NNDC/USNDP Report FY13-14

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Brookhaven National Laboratory

NSDD Meeting, Apr. 20-24, 2015

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a passion for discovery

U.S. DEPARTMENT OF **ENERGY** | Office of Science

Personnel changes in USNDP

- **Balraj Singh** retired from McMaster and moved under contract with NNDC (since Oct. 1, 2013; 0.8 FTE)

- **R. Firestone** and **C. Baglin** retired from LBNL (both under contract with UCB, 0.5 FTE)

- NDDC admin retired in Aug 2013 - replaced by Letty Krejci

- **Jun Chen** moved from ANL to MSU in Sep. 2014

- **Annalia Palumbo** (reaction postdoc) left NNDC in May 2014 - not replaced!

- **Marion Blennau** retired from NNDC December 2014 - not replaced!

- **Sam Hoblit** (reactions) passed away in March 2015

Personnel changes in USNDP

increase by >0.1 marked green; decrease by >0.1 in red

	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14
Universities	1.7	1.4	1.6	1.6	1.5	1.8	1.4	0.7
ANL	1.0	1.0	0.8	1.0	1.1	1.0	1.0	0.8
BNL	7.6	6.7	5.3	5.0	5.3	6.7	7.6	6.7
LANL	2.2	2.1	1.9	1.6	2.4	1.4	1.8	1.6
LBNL	2.1	2.1	2.0	2.0	2.0	2.0	1.9	1.0
LLNL	0.5	0.4	0.2	0.3	1.4	0.4	0.3	0.4
ORNL	0.3	0.3	0.7	1.1	1.1	1.7	1.5	1.2
Total	15.3	13.9	12.5	12.6	14.8	15.0	15.5	12.4
Comp. to 07		-8.9%	-18.0%	-17.3%	-3.0%	-1.8%	1.6%	-18.7%

It is likely that negative tendency of FY14 will continue!

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USNDP outlook

- Flat budget scenario is very likely
- Further loss of staff?
- Decrease of evaluation activities
- Risk of going 'under-critical'

- Reorganization (BAND, MSU, …)
- Contracts more and more important
- Berkeley meeting (new funding?)
- Closer link with experiment and applied programs
- We need more non-US contribution to ENSDF

ND Priorities

- Archival of high quality nuclear data for basic nuclear science and technologies.
- Dissemination of nuclear physics data through Web based services.
- Compilation of bibliography data, nuclear structure and reaction data to NSR, XUNDL and EXFOR databases.

- **Evaluation of nuclear structure and reaction data for ENSDF and ENDF/B databases.**
- Advance nuclear reaction modeling in support of data evaluation.
- Maintain/develop nuclear data formats and data verification codes.
- Promote training of new structure and reaction evaluators.
- …

Nuclear Data chain can't be broken

Dissemination

Obviously indispensable
moderate cost

Archival

Absolutely essential
rather inexpensive

Evaluation

Prime nuclear data product
combines experiment with theory
links basic science with applications
includes modeling and covariances
high added value!
high cost!

Compilation

Needs continuous coverage
backlog needs to be dealt with
moderate cost

What can we cut if there is a temporary(!) shortage of funding?

Dissemination   if we don't do this what for we would do the rest

Archival   stopping this is to loose all we've done over >60 years

Compilation   no gain; if we stop it we'll have to recover it later

Evaluation   Evaluation could be put on hold and resumed later without backlog and interruption of services

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NNDC moved to the new building

We moved! Click on this text for map.

The NNDC has moved to Bldg. 817

- Library has been reduced keeping only material not available on line.
- Scanning reports would cost $50K - postponed due to funding concerns

NNDC Services

- Newer, more powerful hardware

- Complete reorganization of Web-services
  Develop. => GForge => Develop. => Web-servers

- Practically all servers and the cluster moved to a dedicated, ITD operated, building

- Upgrade of the file system (ext4) results in sluggish performance of Web-trend (outdated Perl coding) => Web-trend needs to be rewritten

- Load balancing (round-robin) between the two Web servers causes some problems with long Web sessions

- Cyber security - an onerous task!

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All NNDC data services moved to the new servers

NEW

Input

NEW

Web server 1

NEW

NNDC cluster   **ADVANCE**

⊝ **FORGE**
Advanced Server

Development

NEW

Web server 2

NEW

NEW

Database int.

NEW

Database ext.

