

Modernization Efforts of NEA Nuclear Data Projects

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**Consultancy Meeting on Information
Exchange on Developments and Operations of
Nuclear Data Dissemination Services**



NEA Nuclear Data Projects

THE NEA is responsible for two main nuclear data projects:

JEFF

- Compile the library
- Track changes
- Store the files
- Verify the quality of the files
- Process the library
- Distribute the files
- Organize meetings

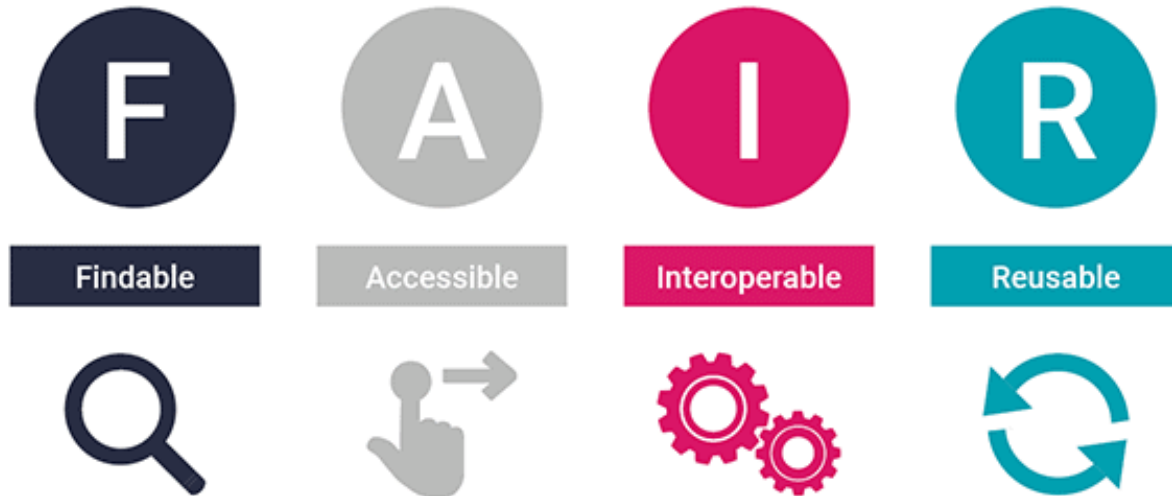
EXFOR

- Compile entries area 0 and area 2
- Review PRELIM files area 0,2
- Review PRELIM from other centers
- Keep track of allocated entry numbers
- Write MEMOS

