NEA Data Bank (DB)

Progress report 2015-2016

OECD/NEA Data Bank

NRDC 2016 Meeting, 7-10 June 2016,
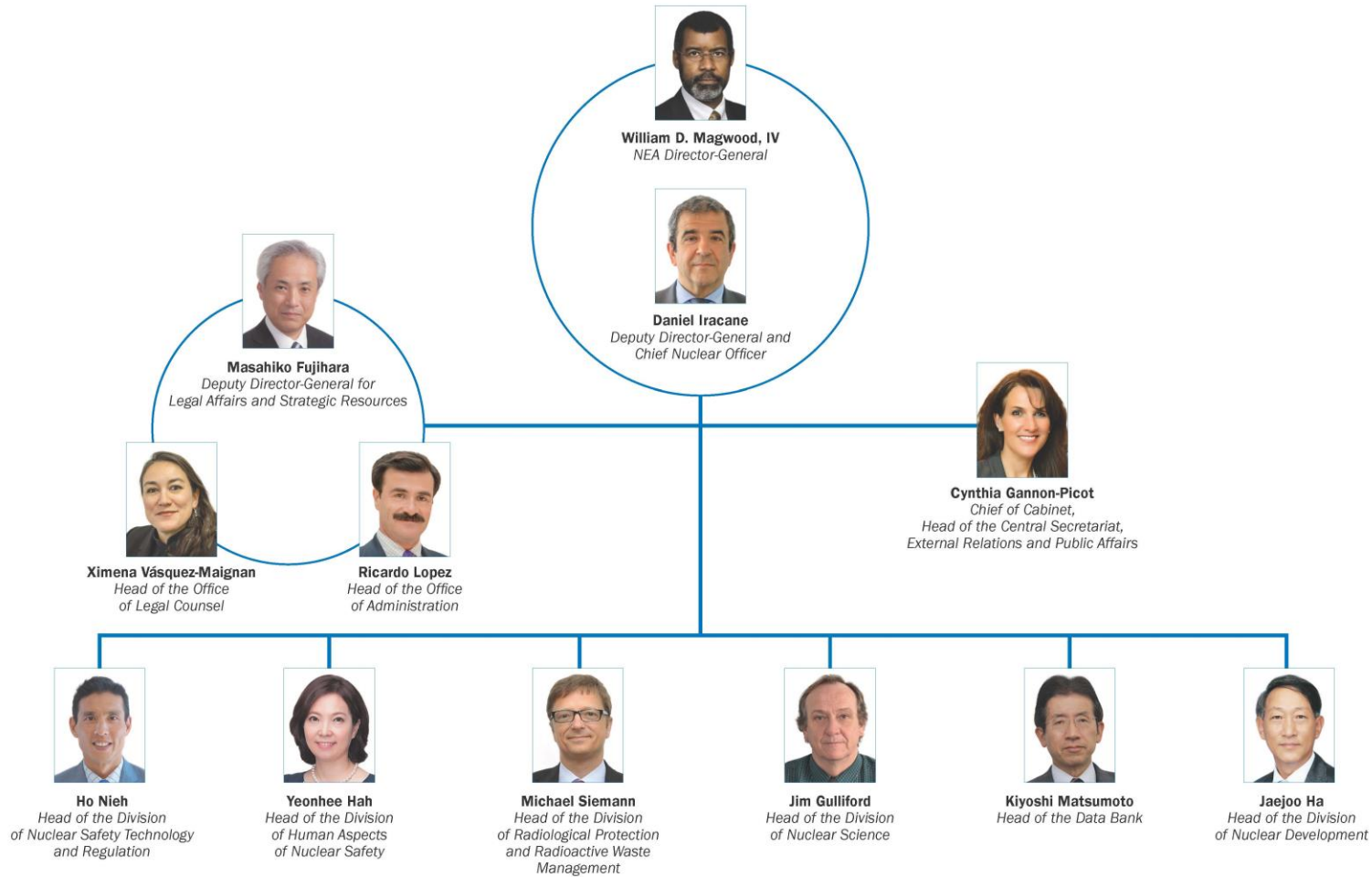**China Hall of Science and Technology, Beijing, China**

1. Organization, Staff

❑ **K. Matsumoto** (Head of NEA Data Bank) leaves NEA at the end of August after 5 years of service

