FFRDC – Best Practices
Lessons from DOE Laboratories

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Areas for Discussion

What can we learn from other FFRDCs to enhance the quality and impact of the science being done at FNLCR?

• How do DOE Laboratories operate?

• What are they doing that might improve FNLCR?

• What areas does the NCI-Frederick Advisory Committee (NFAC) think we should focus on?

*This is a presentation-catalyzed discussion*
Sources
How do DOE Labs operate?

• NFAC Visit to Lawrence Berkeley Laboratory – Feb 2013
• Other National Laboratory Interactions
  – Visit to Sandia & Lawrence Livermore Labs (FNLCR - Heimbrook, Kuki)
  – Visit to Jefferson National Laboratory (FNLCR – Carpenter et al.)
  – Visit from G. Kubiak, COO, LBL (FNLCR and NCI)
  – Dr. P. Gilna (Director BioEnergy Science Center, Oak Ridge Nat. Lab.)
    • Member SAIC-Frederick Board of Directors
• Published External Reviews
    • National Academy of Public Administration
  – “Reimagining the National Labs in the 21st Century Innovation Economy” - June 2013
    • Information Technology & Innovation Foundation, Center for American Progress, and Heritage Foundation
Fundamental differences between DOE FFRDCs and FNLCR

• DOE Laboratories and academia provide the science for all of DOE’s needs
  – The NIH and NCI have robust intramural science programs

• DOE Laboratories compete with each other for much of their funding
  – As the only NIH FFRDC, FNLCR does not directly compete with other National Laboratories for NIH funding

• Many DOE laboratories have a “User Facility” which is functionally unique, sustainably funded and draws users from the external research community to the National Laboratory
  – FNLCR has no comparable facility

• DOE Laboratories have access to Congressionally-mandated Lab-directed Research and Development funds (LDRD) via a 3% to 6% “tax” on all expenditures
  – No formal “LDRD” at FNLCR

• Contract employees provided “reasonable and competitive” salaries
  – At FNLCR, contract-allowable compensation capped at $180 k / year
    • Contractor supplements compensation from its Award Fee pool to achieve “reasonable and competitive” salaries
**Operational Model**: By U. California-Berkeley for DOE Department of Science

- 4200 employees, $820M annual budget
- Co-location between the University and LBL is essential to the culture and science of LBL, with 190 shared faculty
  - “I do my core science at UC, and my team science at LBL.”
- University reinvests almost all of earned award fee in the Laboratory

- **Reinvented itself when the cyclotron became obsolete**
  - Material science, biology, computation (esp. biosciences)
- **Institutional “pride of ownership”** – make own decisions in strategic framework
  - Modest government presence on site
- **Most major projects started with LDRD funding**
  - $15.8 M in 2013; Lab Director decides what to spend in on (with input)
- **Tenure-like system for investigators, with 5-year internship**
  - Set own path, find own funding – academic mindset
Visit to Lawrence Berkeley National Laboratory – Recap (2)

- Extensive collaboration and funding from outside sources
  - $124 M in “work for others”
    - At what point does it distract from mission?
  - Supercomputer, Molecular Foundry, Bioenergy
    - Access is free if you publish, otherwise cost recovery
  - 15000+ scientific visitors per year

- Strategic effort to expand commercial access to LBL know-how
  - Richmond Bay campus integrates and extends Biosciences capabilities in an open site
    - Focus on Biosciences for Energy and Environment and Bio-manufacturing
  - Catalyst for regional growth
  - U. California has recently taken a more prominent role

Other observations?
Visit to Lawrence Livermore National Laboratory

Sponsored by the DOE National Nuclear Security Administration
- Operated by a joint LLC (Bechtel, U. California…)

- 6700 employees (1/3 ST&E), budget of $1.6 B
  - 180 postdocs, 200 grad students – mainly engineering

- Core mission – attest to the safety, security, and functionality of the nuclear stockpile
  - Also – address chemical, biological, and explosives security, and climate change (adapt nuclear winter to global warming)

- Closer government interface in Contractor operations (personnel, etc).
  - Performance Evaluation plan “in flux”
  - Contract Assurance System implemented, but under review

- LDRD “tax” yields approximately $85 M / year
Livermore partnering efforts

- Established joint “open campus” with Sandia in 2009
  - Energy, healthcare, IT, manufacturing, supercomputing, smart grid

- Partnering vehicles
  - High-performance computing and laser (500 terawatts) facility are main draws
  - cCRADA’s
  - Work for Others
  - Advancing Commercial Technology (ACT)
    - Contracts with partner directly and accepts liability and risk for delivery; no government involvement or reach-in
    - Licenses technology to enable startups
Sandia National Laboratory (California)

- Sponsored by Nuclear National Security Agency (NNSA); Operated by Sandia Corp (wholly owned subsidiary of Lockheed Martin Corp)
  - Twelve thousand employees (10% in CA)
    - R & D – 4000 (520 in CA)

- Primary academic tie to UC Davis – not as close as Berkeley

- Core missions - ensure nuclear weapons stockpile is safe, secure, and reliable
  - Operates Combustion Laboratory, which provides sustained funding
  - Secondary efforts – Energy (esp. H₂), cyber- and infrastructure security
    - Highly entrepreneurial – proposals on most any topic within very broad limits
      - Go after funding and mission supporter
      - Concerns about dilution of expertise and loss of synergy?

