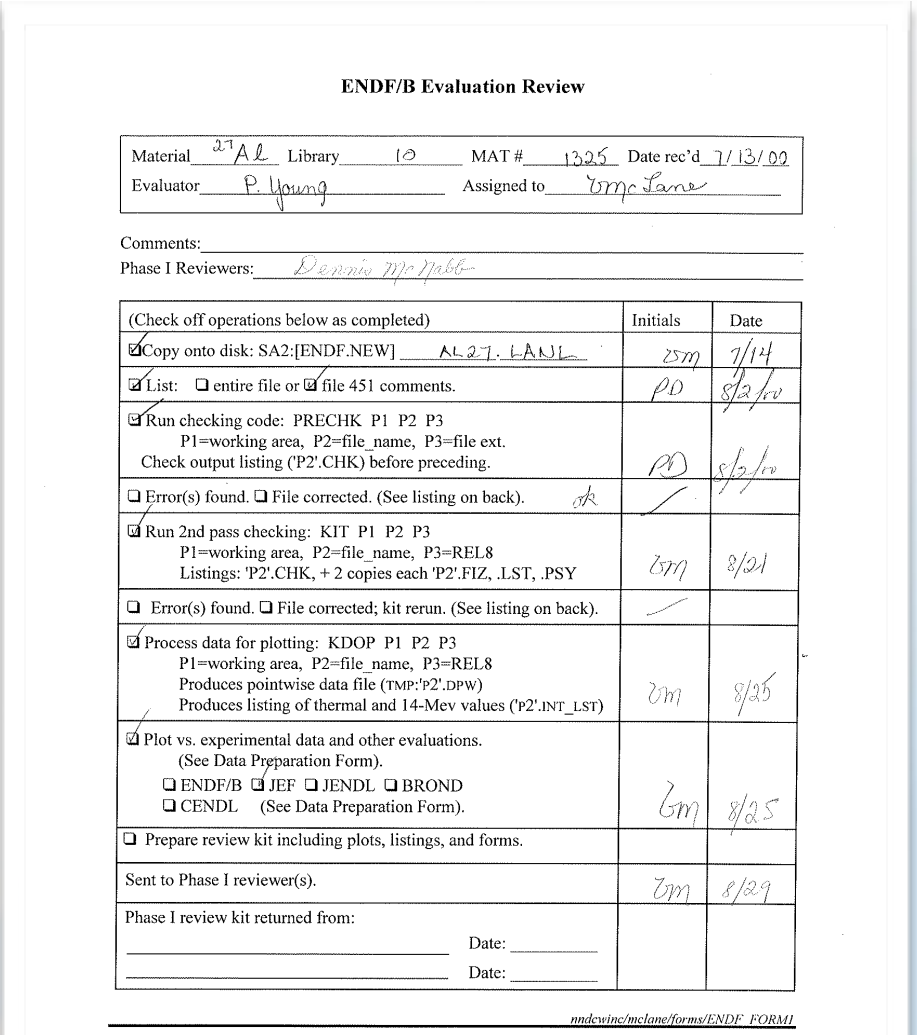
ADVANCE advances

D. Brown

BROOKHAVEN NATIONAL LABORATORY
a passion for discovery
U.S. DEPARTMENT OF ENERGY | Office of Science

ENDF quality control in the days of yore

- **CSEWG peer reviews all evaluations before accepting**
- **Phase I Testing:**
  - ENDF/B-VI and earlier: pen & paper reviews
  - ENDF/B-VII.0: partially automated with EMPIRE tools
- **Phase II Testing:**
  - User/developer communication
  - Nuclear data week, CSEWG validation committee
- **Version control by hand with ENDF/A & ENDF/B**



ENDF/B Evaluation Review

Material 27 Al Library 10 MAT # 1325 Date rec'd 7/13/00
Evaluator P. Young Assigned to Dmc Lane

