Modernization Efforts of NEA Nuclear Data Projects

Daniela FOLIGNO

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
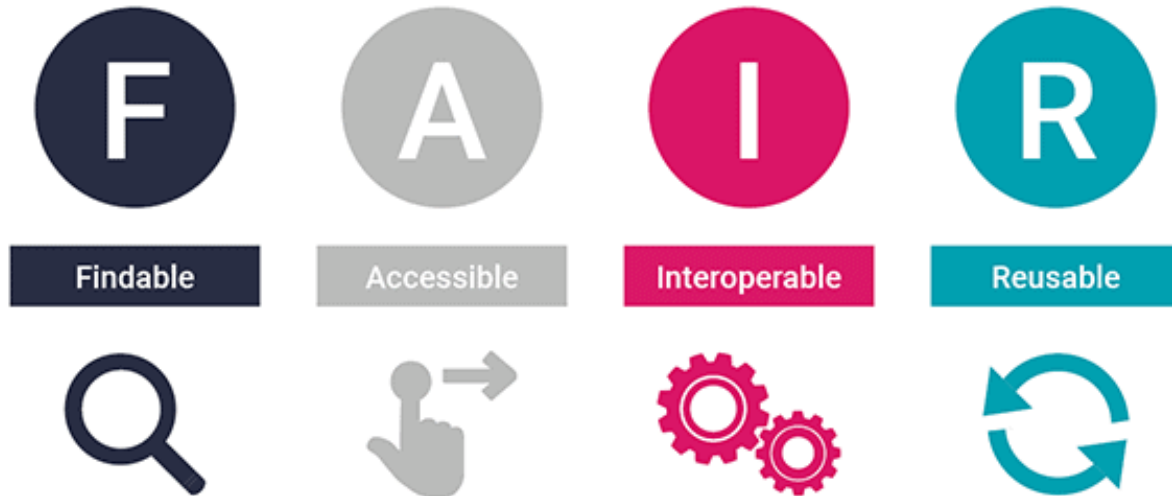- Distribute the files
- Organize meetings

EXFOR

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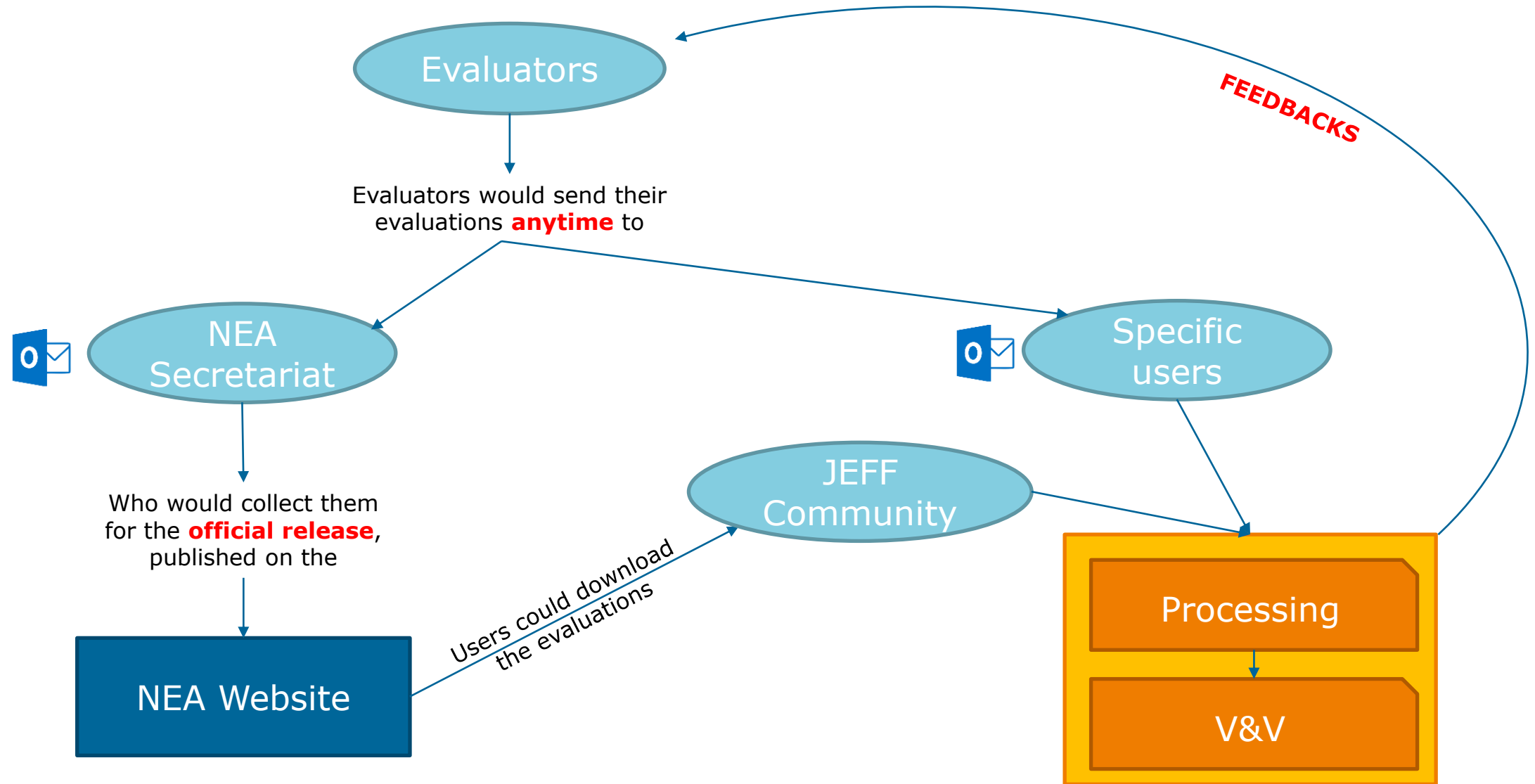- Keep track of allocated entry numbers
- Write MEMOS