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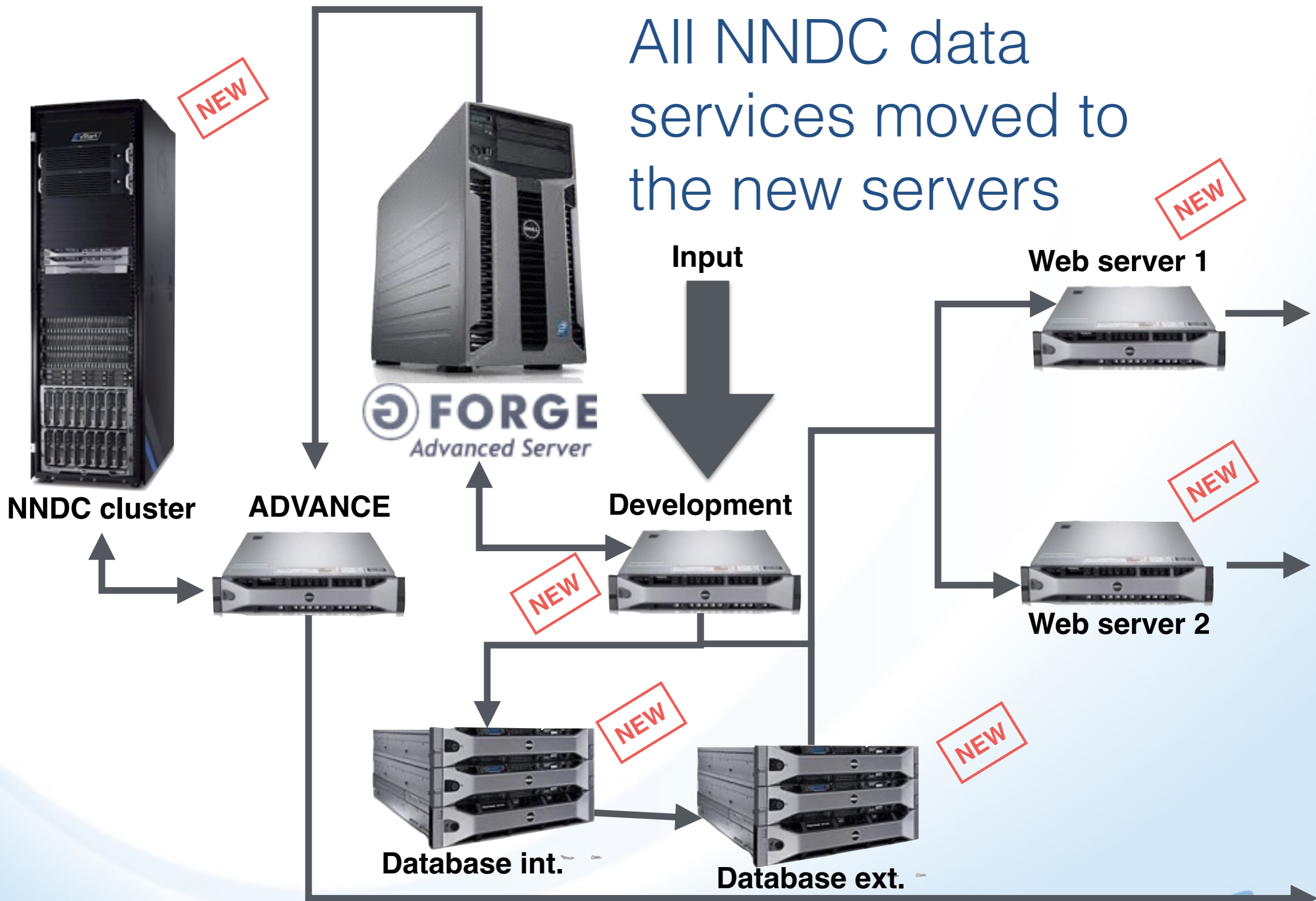
NNDC Web retrievals 3,269K