Comments:
Phase I Reviewers: Dennis McNabb

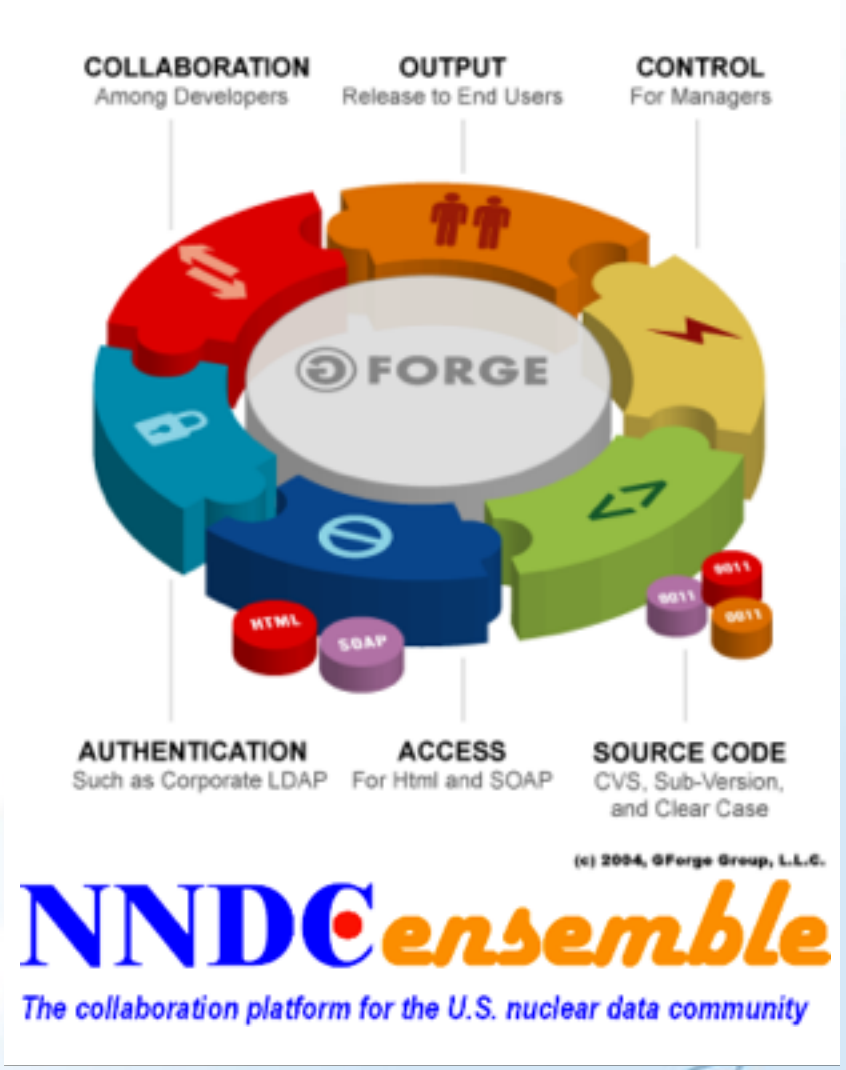
(Check off operations below as completed)	Initials	Date
☑ Copy onto disk: SA2:[ENDF.NEW] AL27. LANL	DM	7/14
☑ List: ❑ entire file or ☑ file 451 comments.	PD	8/2/00
☑ Run checking code: PRECHK P1 P2 P3 P1=working area, P2=file_name, P3=file ext. Check output listing ('P2'.CHK) before preceding.	PD	8/2/00
❑ Error(s) found. ❑ File corrected. (See listing on back). ok	✓	
☑ Run 2nd pass checking: KIT P1 P2 P3 P1=working area, P2=file_name, P3=REL8 Listings: 'P2'.CHK, + 2 copies each 'P2'.FIZ, .LST, .PSY	DM	8/21
❑ Error(s) found. ❑ File corrected; kit rerun. (See listing on back).	✓	
☑ Process data for plotting: KDOP P1 P2 P3 P1=working area, P2=file_name, P3=REL8 Produces pointwise data file (TMP:'P2'.DPW) Produces listing of thermal and 14-Mev values ('P2'.INT_LST)	DM	8/25
☑ Plot vs. experimental data and other evaluations. (See Data Preparation Form). ❑ ENDF/B ☑ JEF ❑ JENDL ❑ BROND ❑ CENDL (See Data Preparation Form).	DM	8/25
❑ Prepare review kit including plots, listings, and forms.		
Sent to Phase I reviewer(s).	DM	8/29
Phase I review kit returned from: _____ Date: _____ _____ Date: _____		

nndcwinc/mclane/forms/ENDF_FORM1

Sample PHASE I review packet cover page (June 2000)