1) JEFF

Trying to be FAIR

F Findable

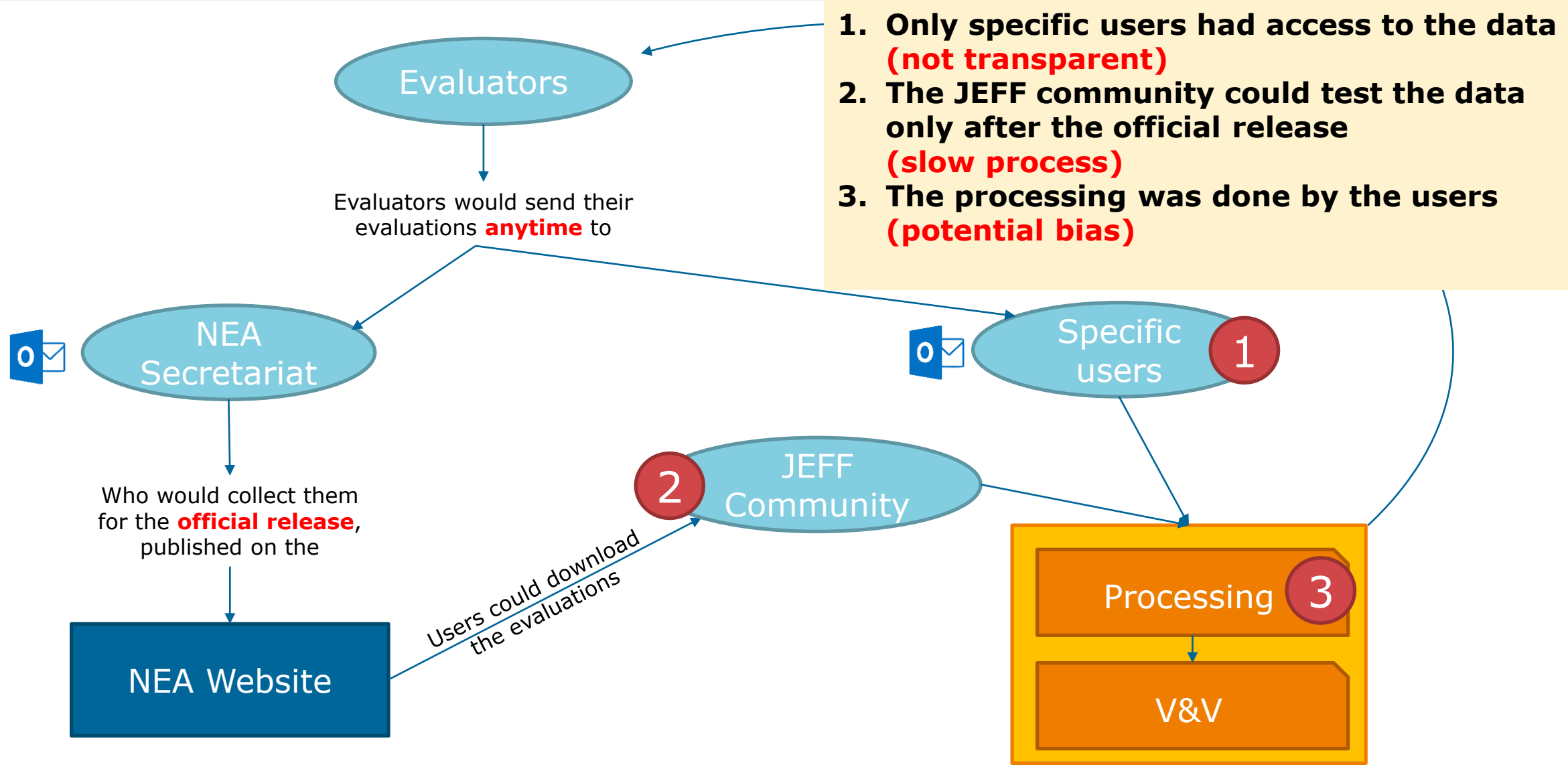**A** Accessible

I Interoperable

R Reusable