1) JEFF

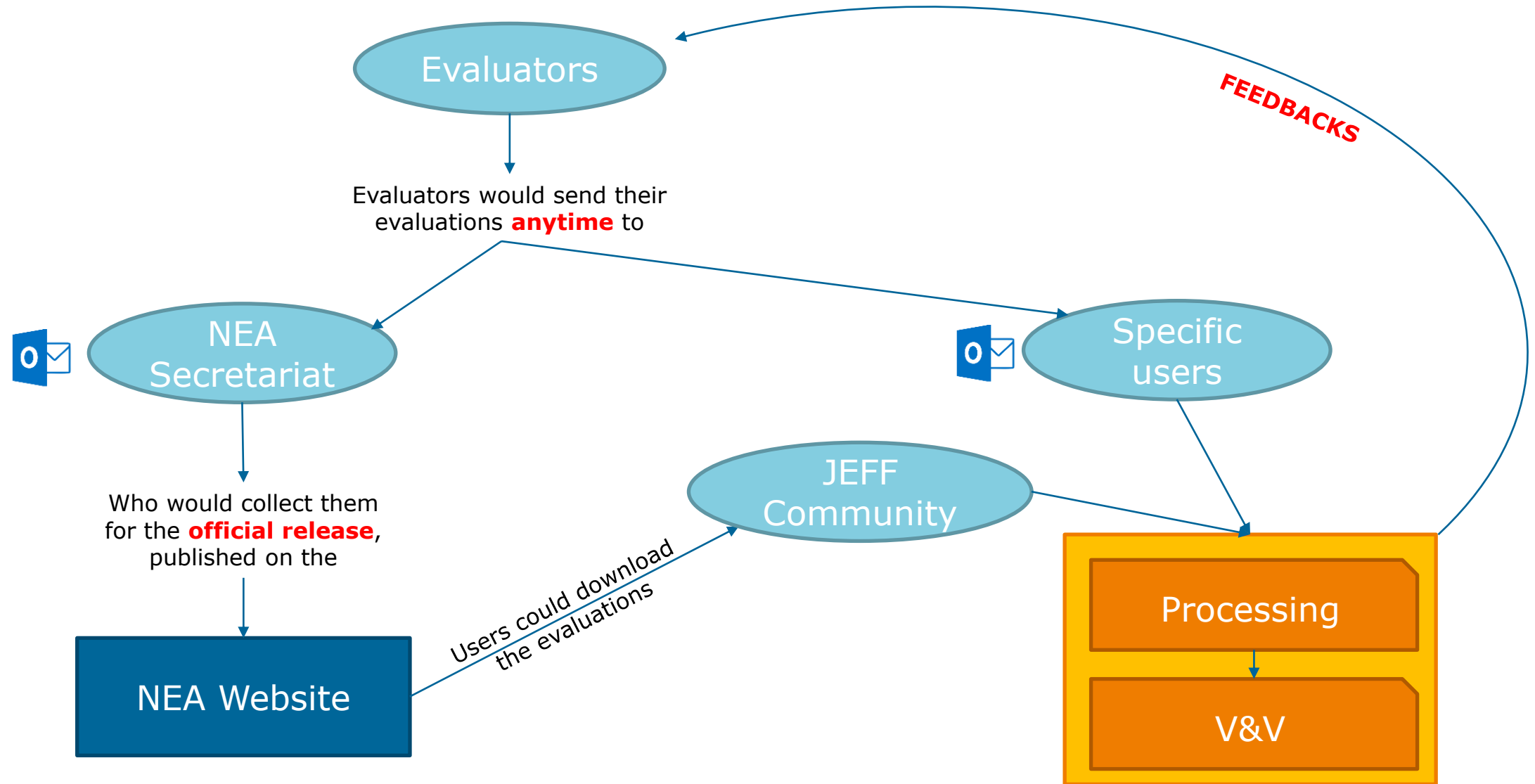


Trying to be FAIR

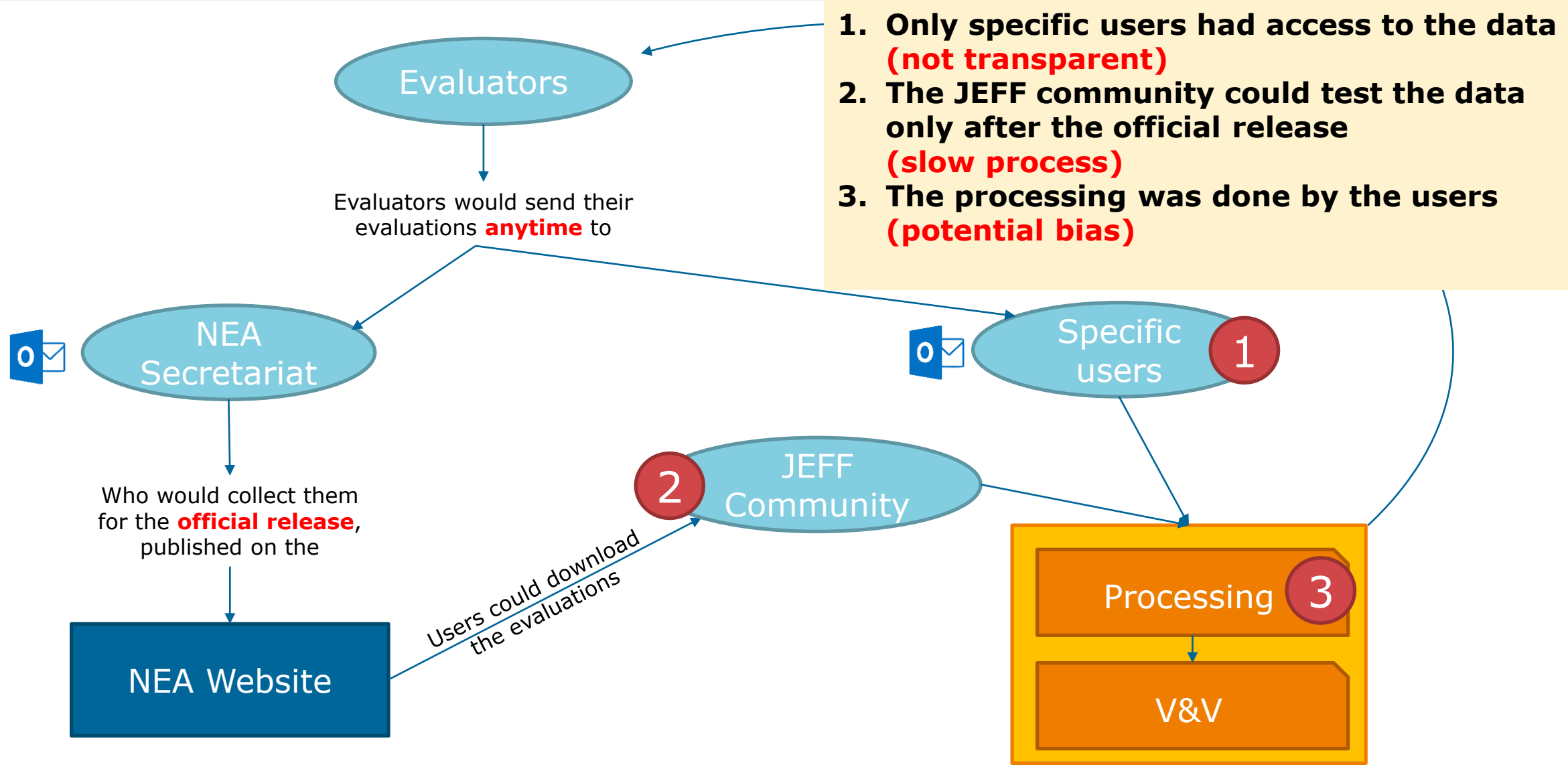


The NEA, independently on IAEA and NNDC, has dedicated substantial efforts to implement strategies that align with the FAIR principles for Evaluated Nuclear Data Files