For ENDF/B-VII.0 (2006), we began modernizing

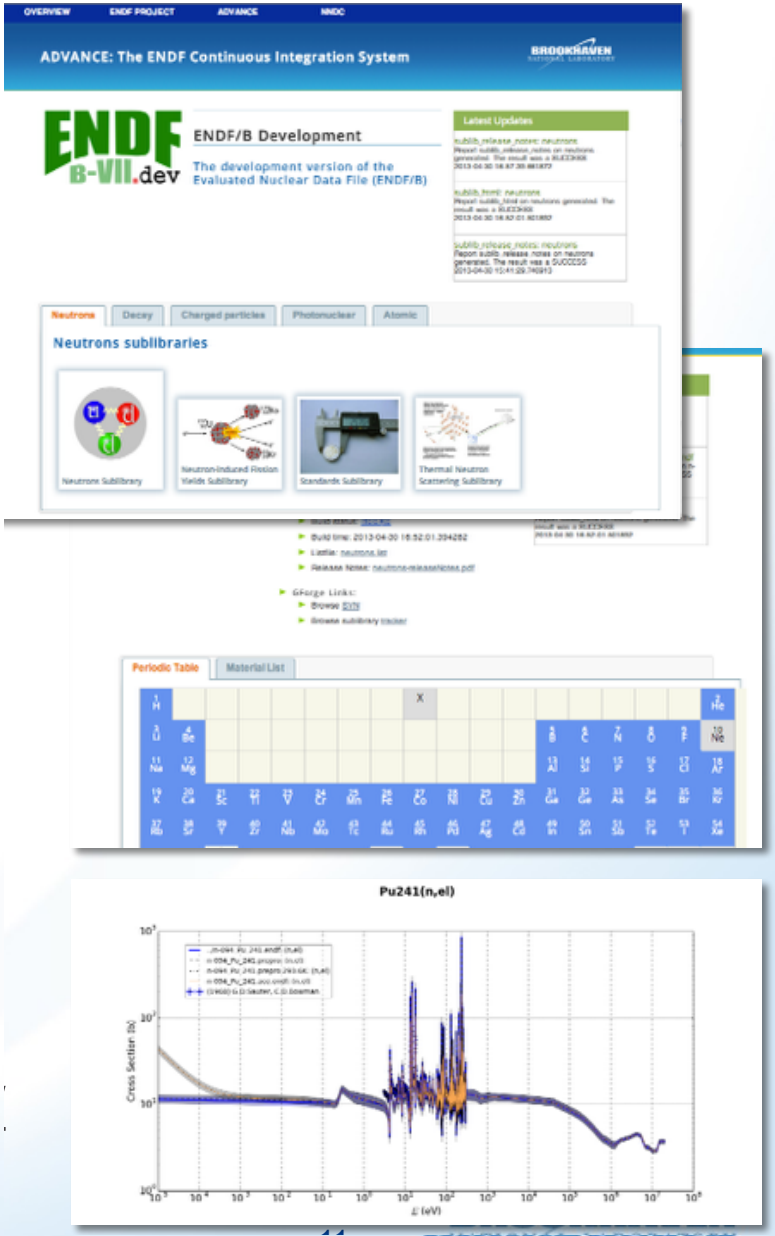
- **Old ENDF/A & ENDF/B arrangement was ending**
- **Library version management now taken over by GForge**
  - subversion does the main work
  - GForge adds bug tracking
  - (and a bunch of other stuff we don't use)
- **Change spearheaded by Michal Herman, current head of the NNDC**



In the final stages of the preparation of ENDF/B-VII.1 (2011), we tried something else new

ADVANCE quality assurance system for ENDF

- **On every commit of every evaluation in ENDF**
  - Check out evaluation
  - Run through a battery of tests
  - Process with customer processing codes
  - Generate comparison plots
  - Generate HTML report of evaluation
- **Automation is better!**
  - Find data problems before the customers!
  - Far faster/better than old PHASE I review
- **Available at http://www.nndc.bnl.gov/endf/b7.dev/qa/index.html**