❑ **Manpower** allocated to nuclear data (ND) activities is shared among 4 staff:

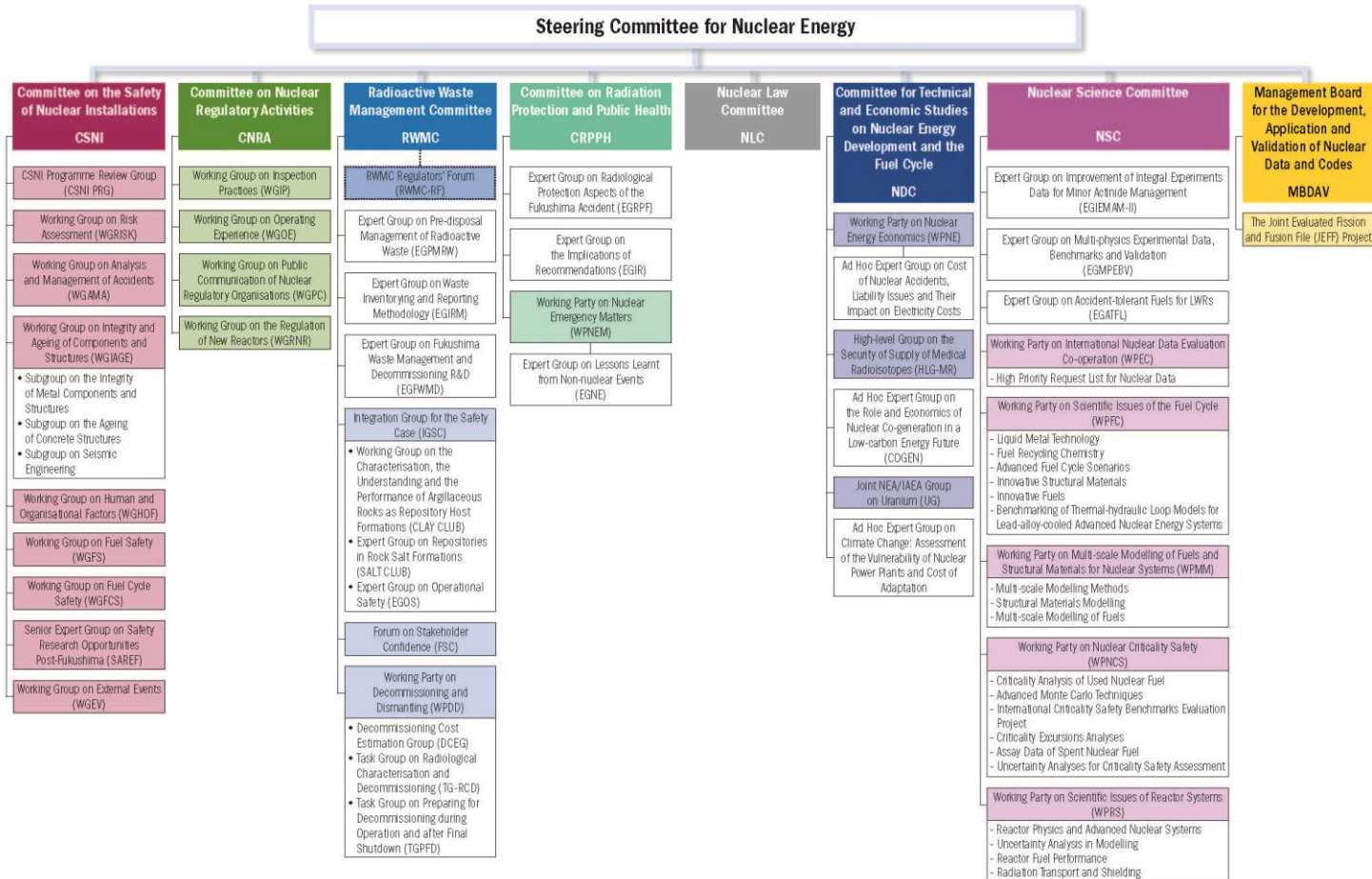|	
▪ DB Nuclear Data Services (~0.7 man-year) & JEFF (~1.4 man-year)	: F. Michel-Sendis, O. Cabellos, C. J. Diez
▪ DB Software (~0.3 man-year)	: N. Soppera, M. Bossant
▪ WPEC (~0.3 man-year)	: O. Cabellos

❑ **DB Task Force (TF)** was established to discuss future NEA DB activities and prepare the next NEA strategic plan 2017-2022.

