

(U) Proposal for a WPEC Sub-Group Validation of Nuclear Data Libraries (VaNDaL)

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Our goal is to improve the process by which we do Validation of Nuclear Data Libraries

• A fundamental requirement before we release a new nuclear data library is that we validate that these data are appropriate for general purpose use
  – This requires 1000s of hours (or more) of effort to run and analyze broad suites of validation tests

• We struggle needlessly with many aspects of this process
  – We spend too much of our time where multiple people fix the same issue, build tools that are redundant, and waste precious time we need to use for analysis

• We need to automate the simple tasks, so that we may spend more productive time addressing real issues
The vision is to build a system of shared tools and procedures to amplify our validation efforts

• A public repository of benchmark input decks
  – Ensure reproducibility, traceability and transparency
  – This enables one of the fundamental tenets of science, our colleagues may reproduce our results

• Procedures for validating the inputs the repository
  – Common, documented methods for quality assurance

• Tools to run the tests and mine the data
  – Reduce errors and time associated with running the tests
  – Reduce errors and time associated with mining outputs
  – *Allows us to focus on analysis of the results*
Our initial focus is on the infrastructure and process. We need an engaged community to populate it.

- The deliverable of this sub-group is not the suites of benchmarks, it is methods to verify and share them.

- We need to have a robust outreach to the broader user communities to engage with us and use these tools to produce the actual test suites.

- This infrastructure is code and test agnostic, it should work equally well for any code and for any benchmark.
We need to enable wide distribution of the results

• The NEA and IAEA (and the nuclear data centers) provide documents and other tools to enable our communities to judge the usefulness of these data
  – DICE, NDaST and other tools enable our users to quickly drill into these results to examine the benchmarks of most relevance to their application

• We need to standardize the outputs from these tests that are of highest value so that they may be broadly shared through these channels
  – Validation results for key nuclear data libraries should be made available similar to the evaluated data themselves
Time-Schedule and Deliverables

• **Year 1:**
  – Collect suitable input decks from participants and other stakeholders
  – Define the layout and implement an initial repository
  – Generate a prototype QA requirements specification and tools to help implement this process

• **Year 2:**
  – Perform QA on a subset of inputs using prototype requirements to determine its suitability and revise as necessary
  – Generate a prototype requirements document for standard outputs
  – Develop tools to run benchmarks and parse these outputs

• **Year 3:**
  – Finalize QA and outputs requirements
  – Release initial benchmark suite and tools
Potential follow-on projects

- Enable code verification
- Provide tools to create standardized input decks across multiple codes
- Expansion of inputs to include shielding, reactor physics, fuel burnup and other benchmarks.
- Populate suites of these benchmarks, particularly with tools to automate data comparisons
- Integration of these tools in data adjustment or data assimilation projects
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