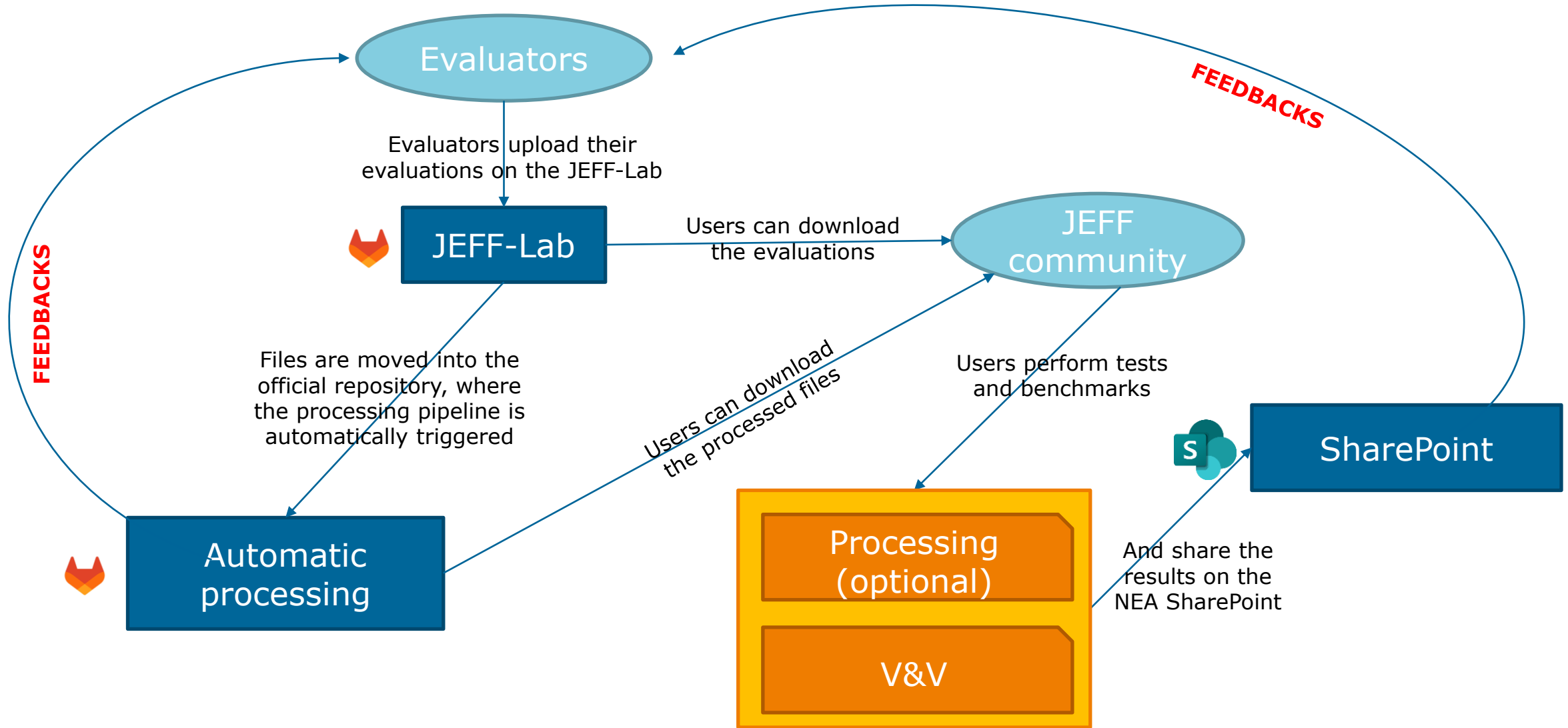
Before the modernization effort



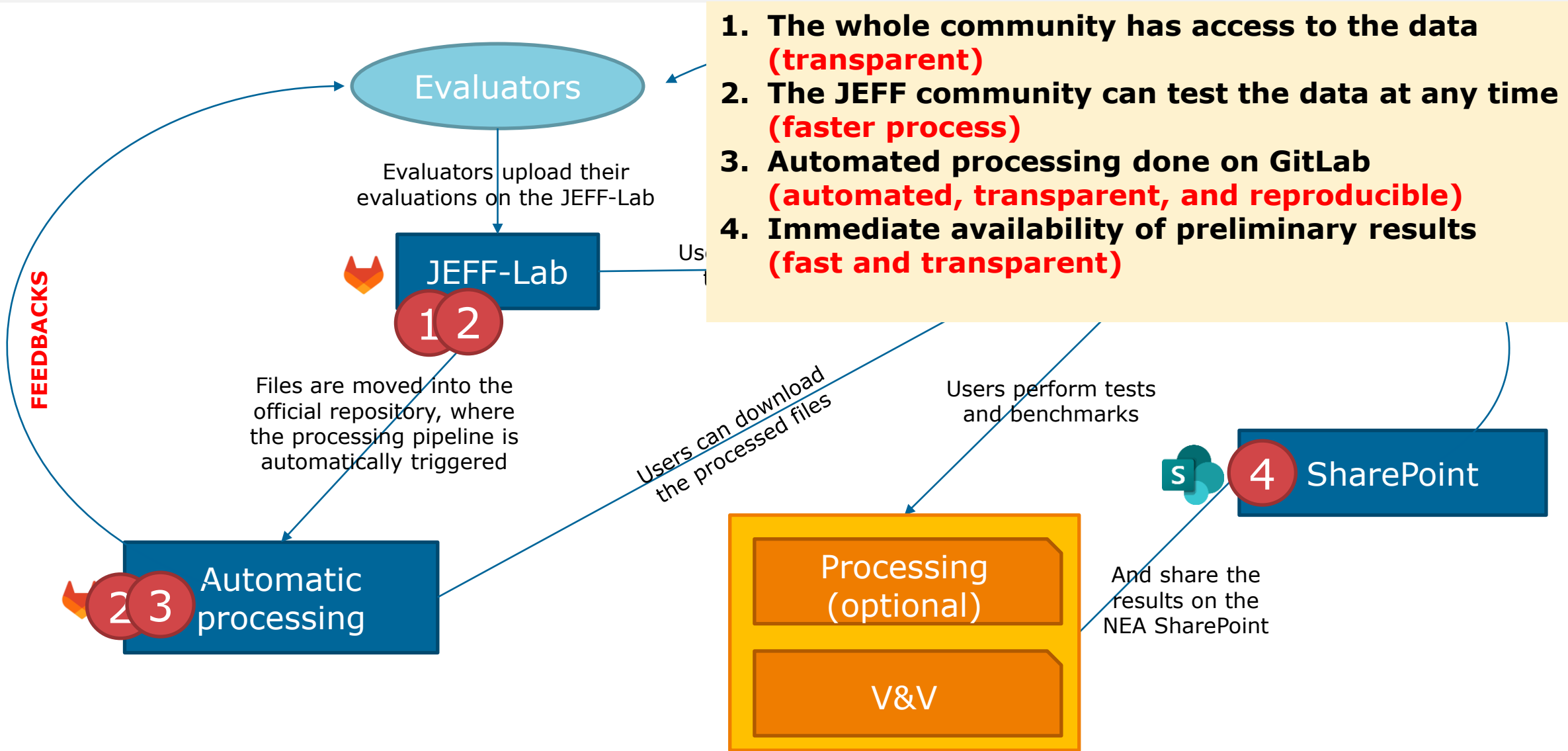
Before the modernization effort



After the modernization effort



After the modernization effort



A project in JEFF-Lab

Proposals_for_JEFF... evaluation-pu-240 / + ▾

History Find file Web IDE ⬇ ▾ Clone ▾

Name	Last commit
.gitlab-ci.yml	Add new file
94-Pu-240g_MF6MT102mod...	MF 6 MT 102: (CEA/DES)
94-pu-240g.endf	Upload New File
94-pu-240g.update2.txt	Upload New File
README.md	Update README.md

Several versions of the same file

Inappropriate use of a version-controlled system

Use of dates

README.md

Evaluation Pu-240

The aim of this repository is to exchange ENDF files and integral feedbacks on the Pu-240 evaluation for JEFF-4.

The new Pu240 evaluation for JEFF-4 is based on the JEFF-4T0 starter file, namely 94-pu-240g.endf2c (see <https://nds.tgitlab.io/nds/jeff4t0.html>)

16/09/2021, G. Mogueure : new RRR file with results obtained from the CONRAD analysis of EXFOR data

10/07/2023: **94-pu-240g.update2.txt** Update of Pu240 JEFF-4.0T2 with a simultaneous GLLS adjustment based on the JEFF-4.0T2 library. The adjusted isotopes are Pu239, Pu240 and Pu241. The following quantities were adjusted:

- Pu240: all resonance parameters up to (and including) 41.69 eV
- Pu239: all resonance parameters up to (and including) 49.46 eV nubar from 0 to 16 eV
- Pu241: all resonance parameters up to (and including) 48.10 eV

During the GLLS adjustment, the following calculations were considered:

- pincell burnup calculation (k_{inf} and Pu239 concentration)
- Alpha ratio for Pu239
- PST benchmarks (pst1, 4, 5, 6, 7, 9, 12, 34, 38)
- kritz benchmark (kritz-lwr-resr-001-case-1 and case 2)
- Thermal standard values (fission, capture) for Pu239 and Pu240

The target was to reproduce the performances of JEFF-3.1.1. It was additionally checked with the duke-pwr-power-001 (from IRPhE)

Authors: S. van der Marck (NRG), M. Hursin (EPFL), and D. Rochman (PSI)

07/11/2023: **94-Pu-240g_MF6MT102mod.STN** JEFF-4.0T2 Pu240 with the addition of a new MF6/MT102 for the thermal point. Prompt Capture Gamma Spectrum (histogram) and multiplicity 3.237(4) are added at 1.E-5 eV-n with FIFRELIN calculations. They are not recovering the Qg value (PSYCHE tests): 171 keV is missing because ICC energy (105 keV), pair production, X-rays and Auger electrons energies are not in this MF6 file.