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
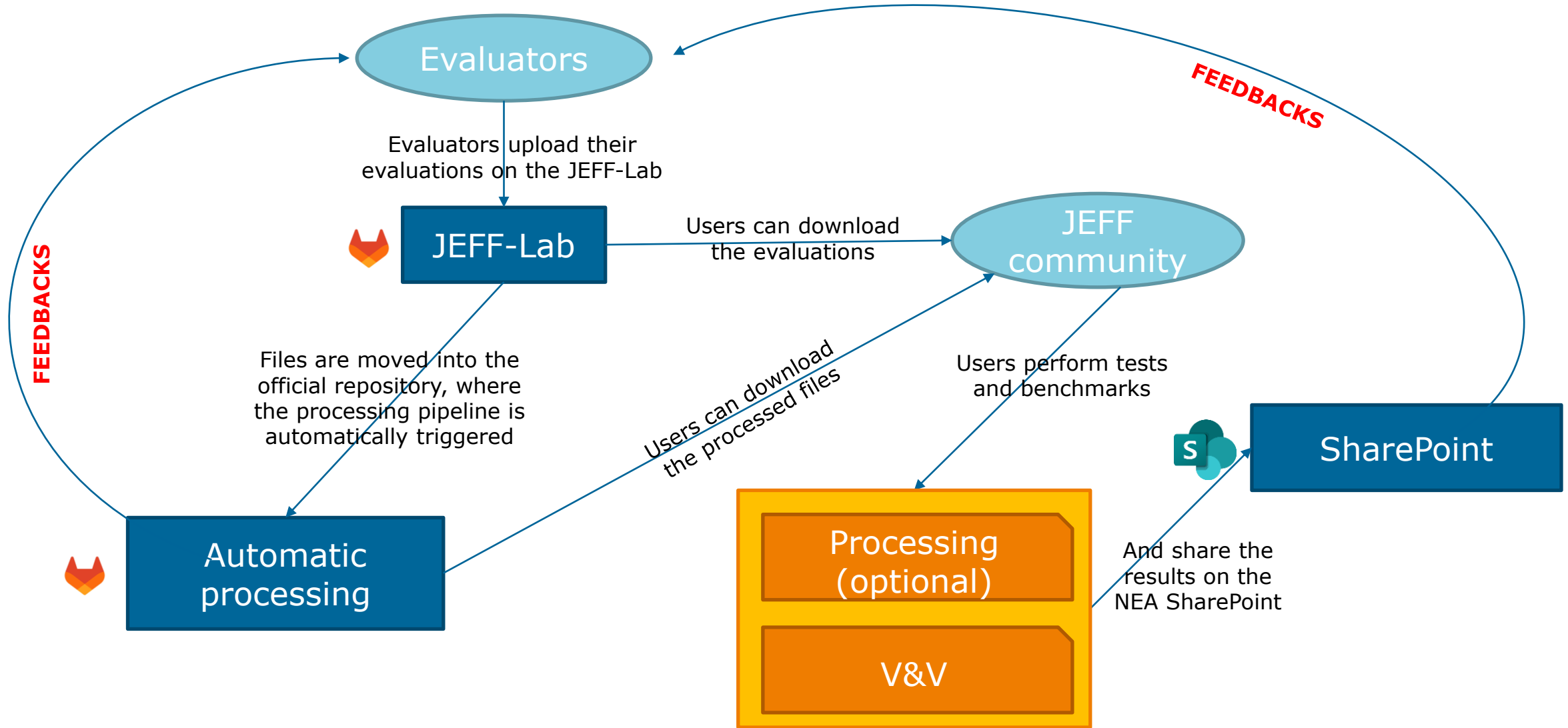
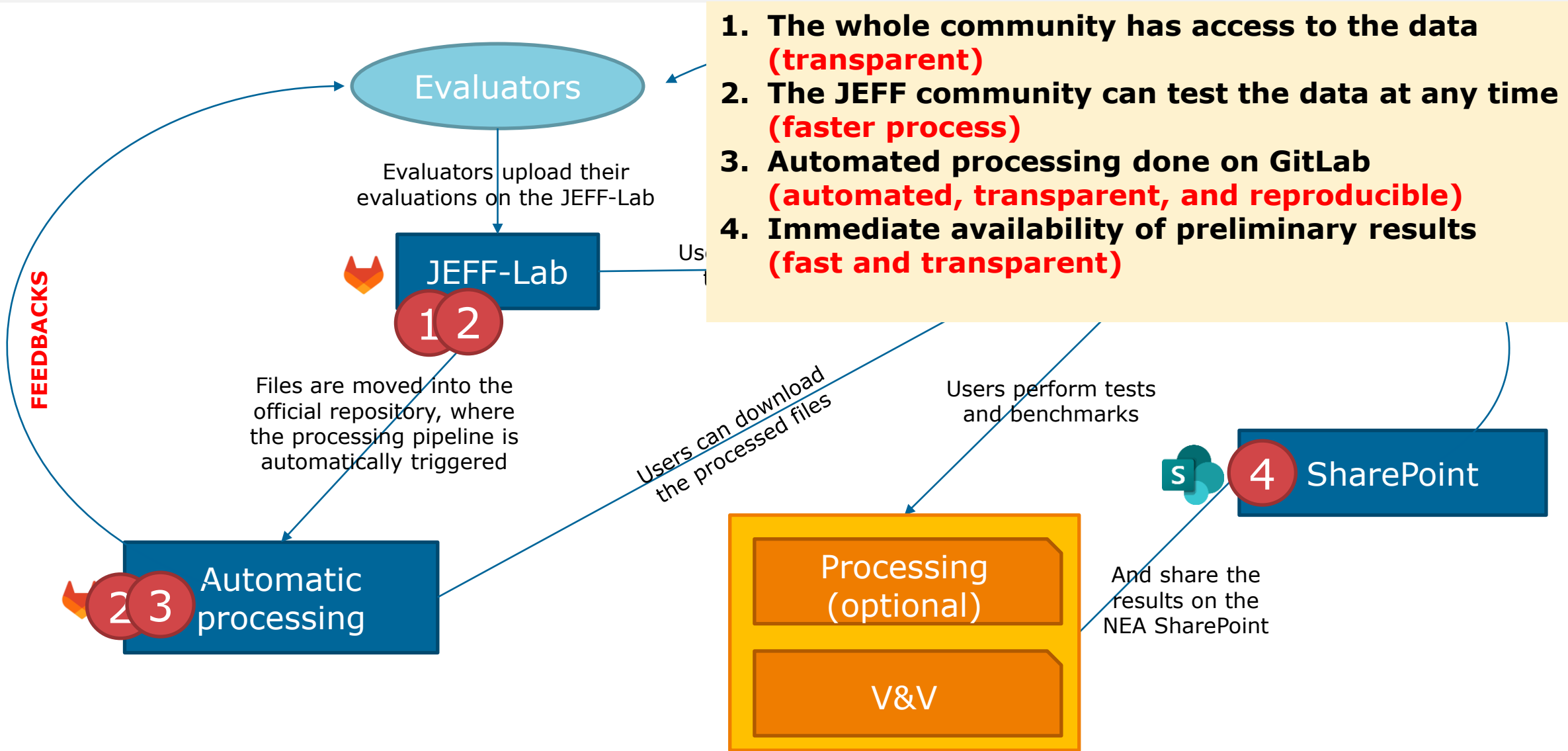# Before the modernization effort