   ▪ Recommendations: "improving client services, adapting to new technical developments, enhancing scientific expertise, and enhancing governance"

❑ The **Executive Group of the NSC** has been renamed "Management Board on the Development, Application and Validation of Nuclear Data and Codes" (**MBDAV**)

   ▪ MBDAV reports directly to the NEA Steering Committee
   ▪ First step towards enhancing the Data Bank's governance structure and visibility

Organisational Structure of the OECD Nuclear Energy Agency (NEA)

Steering Committee for Nuclear Energy

Committee on the Safety of Nuclear Installations — CSNI

- CSNI Programme Review Group (CSNI PRG)
- Working Group on Risk Assessment (WGRISK)
- Working Group on Analysis and Management of Accidents (WGAMA)
- Working Group on Integrity and Ageing of Components and Structures (WGIAGE)
  - Subgroup on the Integrity of Metal Components and Structures
  - Subgroup on the Ageing of Concrete Structures
  - Subgroup on Seismic Engineering
- Working Group on Human and Organisational Factors (WGHOF)
- Working Group on Fuel Safety (WGFS)
- Working Group on Fuel Cycle Safety (WGFCS)
- Senior Expert Group on Safety Research Opportunities Post-Fukushima (SAREF)
- Working Group on External Events (WGEV)

Committee on Nuclear Regulatory Activities — CNRA

- Working Group on Inspection Practices (WGIP)
- Working Group on Operating Experience (WGOE)
- Working Group on Public Communication of Nuclear Regulatory Organisations (WGPC)
- Working Group on the Regulation of New Reactors (WGRNR)

Radioactive Waste Management Committee — RWMC

- RWMC Regulators' Forum (RWMC-RF)
- Expert Group on Pre-disposal Management of Radioactive Waste (EGPMRW)
- Expert Group on Waste Inventorying and Reporting Methodology (EGIRM)
- Expert Group on Fukushima Waste Management and Decommissioning R&D (EGFWMD)
- Integration Group for the Safety Case (IGSC)
  - Working Group on the Characterisation, the Understanding and the Performance of Argillaceous Rocks as Repository Host Formations (CLAY CLUB)
  - Expert Group on Repositories in Rock Salt Formations (SALT CLUB)
  - Expert Group on Operational Safety (EGOS)
- Forum on Stakeholder Confidence (FSC)
- Working Party on Decommissioning and Dismantling (WPDD)
  - Decommissioning Cost Estimation Group (DCEG)
  - Task Group on Radiological Characterisation and Decommissioning (TG-RCD)
  - Task Group on Preparing for Decommissioning during Operation and after Final Shutdown (TGPFD)

Committee on Radiation Protection and Public Health — CRPPH

- Expert Group on Radiological Protection Aspects of the Fukushima Accident (EGRPF)
- Expert Group on the Implications of Recommendations (EGIR)
- Working Party on Nuclear Emergency Matters (WPNEM)
- Expert Group on Lessons Learnt from Non-nuclear Events (EGNE)

Nuclear Law Committee — NLC

Committee for Technical and Economic Studies on Nuclear Energy Development and the Fuel Cycle — NDC

- Working Party on Nuclear Energy Economics (WPNE)
- Ad Hoc Expert Group on Cost of Nuclear Accidents, Liability Issues and Their Impact on Electricity Costs
- High-level Group on the Security of Supply of Medical Radioisotopes (HLG-MR)
- Ad Hoc Expert Group on the Role and Economics of Nuclear Co-generation in a Low-carbon Energy Future (COGEN)
- Joint NEA/IAEA Group on Uranium (UG)
- Ad Hoc Expert Group on Climate Change: Assessment of the Vulnerability of Nuclear Power Plants and Cost of Adaptation