Legend:
- Others
- Sigma
- Wallet
- CAPGAM
- MIRD
- ENDF
- NUDAT
- ENSDF
- NSR

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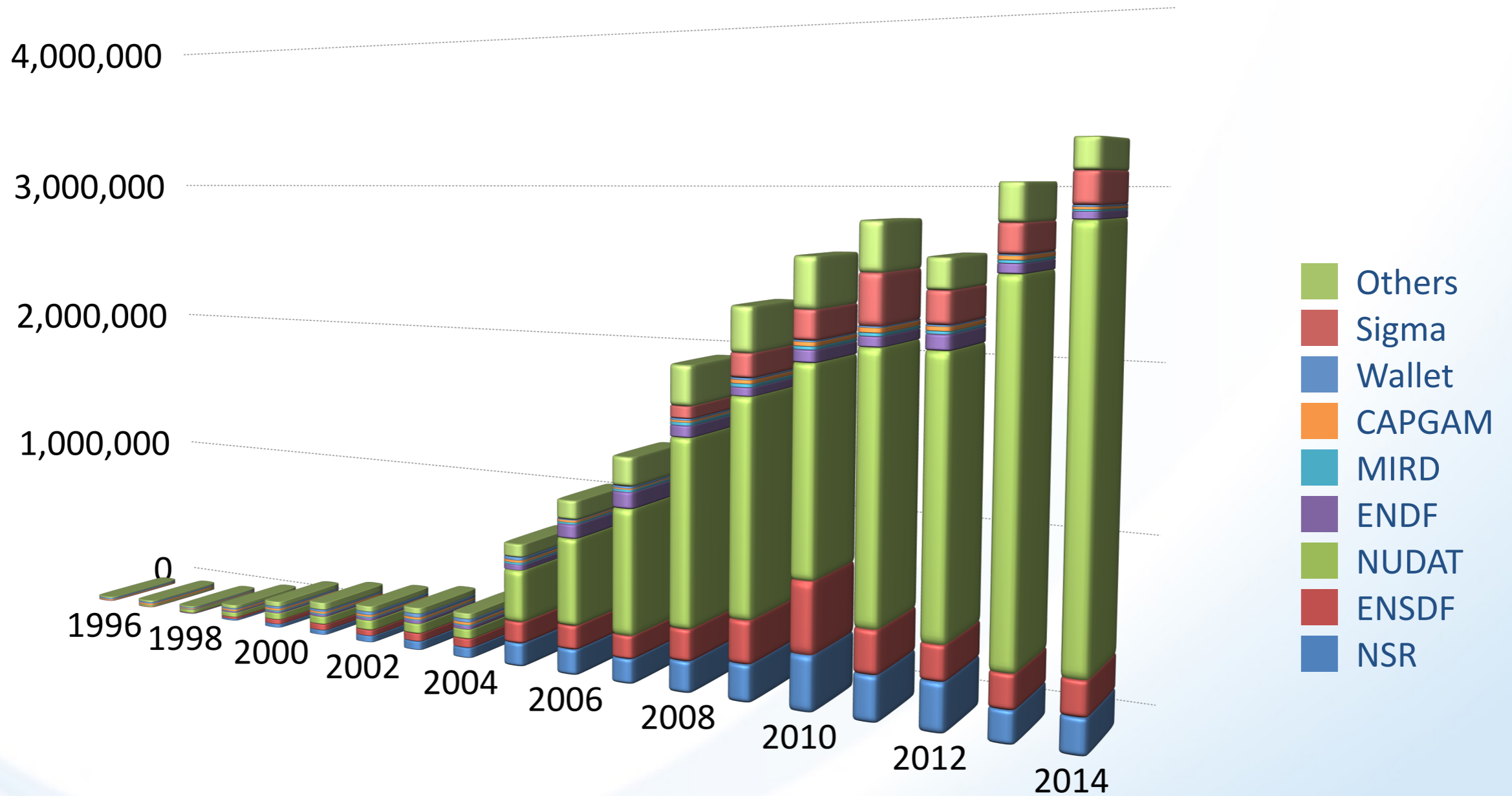
Nuclear Data Sheets FY2013
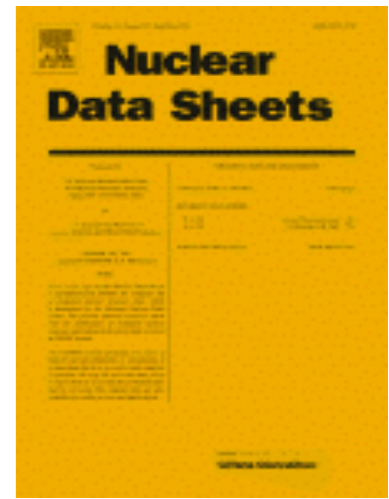
1. Volume 113, Issue 10; (October 2012)
2. Volume 113, Issue 11; (November 2012)
3. Volume 113, Issue 12; (December 2012), **Reaction Data Issue**
4. Volume 114, Issue 1; (January 2013)
5. Volume 114, Issues 2–3; (February–March 2013)
6. Volume 114, Issues 4–5; (April–May 2013)
7. Volume 114, Issues 6–7; (June–July 2013)
8. Volume 114, Issues 8–9; (August–September 2013)

