

Update on the NSAC Nuclear Data Charge Subcommittee

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The First Part of the Charge (due 9/15/22)

1. Assess USNDP Status, which would include the following actions:
 - a) Assess and document *recent achievements* in nuclear data and their impact.

Input from USNDP staff

- b) Survey current and future federal and non-federal *needs* for reliable, accurate, secure, accessible nuclear data.

Input from the NSAC Nuclear Data Charge Subcommittee (NSAC-ND)

- c) Assess the role, competitiveness, and importance of the USNDP in an *international context*.

Input from USNDP and IAEA staff

The NSAC Nuclear Data (NSAC-ND) Charge Subcommittee

<u>Person</u>	<u>Org</u>	<u>Person</u>	<u>Org</u>
Friederike Bostelmann	ORNL	Arjan Koning	IAEA/Petten
Mike Carpenter	ANL/Atlas	Ken LaBel & Tom Turflinger	NASA & Aerospace
Mark Chadwick	LANL	Caroline Nesaraja	ORNL
Max Fratoni	UCB	Syed Qaim	Jülich
Ayman Hawari	NC State	Catherine Romano	Aerospace
Lawrence Heilbronn	UTK	Sunniva Siem	Univ. of Oslo
Calvin Howell	TUNL	Artemis Spyrou	MSU
Jo Ressler	LLNL	Etienne Vermeulen	LANL
Thia Keppel	J-lab	Ramona Vogt	LLNL

All of these people were chosen based on their experience in nuclear data and some of the applications that rely on it

The first report by the numbers...

- Totals: 88 pages, 6 Chapters, 30 figures, 7 tables, 293 references
 1. USNDP since 2018-now Accomplishments: 25 items; 23 pages
 2. International efforts/collaborations: 4 pages
 3. Nuclear Data needs (50 pages): Basic Science (8); Energy (9), including 4 detailed tables); Medical (8); National Security (3); Nonproliferation (8); Space (10).
 4. Crosscutting Needs: Workforce Development; Ongoing Fission Evaluation; Accelerated Decay Data Evaluation; Statistical Structure Evaluation; (n,x) data & High energy data (5 pages).

Some information was moved to the second report and a final version released on January 22, 2023

The Second Part of the Charge (due 1/30/23)

2. Based on the USNDP Status Report (from part 1), provide recommendations for maintaining effective stewardship of nuclear data, which includes the following actions:
 - a) **Identify challenges** for nuclear data stewardship in the future, **including identifying and prioritizing the most compelling opportunities to enhance and advance NP stewardship of nuclear data** and the impact if those opportunities can be realized.
 - b) Describe possible ways the Nuclear Data (ND) community can work to **train and retain** a diverse, equitable, and inclusive workforce capable of sustaining the U.S. ND enterprise.
 - c) Identify **access needs for facilities and instrumentation, crosscutting opportunities with other federal programs, and potentially mutually beneficial interactions with other domestic and international stakeholders.**

The first report and input from the USNDP was used

The second report by the numbers...

- Main Body: 41 pages, 4 Chapters, 9 figures/tables, 123 references
 1. Executive Summary (2 pages)
 2. Challenges and Opportunities for Nuclear Data (28 pages)
 3. Diverse, Equitable & Inclusive Workforce Development (3 pages)
 4. Facilities and Instrumentation Access Needs (8 pages)
- Appendix: Domestic Nuclear Data Generating Facilities
 - 21 Facilities @ 17 National Labs and Universities
 - Updated & Expanded from the 2015 NDNCA Whitepaper Appendix D.