Nuclear Science Committee — NSC

- Expert Group on Improvement of Integral Experiments Data for Minor Actinide Management (EGIEMAM-II)
- Expert Group on Multi-physics Experimental Data, Benchmarks and Validation (EGMPEBV)
- Expert Group on Accident-tolerant Fuels for LWRs (EGATFL)
- Working Party on International Nuclear Data Evaluation Co-operation (WPEC)
  - High Priority Request List for Nuclear Data
- Working Party on Scientific Issues of the Fuel Cycle (WPFC)
  - Liquid Metal Technology
  - Fuel Recycling Chemistry
  - Advanced Fuel Cycle Scenarios
  - Innovative Structural Materials
  - Innovative Fuels
  - Benchmarking of Thermal-hydraulic Loop Models for Lead-alloy-cooled Advanced Nuclear Energy Systems
- Working Party on Multi-scale Modelling of Fuels and Structural Materials for Nuclear Systems (WPMM)
  - Multi-scale Modelling Methods
  - Structural Materials Modelling
  - Multi-scale Modelling of Fuels
- Working Party on Nuclear Criticality Safety (WPNCS)
  - Criticality Analysis of Used Nuclear Fuel
  - Advanced Monte Carlo Techniques
  - International Criticality Safety Benchmarks Evaluation Project
  - Criticality Excursions Analyses
  - Assay Data of Spent Nuclear Fuel
  - Uncertainty Analyses for Criticality Safety Assessment
- Working Party on Scientific Issues of Reactor Systems (WPRS)
  - Reactor Physics and Advanced Nuclear Systems
  - Uncertainty Analysis in Modelling
  - Reactor Fuel Performance
  - Radiation Transport and Shielding

Management Board for the Development, Application and Validation of Nuclear Data and Codes — MBDAV

- The Joint Evaluated Fission and Fusion File (JEFF) Project

May 2016

2. EXFOR – Experimental nuclear data

❑ Update and maintenance of the EXFOR database (areas 2 and O)

- Full coverage of experimental results published in open literature
- Revision of old entries is a significant part of the activity
- Peer-review of all transmissions using JANIS

Table 1. Detailed statistics of recent NEA transmissions
(*Status = PRELIM)

Year	Trans	Entry	
		New	Updated
2015	2241 (May 2015)	7	5
	2242 (Nov 2015)	2	21
	2243 (Feb 2016)	0	14
	2244 (Feb 2016)	15	5
	o053 (Feb 2015)	55	14
	o054 (Jul 2015)	28	19
	Total	**107**	**78**
2016 (1st half)	2245 (May 2016)	0	13
	2246 (May 2016)	0	33
	2247 (May 2016)	4	20
	2248 (May 2016)	12	3
	2249*	10	14
	o055 (May 2016)	7	6
	o056 (May 2016)	0	52
	o057 (May 2016)	2	3
	TOTAL	**35**	**144**

2. EXFOR – Actions NRDC 2015 Meeting

EXFOR General	S. Dunaeva's Comments
A2	(Continuing action) Correct erroneous entries listed on the EXFOR Feedback List according to the indicated priorities. All urgent corrections must be done by the next meeting.	Corrections in 252 Entries: 177 - area '2' & 75 – area 'O' Additionally, to errors mentioned in Feedback list, Entries were update following last EXFOR rules (4-digit-year, low cases, etc.). Several of them were re-compiled.
EXFOR Compilation Needs		**M. Marina's Comments**
A15	(Continuing action) Compile with priority the proton-induced isotope production cross sections listed in CP-D/725 Rev. (~WP2012-19). Notify Semkova if the assigned centre does not compile the high energy (E > 1 GeV) data in the list.	
A16	(Continuing action) Compile with priority the light charged-particle induced isotope production cross sections listed in CP-D/757. Notify Semkova if the assigned centre does not compile the high energy (E > 1 GeV) data in the list.	
A17	(Continuing action) Compile with priority the articles cited in the NACRE II (an update and extension of European Compilation of Reaction Rates for Astrophysics) listed in Tables 1 and 2 of CP-D/833.	finished for n-induced - Entry 23228 (Naohiko)
A18	(Continuing action) Compile with priority the articles related to ion beam analysis application listed in CP-D/832 Rev.	

