(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
- …