

A modern nuclear database structure beyond the ENDF format

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We've made excellent progress toward the development of a modern database structure

- Detailed requirements have been drafted and reviewed in 3 documents
 - Many thanks to David Brown, Bret Beck and Caleb Mattoon for documentation efforts
 - High-level vision and requirements
 - Basic numeric and text data
 - Particle information
 - Reaction information

Finished!
- Initial specifications will be finished (I hope this week!)
 - Documentation
 - Basic data
 - Particle data
 - Reaction data

Will continue to evolve under version control.

I propose to close SG38 in a few months with a summary report that references all documentation prepared by SG38

Two new subgroups will carry the effort to modernize our nuclear data infrastructure

Expert Group: Recommended definition for a General Nuclear Database Structure (EG-GNDS)

- A long-term sub-group to serve as a governance body
- Promote format, infrastructure into the future

New subgroup (SG-43): Code infrastructure to support a general nuclear database structure

- Code infrastructure will enable international adoption
- There is a lot of work to do -- a separate focused effort
- After completion, long-term subgroup can oversee efforts

Next steps

- Finish writing the specifications documentation
 - Since these will be maintained under version control, should we release with NEA document numbers?
- Release ENDF-B8 in both ENDF6 and GNDS
- Develop initial software infrastructure
 - Needs more involvement from evaluators and HF code projects
- Areas for further work by EG-GNDS
 - Address known and future issues as ENDF-B8 in GNDS is utilized
 - Add new capabilities as requested by community (e.g. covariance formats)
 - Promote structure and available tools, particularly in evaluation community

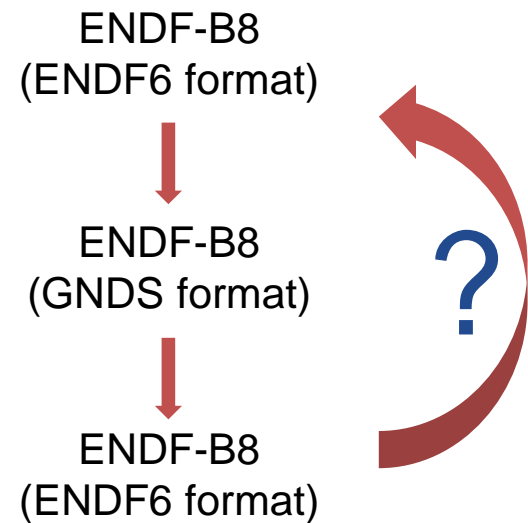
Current status of ENDF-VIII to GNDS translation

- Most sub-libraries are translated:
 - Incident n, p, d, t, He3, alpha, gamma and electron data
 - standards
 - photo-atomic
 - atomic relaxation (a few things to be fixed)
 - thermal_scattering
- Still to be translated:
 - Neutron-induced and spontaneous fission yields
 - nfy and sfy translation is simple, but finalizing how to store them in GNDS
 - Decay sub-library

Translations of JEFF-3.2 and JENDL-4 also being performed --
Interactions to work out issues taking place

Validation of backwards compatibility

- Original goal was to demonstrate ability to recover ENDF-B8 in ENDF6 format from GNDS
 - Works at the 98% level (by number of lines reproduced)
 - Remaining 2% seems largely due to data redundancy or errors (particularly in gamma outputs)
- Comparison of NJOY multi-group files maybe a better way to ensure that 100% of physics intent is captured



Concluding remarks

- It has been very rewarding to have the WPEC community be so supportive of taking these first steps toward modernization
 - Built community and goodwill
 - Hopefully will lead to new knowledge and clarity
- A new set of leaders step forward to continue these advances
 - SG43: Jeremy Conlin, Caleb Mattoon, Fausto Malvagi
 - EG-GNDS: David Brown, Emmeric Dupont
- The main technical benefit so far has been in improving data consistency/quality
- I'm really looking forward to seeing how the new structure gets used, unanticipated benefits

Translation status for JEFF-3.2 (incident neutrons only)

- 174 files (out of 472) fail to translate.
 - Additional 19 files require the ‘—continuumSpectraFix’ option
- Some common problems:
 - Mismatch between MF=2 and MF=32 resonance parameters
 - Using a ZA instead of MAT in the ‘MAT1’ field of MF=33.
 - If MAT1 == MAT, current manual says to set MAT1=‘0’
 - Incident energies out of order in MF=3
 - Excited-state products are sometimes listed in MF=8 with ‘LMF=6’... but the product is missing from MF=6
 - For example, MT=5 for Y90 and Y91

Translation status for JENDL-4 (incident neutrons only)

- 11 files (out of 406) fail to translate
 - B10 may be a translator bug
 - Te129m: for MT=51, QI should equal QM (inelastic from metastable back to ground state)
 - U233, U234, U235, U238, Np237, Pu238, Pu240, Pu242: resonance parameters in MF=32 don't agree with MF=2
 - Am241: MF=8 and MF=9 disagree about excited level energy following (n,gamma) to Am242_m1
- I previously reported patches for some of issues, so they may be fixed in latest development version