

# Technical Issues with EXFOR Compilations in area #1

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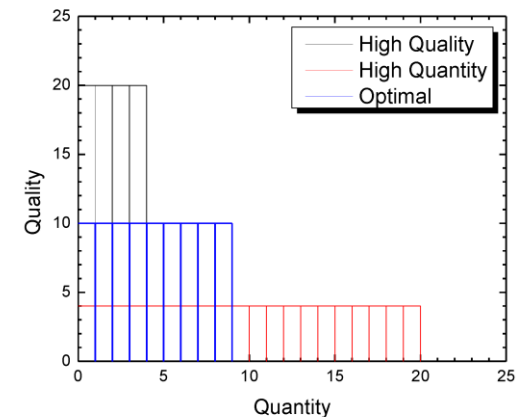


# Big Picture

- I have a unique and very diverse experience of learning from the best Soviet and American educational and scientific institutions.
- I have been taught by good physicists in both countries that everyone supposed to see a big picture and separate the less important features (prioritization or order of relative importance).
  - Scale problem: Student reads 10 papers, group leader reads/looks 100 papers, editor/large project manager looks at 1000+ papers. Quality of the final decision depends on depth of your knowledge and analysis.
- I also have had the same experience in software development in California. Anyone who is familiar with software life and production cycle understands that if we would like to have a perfect software product then nothing will be released.
  - Software developers (or release engineers) routinely draw a line in the sand before the release.
- I also have been taught that I can be wrong, and this normal in physics or computer science. So, please take my presentation with a grain of salt.

# NRDC 2013

- I'm not a typical project manager because I'm involved in compilation activities.
- My first (rookie) year as an EXFOR compiler, first insider experience with compilation and 2 questions:
  - EXFOR rookie comment: Observing discussions/arguments between Naohiko and Otto. How difficult EXFOR should be, if two most qualified people are still discussing the compilation?? Sometimes, I think that this is the most difficult database at NNDC, just look at the dictionaries.
  - Finally, famous Quantity vs. Quality plot from U.S. business education:  $\text{Quantity} \times \text{Quality} = \text{constant}$
- In 2016 I still have these questions.



# NRDC Compilation Statistics

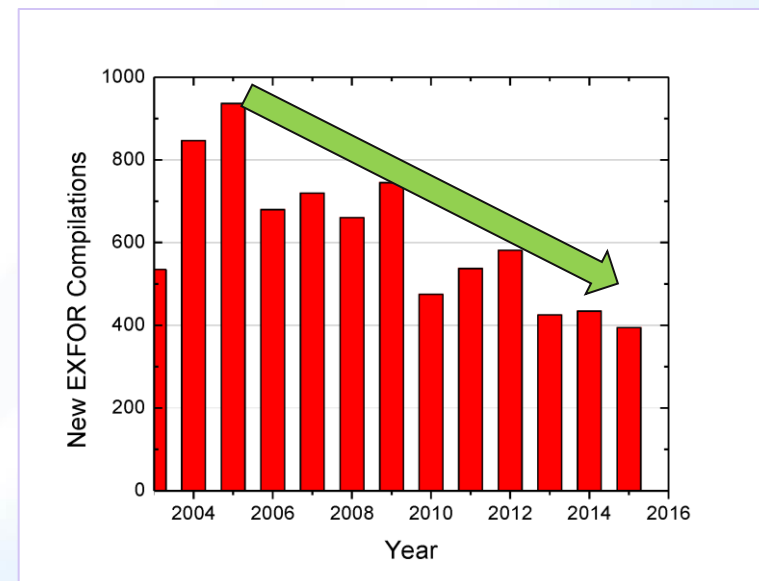
- Previously, NRDC was a productive operation with large number of good new compilations.
- We had new software products:
  - EXFOR compilation control system (Svetlana, Viktor)
  - Direct access to PDF files (Svetlana, Viktor, Lidija, Alex, Naohiko, ...)
  - EXFOR editor (Galina, Svetlana, Sophia)
- NRDC 2012-2016:
  - Plenty of hard work in spite of declining compilation output
  - Large number of Emails and memos, and lack of communication
  - Attention to detail and very strict quality requirements

EXFOR-Compilation Process X4Compilation

https://www-nds.iaea.org/exfor-master/x4

Full EXFOR Compilation Statistics (based on HISTORY)  
Information updated: 18-May-2016, 15:34:12

