentation with the question: Why are NSF programs designed in terms of academic-industry partnerships? She stated that today the United States accounts for 31 percent of all global R&D funds, which is down from 38 percent a decade ago. U.S. industry now relies more heavily on outsourced university research than in the past (Jachimowicz, 2000). To remain competitive globally and to maximize the impact of research across a larger national footprint, the role of NSF is to work at the intersections of the triple helix G-U-I model to stimulate, facilitate, and increase the numbers of U-I partnerships. Wang continued by explaining, in the coming years, there will be an even faster pace of emerging technologies in a much more connected world with the increasingly mobile and talented millennials (Generation Y) entering the workforce. Combine this with more limited R&D budgets and resources, and companies will be increasingly driven by ROI and shorter product cycles. While agreeing with earlier comments from the audience about the need to protect the basic research investment from short term ROI demands, Wang stated that we need

to translate fundamental research results, or someone else will. She went on to highlight various NSF programs and projects meant to spur university-industry partnerships with the objective to mature innovative technology and thus lower the risk to the point where a venture capitalist or angel investor will provide the funds necessary to commercialize a product which will then lead to strategic partnerships with large companies. What is needed, says Wang, is a culture change for more open innovation.

The final presenter was **Lawrence A. Hornak**, Program Director of the Industry/University Cooperative Research Centers (I/UCRC) Program since 2010. Hornak began the presentation, titled: "I-U Partnerships: A View from the Cooperative," by reminding the audience that the I/UCRC program is focused on pre-competitive research at the intersection of and as a link between university fundamental research and industry competitive R&D. The I/UCRC program is designed to operate in the Pasteur's Quadrant (use-inspired basic research) and is relevant to both the advancement of knowledge and the application of technology. Hornak explained that the tenets of the program include joint funding, non-exclusive IP, and increased value through the building of trust among the partners.

Responding to comments expressed by several members of the audience over the past two days about IP-related exclusivity concerns linked to multi-institutional partnerships, Hornak reviewed several changes already planned to the I/UCRC base agreement in 2014 to enhance the precompetitive environment including royalty-free, non-exclusive access to IP by all parties. He also stated that no IP actions will be initiated from shared work.

Summary of Day 2 Breakout Sessions

Anthony Boccanfuso, Executive Director, University-Industry Demonstration Partnership, explained that UIDP projects are activities designed to address a challenge or need that affects U-I collaboration and whose products take many forms: publications, workshops, webinars, etc. After reviewing the steps in the normal process of a UIDP project, Boccanfuso charged the audience to return to their breakout groups one final time to review the short- and long-term challenges that are encumbering government-university-industry engagement discussed over the past two days and to identify proposals worthy of consideration and testing through pilot projects.

In the final breakout sessions, the four groups met for two hours to identify fertile areas for potential actionable pilot projects, which were then provided to Boccanfuso in plenary session for consideration by UIDP for testing through pilot projects.

Intellectual Property Group. This group's rapporteurs, Jay Schrankler and Dennis Fortner, shared some group members' proposal that UIDP consider developing a quick guide addressing IP FAQs. The areas they suggested to be addressed include: government use rights, tax laws, working definitions, purpose of IP defense, evaluation of IP, and pros and cons of protecting IP. Secondly, several group members also gave merit to the need for a study to ascertain how much university-owned IP is sitting idle, i.e., not generating revenue or providing an added value. Included in the project study would be developing some measure of efficiency in IP strategy and exploring potential for like entities to pool their IP. This could serve as the first step to doing the same with industry.

Metrics Group. Terri Lomax and Deborah Radasch shared several ideas from group members, including that UIDP consider developing key terms to be used in metrics, develop a translator to cross reference key words, and identify timelines and then develop short- and long-term metrics, both tangible and intangible. The group rapporteurs also shared the suggestion that UIDP consider a long time horizon study and mapping of networks resulting from funded research projects. Big data analyses and already-in-use mapping techniques could be used to accomplish this.

Roles of Government Group. Lana Skirboll and Kristian Hansen shared the proposal that UIDP's major industry partners move into appropriate sectors to create a translational opportunity for a given region. They reasoned that local UIDP academia could adjust to complement the regional industry efforts. Some group members also suggested that UIDP advocate a close look at the current European Commission initiatives to promote the "industrial PhD and postdoc" in the United States.

Additionally, the UIDP could study and report on ways to expand current NSF efforts to get more industry involvement in government-supported STEM initiatives.

New Models of Collaboration Group. Luis Proenza and Nick Nikolaides reviewed the discussion of the New Models Group by passing on one suggestion that UIDP consider a project of volunteer institutions to develop a "public dedication resource" of open IP and expand existing core models of university-Industry shared knowledge into new areas. Through such a pilot project, UIDP members could consider developing a university researcher residency in industry program, sometimes termed a "dual citizenship" program. Such a program could be beneficial for UIDP member organizations to work with government(s) to identify and align innovation programs to megatrends to include global entities.

Final Remarks

Following the reports from the breakout groups there was some general discussion of potential next steps. Boccanfuso reminded the participants of the process for UIDP project selection, thanked everyone for their active engagement, and then adjourned the meeting.

References

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DISCLAIMER: This meeting summary has been prepared by **Patrick Denny** as a factual summary of what occurred at the workshop. The committee's role was limited to planning the workshop. The statements made are those of the author or individual meeting participants and do not necessarily represent the views of all meeting participants, the planning committee, GUIRR, UIDP, or the National Academies.

The summary was reviewed in draft form by **Steve Fraser**, Cisco Systems, to ensure that it meets institutional standards for quality and objectivity. The review comments and draft manuscript remain confidential to protect the integrity of the process.

About the Government-University-Industry Research Roundtable (GUIRR) and the University-Industry Demonstration Partnership (UIDP)

GUIRR's formal mission is to convene senior-most representatives from government, universities, and industry to define and explore critical issues related to the national and global science and technology agenda that are of shared interest; to frame the next critical question stemming from current debate and analysis; and to incubate activities of on-going value to the stakeholders. The forum is designed to facilitate candid dialogue among participants, foster self-implementing activities, and, where appropriate, carry awareness of consequences to the wider public. For more information about GUIRR visit our web site at http://www.nas.edu/guirr.

The purpose of the **UIDP** is to enhance the value of collaborative partnerships between university and industry in the United States. UIDP is an organization of universities and companies who seek to build a stronger relationship between these parties. UIDP provides a unique forum for university and industry representatives to meet and discuss operational and strategic issues such as contracting, intellectual property, and compliance matters. These conversations might otherwise never take place, and they serve to help university representatives better understand the culture and constraints of their industry counterparts, and vice versa. This initiative is supported by the Government-University-Industry Research Roundtable (GUIRR). For more information about UIDP, visit http://www.uidp.org.

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