Authors: O. Litaize, D. Bernard, A. Chebboubi (CEA-CAD)

The NEA Processing pipeline

Upload ENDF-6 file

🕒 8 jobs for [JEFF-4T2.2](#) in 23 minutes and 59 seconds (queued for 2 seconds)

📄 latest

🔗 [cd0e8c84](#) 📄

🔗 No related merge requests found.

Pipeline Needs Jobs **8** Tests **0**

Group jobs by

verification_for...	basic_processing	create_ace	create_other_for...	recap
<input checked="" type="checkbox"/> CHECKR <input type="button" value="↺"/>	<input checked="" type="checkbox"/> FUDGE <input type="button" value="↺"/>	<input checked="" type="checkbox"/> NJOY_ace <input type="button" value="↺"/>	<input checked="" type="checkbox"/> OPENMC <input type="button" value="↺"/>	<input checked="" type="checkbox"/> collect_artifacts <input type="button" value="↺"/>
<input checked="" type="checkbox"/> FIZCON <input type="button" value="↺"/>	<input checked="" type="checkbox"/> NJOY_basics <input type="button" value="↺"/>			
<input checked="" type="checkbox"/> PSYCHE <input type="button" value="↺"/>	<input checked="" type="checkbox"/> PREPRO <input type="button" value="↺"/>			

The main YAML (pipeline definition) is maintained in its own repository

After every commit, the pipeline is automatically triggered

The pipeline is identical for all isotopes

Codes are built into Docker images, stored in the Harbor, and pulled by the pipeline



2) EXFOR



Data Bank Review Process

The NEA Data Bank Review Process includes:

- Bibliography checks
- TRANS checker
- JANIS checks
- Text clarity

```
1  ===== BIB checks =====
2
3
4  ===== TRANS checker =====
5
6
7  ===== JANIS checks =====
8
9
10 ===== Text clarity =====
11
12
```

Bibliography checks

Manuel Bossant performs the bibliography checks

```
1  ===== BIB checks =====
2
3  11850.001  REFERENCE  ARI 18  279
4  TITLE: 2.8-MeV (d,d) neutrons => 2.8-MeV (D, d) neutrons
5
6  10633.001  REFERENCE  NP/A   275 325
7  TITLE: append ' optical potential'
8
9  13135.001  REFERENCE  NP/A   493 267
10 AUTHOR: swap 2nd and 3rd author
11
12 13188.001  REFERENCE  NP/A   519 487
13 AUTHOR: swap 2nd and 3rd author
14
15 10528.001  REFERENCE  PL/B   58  293
16 TITLE: Effects => Effect
17
18 10732.001  REFERENCE  PR/C   17  508
19 AUTHOR: S.Grimes => S.M.Grimes
20 AUTHOR: R.Haight => R.C.Haight
21 AUTHOR: J.Anderson => J.D.Anderson
22
23 10805.001  REFERENCE  PR/C   29 2188
24 TITLE: 242Am(m) fission cross section
25
```



TRANS Checker

<https://www.oecd-nea.org/janisweb/trans-checker>

- Very easy to use:
- Choose File
 - Submit

JANIS Web Browse Search Books TRANS Checker

JANIS Online TRANS Checker

prelim.4208.txt

1 error(s)

1 warning(s)

Message	Detail (line number)
40422.003 EXFOR_Exception Unknown quantity	PAR/CUM,FY (line 619)
41752.001 [INSTITUTE] : Unknown Institute	4RUSDBU (line 4619)

Check another file



```
4 ===== TRANS checker =====
5 1 error(s)
6 1 warning(s)
7 | Message Detail (line number)
8 40422.003 EXFOR_Exception
9 Unknown quantity PAR/CUM,FY (line 619)
10 41752.001 [INSTITUTE] : Unknown Institute 4RUSDBU (line 4619)
```

Text Clarity

I use the editor spelling checks. Misspelled words are highlighted and easy to identify

```
REACTION (62-SM-147(N,0),,J) 40405 2 3
FLAG (1.) Spin value determined indefinitely 40405 2 4
STATUS (TABLE) Table 2 of R,JINR-P3-6092,1971 40405 2 5
| | | | | Resonances 94.9 and 108.4 eV are given in Table 2 40405 2 6
| | | | | without spin J value. 40405 2 7
| | | | | (SPSDD,40098002) Newer publication at 1972 40405 2 8
HISTORY (20220722S) Restored from trans.4033 of 1978 year 40405 2 9
ENDBIB 7 0 40405 2 10
NOCOMMON 0 0 40405 2 11
```