Evaluators

Evaluators would send their evaluations **anytime** to

FEEDBACKS

NEA Secretariat

Specific users

Who would collect them for the **official release**, published on the

JEFF Community

Users could download the evaluations

NEA Website

Processing

V&V

Before the modernization effort

Evaluators

Evaluators would send their evaluations **anytime** to

NEA Secretariat

Who would collect them for the **official release**, published on the

NEA Website

Users could download the evaluations

JEFF Community

2

Specific users

1

Processing

3

V&V

1. **Only specific users had access to the data (not transparent)**
2. **The JEFF community could test the data only after the official release (slow process)**
3. **The processing was done by the users (potential bias)**

After the modernization effort

Evaluators

Evaluators upload their evaluations on the JEFF-Lab

JEFF-Lab

Users can download the evaluations

JEFF community

Files are moved into the official repository, where the processing pipeline is automatically triggered

Users can download the processed files

Users perform tests and benchmarks

FEEDBACKS

Automatic processing

Processing (optional)

V&V

SharePoint

And share the results on the NEA SharePoint

After the modernization effort

Evaluators

Evaluators upload their evaluations on the JEFF-Lab

JEFF-Lab

1 **2**

Files are moved into the official repository, where the processing pipeline is automatically triggered

FEEDBACKS

Automatic processing

2 **3**

Users can download the processed files

Users perform tests and benchmarks

Processing (optional)

V&V

SharePoint

4

And share the results on the NEA SharePoint

1. **The whole community has access to the data (transparent)**
2. **The JEFF community can test the data at any time (faster process)**
3. **Automated processing done on GitLab (automated, transparent, and reproducible)**
4. **Immediate availability of preliminary results (fast and transparent)**