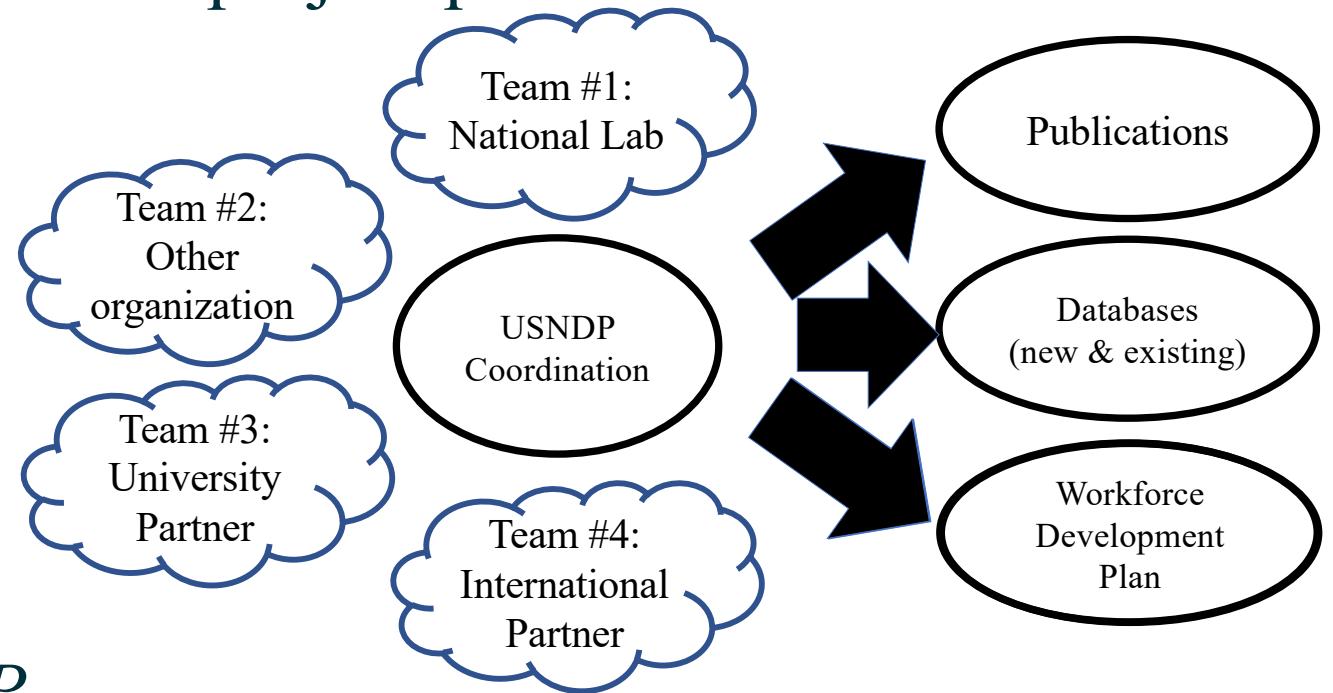
Three critical “Take Aways” from the Second Report

1. Continued support is necessary for the existing nuclear reaction (ENDF), structure (ENSDF) and mass (AME) evaluation efforts.
2. A number of *new initiatives* are required to address societies evolving nuclear data needs. These initiatives will require a concerted recruitment effort and support over time to build.
3. These new evaluators should be a part of any experimental activities to ensure expedite data incorporation and ensure a good understanding of the nominal values and uncertainties of the data being measured.

Collaboration is Essential

A key finding is that USNDP members should be part of *Topical Nuclear Data Collaborations (TNDC)*

1. The TNDC brings together application and data subject matter experts and includes workforce development in its project plan.
2. Data would be published in appropriate peer-reviewed journals as well as being incorporated into new or existing databases.



This paradigm is already used by NP (e.g., FIRE) and by NA-22 (e.g., ventures)

Think of these people as *embedded evaluators*

Fourteen Nuclear Data Thrust Areas were presented including eleven new initiatives

1. Supporting Structure Evaluation Capabilities
 2. Enhance Reaction Evaluation Capabilities
 3. Maintain Atomic Mass and Nuclear Property Evaluation
 4. Nuclear Astrophysics Evaluation
 5. Develop Statistical Nuclear Structure Data Evaluation and Databases ✓
 6. Establish Methods for Continuous Fission Evaluation ✓
 7. Targeted Accelerated Decay Data Evaluations ✓
 8. Provide Comprehensive, Consistent Neutron Reaction and Structure Data ✓
 9. Charged-particle stopping powers measurement and evaluation ✓
 10. Comprehensive reaction measurement and evaluation to $E/A \leq 10$ GeV/amu) ✓
 11. Provide Nuclear Data for Fusion Energy *A workshop is being planned for April 2023*
 12. Continue Development of Modern Data Formats ✓
 13. AI/ML for Modern Nuclear Data Compilation, Evaluation, and Dissemination ✓
 14. Create an Infrastructure for Data Preservation and Open Data ✓
- Existing USNDP Efforts } ✓ - Covered at a WANDA
- Topical USNDP Initiatives }
- Enabling USNDP Initiatives }

These 14 crosscutting nuclear data topics map onto all of the topic areas presented in the first report