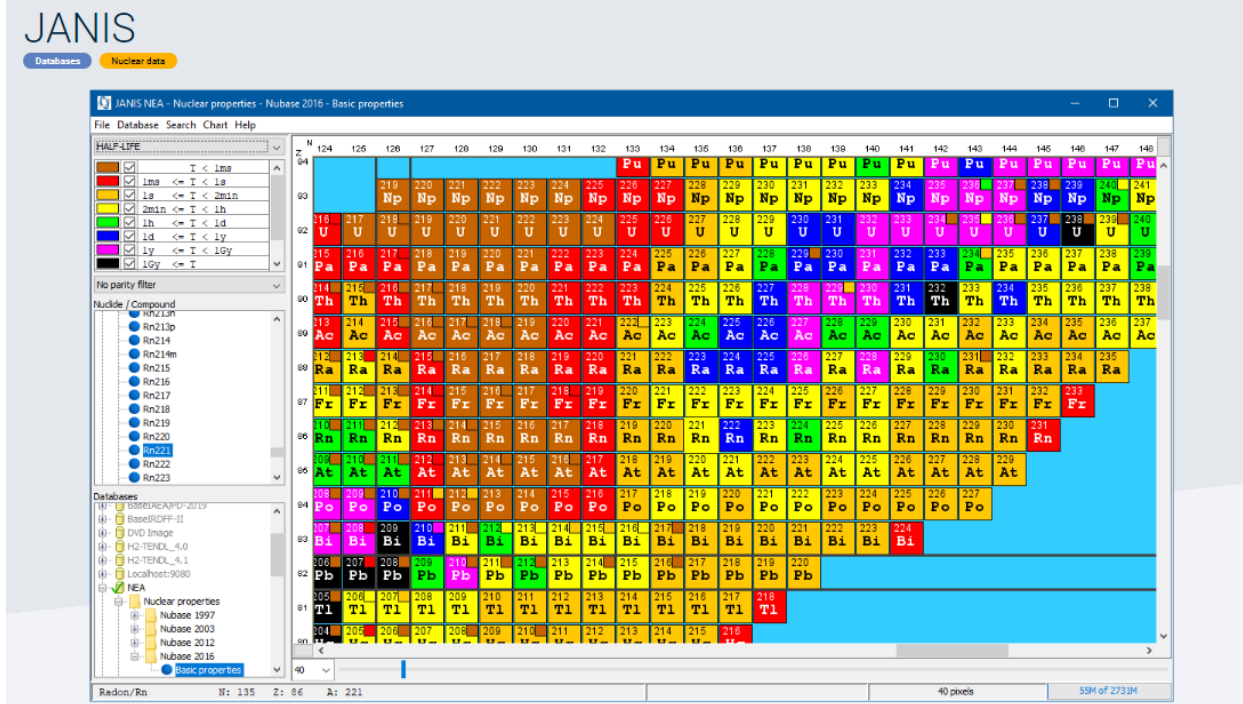


```
15 ===== Text clarity =====
16 40405 1 23 superceded --> superseded
17 40405 2 4 indefinitely --> indefinitely
18 40405 3 4 indefinitely --> indefinitely
19 40405 9 9 superceded --> superseded
20 40405 10 7 superceded --> superseded
```

JANIS Checks

https://www.oecd-nea.org/jcms/pl_39910/janis

This step is the most time-intensive and challenging to automate.



The screenshot displays the JANIS web application interface. At the top, there are tabs for 'Databases' and 'Nuclear data'. The main content area shows a window titled 'JANIS NEA - Nuclear properties - Nubase 2016 - Basic properties'. This window contains a table of nuclear data with columns for atomic number (Z), mass number (N), and various isotopes (e.g., Pu, Np, U, Pa, Th, Ra, Fr, Rn, At, Po, Bi, Pb, Tl). The table is color-coded by element and mass number. On the left side of the window, there are several filters and options, including 'HALF-LIFE', 'No parity filter', and 'Nucleide / Compound'. Below the table, there are fields for 'Radon/Rn', 'N: 135', 'Z: 86', and 'A: 221'. At the bottom of the screenshot, there are four buttons: 'Launch JANIS 4.1' (Java Web Start), 'JANIS Web' (Online version, no Java required), 'Downloads' (Software, Manual, DVD 4.0 ISO), and 'JANIS Books' (Experimental and evaluated cross-sections).

JANIS screenshot

- What is JANIS?
- Screenshots
- What's new in 4.1 (Sept 2020)
- Content of the NEA database
- Help pages

