Enhancing National Laboratory Partnership and Commercialization Opportunities

National Academies GUIRR

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Statements presented here are solely those of the presenter.

DOE National Labs – An Innovation Force

- 17 DOE national labs, all but one are managed by private or non-profit organizations (GoCos).
- More than $11 billion/yr. budget, and employing 55,000 researchers and staff; they are a major force for U.S. tech discovery and innovation.
- Too few technologies are commercialized.
- Several reasons and barriers involved in commercialization.

Commercialization Issues

- STPI, GAO, Brookings, ITIF and others have identified issues and barriers. IA and ITIF with the House Tech Transfer Task Force held briefings. SEAB and CRENEL reports outline barriers and successes.
- National labs are not universities and while we can adapt some acceleration methods, benchmarking and expectations should be put into context.
- Major differences among DOE offices – EERE and OS, for example, have different missions and priorities.

Barriers to Commercialization

- DOE over-centralization
- Inconsistency and mixed messages regarding the importance of technology transfer, and what is permitted
- Aversion to risk
- Lack of flexibility
- Lack of researcher commercialization knowledge, capacity and incentives
- Underfunded support for technology transfer and commercialization

Overcoming Commercialization Barriers: DOE Responses

1) DOE Office of Tech Transitions ramping up; first Strategic Plan (Nov. 2016)
2) EERE and Advanced Manufacturing Office support for several innovative programs including Cyclotron Road
3) Lab-Corp
4) Small Business Vouchers
5) Agreement for Commercializing Technology (ACT)
6) Fast Track CRADAs

Innovative Programs at National Labs

- CalCharge and VOLTA -- Linking corporate members to national laboratory R&D
- Cyclotron Road, Chain Reaction Innovation and Innovation Crossroads -- Accelerating entrepreneurial innovations through laboratory partnerships
- New Mexico Consortium – Leveraging university-laboratory collaboration

Innovative Programs at National Labs (cont.'d)

- ORNL's Manufacturing Demonstration Facility – Promoting industry and university partnerships for advanced manufacturing
- NREL's Innovation Incubator (IN2) – Demonstrating technologies through private sector partnerships

Innovative Programs at National Labs (cont.'d)

- PNNL's VOLTTRON related initiatives
- Sandia's (future) Center for Collaboration and Commercialization (C3)

CalCharge

- In 2012, Berkeley Lab and the California Clean Energy Fund (CalCEF) partnered to create CalCharge as a public-private partnership.
- Focused on commercializing California's battery and energy storage technology companies.
- Master Services Agreement (an umbrella CRADA) with Berkeley Lab that permits CalCharge members access to Berkeley Lab without negotiating individual contracts.

CalCharge (cont.'d)

- Master services agreement now with 3 labs: Berkeley Lab, LLNL and SLAC.
- To date, 8 companies have conducted 13 CRADAs at 2 national labs. Currently, 4 active projects.
- 28 members; 10 of which are small; two universities (SJSU and UCSD); multi-nat. corps.; and a few organizations.

CalCharge (cont.'d)

- CalCharge is an LLC, wholey owned by CALCEF.
- Approaching self-sufficiency through membership dues and CALCEF administrative support.
- CalCharge is a model that is being replicated by Argonne (VOLTA) and is being considered by other labs.

VOLTA

- VOLTA Energy Technologies LLC is a spin-off of Argonne National Lab.
- Started 2016 by Jeff Chamberlain, on entrepreneurial leave from Argonne. Former Director of Argonne Collaborative Center for Energy Storage Science.
- Provides bridge between private sector, Argonne and other labs and universities, in area of energy storage.
- Will work closely with energy-related public utilities.

Cyclotron Road

- Launched by Berkeley Lab in July 2014 as a pilot and supported later by EERE, Advanced Mfg. Office
- Competitively selects national cohort of innovators with pre-competitive research to develop and commercialize clean energy technologies.
- Embeds them in Berkeley Lab, providing a home and two years support including living stipend, access to Berkeley Lab facilities, expertise, business mentoring, and connections to investors.

Cyclotron Road (cont.'d)

- Innovators must form legal entity prior to entering program. Specific short form CRADA developed for program.
- Innovators retain IP that they bring to program; IP developed jointly with Lab researchers is shared with option to license.
- Innovators are expected to have prototype or funding to complete prototype at end of two years.

Cyclotron Road (cont.'d)

- Tremendous response: 400+ applicants; last call from 28 states.
- By Dec. 2016, two cohorts of six teams (one-two innovators/team); first cohort will graduate in 2017; third call announced in Oct.
- Activation Energy developed as a non-profit by external consultant to provide Cyclotron Road with business and financial mentors and advisors.

Cyclotron Road (cont.'d)

- Fills a gap in the R&D process. An embedded, applied R&D program (Lab-Embedded Entrepreneurship Program) with commercialization goals.
- A win-win: Entrepreneur–advances and adds value to ideas, gives credibility with investors; Lab—brings fresh ideas and perspective; pathway to market.
- Early demonstrated success: attracted $10 million in federal and state grants, additional $5 million in private sector funding.