A project in JEFF-Lab

Several versions of the same file

Inappropriate use of a version-controlled system

Use of dates

The NEA Processing pipeline

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

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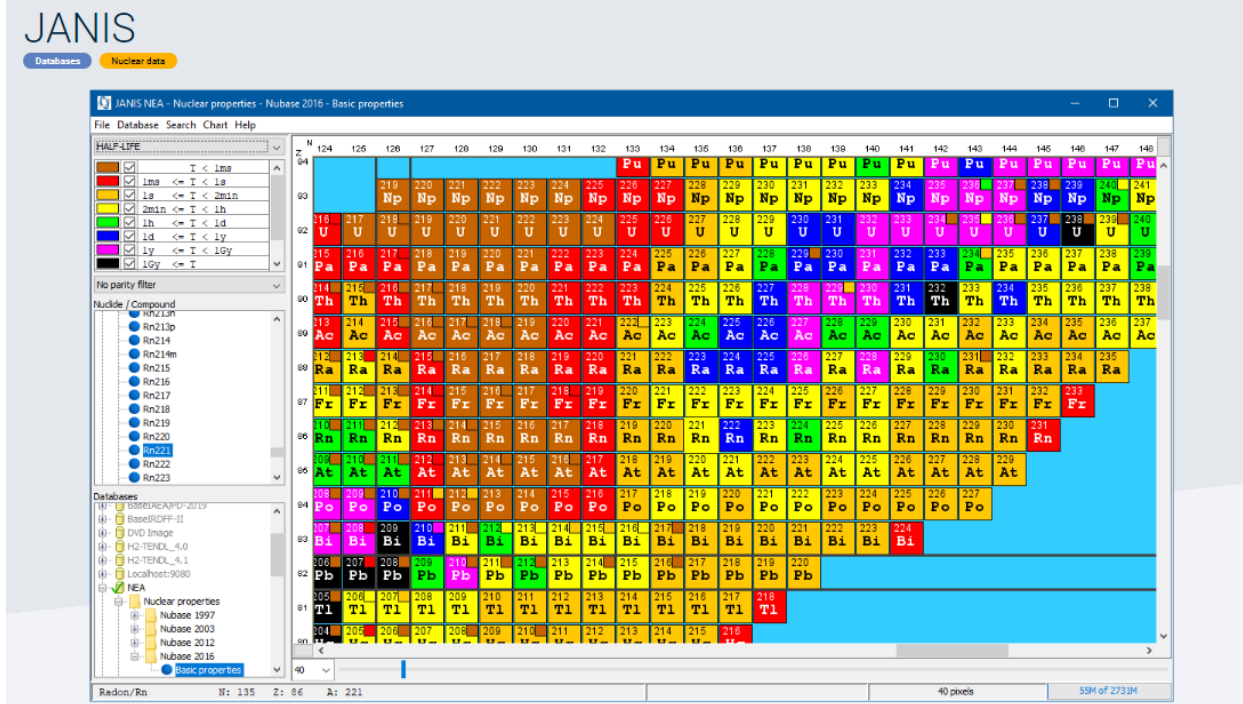
```
15      ================ Text clarity ================
16      40405  1   23 superceded --> superseded
17      40405  2    4 indefinitly --> indefinitely