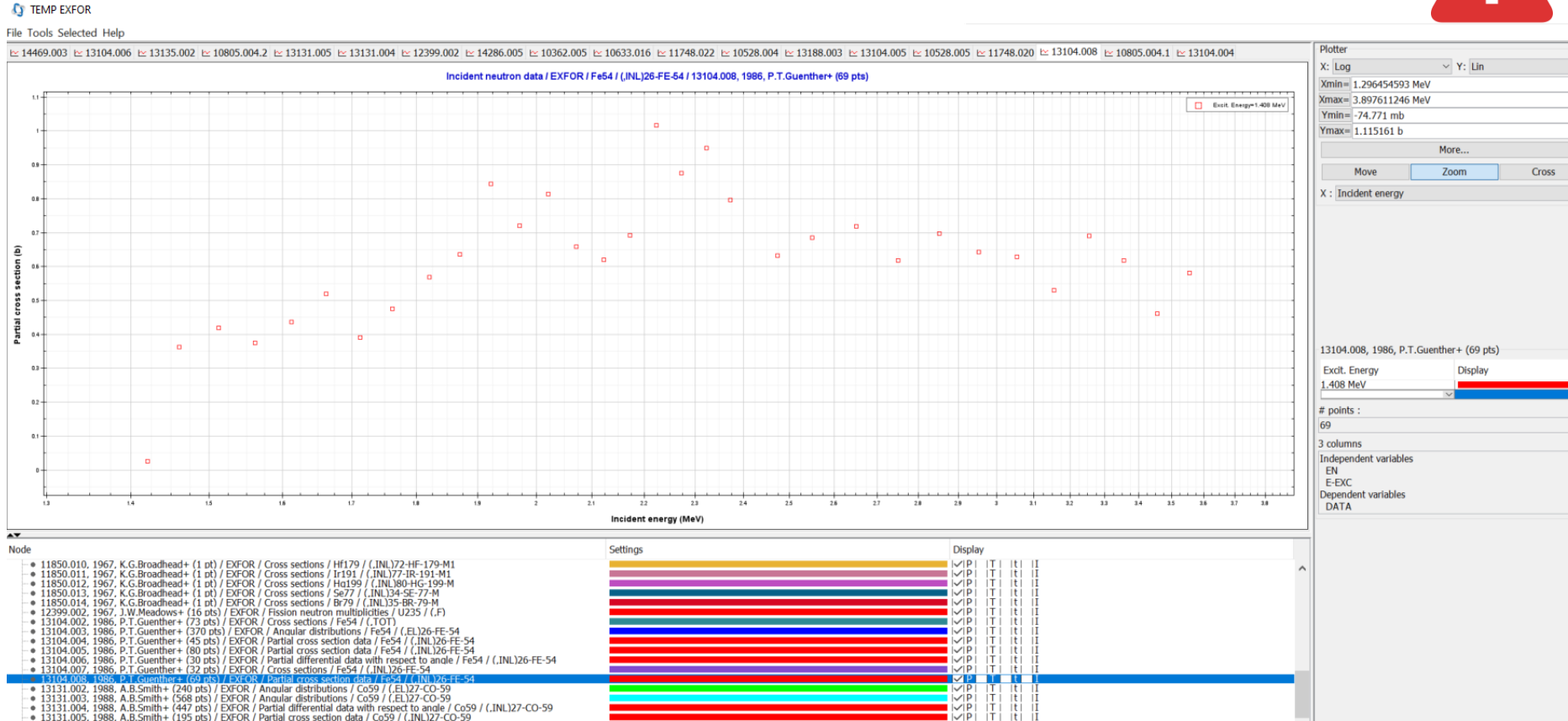
Launch JANIS 4.1
Java Web Start

JANIS Web
Online version, no Java required

Downloads
Software, Manual, DVD 4.0 ISO

JANIS Books
Experimental and evaluated cross-sections

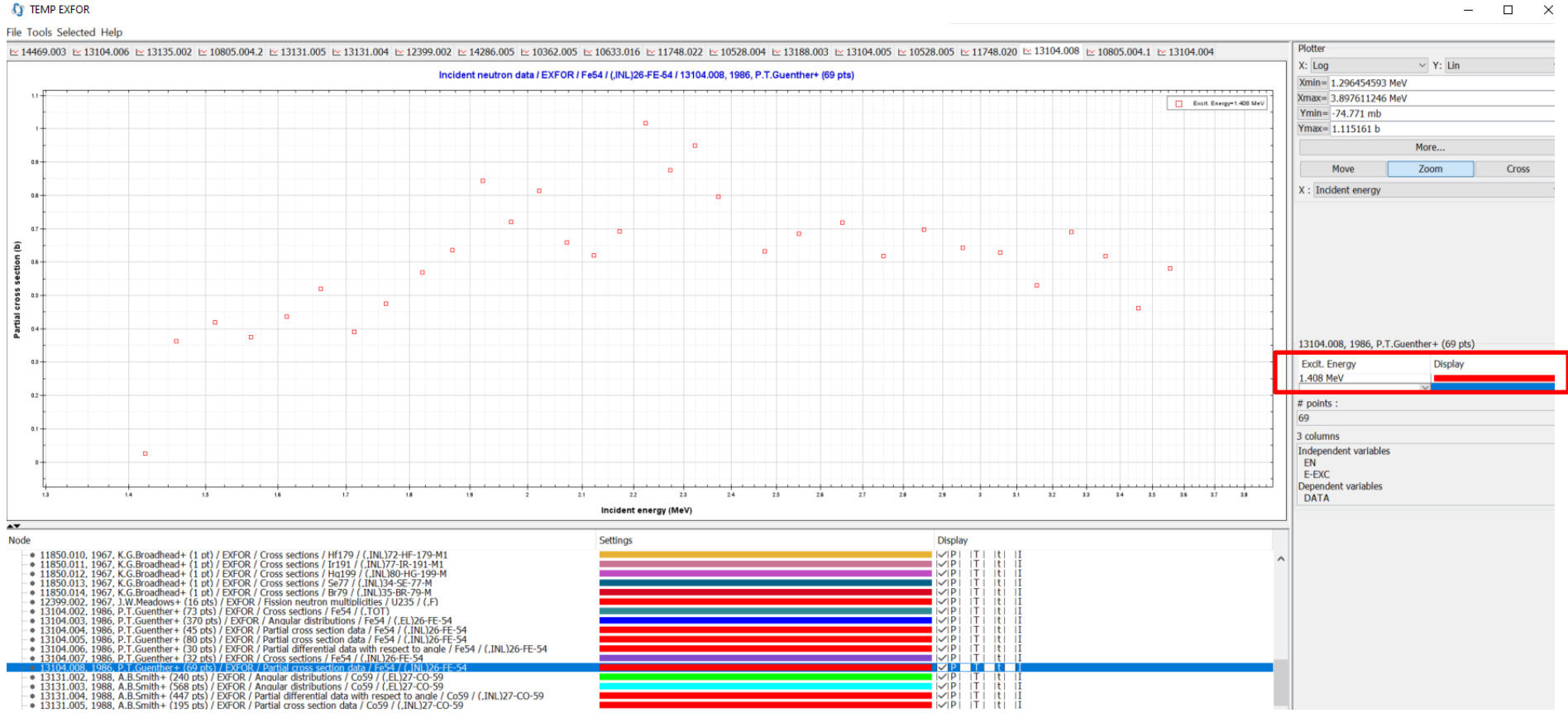
Sometimes, not all the data is plotted at once



Of the 69 pts, only 32 are shown

JANIS Checks

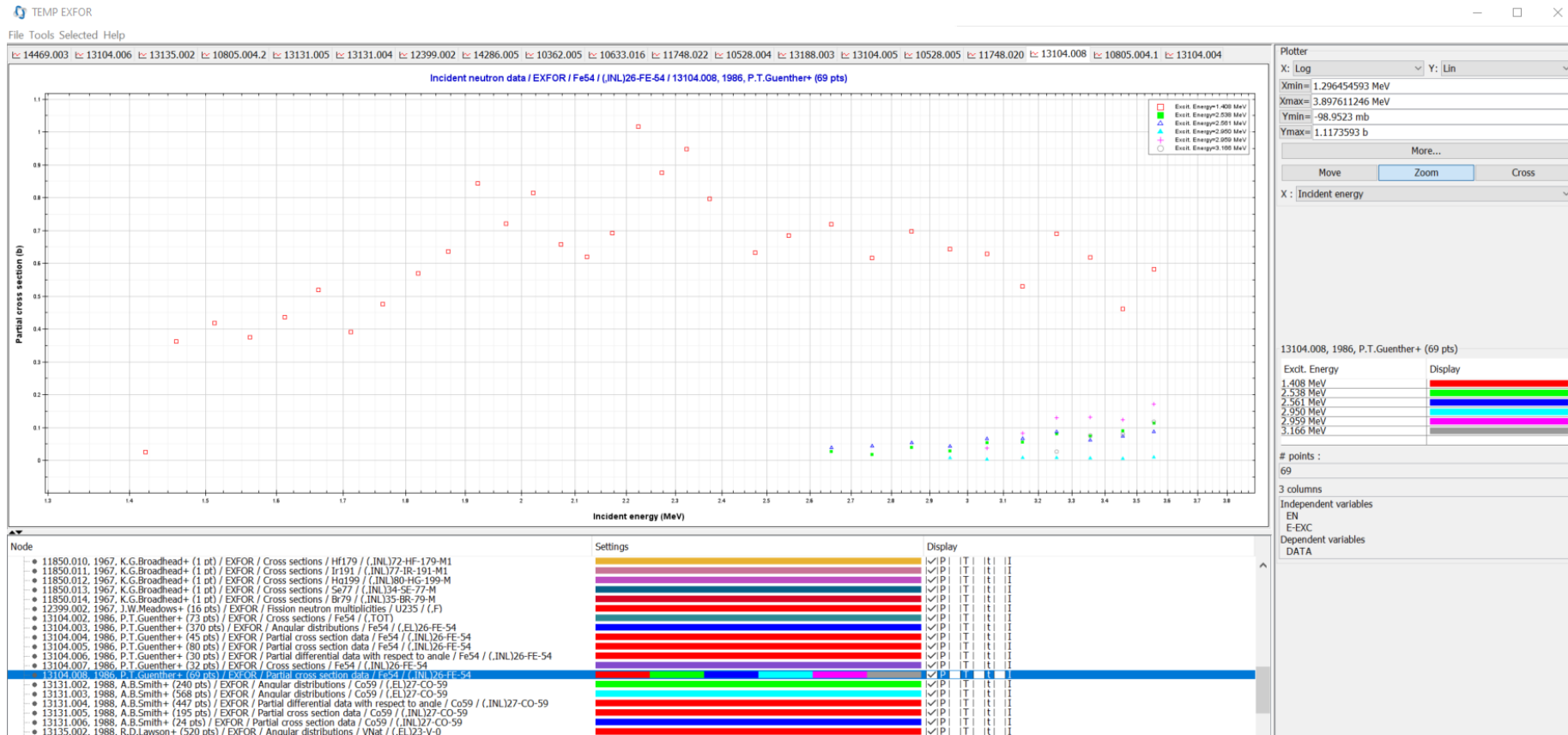
You can plot the remaining data by clicking on the other energies