Cyclotron Road (cont.'d)

- In 2016, Cyclotron Road has been adapted by two laboratories:
  - Argonne National Lab: Chain Reaction Innovations
  - Oak Ridge National Lab: Innovation Crossroads

Chain Reaction Innovations

- First call closed in Oct. 2016; will announce first cohort of 5 companies and 7 innovators in Jan. 2017.
- 100 applicants in first round.
- UC's Polksy Center likely will help entrepreneurs develop business plans and provide mentoring. The Center's innovation fund could be applied later for commercialization funding as well as other investors.
- Some scientists will be developing SBIRs with the innovators.

New Mexico Consortium

- A non-profit organization established by 3 New Mexico universities: UNM, NMSU, and NM Tech; fostered by and affiliated with Los Alamos Nat. Lab.
- Created to facilitate cross-institutional and inter-disciplinary research, and outreach to private sector with goal of enhancing econ. dev. outcomes.
- NMC Campus consists of 2 buildings: a Biological Laboratory; LANL subcontracts for access to Lab., and Los Alamos "Research Park" owned by a comm. organization and leased to Lab and others.

New Mexico Consortium (cont.'d)

- NMC gives "academic standing" to researchers, allowing them to receive grants from a variety of federal agencies and philanthropic foundations.
- Staffing agreements between NMC and LANL can be structured as "outside activity" (two-paycheck model) or a "joint appointment" (single paycheck model).
- "Joint Appointments" are used for interactions with NMC and academic partners; researchers remain LANL employees, are "lent" to NMC, and reimbursed for specific projects. Based on ORNL model.

New Mexico Consortium (cont.'d)

- Conducts $10 million research annually. Grants from NSF, DARPA, NIH, USDA and other agencies; about $2.5 million comes from philanthropic foundations.
- LANL provides base funding from overhead for NMC admin., education, workshops, internships, etc.
- The research funding pays for about 150 full-time and part-time researchers.

New Mexico Consortium (cont.'d)

- Advantage for the Lab is that NMC is non-profit organization "outside the Lab fence", facilitating a broader range and more applied R&D than would be possible within the Lab.

- It leverages and extends the Lab's research, providing greater flexibility that facilitates academic, private sector and philanthropic partnerships.

ORNL's Manufacturing Demonstration Facility

- DOE EERE's Advanced Manufacturing Office (AMO) established MDF to develop and accelerate advanced manufacturing innovations to rapidly deploy in marketplace.
- Composed of a main facility located on the ORNL campus, and two nearby offsite locations.
- MDF received national acclaim for its work private sector in producing a 3-D printed automobile. It is now working with Local Motors to produce a 3-D car, and working with supply chain on production.

ORNL's MDF (cont.'d)

- MDF at ORNL directly involves industry on almost all of its R&D, and industry representatives work alongside ORNL researchers. Industry funding at times has exceeded that provided by DOE.

- An EERE AMO special project provides MDF with $2 million per year for three years. Involves open calls and operates in two phases that is matched by industry funds. Non-negotiable CRADA.

ORNL's MDF (cont.'d)

- "Research for Additive Manufacturing Program - University Partnerships" (RAMP-UP): In 2015, EERE's AMO developed a $1.5 million program involving 10 teams of a university professor and 1-2 students to engage in additive manufacturing research at MDF.

- MDF participates in two Manufacturing USAs (formerly NMIIs): American Makes and the Institute for Advanced Composites Manufacturing Innovation (IACMI).

ORNL's MDF (cont.'d)

- IACMI is a public-private partnership developing low-cost, high-speed manufacturing technologies promoting fiber-reinforced polymer composites.
- Synergistic relationship between IACMI and MDF.

NREL's Innovation Incubator (IN2)

- IN2 is a joint NREL-Wells Fargo program combining external entrepreneurial talent with NREL's R&D to develop, test and apply clean tech innovations to commercial buildings.

- Wells Fargo funded NREL $10 million/5 years. Entrepreneurial companies receive up to $250,000 to work with experts in research and testing at NREL, business development at universities and regional accelerators, and coaching/mentorship from Wells Fargo.

NREL's IN2 (cont.'d)

- In Dec. 2016 IN2 was in its third round.
- This program could be duplicated for other types of R&D.

PNNL's VOLTTRON Initiatives

- VOLTTRON user community: PNNL "office hours" to answer questions and help users.
- 3 user meetings to date including 16 universities, 5 national labs and companies building solutions.
- DOE Building Technology Office (BTO) in FY16 provided "innovator grants" to universities, funding grad students; researchers from PNNL and ORNL mentored students.

PNNL's VOLTTRON Initiatives (cont.'d)

- BTO funded PNNL in 2016 to run "connected building challenge". Six teams of grad students and others presented solutions they developed before judging panel of PNNL and major corps.; goal to encourage entrepreneurial outcomes.

- In 2016 PNNL partnered with WSU and UW to develop and test campus-scale control strategies. In 2017 partnership expanding to Ohio univs – CWRU and U. Toledo.