2. EXFOR – Actions NRDC 2015 Meeting

EXFOR Compilation Needs	M. Marina's Comments
A19	(Continuing action) Compile with priority the β-delayed neutron spectra published in the articles listed in the table of CP-D/837.	J,NSE,80,238,1982 was canceled by Naohiko, was reserved for Entry #23247 INDC(NDS)-107/G,103,1979 is review, but reserved for Entry #23248 and Lidija and Valentina sent more articles (as original publication refs., could be compiled in future) All others were compiled. So this could be marked as finished (for this memo #837).
A21	(Continuing action) Assess the articles reporting keV neutron capture cross section entries listed in CP-D/740, and add these articles with necessary revisions with priority.	Compiled (in data base already): 22436 J,NP/A,621,262,1997 Some were compiled in my prelim.2249, but it's not put in NDS open area yet: 21937, 22008, 22010, 22307, 22356, 22400, 22401, 22499, 22907, 22916, 22917, 22926, 23064. Not finished yet.
A23	(Continuing action) Compile the thermal neutron-induced reaction data cited in Mughabghab's "Atlas of Neutron Resonances" and listed in 4C-3/395.	Compiled: • Albert J,KE,10,306,1967 - Entry # 31756 • Albert R,ZFK-RN-23,1964 - #31003, 31467, 31753 - move in area 3 • Alexander R,ZFK-RN-23,1964 - #31003, 31467 - move in area 3 • Huttel R,ZFK-RN-23,1964 - #31003, 31467 - move in area 3 • Hashimoto J,JRN,120,185,1988 - # 23227 • Alstad P,INDC(NOR)-1,1(1),1972 - #20187 • Alstad P,INDC(NOR)-1,1(2),1972 - #20187 • Poortmans R,INDC(CCP)-134,68,1978 - #20725 Not finished yet.

2. EXFOR – Actions NRDC 2015 Meeting

	EXFOR Compilation Needs	M. Marina's Comments
A25	(Continuing action) Perform EXFOR completeness checking for the list of articles received from NDS (articles cited in S. Mughabghab's "Atlas of Neutron Resonances") to identify articles missing in EXFOR, and assign responsibility of compilation of the identified articles to centres for by a memo.	Not finished yet.
A29	(Continuing action) Monitor CIELO mailing lists, and try to receive tabulated experimental data from evaluators who have their own internal database.	New HPRL requests and feedbacks, 2016-2017
A31	Compile with priority prompt fission neutron multiplicities listed in CP-D/871.	Compiled: K.F.Flynn+ J,HCA,52,2216,1969 - 23271 Not compiled - K.C.Cuninghame J,JIN,4,1,1957 A33, A46 not finished.
A33	Compile articles published in JINR Rapid Communication (KSO) and Phys. Part. Nucl. Lett. (PPN/L) and listed in CP-D/858.	
	EXFOR Quality Control	
A36	(Continuing action) Resolve inter-centre duplication C0846/F0160, C0968/A0320, C0998/O0452 and T0297/O0338 (c.f. CP-D/762), and inform Otsuka the conclusion.	Finished
A46	(Continuing action) Assess the entries listed in Appendix C of WP2014-32. Re-compile the article based on the entry in the "EXFOR updates and archive" maintained by NDS when appropriate. If not, create only a common subentry with minimum keywords (i.e., TITLE, AUTHOR, REFERENCE, FACILITY, HISTORY) as time permits.	

2. EXFOR – Actions NRDC 2015 Meeting

EXFOR Quality Control		M. Marina's Comments
A47	(Continuing action) Try to add numerical data which are not superseded (SPSDD) but still unobtainable (UNOBT) for neutron-induced reaction data published in old literature for 1H, 16O, 56Fe, 235U, 238U and 239Pu.	At 2015 - (08 April 2015): 1H–no Subents, 16O – 3(area2), 56Fe – 5(area2), 235U –27=21(area2)+6(area4),238U–18=7(area2)+11(area4), 239Pu – 10=1(area1)+9(area2). It could be proposed to produce a list of such Entries - for easy checking of corrections.
A49	(Continuing action) Assess if REACTION of 22077.014, 029 and 044 can be improved as proposed in the table of CP-D/813 (Rev.2).	not finished
A51	(Continuing action) Provide a list of erroneous and suspicious outliers by using various statistical approaches (c.f. WP2011-17, WP2013-19).	See presentation A51
A52 + A68	(Continuing action) Provide JANIS–TRANS Checker Log list on every preliminary TRANS-file. Continue development and testing of the JANIS – TRANS Checker in cooperation with NDS and the other centres.	Available online at www.oecd-nea.org/janisweb/trans-checker. Java version 8u92 in 23-May 2016
A53	(Continuing action) Provide JANIS Import Log created from the EXFOR Master File to Otsuka on a regular basis.	
A56	Delete 22711.003 which is duplication of 13918.002 (c.f. CP-D/762).	not finished
A60	Revise the unit codes of energy differential probability distributions listed in WP2015-27.	not finished (3 Subents for area O, it's my WP2015-27)
A61	Revise data β-delayed neutron emission probabilities listed in WP2015-25.	one 22245 made, 1 other 23191 - not
A62	Revise data sets tabulated in the Leningrad Institute of Nuclear Physics Report LIJAF-531 and listed in CP-D/860.	CP-induced
A63	Explain availability of the neutron spectra of ISNF, Sig-Sig, CFRMF and YAYOI facility compiled in the IRDF-2002 library under the keyword COMMENT of entries summarized in WP2015-17 as compiler's comments.	Finished