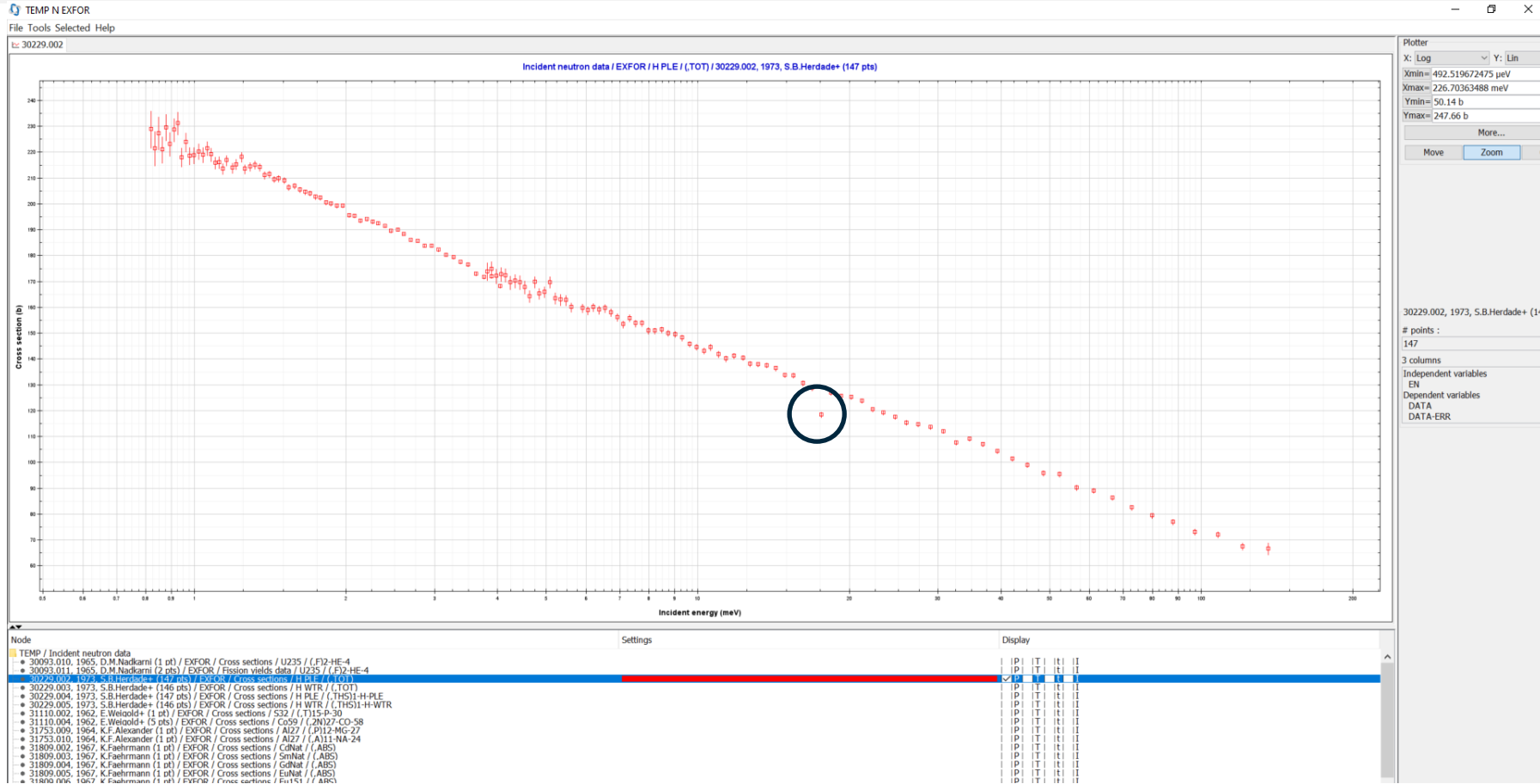
1.408 MeV, 2.538 MeV, 2.561 MeV, 2.950 MeV, 2.959 MeV, 3.166 MeV

JANIS Checks

Once all the data points of the subentry are plotted, you can see if the data makes sense