	NNDC	NEA-DB	NDS	CJD	ATOMKI	CAJad	CDFE	CNDC	CNPD	CPRG	Ukr	NDC	NDPCI	KNDC	KCPDG	RIKEN	Sum
2016	12		6				1		2	3		1		2			27
2015	98	37	55	7	15		27	30	29	17	12	49	18				394****
2014	92	104	54	7	23		1	21	24	42	25	14	23	4			434****
2013	122	82	35	14	11	16	12	7	25	38	16	51	3				432****
2012	128	201	45	9	22	26	20	18	41	46	10	19	9				594*****
2011	78	97	54	19	16	47	36	10	50	50	13	59	8				537*****
2010	75	100	67	20	8	30	20	19	53	57	9	14	10				482*****
2009	132	179	85	11	26	19	19	11	70	104	19	63	7				745*****
2008	94	192	145	19	15	20	27		84	22	27	15					660*****
2007	125	196	37	21	15		25		84	149	34	34					720*****



# How to Skin a Cat?

- I learned EXFOR compilation from Svetlana and Otto.
- A also learned from Svetlana that there is more than one way to skin a cat (Famous American saying). This is, exactly, how large projects should be run.
- It is more productive to work with a someone who knows more than one way how to skin a cat instead of three different ways to proceed: my way, my way and my way.
- EXFOR management should listen to the centers because they are more close to real users and their needs.



The screenshot shows the homepage of the 'World Wide Words' website. The header features a row of various dictionaries and a central logo with the text 'WORLD WIDE WORDS Investigating the English language across the globe'. Below the header is a navigation menu with links for Home, Index, Newsletter, About, Information, and Surprise page. The main content area displays the title 'More than one way to skin a cat' and the start of an article by Mike Reilly. The article discusses the origin of the proverb 'There's more than one way to skin a cat', mentioning Charles Kingsley's 1855 work and John Ray's 1678 collection of proverbs. It also references Mark Twain's 1889 work. To the right of the article is a 'Share this page' section with social media icons for Facebook, Twitter, LinkedIn, and Google+. Below that is a search bar for 'World Wide Words' and a 'Recently added or updated' list containing various phrases like 'Lie Doggo', 'Fewmet', 'Dingbat', etc. At the bottom right, there is a 'Support World Wide Words!' button.

# Is EXFOR Quality Important?

- EXFOR compilation is performed once, while ENDF evaluation is revisited during each library release. Therefore, it has to be good during the first try.
- Unfortunately we cannot produce perfect compilations
  - Lack of direct access to the data and complete knowledge of the experiment
  - Compilation effort manpower
  - There is no limit for compilation beatification
  - Changing compilation rules, old compilations contain too many errors from the current point of view
- Big picture: Quality vs. Quantity



# Requirements & Deliverables

- We need realistic compilation quality requirements: It is difficult to expect that physicist would remember all details 20 years later (Crunch table values). Prelim 1408, multiple-exchanges back and forth, Otto quits as a mediator on the prelim in November of 2015.
  - EXFOR group deliverables: EXFOR was not updated from November 23, 2015 to February 8, 2016. February 8 update: C153, C154, 1408, D102.
  - NSR was updated 24 times, 916 new and 144 updated entries during the same time. ENSDF/XUNDL are updated on a weekly basis. In US we had: Thanksgiving Day, X-Mas, New Year, MLK and Presidents Days. **Perhaps we can learn from the NSR operation about speed and user relations.**
- EXFOR should be a fun project that NRDC members enjoy. Happy employees are productive employees.



# Area #1 Technical Details

- EXFOR Software issues:
  - NRDC has software problems with processing of more than 1 MB files when NNDC has 20MB data files from Oak Ridge. **Solved by Sarov!!!**
  - We need a realistic definition of errors and bug database. Software life & production cycle: 1 Showstopper, 2 Serious, 3 Medium, 4 -Minor. Only severity 1 stops the product release, 2-4 are often addressed in released notes. **Not all bugs are addressed in releases by software companies.**
- We should remember that there is more than one way how to skin a cat. Often, we waste plenty of time on unnecessary discussions between centers and the IAEA on EXFOR compilations. We have to be flexible.