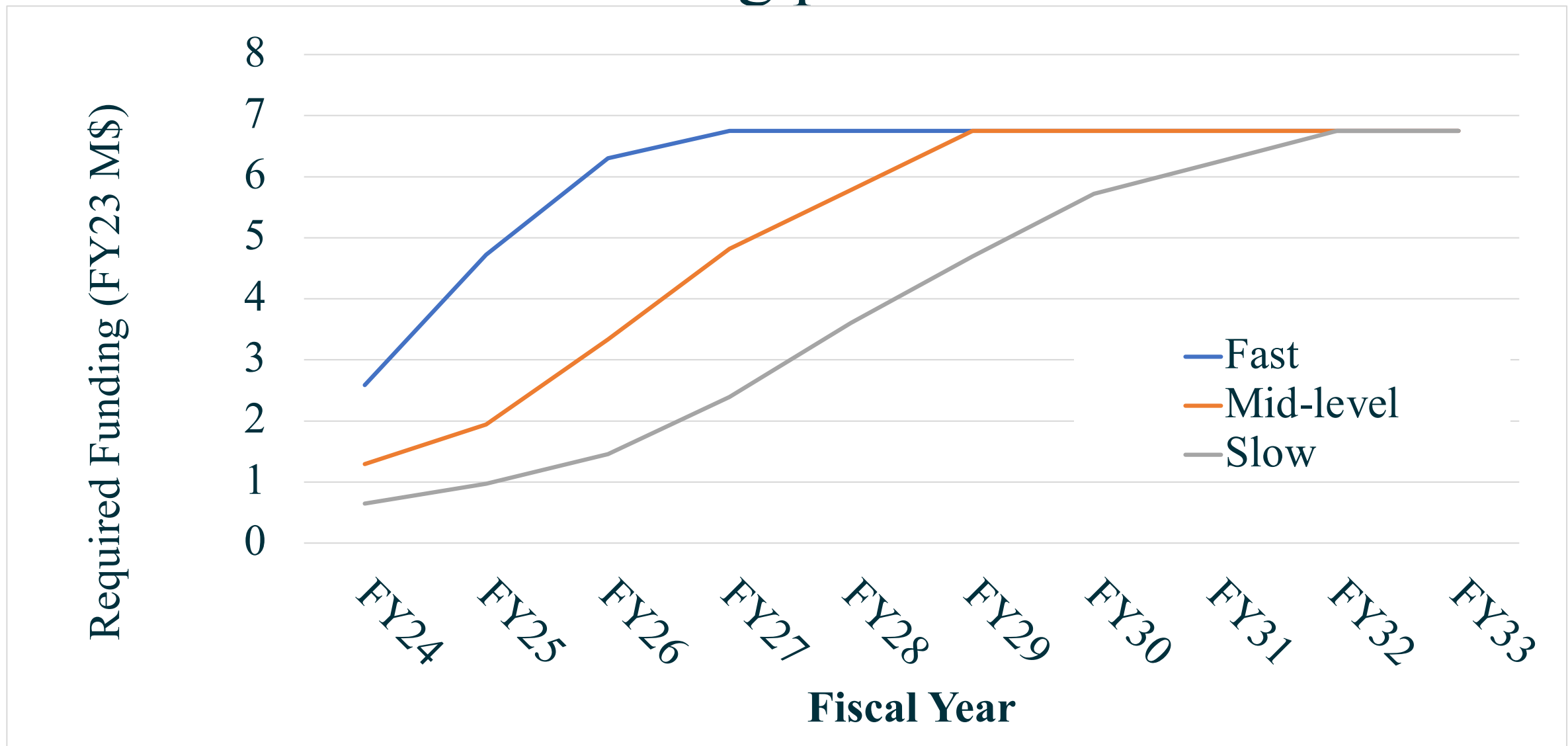
Nuclear Data Initiative	Basic Science	Energy	Medical Applications	Nat'l Security & Nonproliferation	Space Applications	
Structure Data						} Existing USNDP Efforts
Reaction Data						
Mass Data						
Astrophysics						} New USNDP Initiatives
Statistical Data						
Fission						
Decay Data						
(n,x) data						
Stopping						} Enabling USNDP initiatives
High Energy Data						
Fusion						
Data Formats						} Enabling USNDP initiatives
AI/ML Tools						
Data Preservation						

Each nuclear data initiative is presented in 4 parts

- 1. Issue:** Identification of a crosscutting nuclear data need;
- 2. Background:** A discussion of how the initiative is related to the need;
- 3. Recommendation:** A recommendation of how to carry out the initiative, including an estimate of the additional workforce needs and a recruitment/training timeline;
- 4. Impact:** The societal benefits that would result from carrying it out.

The target audience for these initiatives are congressional staffers

The time scale of this expansion can be adjusted to fit funding profiles



Next Steps

- The report was sent to NSAC on 2/13/23.
- The report will be discussed at the 3/7/23 meeting
- Input from the report will be used for portions of the Long Range Plan (e.g., applications, low-energy program etc.)

Special Thanks

Ramona Vogt, Cathy Romano, Bethany Goldblum, Jo Ressler and many of my colleagues in the USNDP