JANIS Checks



Sometimes,
detecting outliers
is fast and
straightforward

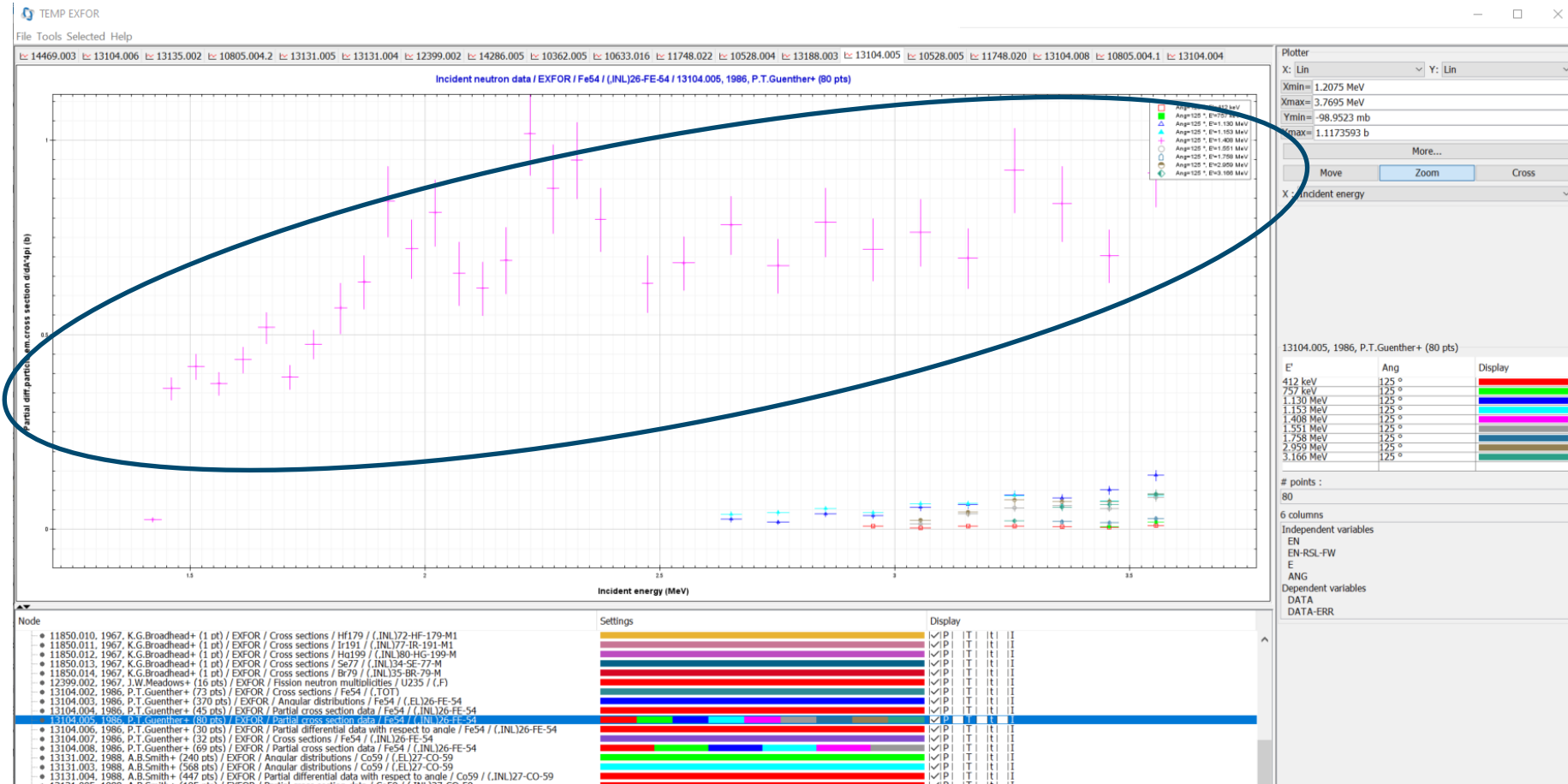
```

12  ===== JANIS checks =====
13  30229  2 DATA Check the following data point:
14  | 1.76E-2218.5    1.0                                30229  2  134
15  It looks like an outlier. I think that it should be around 118 b rather than 218.5 b.
16

```

Prelim.3204,
Entry 30229,
Subentry 002

JANIS Checks






Prelim.1500,
Entry 13104,
Subentry 005



Sometimes, it takes longer to plot all the data

EXFOR on GitLab

One project per PRELIM, accessible by NEA DB Staff and by our compilers

















Data Bank > ... > PRELIM

 **PRELIM** 
Group ID: 1404 


 


Preliminary tapes for submission to NRDC (<https://www-nds.iaea.org/nrdc/ndsx4/trans/prelim>)

Subgroups and projects Shared projects Archived projects

	 0	o098 	 0
	 2	2318 	 0
	 2	2319 	 0
	 0	o099 	 0

EXFOR on GitLab

 Closed **prelim.2316**


 **FOLIGNO Daniela, NEA/DB** @foligno_d · 3 months ago Author Owner ⋮

Dear @sdunaeva, this is to let you know that I uploaded the file you just sent me (26/09/2023) by email as trans.2316.

Dear @notsuka1, please consider this new version.

Best regards,

Daniela

 **Naohiko Otsuka** @notsuka1 · 3 months ago Developer ⋮


Dear @foligno_d,

I checked the draft of TRANS.2316 against my comments.

20847.002: HISTORY(19800723A,19821124A): It seems the free text for 003 is wrongly repeated.

Best regards,

Naohiko


 **FOLIGNO Daniela, NEA/DB** @foligno_d · 3 months ago Author Owner ⋮

Dear @notsuka1,

Thank you for your thorough review. @sdunaeva sent me the corrected version. You can see the changes here: [316296c2](#)

Best regards,

Daniela

 **Naohiko Otsuka** @notsuka1 · 3 months ago Developer ⋮

Dear @foligno_d,

I confirmed the correction was done as expected, and uploaded it to the NDS open area.

Best regards,

Naohiko

- We leverage the GitLab issue feature to centralize all comments pertaining to a particular file in one location
- Once the file transitions to a TRANS status, both the project and its related issues are archived

Issue Board

Data Bank > PRELIM > Issue Boards

Search



Edit board

Create list

Text clarity

2 +

2319

databank/nds/exfor/prelim/2319#1

o099

databank/nds/exfor/prelim/o099#1

Bibliography check

1 +

2318

databank/nds/exfor/prelim/2318#1

IAEA preliminary checks

0 +

NDS open area

0 +

The issue board serves as a valuable tool for obtaining a comprehensive overview of all ongoing PRELIMs and their respective status within the review chain.

3) General comments

Key Objectives

- Ensuring community access to data
- Automation of file processing
- Transparency and reproducibility
- Limiting email exchanges
- Storing/archiving comments for the future

Challenges

- The primary obstacle is the **human factor** and its resistance to change and learn new tools



Solutions

- Showcase the advantages of adopting new tools
 1. Improved efficiency
 2. Enhanced collaboration
 3. Future-proofing for upcoming generations
 4. Simplified data management
- Find strategies to make the transition smoother:
 1. User-friendly interfaces
 2. Training sessions and resources
 3. Support systems for troubleshooting





Thank you for your attention

Please contact me
(daniela.foligno@oecd-nea.org) if you
have any questions or comments.