18      40405  3    4 indefinitly --> indefinitely
19      40405  9    9 superceded --> superseded
20      40405 10    7 superceded --> superseded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

JANIS Checks

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

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

JANIS Checks

Sometimes, not all the data is plotted at once
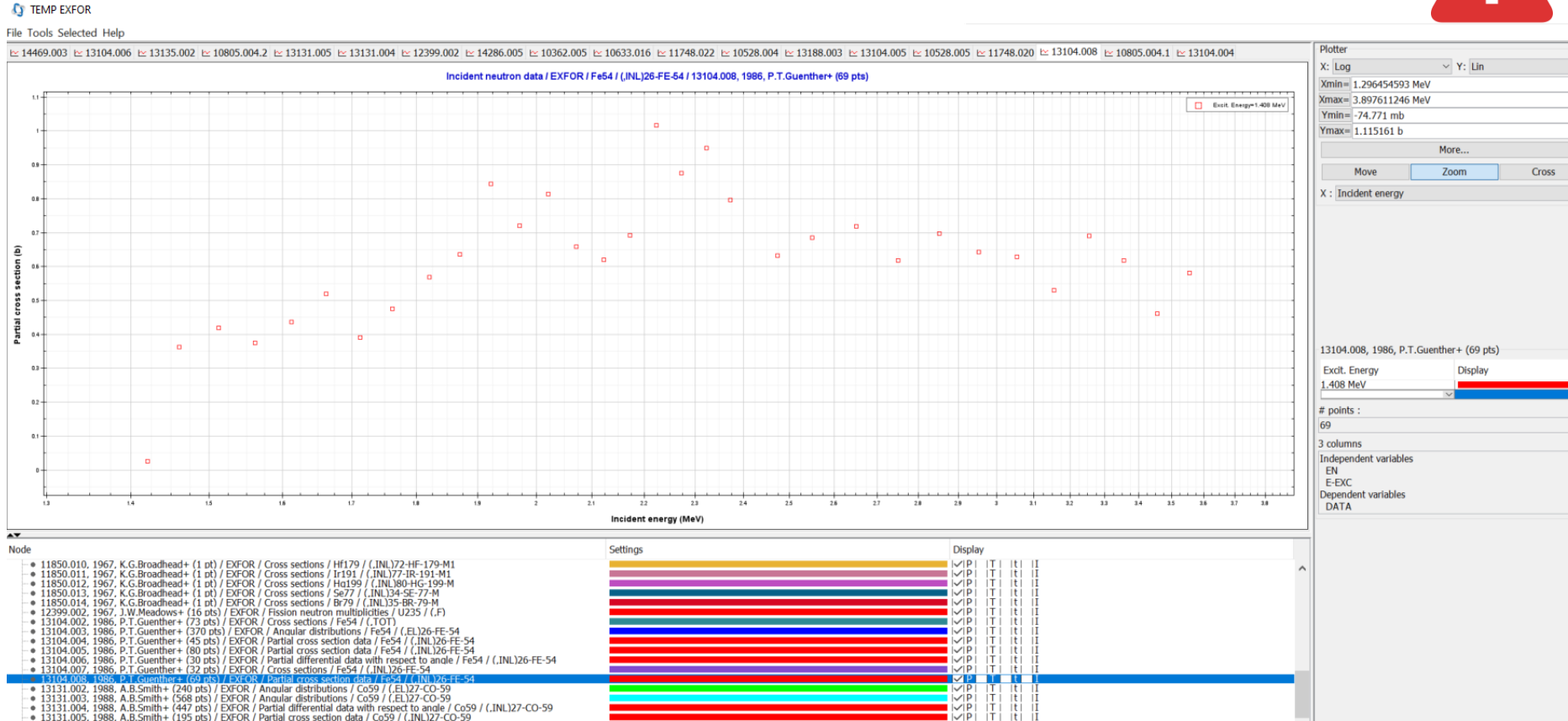