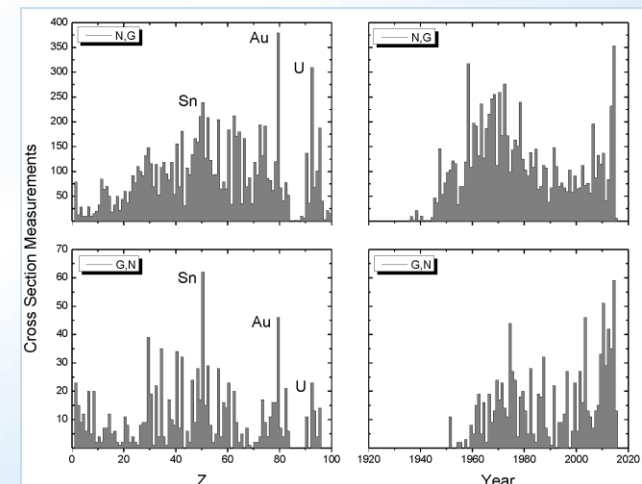
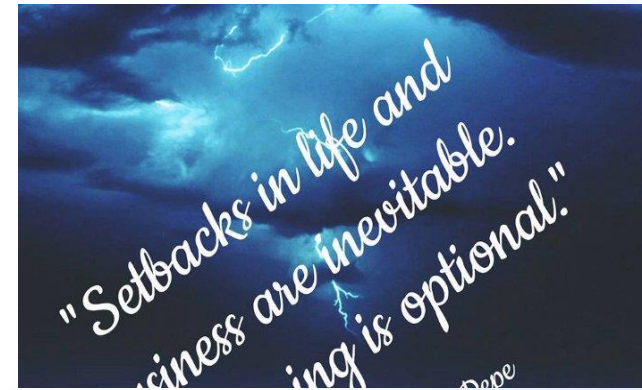
# Communicate, Communicate, Communicate, ....

- The best way to verify quality of EXFOR is to check the data sources because mathematical procedures never will find the missing data sets. We have more than 22,000 publications in EXFOR, so we cannot be accomplished by compilers only. We need better relations with EXFOR users and authors.
- Perhaps, we could learn from the NSR operation where ENSDF evaluators constantly correct the entries and Physical Review C authors who submit abstracts to NSR.
- We should find new creative ways to operate the EXFOR project and engage the users worldwide through interactions, consultations, articles, presentations, posters, ...



# Current State of EXFOR

- We cannot control the EXFOR past but we can control its present and future developments.
- We should compile all current nuclear reaction data in order to avoid missing data issues in the library.
- EXFOR library should provide a complete collection of n-, p-,  $\gamma$ -induced cross sections and covariances for major users. We have to restore these missing data when possible.
- We should carve an optimal path that would satisfy more than 90% of potential applications instead of jumping on unrelated topics such as beta delayed neutron or kerma compilations. A single CRP group suggestion to compile structure and decay quantities in reaction database should not overshadow the big picture.



# Conclusions

- EXFOR operation will be always imperfect but we have to find a way to increase its efficiency.
- We need to increase the network output, new compilation number cannot slide down any longer.
- Network compilation output is, perhaps, affected by the current operation model that has to be changed: 5-10 years ago we had a more efficient model.
- Prioritization (to arrange items in order of their relative importance) of work instead of working like firemen on burning buildings.
- Personal stakes of participating centers have to be raised, project communication and coordination have to be improved.
- We need work together and share all our successes and failures. We should not be in a situation when we feel ignored, treated unfair or disrespected.
- **Please consider this presentation as a starting point for a discussion on project improvement. New ideas and suggestions are welcome.**

# The IAEA Mission Statement

## **The International Atomic Energy Agency:**

- is an independent intergovernmental, science and technology-based organization, in the United Nations family, that serves as the global focal point for nuclear cooperation;
- assists its Member States, in the context of social and economic goals, in planning for and using nuclear science and technology for various peaceful purposes, including the generation of electricity, and facilitates the transfer of such technology and knowledge in a sustainable manner to developing Member States;
- develops nuclear safety standards and, based on these standards, promotes the achievement and maintenance of high levels of safety in applications of nuclear energy, as well as the protection of human health and the environment against ionizing radiation;
- verifies through its inspection system that States comply with their commitments, under the Non-Proliferation Treaty and other non-proliferation agreements, to use nuclear material and facilities only for peaceful purposes.