

Beyond the ENDF format: Developing a plan to meet our requirements

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At our last workshop, and in the intervening months, we wrote a draft requirements document for a new format to improve our community

- Introduction
- History
- Purpose of the new structure
- System Overview
- Benefits and requirements for data evaluation and processing
- Basic data containers
- Summary
 - Ten (10) high-level requirements for format
 - Shared low-level data containers
 - Four (4) broader recommendations to facilitate adoption

Are there any changes proposed before we vote for adoption?
Modifications can be proposed in the future – a living document

My plan is to go through requirements/recommendations now

Goal is to make sure we capture our thinking as a community

- Does the requirements document meet your needs in a new structure?
- If no objections, I will submit to data projects for acceptance on Thursday or Friday

Requirements that apply to the structure for storing reaction data

- Be governed by an international organization that will define the structure and maintain the documentation
- Use a hierarchy that reflects our understanding of nuclear reactions and decay, and that clearly specifies all data
- Define APIs for reading and writing data in the structure
- Support storing multiple representations of the same quantity simultaneously (e.g. evaluated and processed)
- Support both inclusive and exclusive reaction data (i.e. discrete reaction channels as well as sums over them)
 - Open question: whether or how to require consistency between the two?
- *(Require or Contains provisions for)* evaluators and data processors to provide detailed information needed to reproduce and extend their data.
 - Bibliography, links to EXFOR data used *including correction factors*, a description of codes and input parameters, and comments
- Eliminate redundancy where possible (e.g. Q-values are not needed since they can be derived from particle masses) and provide a way of linking to an external particle databases such as RIPL

Requirements that apply to the structure for storing reaction data (cont)

- Support any particle and any combination of reaction products (and subsequent decay products)
- *(Require or Contains provisions for)* the user to specify the precision, physical units, and interpolation of the data
- Support backwards-compatibility with ENDF-6 in the short term (approximately 10 years), although in the long term new features will likely be added that cannot be translated back to ENDF-6

In addition to nuclear reactions, a hierarchical structure could also be used to organize nuclear structure data (as in ENSDF), experimental data (as in EXFOR), and reaction model parameters (as in RIPL). This leads to an additional goal:

- The structure must include reusable low-level data containers that are general enough to be shared between data products (e.g., EXFOR, RIPL and ENSDF)

Four broader recommendations to nuclear data community to facilitate adoption of new data structure

- Use open source infrastructure to manipulate, search, plot, process, translate and assure the quality of the data.
 - For better quality assurance and data checking, at least two independent codes are necessary.
- This infrastructure should be forgiving, meaning that access routines for the new structure must be able to recover gracefully and continue working if they encounter data containers that are not yet officially recognized as part of the structure.
- APIs for accessing data in the new structure should be provided as open-source.
 - They should be initially written in both Java and C, with wrappers for C++ and Fortran.
- Evaluators are encouraged to provide a pointwise, linearly-interpolable representation where possible for easier plotting and consistency checking, but other forms should also be supported.

Anyone opposed to recommending adoption of the requirements document? Does it meet your needs in a new structure?

- If no objections, I will submit to data projects for acceptance on Thursday or Friday

Next steps: Developing a plan to meet our requirements

We propose to breakdown the work into seven (7) work products:

1. Low-level data containers
2. Top-level hierarchy for storing nuclear reaction data
3. Hierarchy for storing particles, level schemes and decays data
4. Infrastructure for data handling, processing, plotting, etc
5. API for reading and writing data in the new structure
6. Defining the tests that will be needed to assure quality of data
7. Documentation and governance

Last time we focused on scope and vision.

Today we are developing a consensus on how to execute the project:
What work will be done and who will do it?