Of the 69 pts, only 32 are shown

JANIS Checks

You can plot the remaining data by clicking on the other energies
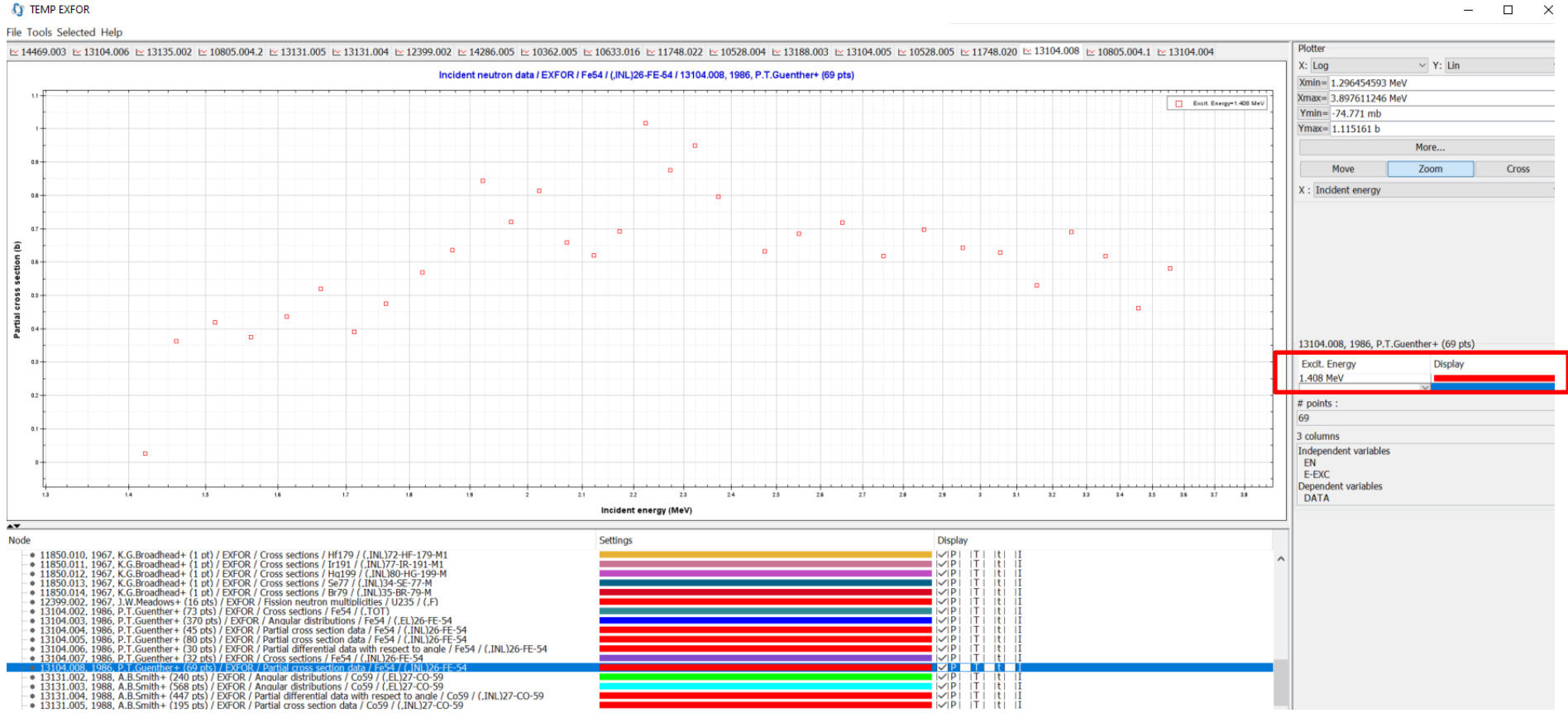
1.408 MeV, 2.538 MeV, 2.561 MeV, 2.950 MeV, 2.959 MeV, 3.166 MeV

JANIS Checks

Once all the data points of the subentry are plotted, you can see if the data makes sense
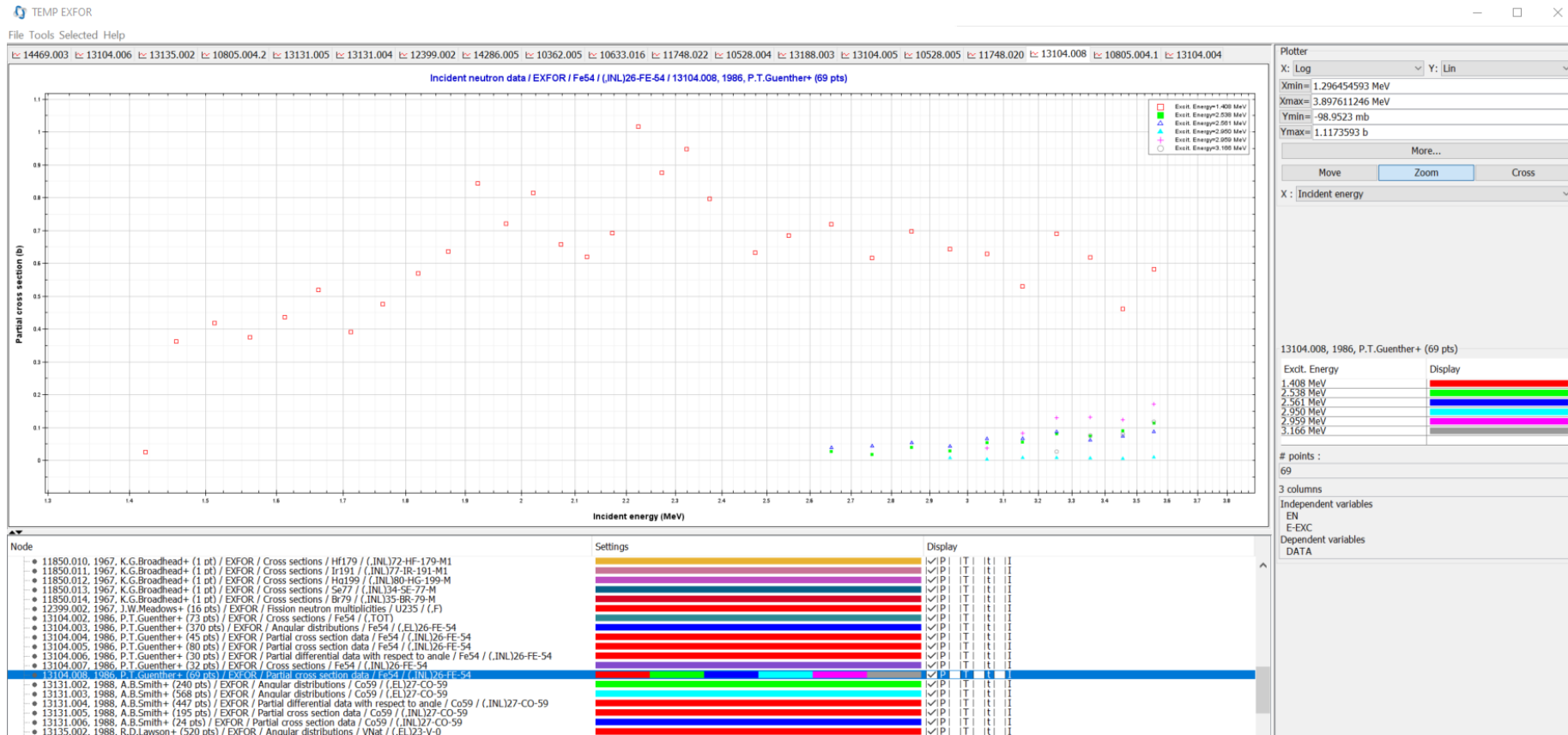
JANIS Checks
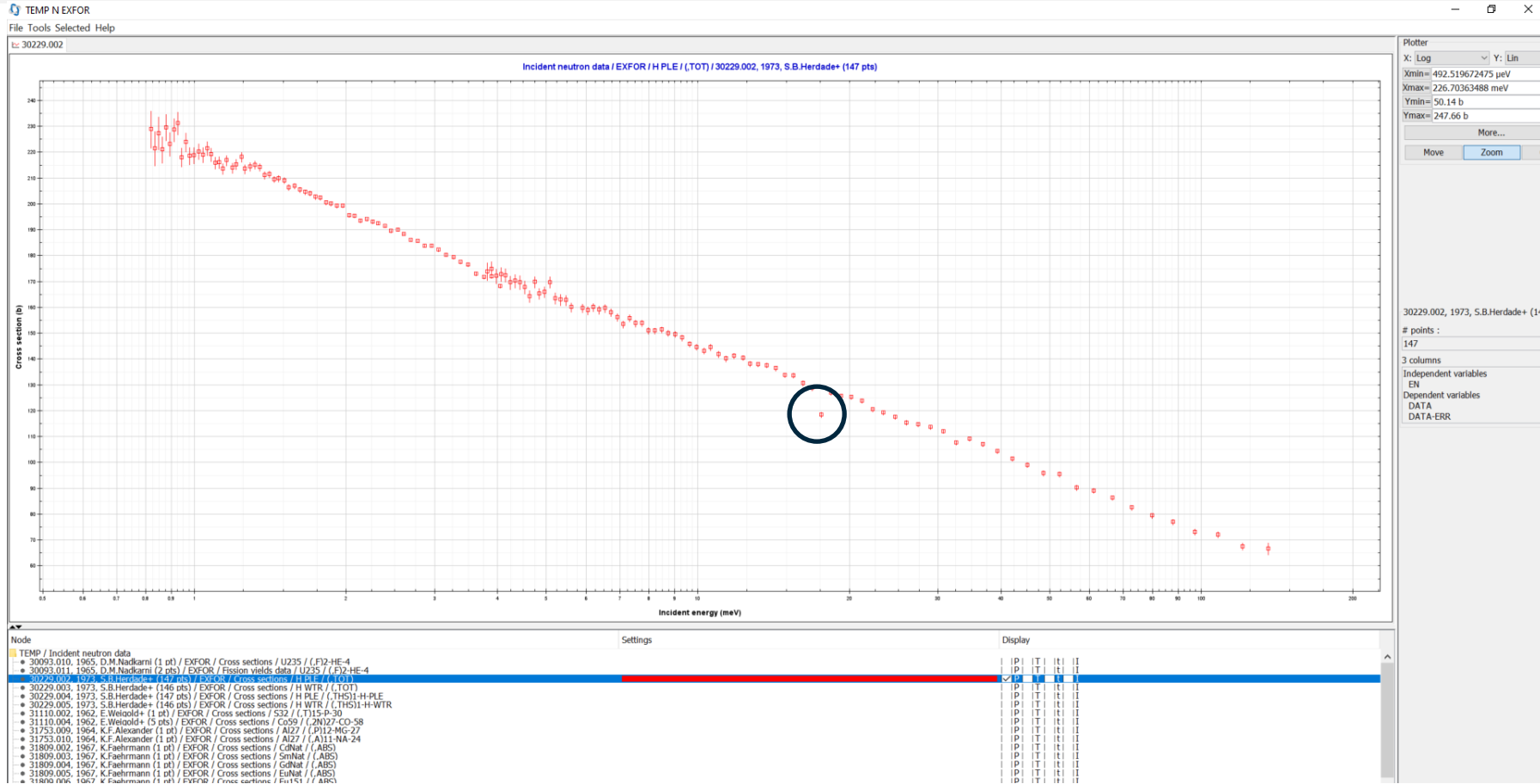