2. EXFOR – Experimental nuclear data

❑ JANIS Trans Checker

- Peer-review of all NRDC prelim files
- Analysis of JANIS import log for the EXFOR master (cf. WP2014-30)
- Available online at www.oecd-nea.org/janisweb/trans-checker
  The standalone ".exe" is released with new Java version 8u92 in 23-May 2016

❑ EXFOR checking ("post-SG30" activities)

Verification methods developed within WPEC Subgroup 30 have been implemented at the Data Bank to further improve the quality of EXFOR

▪In-depth review of all threshold reaction cross-sections

"*Statistical Verification and Validation of the EXFOR database: (n,n'), (n,2n), (n,p), (n,α) and other neutron-induced threshold reaction cross-sections*" by A.Koning, NEA/DB/DOC(2014)3

In 2016, the (n,gamma) reaction cross-section will be included in this report.

▪Assessing the quality of EXFOR data using a statistical approach

SCM-NEA methodology will be applied to the most of the EXFOR data (e.g. threshold reactions, isomeric transitions and data in the resonance region). The methodology will be extended to natural elements, angular distributions and integral resonances
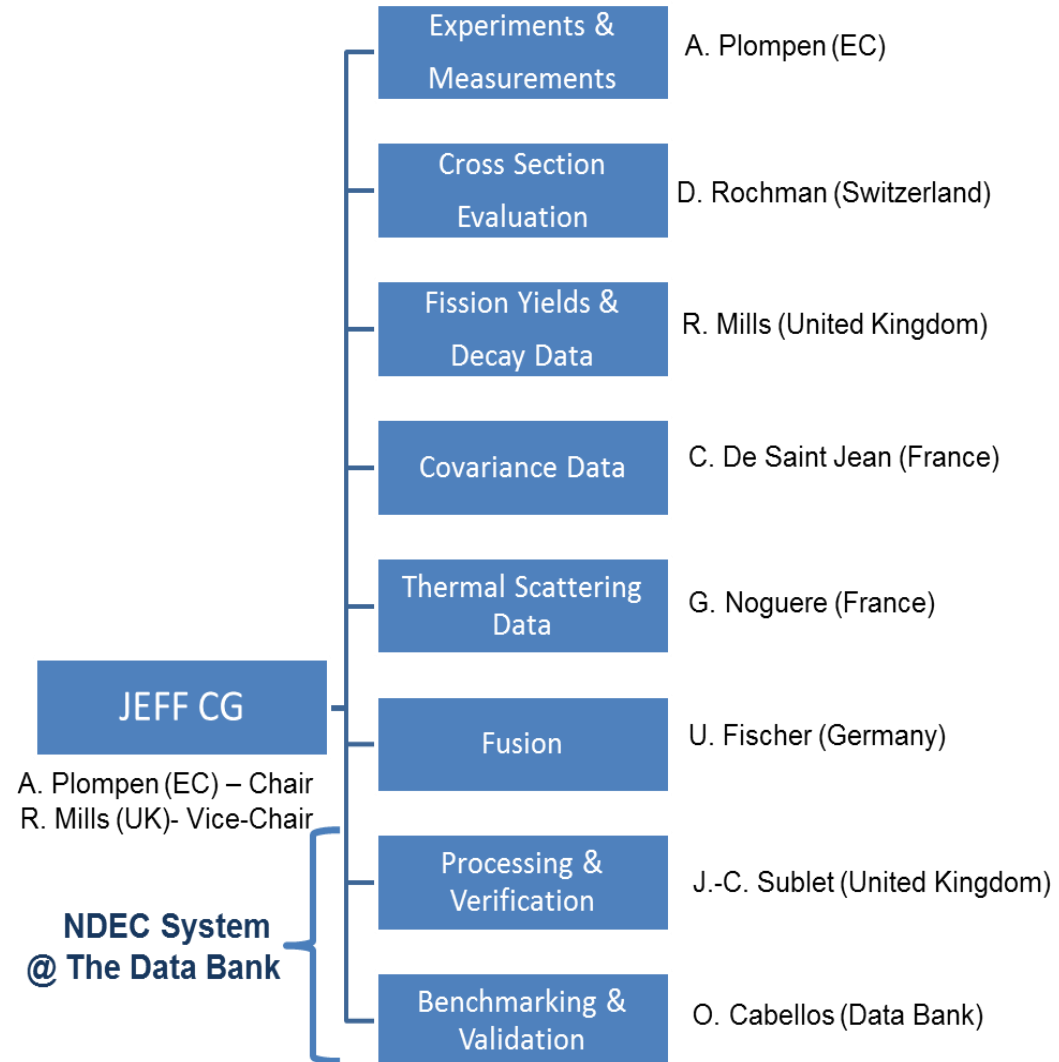
This work will be presented in ND2016