By the end of this workshop, we should have the pieces for a draft document regarding our plan to roll out a new format

- Everyone will want to jump into technical discussion, but REMEMBER our primary goal: *A community plan*
- Helps us understand the broader context and coordinate better as we get deeper into technical issues over the coming year or two
- Each session (work product) should provide me input that captures plan before leaving Wednesday
 - A statement of work – list of items/products to completed
 - E.g. specifications, test plan, new code, reports
 - A resource list – what/who do you need to perform work and availability
 - A list of tasks – who will perform them and effort estimates
 - A schedule of when tasks will be completed
 - A risk plan – what are the risks and how do we plan to handle them?

OK to have an aggressive schedule --
Focus on issues of coordination/communication between product teams

An example: My first stab at these things from a high-level coordination point of view

- A statement of work – list of items/products to completed
 - E.g. specifications, test plan, new code, reports
- A resource list – what/who do you need to perform work and availability
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A statement of work – list of items/products to completed (<10)

- Low-level data containers – *Morgan White and Victor Zerkin*
- Top-level hierarchy for storing nuclear reaction data – *Arjan Koning and David Brown*
- Hierarchy for storing particles, level schemes and decays data – *Roberto Capote and Caleb Mattoon*
- Infrastructure for data handling, processing, plotting, etc – *Bret Beck, Yannick Peneliau, Valentin Sinitsa*
- API for reading and writing data in the new structure – *Bret Beck and Wim Haeck*
- Defining the tests that will be needed to assure quality of data – *Michael Dunn and Jean-Christophe Sublet*
- Documentation and governance – *Emmeric Dupont*

A resource list – what/who do you need to perform work and availability

- Need folks to coordinate each product team
 - Low-level data containers
 - Top-level hierarchy for storing nuclear reaction data
 - Hierarchy for storing particles, level schemes and decays data
 - Infrastructure for data handling, processing, plotting, etc
 - API for reading and writing data in the new structure
 - Defining the tests that will be needed to assure quality of data
 - Documentation and governance

- Need a web site/wiki/repository for our project's work
 - NEA or BNL?

- Need a representative from each data project to be responsible for beta testing – ensure that new structure meets local requirements
 - ENDF – David Brown/Advance
 - JENDL – Osamu Iwamoto
 - JEFF, BROND, Others?


A list of tasks – who will perform them and effort estimates

- Compare notes and agree on technical path, document
- Document specifications for format or code, depending on product
- Beta release of database or code
- Each data project reviews results – Testing occurs
- Compare notes and update specifications
- Release revised databases and codes, formally request adoption from data projects

- Since we are meeting twice a year, I'm hoping that each step can be done in ~6 months

A schedule of when tasks will be completed

- Structure specs need to be reasonable mature before code development can really get going
- Next few slides: My high-level thoughts on schedule

	2013		2014		2015	
	May	Nov	May	Nov	May	Nov
Low-level data containers	Review ENDF, EXFOR, GND, ...; Choose technical paths	Draft documentation of structure specifications	Peer review; Iterate as necessary	Release documentation of structure specifications		
Particle data hierarchy	Review POP, ENSDF, RIPL, masses, ...; choose path	Draft documentation of structure specifications	Beta release of particle database	Peer review; iterate as necessary	Release of particle database	
Reaction data hierarchy	Review ENDF, EXFOR, GND, ...; Choose technical paths	Draft documentation of structure specifications	Beta release of current databases in new structure	Testing by SG38 and data projects	Release documentation of structure specifications	
Infrastructure	Review Fudge and other codes	Specification of required functionality	Beta release of translation code (ENDF to new structure)	First release of other infrastructure	Release of translation code (ENDF to new structure)	
API	Review GIDI	First draft of API with code spec.	Beta release in C, C++ and/or Java	Use testing by infrastructure group	Release in C, C++ and/or Java	
Database testing/Q&A	Review current checking codes	Document list of required tests	Implement tests in Fudge	Release		

A risk plan – what are the risks and how do we plan to handle them?

- People get distracted
 - How do we keep people focused and energized?
- Product teams do not communicate well
 - Fail to get what they need to proceed
- Thoughts on how to mitigate?
 - Regular phone meetings?