

*50 Years of Nuclear Structure and Decay Data Network  
Memorial Session, IAEA Vienna, 15 April 2024*

# **Brief look at 50 years of NSDD**

## **Recollections from both sides of the Atlantic**

Pavel Obložinský  
Retired, Bratislava, Slovakia

*Slovak Acad. Sci. Bratislava (1967-1993)  
Nuclear Data Section, IAEA Vienna (1993-2000)  
National Nuclear Data Center, BNL, NY (2000-2011)*

# When one says NSDD, I hear ENSDF

**Evaluated Nuclear Structure Data File, ENSDF**, is the most fundamental nuclear data library. Major product of the **NSDD** network. Reflecting more than 100 years of nuclear physics. And more than 100,000 experimental papers.

*“All nuclei, all levels, all spins, all half-lives, all decay modes, all transitions, all branching ratios. All the Universe. All in one file.”*

This is ENSDF, almost.

My first encounter with ENSDF was 41 years ago.

# 1983 Smolenice: Mulki Bhat explains ENSDF

## Unexpected consequence of major USA-IAEA crisis

Early 1983, IAEA Nuclear Data Section, Hans Lemmel (later **NSDD** officer) approached me with surprising request to host small U and Cf fission meeting - most unusual IAEA meeting.

- Background: in *June 1981 Israel bombarded Iraqi reactor with F16(!)* => UN condemned Israel sharply => IAEA followed and got sharper => **USA boycotted IAEA from Sep 1982 through Feb 1983** => boycott lifted in March 1983 => 1st meeting USA attended was Smolenice!
- US attendees: W. Poenitz - legendary fission evaluator; **Mulki Bhat** - National Nuclear Data Center, leading evaluator, 1st NNDC and 1st **ENSDF** guy I ever met.

Smolenice Castle - romantic place, ideal for long evening discussions.

- We talked with **Mulki** for hours - I was curious and he was curious
- I learnt about **ENSDF, mass chains, structure data, punch-card format, evaluations, importance of IAEA, ...**
- And about NNDC,...
- Mulki learnt about life behind Iron Curtain, ...

*Mulki was my destiny: years later I took his position, but before that was Vienna*



Smolenice Castle of the Slovak Acad. Sci.  
Carpathian Mountains

Mulki Bhat

# 1995 Vienna: Arima Panel appreciates ENSDF

Most difficult moment in the entire existence of NDS

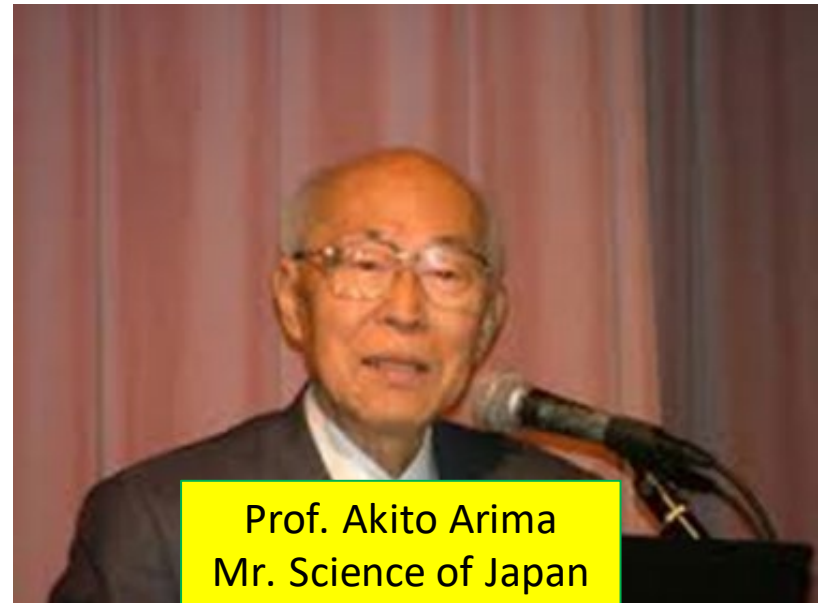
I joined IAEA in June 1993. Nuclear Data Section was in trouble culminating in 1995.

1. *NDS without leadership 1.5y: D. Seeliger, E. Germany, not approved by unified country (Stasi!?) => 2nd candidate seen as mistake => new selection => **Charlie Dunford** NDS head in July 1993 (crisis manager, NNDC head on 2y leave of absence).*
2. *Post-Chernobyl trauma + post-cold war anti-nuclear mood => dramatic loss of funding => nuclear in disfavor => IAEA plan: **reallocate funds from nuclear data** to nuclear safety.*

Charlie left on 7 July 1995 => I become Acting Head => IAEA felt time is right for Peer-Review which Charlie resisted 2y => High-ranking **Arima Panel** completed with shocking speed.