3. JEFF Project, Files

☐ JEFF-3.2 General Purpose File (released in March 2014)

☐ JEFF-3.2 Special Purpose Files to be released
  ▪ Decay Data update in 2016
  ▪ Fission Yields (will integrate FY data from GEF/GEFY) update in 2016

☐ JEFF-3.3 (2017)
  ▪ Further improvements and extensions for fission (fast reactors, transmutation) and fusion (e.g. IFMIF)
  ▪ Integrate multiple contributions from WPEC SGs (CIELO…), EC-sponsored initiatives (e.g. CHANDA, H2020)
  ▪ Tested with NDEC

☐ JEFF-4: - **4 C's** : **C**omplete, **C**onsistent, with **C**redible **C**ovariances

  ▪ *Next generation Nuclear Data will be high quality data which can be reliably used in uncertainty assessment studies*

https://www.oecd-nea.org/dbdata/jeff/

Figure 1. *New mandate of the JEFF project (2015-2018)*

| Box	Lead
Experiments & Measurements	A. Plompen (EC)
Cross Section Evaluation	D. Rochman (Switzerland)
Fission Yields & Decay Data	R. Mills (United Kingdom)
Covariance Data	C. De Saint Jean (France)
Thermal Scattering Data	G. Noguere (France)
JEFF CG — A. Plompen (EC) – Chair, R. Mills (UK)- Vice-Chair	
Fusion	U. Fischer (Germany)
NDEC System @ The Data Bank	
Processing & Verification	J.-C. Sublet (United Kingdom)
Benchmarking & Validation	O. Cabellos (Data Bank)

3. JEFF Project, NDEC

❑ NEA/DB working on: "Nuclear Data Evaluation Cycle" (NDEC)

- Systematized workflow of data for the verification, processing, differential validation and integral benchmarking of evaluated nuclear data
- Developed, hosted, maintained and co-ordinated at the NEA/DB by the DB