- LDRD funds foundational science – $160 M annually - high risk, high payoff
  - Proposals have about 10% approval rate from “idea” to “project”
• DOE Management and Oversight of FFRDC’s reviewed by the National Academy of Public Administration (published Jan 2013)

• Key Recommendations
  – DOE should take an integrated strategic view of the National Labs
  – Lab Evaluations based on expected key outcomes, rather than specific tasks or outputs
  – Replace award fee performance incentives with contract term extension incentives
  – Implementation of Contractor Assurance Systems to mitigate operational risks
Key Recommendations

- Transforming lab management from DOE micromanagement to contractor accountability
  - Performance-based contractor accountability model, with expanded and unified Performance Evaluation Management Plan

- Unify lab stewardship, funding, and management stovepipes with innovation goals
  - Enable labs greater latitude to use overhead funds and remove cap on LDRD

- Move technology to market with better incentives and more flexibility
  - Expand ACT for use for any type of partner
  - Enable flexible market-based pricing for proprietary research and technical facilities
  - Add “Technology Impact” category to PEMP
• Build strong ties to local academic institutions
• Culture an entrepreneurial mindset
  – “Venture” funding of exploratory projects is required to get them started
    • DOE labs use LDRD as the primary vehicle
• Contract Assurance System to enable contractor accountability without transactional oversight

Some of these opportunities are enabled, facilitated, or implemented with the RAS Program
• Test case for a new model?
• Are the principles broadly applicable?
Enabling stronger ties to local academic institutions

• **Potential benefits of stronger academic ties are apparent**
  – Joint appointments, new perspectives, reciprocal training, etc

• **FNLCR does not currently have a strategic research relationship with any local research institution**
  – Individual laboratories build collaborations based on expertise and mutual interest at the national level
  – The Visiting Scientist Program has not generated a robust flow of prominent scientists interested in coming to work at FNLCR
  – 26 Postdocs in FNLCR laboratories

• **How to implement, and with whom?**
  – Physical co-location akin to “Berkeley” not feasible – more of a “Sandia” model
  – RAS program (Spokes and RAS Community) - not regional, but provides a compelling draw
  – Frederick Regional Higher Education initiative with University System of MD & JHU
    • Fulfills a regional need for creating local Higher Education (post-baccalaureate) opportunities
    • Supported by MD General Assembly
Entrepreneurial science enabled by academic mindset and “ownership” of the project

- Our “core mission” remains the support of the NCI / NIH research agenda
- “Entrepreneurial scientists” can coexist with our core mission, which is to support intramural NCI and NIH science
  - Two areas within FNLCR currently do independent, peer-reviewed research
    - AIDS and Cancer Virus Program (ACVP) within Office of the Director and Basic Sciences Program (BSP) within Center for Cancer Research
- The RAS program creates an additional example of FNLCR-directed research – and is a paradigm for future such programs
- No other NIH FFRDC’s to compete with – so who do we compete for funding with? Academia? Cancer Center Cores? Biotechs?
“Venture” funding of Entrepreneurial Science

- Virtually all significant entrepreneurial projects at the 3 DOE labs visited started with LDRD, funded by the Congressionally-mandated “tax” on all funding
  - Varying levels of government involvement in project approval in different Labs
- FNLCR does not have LDRD, but modest “Venture Funding” did exist
  - “Technology development” funding from Office of Scientific Operations (OSO) solicited and funded Contractor-originated research proposals within the (now pivoted) Advance Technology Program – up to $3M / year
  - SAIC Corporate provides a partial rebate of award fee to Laboratory Director to fund discretionary one-time or short-term research activities ($0.2 to $0.4 M / year)

- Based on DOE Lab experience, a vibrant entrepreneurial scientific culture requires robust “venture” funding of pilot projects
Contract Assurance System to enable contractor accountability without transactional oversight

- Contractor establishes a process to assure Sponsor and Contractor’s management that operational and programmatic risks are effectively identified, controlled, & managed
  - Defines processes and activities to identify/report deficiencies, opportunities for improvement, complete corrective actions, lessons learned
- Enables Government to focus on approving Contractor systems, not day-to-day transactions, for example:
  - Manage to an approved budget
  - Hire and replace within an approved staffing plan
  - Manage FNLCR laboratory and office space
- Maturity & effectiveness of CAS varies by DOE FFRDC
  - Requires trust, accountability, and transparency
  - Things can go wrong
- Some elements of CAS-like “contractor accountability” approach are being applied to the RAS program
Discussion
What should FNLCR focus on (opinions will vary)?

Elements of each of these key opportunities already exist or are being created within FNLCR – *but there is opportunity to do more*

- **Build strong ties to local academic institutions**
- **Culture an entrepreneurial mindset**
  - “Venture” funding of exploratory projects is required to get them started
- **Contract Assurance Plan to enable contractor accountability without transactional oversight**

Other ideas? *and* Discussion