Developing Organizational Flexibility

VCAT

6-14-2017

Major Strategic Themes for NIST

COMMON DRIVERS

- NIST must address measurement needs in complex multivariable environments
  - Biological measurements
  - IoT
  - AI
- Converging technologies require multidisciplinary teams
- Restricted funding environment
  - Increased uncertainty

NEED

- NIST Needs to maintain organizational agility and flexibility
  - Build and dismantle cross disciplinary teams
  - Tap into existing expertise
  - Develop new methods of delivering "trust in measurement"

Institutional Characteristics

- **NIST is primarily an intramural lab research organization**
  - Requires dedicated infrastructure and staff
- **NIST's organizational structure is relatively static**
  - Last major reorg took place in 2010 (22 years after the last major change)
  - NIST's organization remains largely discipline-based
- **NIST labs have broad autonomy within respective scopes**
  - Must still maintain core activities (measurement traceability, etc.)

"(…) the Bureau's hands-on experimental capability is the primary basis for its reputation and usefulness. The laboratory focus is also reinforced by the unique expertise and facilities required by the basic mission and by the Bureau's role as an objective, independent third-party."

Long-Range Plan of NBS, 1981

Methods NIST Uses to Increase Operational Flexibility

Key Questions

- **Address multidisciplinary problems in a discipline-based organization?**
- **Address rapidly emerging technologies?**
- **Deliver trust in complex systems?**

- Start up and directed funding
- Cross organizational program management
- Grants-based Partnerships and Joint Institutes
  - NIST Centers of Excellence
  - JILA, JQI, JIMB
- Leveraging NIST Extramural Programs
  - Manufacturing USA

Start-up and Directed Funding

Advantages

- Provides flexibility towards near-term NIST-level priorities
- Enables creative bottom-up research
- Enables formations of unique teams outside of home organizations

Challenges

- Sometimes challenging to maintain momentum when projects transferred off centralized funding.
- Programs are often undersized compared to scope of the challenge

Example Efforts

- Strategic and Emerging Research Initiatives (SERI)
- Innovations in Measurement Science (IMS)

FY2018 Impact

- NIST protected these programs in FY2018
  - As funding environment tightens we will evaluate how funds are allocated

Cross Organizational Program Management

Advantages

- Bench-level collaboration across Labs works well at NIST

- Enables coalescence of effort around a major priority area

Challenges

- Base funding resides in labs, isn't readily reprogrammed out of lab

- Challenges to PM increase the more organizational boundaries are crossed

- In some cases PMs control may be limited
  - Impacts where funding goes
  - Impacts scale of effort

Example Efforts

- Special Program Office (GHG Measurement Program, Forensics)

- Quantum Information Science Program (based in PML)

- Materials Genome Initiative Program (based in MML)

- NIST on a Chip (based in PML)

- Public Safety Communications (based in CTL)

- Smart Grid (based in EL)

FY2018 Impact

- SPO resources eliminated

Grant-based Partnerships -- Centers of Excellence

Advantages :

- Close partnership and access to world-class expertise, data, access to facilities

- NIST can expand in new fields and minimize risk by not developing formal in-house capabilities

- Visible focus on priority NIST efforts

- Builds critical mass necessary for impact

Challenges:

- Takes time to establish productive relationship

- Requires significant oversight, changing scientist to program manager

- Limited control

FY2018 Impact

- NIST proposes to eliminate funding for 1 COE

Joint Institutes

Advantages:

- Provides access to expertise not otherwise available to NIST.

- Ability to build long-term capabilities in technical areas with significant growth potential.

- Provides a pipeline for future skilled workforce.

- Ability to work with academia and industry in a flexible and effective manner.

Challenges:

- Loss of NIST culture at off-site centers; embedded staff may not feel connected to NIST.

- Difficult to disengage from commitment.

FY 2018 Impact

- Constrained resources will make it harder to establish new or expand existing partnerships

- Eliminates Hollings Marine Laboratory

JOINT CENTER FOR QUANTUM INFORMATION AND COMPUTER SCIENCE

jqi Joint Quantum Institute

IBBR INSTITUTE FOR BIOSCIENCE & BIOTECHNOLOGY RESEARCH

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

Leveraging NIST Extramural Programs

Pros:

- Large national networks – thousands of stakeholders
- High visibility
- NIST labs can leverage Manufacturing Institutes opportunistically

Cons:

- Harder to develop long term research partnerships – tend to be more transactional

Manufacturing Institutes	Corresponding technical programs in the NIST labs	Assisted in developing Funding Opportunities, vision, and/or reviewing applications	Advisory role within the institute	Active collaborations between institute and NIST Labs
AFFOA (Advanced Functional Fabrics of America)	√	√	√	TBD
Advanced Robotics for Manufacturing (ARM)	√	√	TBD	TBD
AIM Photonics	√	√	TBD	TBD
America Makes	√	√	√	√
BioFabUSA	√	√	TBD	TBD
DMDII	√	√	√	√
IACMI	√	√	√	√
LIFT	√	√	√	√
NextFlex	√	√	√	TBD
NIIMBL	√	√ (NIST Lead)	√	√
Power America	√	√	√	√
RAPID (Rapid Advancement in Process Intensification Deployment)	√	√	TBD	TBD
REMADE (Reducing EMbodied energy And Decreasing Emission in Materials Manufacturing)	TBD	√	TBD	TBD
Smart Manufacturing (Clean Energy Manufacturing Innovation Institute)	√	√	TBD	TBD

Questions for the VCAT

How can NIST be more effective at

- quickly and flexibly crossing organizational boundaries to meet areas of major and immediate national need?

- Working on areas at the convergence of several technical disciplines?

  – What has worked in your organization?

  – What are common pitfalls?

  – What are common warning signs of the organizational structure getting in the way of the mission?