Sandia's Future Center for Collaboration and Commercialization (C3)

- C3 2 nodes: locations in downtown Albuquerque and at the Sandia Science and Tech Park.
- Albuquerque C3 is an accelerator that will co-locate tech transfer arms of UNM and AF Research Lab, and some of Sandia's T2.
- Will focus on commercialization through startups and entrepreneurs and help build regional entrepreneurial ecosystem.

Sandia's Future (C3) (cont.'d)

- Will facilitate linkages with NM Tech Council, software and IT business incubators, investors and others.
- Node 2 at Sandia Science & Tech Park (SSTP) is intended as one of the "front doors" to help corporations connect with SNL.
- Node 1 (Albuquerque) expected to be operational in FY17; Node 2 (SSTP) in FY18.

University and Private Practices with Potential Application to National Labs

- MIT's Industry Liaison Program
- University accelerators
- Fraunhofer style practices
- Coulter, Deshpande and other philanthropic programs aimed at maturing/accelerating R&D to market ready (increasing TRLs)

Continuing Challenges and Opportunities

- Culture change within the Labs
- Aligning, leveraging and connecting programs within national labs
- Adapting and connecting programs between labs
- Integrating national labs as part of regional and national innovation and entrepreneurial ecosystems

Call for a National Office of Innovation

Joe Allen and I co-chaired the White House Lab-to-Market Inter-Agency Summit that gathered national experts in commercialization. Summit recommendations called for:

Creation of a High-Level Office of Innovation and Federal Technology Partnerships.

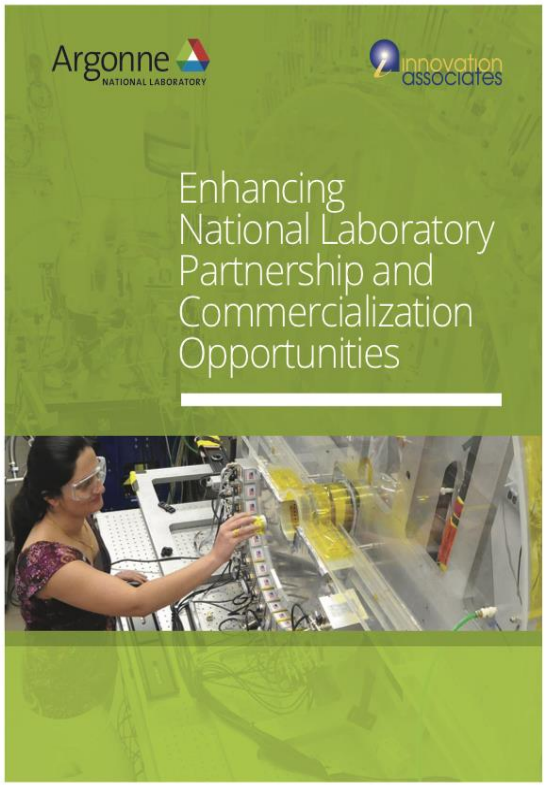
Call for a National Office of Innovation (cont.'d)

This Office would:

- Leverage cross-agency synergies and increase efficiencies regarding agency R&D and commercialization.
- Strengthen public-private partnerships, promoting increased dialogue with the private sector on current and emerging markets and appropriate alignment with federal R&D.

Call for a National Office of Innovation (cont.'d)

- Create innovative public-private partnership initiatives and investment vehicles to accelerate commercialization.
- Assess value of innovation efforts and promote proven practices.



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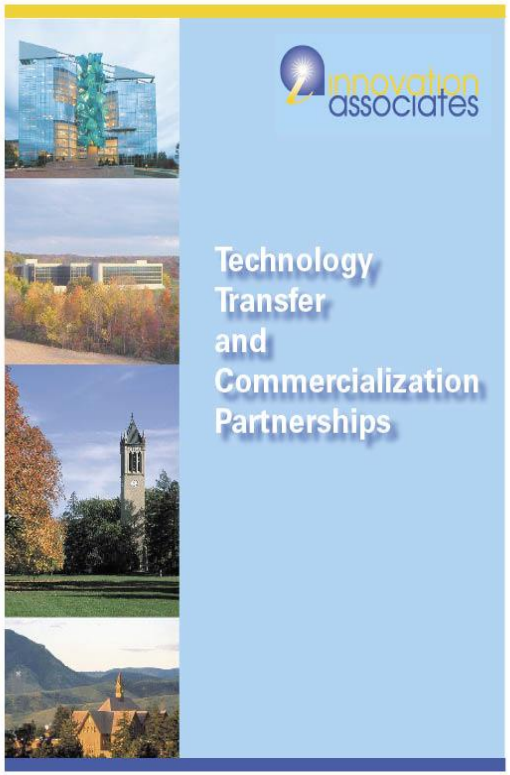

Other IA reports relevant to this discussion:

Technology Transfer & Commercialization Partnerships : *Sponsored by the National Science Foundation, focuses on emerging university institutions.*

Accelerating Economic Development through University Technology Transfer: *Sponsored by the (former) Connecticut Governor's Office, focuses on U.S. top performing institutions in technology transfer.*

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