In the beginning of FY14, two disasters struck

- **The ControlTier project died mid-2013**
  - ControlTier orchestrated the running of ADVANCE in versions before 0.7
  - Responsible for polling subversion and launching jobs
  - Responsible for automatic deployment
- **The old ADVANCE server died in Dec. 2014**

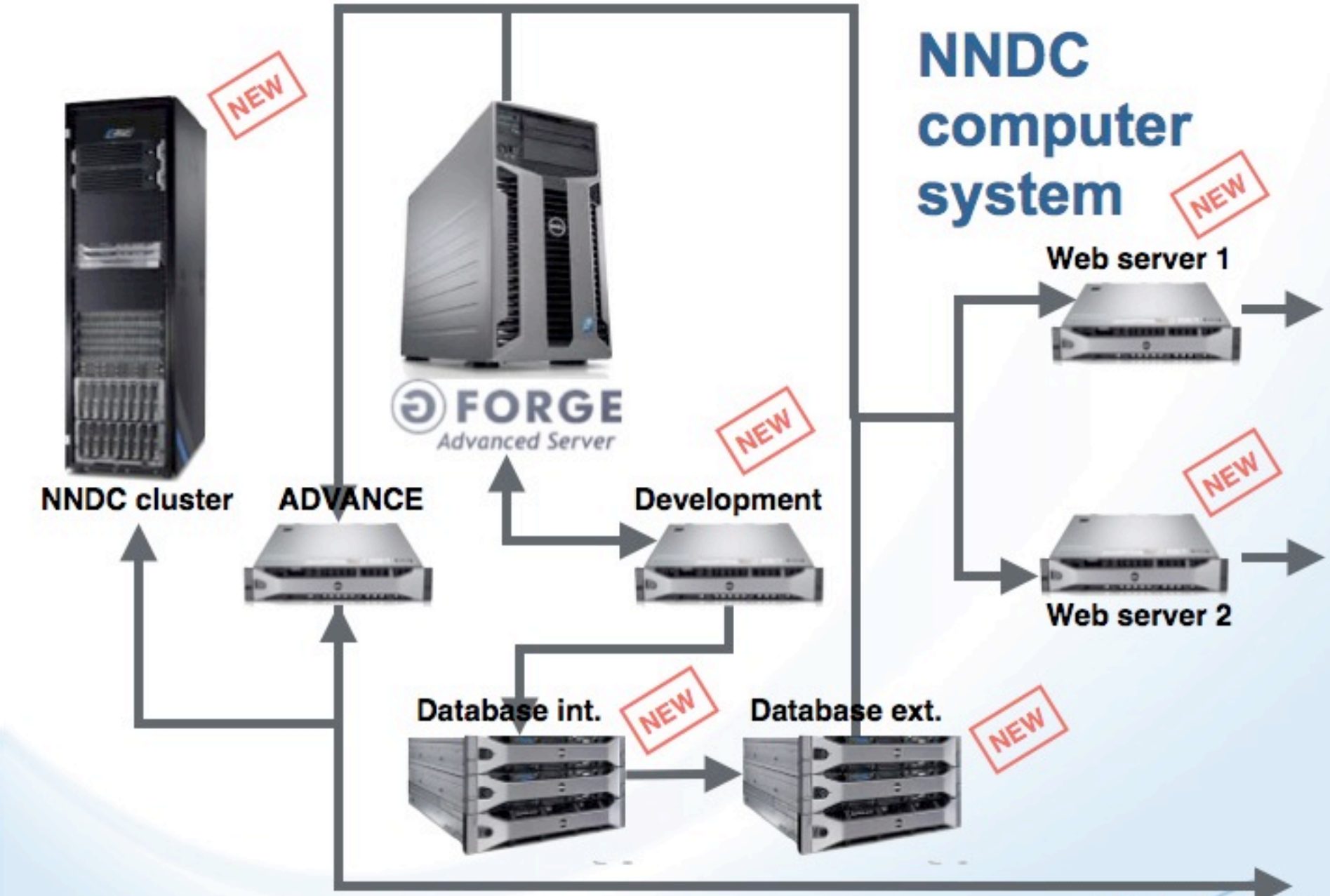
In the beginning of FY14, two disasters struck