Chair **Akito Arima**, Japan (**IBM model, deformed nuclei!**), strongest man in Panel

- *Panel met in Vienna on 30 Aug-1 Sep 1995*
- *Our preparations: complex, elaborated, tailored individually, enormous help from Charlie Dunford and Dick Meyer - detailed advice how to approach Arima*
- ***Demo user session with ENSDF, structure data, IAEA international role => visibly appreciated by Arima.***



Prof. Akito Arima  
Mr. Science of Japan

# 1995 Vienna: Without Arima *et al.* NSDD would be history

We owe them a lot

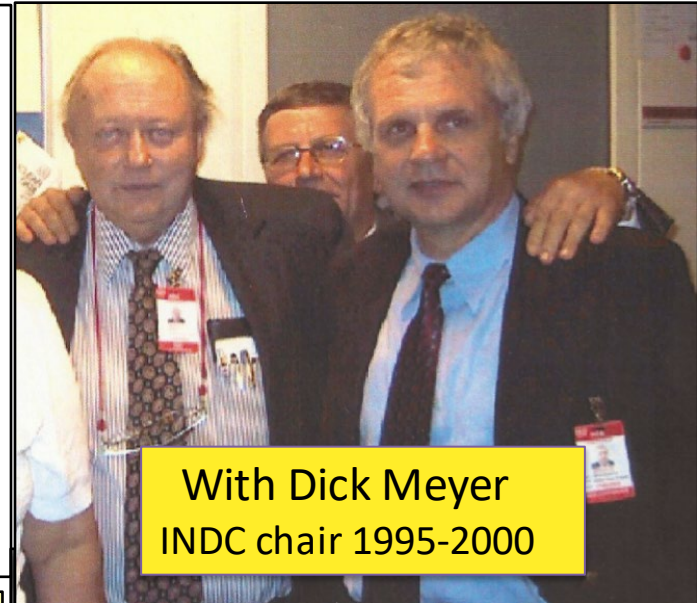
In the IAEA we had no support, all were negative.

- **S. Cherif**, Director General's Office: "Board of Governors has shown decreased interest in Nuclear Data projects."
- **S. Machi**, Deputy DG: "Nuclear Data has difficulty getting support from Member States."
- **R. Iyer**, NAPC Division director, NDS supervisor: "**Nuclear Data is a closed topic.**"

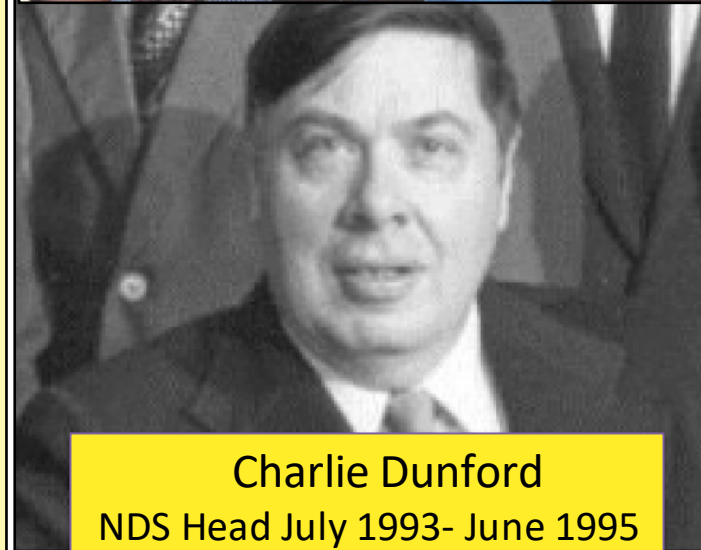
**Arima Panel findings positive!** Great news for NDS and ND centers worldwide. And **NSDD**,...

Most dramatic, most important and also best time in my career. Three men deserve our deep gratitude:

- **Dick Meyer** - **y-ray spectroscopist**, DoE nuclear data manager, INDC chair, **XUNDL** name inventor, passed away in **2010**.
- **Charlie Dunford** - **best known to our community**, leader, fighter, my teacher, passed away in **2016**.
- **Akito Arima** - **nuclear structure science superstar**, member of Japanese cabinet 1998-99, passed away in **2020**.



With Dick Meyer  
INDC chair 1995-2000



Charlie Dunford  
NDS Head July 1993- June 1995

# 1999 Vienna: NSDD workshops invented

## ENSDF manpower is long-term issue

What helped: experience with IAEA-ICTP Workshops on Nuclear Reactions, understanding tricky financial relations\*), familiarity with IAEA planning.

In 1999 I knew enough to act, also having in mind **US Nuclear Data Program** falling on my shoulders soon.

- Prepared proposal for new series of IAEA-ICTP Workshops
- Endorsed by INDC at its 22nd Meeting, also by USNDP because of lecturers
- Put **1st NSDD Workshop** in Blue Book, Work Plan for 2001-2002. At last minute - Nov 1999

*Rule learned in socialist Czechoslovakia: last minute entry stays in the final Plan as nobody has time to read and delete it.*



ICTP Trieste and Abdus Salam

Once in the IAEA Blue Book, Workshops started their own life, supervised by new energetic NDS Head, **Alan Nichols**. Already held 10 times.