Nuclear Data Sheets FY2014
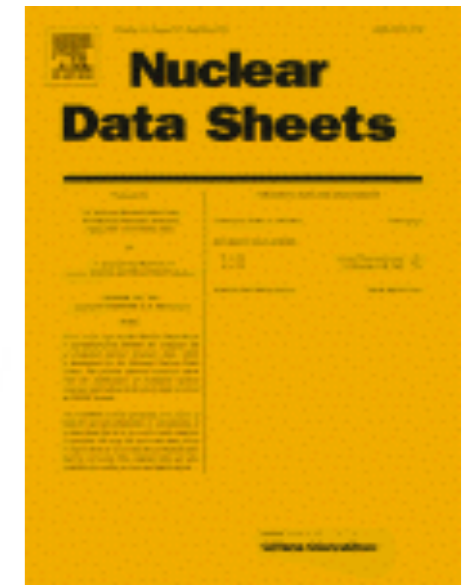
1. Volume 114, Issue 10 - pp. 1189-1496 (October 2013)
2. Volume 114, Issue 11 - pp. 1497-1848 (November 2013)
3. Volume 114, Issue 12 - pp. 1849-2080 (December 201
4. Volume 115 - pp. 1-304 (January 2014)
5. Volume 116 - pp. 1-262 (February 2014)
6. Volume 117 - pp. 1-230 (March 2014)
7. Volume 118 - pp. 1-636 (April 2014) **ND2013**
8. Volume 119 - pp. 1-428 (May 2014) **ND2013**
9. Volume 120 - pp. 1-308 (June 2014) **ND2013**
10. Volume 121 - pp. 1-748 (September–October 2014)

Preparing ND2013 proceedings (~360 papers) -
a very substantial effort by the NNDC staff.

Journal Metrics

Source Normalized Impact per Paper (SNIP):	3.266
SCImago Journal Rank (SJR):	1.538
Impact Factor:	3.353
5-Year Impact Factor:	2.810

USNDP Review

- Role of the NNDC
  - local organization
  - preparing substantial part of the USNDP presentations
  - developing ideas for future activities

- Excerpts from the closeout bullets
  - "NNDC operates very well as a Data Center; this is an essential national resource"
  - "Given the past organization of USNDP, the NNDC and participating institutions have done a remarkable job trying to define the purpose of the USNDP and coordinate the overall effort."
  - "The current organizational structure is fairly effective. Both NNDC and partner institutions are well aware of their responsibilities and specific tasks."

Recommendations of the USNDP Review Panel

BNL, July 2014

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USNDP Advisory Committee

1. Create an external USNDP Advisory Panel, involving representatives from the major stakeholders across basic and applied nuclear physics, to critically assess current efforts and proposed activities.

- Discussed at the USNDP meeting Nov. 2014
- Committee formed to prepare framework of the Panel
  - L. Bernstein (LBNL)
  - F. Kondev (ANL)
  - A. Sonzogni (NNDC)
  - R. Vogt (LLNL)

- Terms of reference drafted
- List of possible members compiled and discussed

- 6-8 members appointed by DOE Program Manager
- 2 year term
- Meetings at BNL every year for 2 days
- USNDP Annual Report + presentations

USNDP Mission Statement

2. DOE NP and USNDP should jointly develop an updated Mission Statement for USNDP that takes into account stakeholder interests and input. This should be widely distributed to guide future developments.

USNDP Mission Statement (2014)
The mission of the United States Nuclear Data Program (USNDP) is to provide current, accurate, authoritative data for workers in pure and applied areas of nuclear science and engineering. This is accomplished primarily through the compilation, evaluation, dissemination, and archiving of extensive nuclear datasets. The USNDP also addresses gaps in the data, through targeted experimental studies and the use of theoretical models.

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White paper

4. A comprehensive document should be prepared that summarizes and prioritizes the possible future developments in the nuclear data program proposed by all USNDP participants. The prioritization should be developed by USNDP participants, in consultation with the advisory panel.