- **The ControlTier project died mid-2013**
  - ControlTier orchestrated the running of ADVANCE in versions before 0.7
  - Responsible for polling subversion and launching jobs
  - Responsible for automatic deployment
- **The old ADVANCE server died in Dec. 2014**

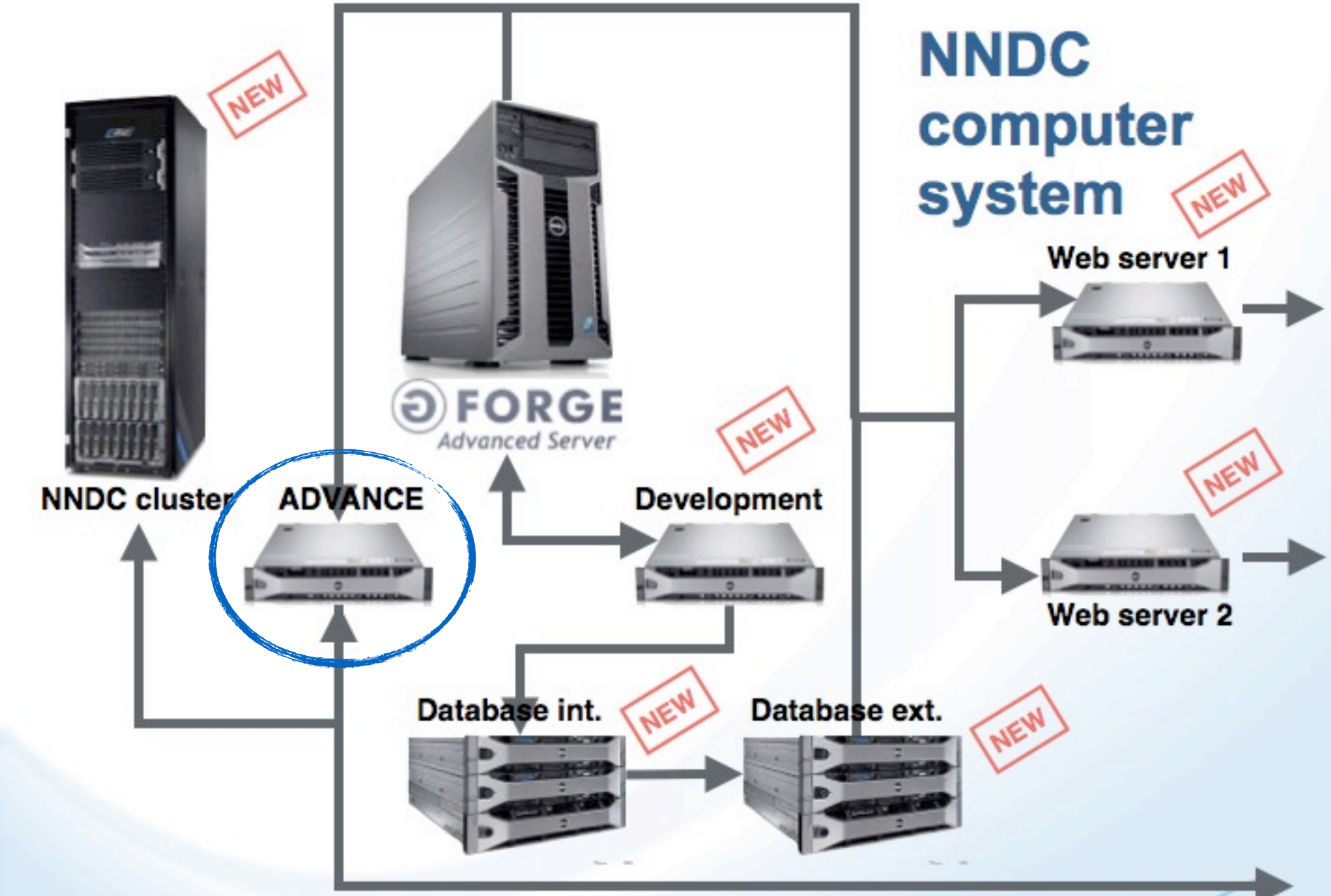
Fortunately we were prepared:

- a facility grant from the Office of Science enabled major computer purchases
- we were also planning an upgrade to ADVANCE software

NNDC computer system

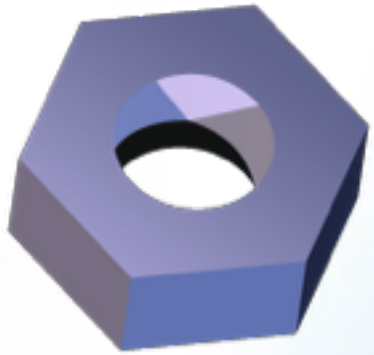


NNDC computer system



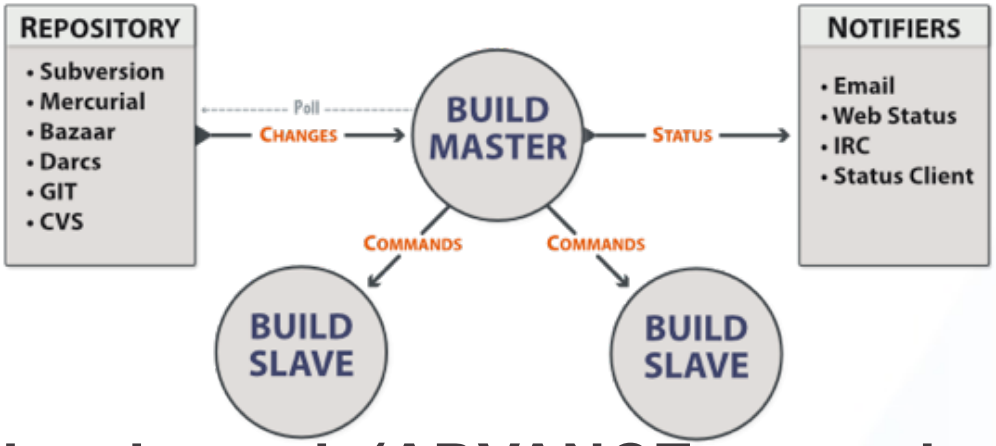
We also took the opportunity to rework the software behind ADVANCE

- **Replace ControlTier with open source BuildBot system**
- **Improved reports, including BNL's new styles (js & css)**
- **Lots of bug fixes**
- **Upgrade processing codes:**
  - Newer Fudge-4.0
  - NJOY2012, including CP and photonuclear processing
- **Full library builds**
- **Latest release, v0.8.1 (Sep. 2014)**