*\*) Thanks to Abdus Salam IAEA supported ICTP but there was no overlap in missions. ICTP was happy to host + finance Nuclear Data Workshops, making cost for NDS low.*

# 2002 Germantown: Dennis Kovar discovers ENSDF

## USNDP troubling relationship with DoE sponsor

I moved to USA in 2000, Charlie Dunford felt “burnt”, stepped down in Feb 2002, I took over as NNDC head, US Nuclear Data Program chair, CSEWG chair.

- Major challenge: **DoE HQ Germantown**, annual budget briefing, USNDP funding, \$5 million, major contributor to **NSDD**, all about **money, money, money!**
- Charlie hated this, especially reporting to Dennis Kovar, powerful director, DoE Office of Nuclear Physics
- Charlie’s report 2000 => Dennis: **“The worst talk I ever heard!”** => Charlie devastated => heated exchange with Dick Meyer (in WC) => Dick pressed Dennis => Charlie’s resignation avoided, but damage done



Dennis Kovar, Dept Energy  
(Czech name Kovář = Smith)  
Controlled \$400 million

I prepared 2002 report => called retired Dick Meyer => Dennis wants 3 things: numbers, numbers and numbers! => added many at the last minute, mostly **ENSDF** (isotopes, nuclei, lines, transitions, decay modes, highest spins, updating cycle, manpower, ...)

- **Dennis Kovar, twice: “This is exactly what I wanted to hear!”**
- Chemistry with Dennis established, relationship improved => USNDP funding and thus also **NSDD** funding stabilized => but slow decline in **ENSDF** manpower continued => major headache of USNDP chair => life under DoE was tough ...

# 2006 Brookhaven: Nuclear Data Sheets accepts ENDF

## Pioneering opening of ENSDF journal for iconic reaction papers

Nuclear Data Sheets - **ENSDF/NSDD** journal of key importance, publishing computerized by NNDC in 1981, ENSDF papers huge and cumbersome, to be modernized?

- In 2000, Jagdish Tuli, editor-in-chief since 1988, highly regarded ENSDF expert: **"In 10 years this journal will be dead."** (*Bonmot: Forecasting is tough job. Particularly when it concerns future!*)
- In 2006, pioneering idea for modernization by CSWEG (Mark Chadwick - LANL; P.O.): major release of reaction data library ENDF => publish **Big Paper on ENDF/B-VII.0** => extensive detailed paper of historical importance => modern look, highly positive response

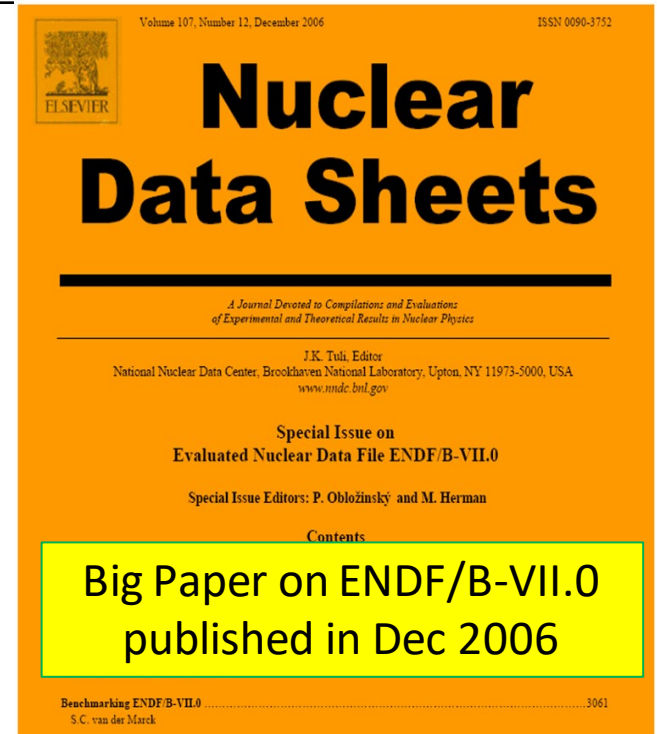
## 2006 Brookhaven: USNDP and CSWEG annual meetings, stormy common session

- **ENSDF** evaluators alarmed, ENDF seen as 1st step to grab journal; ENDF evaluators pushed for 1 issue per year, 11 issues remain for **ENSDF**
- Deal - publish Big Paper as **Special Issue 2006**

Tradition established, journal rating visibly improved, iconic reaction papers published (Libraries ENDF, RIPL; Codes NJOY, Empire, TALYS; Standards ...). **Most cited:**

- 2006, ENDF/B-VII.0 - 2 800 citations
- 2011, ENDF/B-VII.1 - 3 200 - " -
- 2018, ENDF/B-VIII.0 -1 700 - " -

**Great service of ENSDF and its journal to ENDF!**





# Thank you, NSDD!

50 years of the NSDD network demonstrated its unique value.

NSDD continuation is of fundamental importance. Much needed ENSDF modernization is underway. Never-ending fight for funding lies ahead.

I am sure there will be difficult moments. I am sure you will manage.

**Good luck and best wishes for the future.**