U.S. DEPARTMENT OF ENERGY | Office of Science

Research Infrastructure Development: Examples in Policy, Planning, and Execution

Session: International Case Studies for Large-Scale R&D Infrastructure

White House National Science and Technology Council (NSTC) Conference: Building Bridges Across the S&T Enterprise

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Scope of my remarks

- Policy and good practices for large-scale global research infrastructure (GSO)
- Community engagement in strategic planning for particle physics (Snowmass + P5)
- International collaboration and supporting mechanisms for US-hosted neutrino science (LBNF/DUNE)
- These are only case studies/examples for these areas; many other efforts and models are out there!

Policy: G7 Working Group efforts

- Group of Senior Officials (GSO) on Global Research Infrastructures (GRIs): A working group, currently meeting ~2x/yr, under the G7 Science Ministers
- Purpose/scope: identification of good practices; communication on expectations, issues, and approaches; exploration of new collaboration opportunities
- GSO has developed and published a "Framework" for identification as and best practices for GRIs; several facilities have completed detailed self-assessments of alignment with the framework criteria (see GSO website, currently hosted by EC):

1. Core purpose of Global Research Infrastructures
2. Partnership management
3. Defining scope, schedule, and cost
4. Project and operations management
5. Contribution management
6. Periodic reviews
7. Termination or decommissioning
8. Access goal based on merit review
9. e-infrastructure
10. Data management
11. Clustering of Research Infrastructures
12. International mobility
13. Innovation, Technology Transfer and Intellectual Property
14. Monitoring impacts

- Heavily informed by facility and project case studies
- Other bodies are also discussing and working to optimize GRIs, including:
  - The Global Science Forum (GSF) of the OECD
  - The Global Research Council (GRC) – heads of national research funding organizations

Planning: U.S. process for particle physics

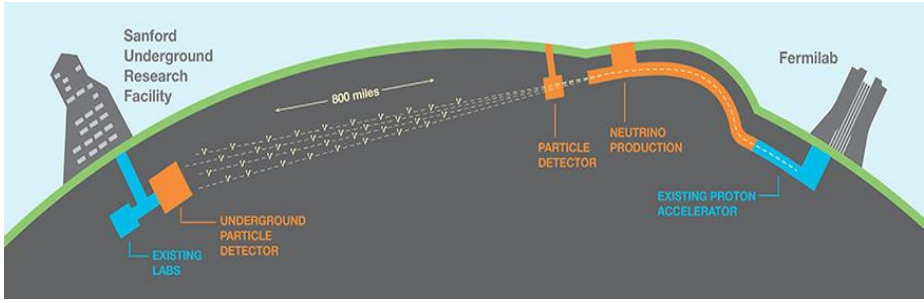
- Strategic planning in the U.S. for particle physics investments in major facilities relies on extensive community engagement involving multiple parties over several years
- **Snowmass**:
  - Organized by the Division of Particles and Fields of the American Physical Society
  - Aimed to identify most compelling science opportunities, and best ways to address them
  - Emphasized asking and answering hard questions, not prioritizing activities
  - Two-decade time horizon
  - Planning, preparatory, and capstone community meetings over >a year
- **Particle Physics Project Prioritization Panel (P5):**
  - Subgroup of the High Energy Physics Advisory Panel (HEPAP), a DOE/NSF Federal Advisory committee
  - Explicitly charged with prioritizing across major projects, under several budget scenario constraints
  - Planning over a 10 year timescale, in the context of a 20-year global vision for the field
  - Snowmass reports and white papers provided critical starting point for P5
  - Other inputs: European Strategy for Particle Physics (CERN), Astronomy and Astrophysics Decadal Survey (National Academies)
  - Active website and submission portal, three large public meetings, physical and virtual town halls, detailed inputs from major experiments/activities
- Major conclusions/emphases of 2014 P5 report:
  - Science impact comes first, and five intertwined science drivers were articulated
  - Fundamentally global nature of the field and need for international facilities recognized
  - The community made difficult choices and projects were prioritized, downselected from many excellent options

Outcome generated consensus, provided agreed-on guidance, and facilitated communication as well as planning

- **U.S. particle physics community** strongly supports strategy
- **U.S. Administration** has supported implementing the P5 strategy through each President's Budget Request
- **U.S. Congress** has supported implementing the P5 strategy through the language and funding levels in appropriations bills
- **International community** recognizes strategy through global partnerships

Execution: LBNF/DUNE engagement and international agreements

- The Long Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) are very-large-scale projects, US-hosted but fundamentally international in character
- More than 1000 collaborators from over 30 countries already participate in DUNE



- Formal international agreements are in place with UK, India, Italy, CERN, and under development or consideration with a number of other countries
- Collaboration agreements and commitments can take various forms:
  - Government-level commitments to major in-kind or other contributions often formalized via Project Annexes and/or Implementing Arrangements under overarching bilateral Science and Technology Agreements (STAs)
  - Memoranda of Understanding or Agreement (MOUs or MOAs) can assist in defining interactions and responsibilities, providing more detail than the broader formal agreements above
  - Contractual obligations such as Cooperative Research and Development Agreements (CRADAs) can be used to solidify arrangements between individual institutions
  - Statements of Interest (SoIs) can demonstrate engagement and may be used as precursors to more formal arrangements
  - All of these approaches are utilized for LBNF/DUNE. Flexibility (and fitness for purpose) is key!

Take-aways:

- Open communication pathways and regular dialogue can lead to greater consistency in policy, expanded use of good practices, and identification of collaboration opportunities
- Engagement, buy-in, and willingness to face hard choices head-on are critical in strategic planning and portfolio definition
- Flexibility is key!