Sometimes, detecting outliers is fast and straightforward

Prelim.3204, Entry 30229, Subentry 002

JANIS Checks
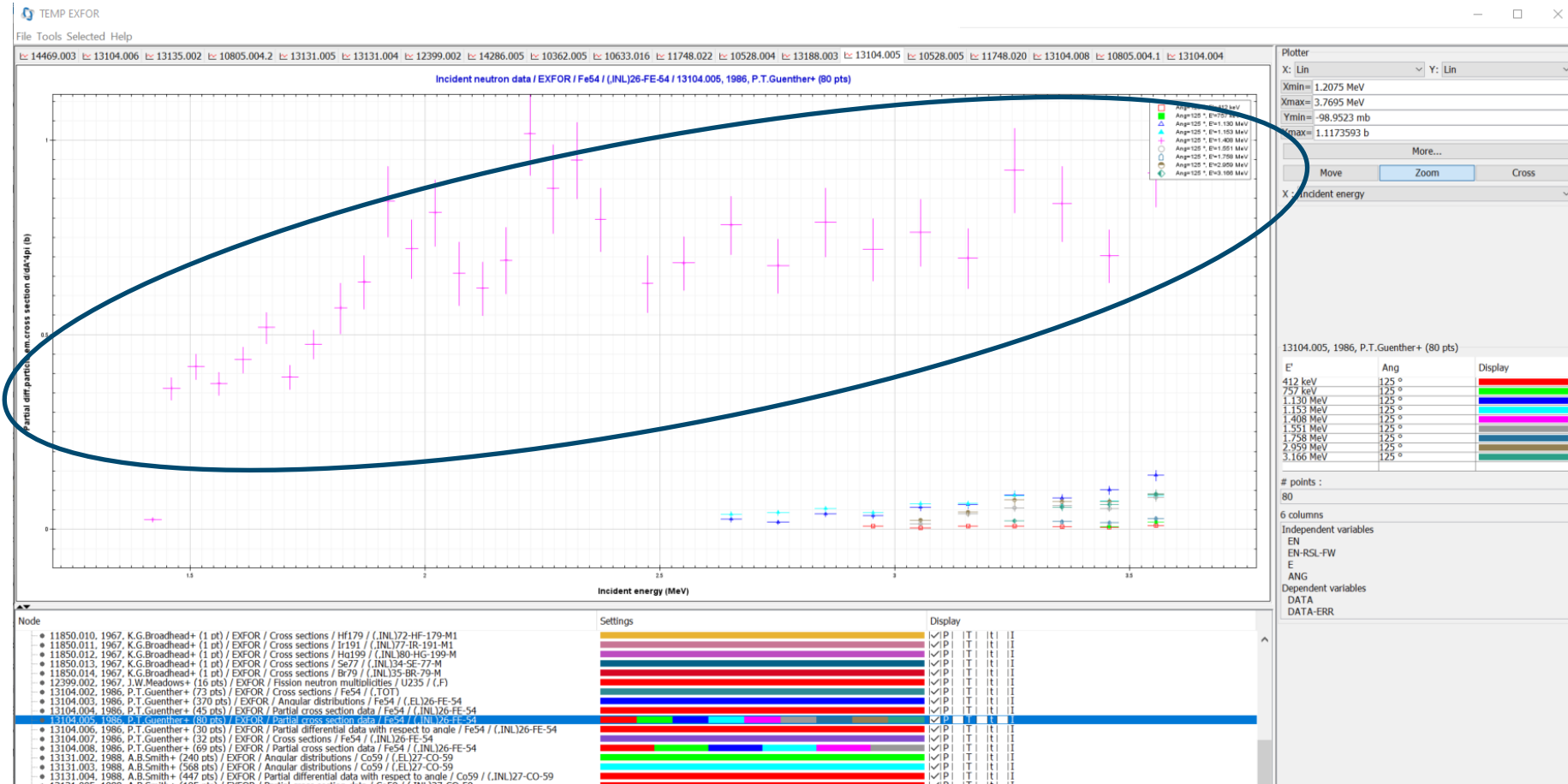
Prelim.1500,
Entry 13104,
Subentry 005

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

EXFOR on GitLab

- 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

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.

Title page photo: Dry storage facilities (Creative Commons, NRCgov)