- Committee formed at USNDP meeting; awaiting advisory panel
- Target date for draft presentation: USNDP 2015 meeting, final paper at Budget Briefing 2018 (Jan./Feb. 2016)
- Some ideas proposed at the USNDP review
- … more ideas will emerge from the Berkeley meeting in May 2015

White paper

- Possible future developments
  - R **Campaign of measurements in support of isotope production**
    - p cross section library for scoping studies within BLIP capabilities
    - Web-based widget for searching isotope production routes
    - **Web-based widget for searching isotopes with given characteristics**
    - Modernization of USNDP Web services
    - **New data structure replacing current formats**
  - R New Atlas of Neutron Resonances
  - R Reaction rates for nuclear astrophysics
    - **High Priority Request List for ENSDF**
  - R Digitization of the NNDC library

- New Nuclear Data collaborations
  - R NNDC-BLIP-Lowell collaboration
  - R ND at the Bay Area
    - ANL-ANU Auger data for medical applications

PRIORITIZE !

Career paths

5. DOE NP should be cognizant of the need for adequately funded career paths for sufficient new evaluators, recruited and trained by USNDP, to carry out the USNDP program.

- **Jun Chen** took a position at Michigan State University funded through ANL. In 2016 should apply for direct funding from DOE-SC.
Activities: ENSDF evaluation and XUNDL compilation.

- **Gustavo Nobre** extended as postdoc at NNDC till June 30, 2015.
Activities: ENDF/CIELO evaluation, EMPIRE development, cross section calculations for isotope production,

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Input on data needs

6. USNDP should devise effective and transparent mechanisms to solicit input and feedback from all stakeholders on nuclear data needs and priorities.

- **High Priority Request List for Structure and Decay Data** conceptual design ready, implementation started.

  - **Participation in conferences and meetings** promoting USNDP data services.

    - **Users' Forum** - reactivate extended talks on ND needs by representatives of users during USNDP meetings

- **ND Advisory Committee** members will
  - promote awareness of nuclear data within their communities
  - convey the specific data needs
  - suggest priorities
- Participation in Long Range Plan preparation
- Local communities (e.g., LANL, LLNL, BLIP)

Support for isotope production
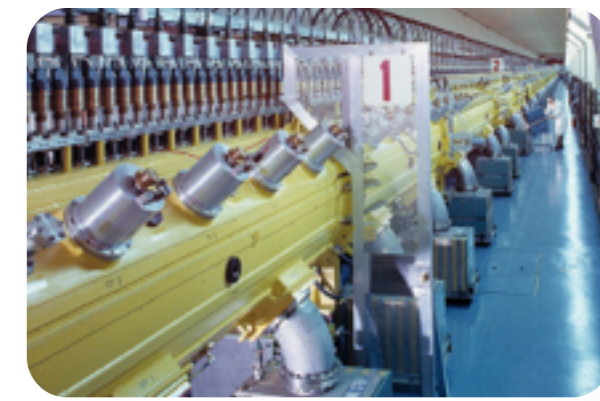
8. Pursue a potential collaboration between the USNDP and Brookhaven Linac Isotope Producer (BLIP) with the aim to expand this to collaborations with other DOE NP funded isotope production facilities such as at LANL and ORNL.

See presentation by E. McCutchan

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New data structure (XML format)
cooperation of structure and reaction communities needed

Requirements for a next generation nuclear data format

OECD/NEA/WPEC SubGroup 38*

(Dated: March 23, 2015)

This document attempts to compile the requirements for the top-levels of a hierarchical arrangement of nuclear data such as is found in the ENDF format. This set of requirements will be used to guide the development of a new set of formats to replace the legacy ENDF format.

CONTENTS

Requirement 14: Particles

14.1 Each 'matter', 'particle' and 'alias' instance in the database shall have a unique id used to identify and refer to it. Only these classes shall have ids (for example, no id is given to the mass or spin, only to the instance itself)

14.2 Every particle shall contain at least the following properties: mass, charge, spin, parity and half-life (which may be 'stable'). However, some of these properties may be inherited from higher in the hierarchy rather than being listed explicitly (see requirement 4).

14.3 The database shall support storing uncertainties with all particle properties. Uncertainties may be given either in the form of a central value with uncertainty (for example, mass = 54.938 +/- 0.729 amu) or as a list of multiple possible assignments (for example, spin = 3/2, 5/2 or 7/2). If multiple assignments are listed, the database shall require that one assignment be explicitly listed as the 'recommended' value.

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Challenges
(in addition to compilation and evaluation activities)

- Substantial changes in the USNDP structure

- Reorganization of XUNDL compilation

- Need to increase non-US contribution

- Developing new format

- Transition to the new mode of NDS production

- Continue upgrading codes for ENSDF

- Replace Webtrend

- Continuing collaboration with BLIP

- Major modernization of the NNDC Web services