- Built around already existing NEA tools (JANIS, ICSBEP/DICE, etc…) and implementing new ones, in a collaborative working environment
- Sub-versioning system to keep traceability of submitted files
- Facilitate the implementation of a more project-managed approach for the production and final Q&A of nuclear data libraries (JEFF, CIELO,…)
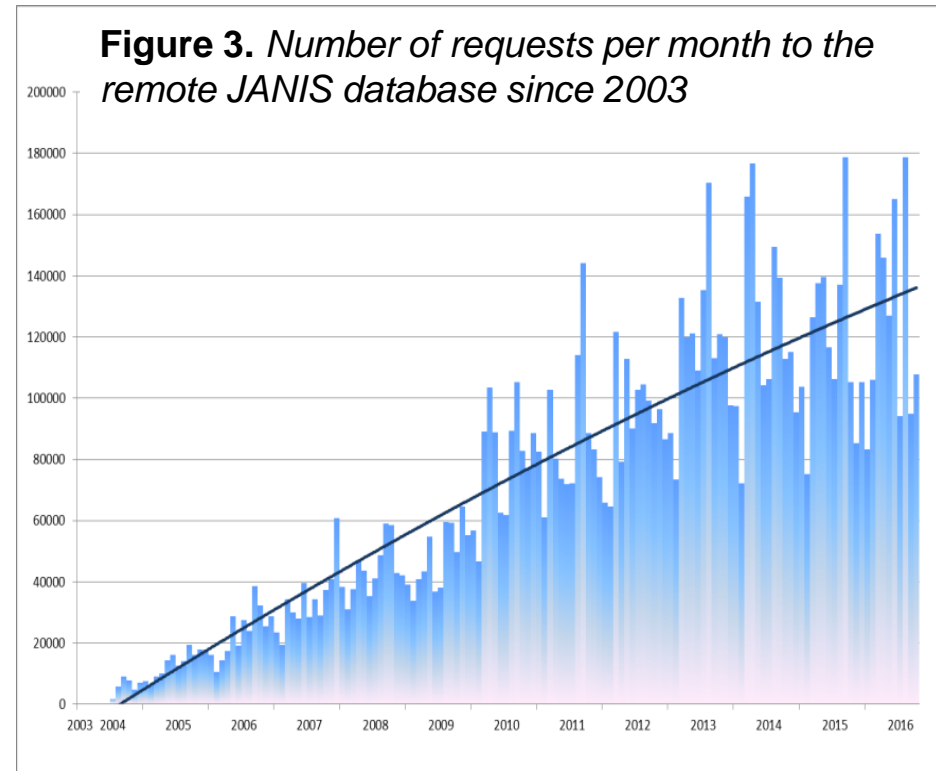
Figure 2. *Nuclear Data Evaluation Cycle (NDEC) platform*
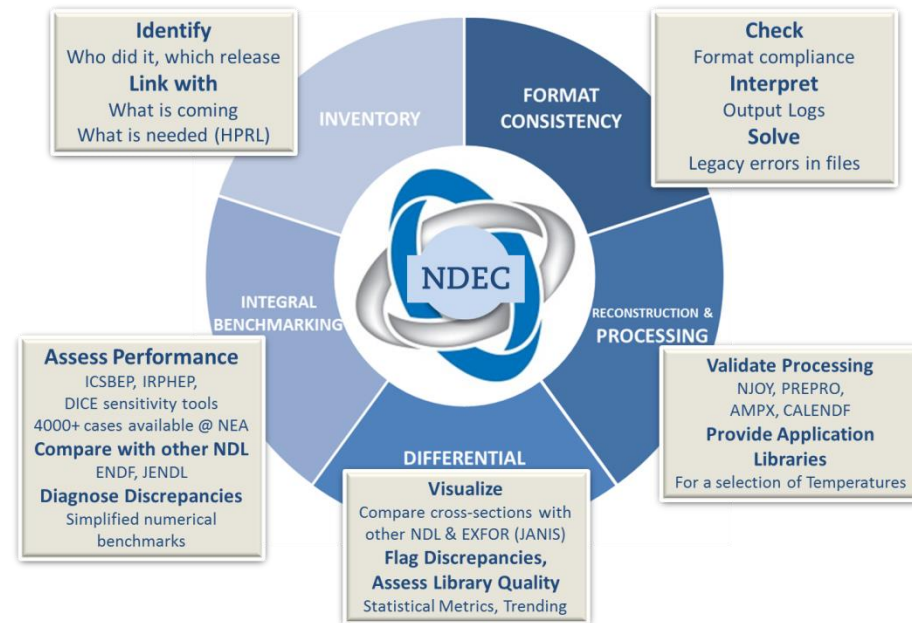
4. JANIS – Nuclear data display software

❑ JANIS 4.0 released online (Webstart) and on DVD in Oct. 2013
  ▪ The latest ENDF libraries (TENDL2014, TENDL2015…)

❑ JANIS 4.1/5.0 to be released in 2016/2017

  ▪ Complete ENDF coverage
  ▪ Easy update new data
  ▪ New plotting capabilities (covariances, 3D, …)
  ▪ New formats (coverx, ace,…)
  ▪ …
  ▪ Automated plots generation through scripting via the command line
  ▪ Recent developments rely on JANIS features to access nuclear data, e.g. Nuclear Data Sensitivity Tool (NDaST) makes use of BOXER and COVERX

Figure 3. *Number of requests per month to the remote JANIS database since 2003*

Nuclear Energy Agency

Thank you for your attention