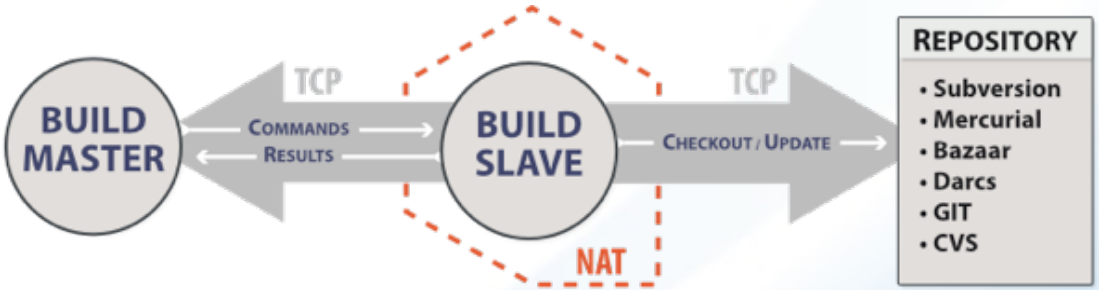


ADVANCE is now parallelized & distributed

- Builds coordinated by ADVANCE server

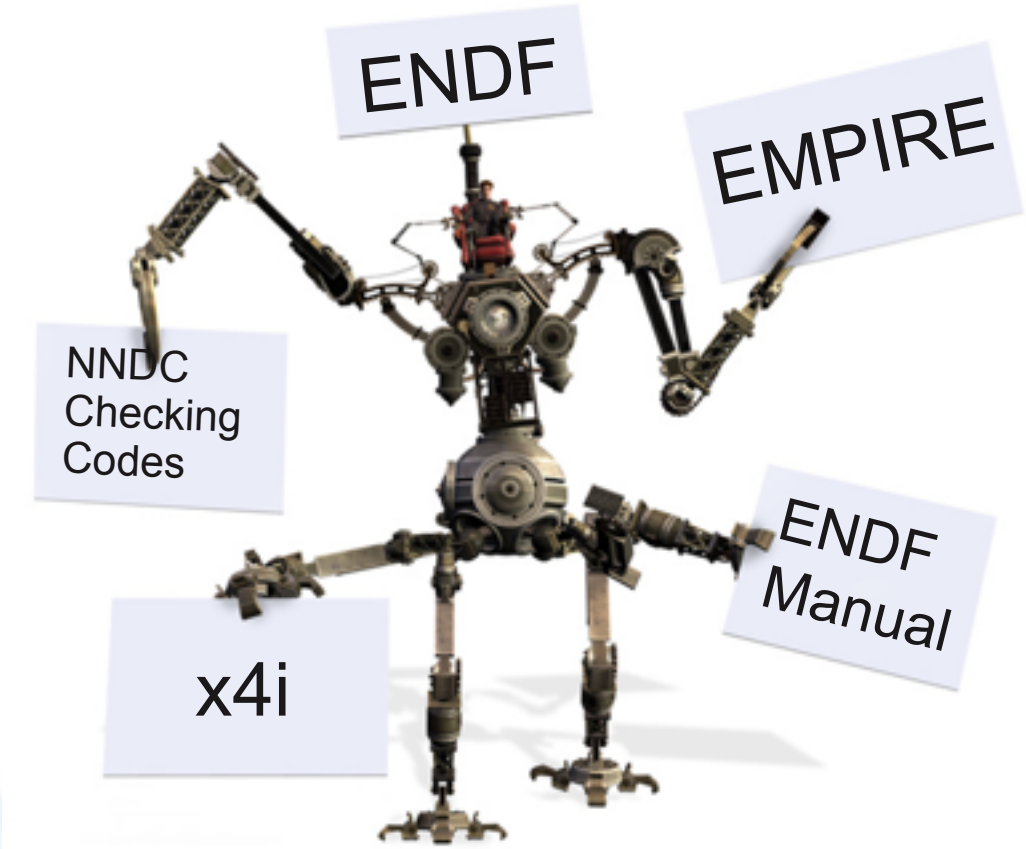


- Slave nodes do work (ADVANCE server is master & slave)



- NNDC cluster main node will be slave too...

The NNDC is now using ADVANCE for several projects



That is pretty cool.
I like it very much.

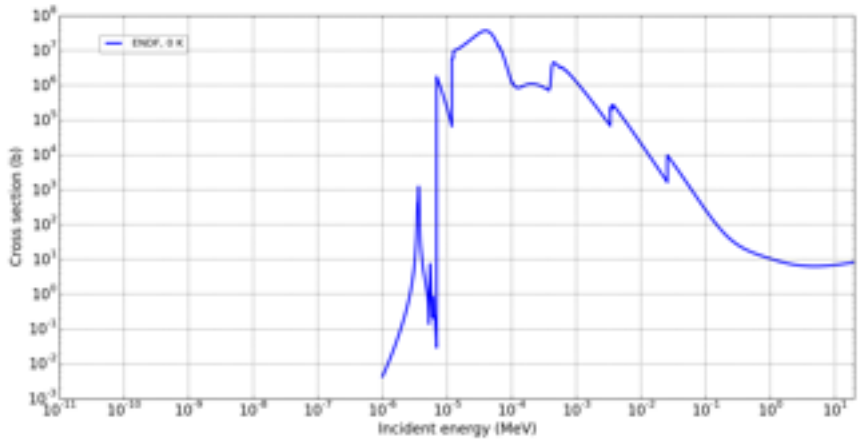
Actually, it is amazing, congratulations !

— *Roberto Capote*

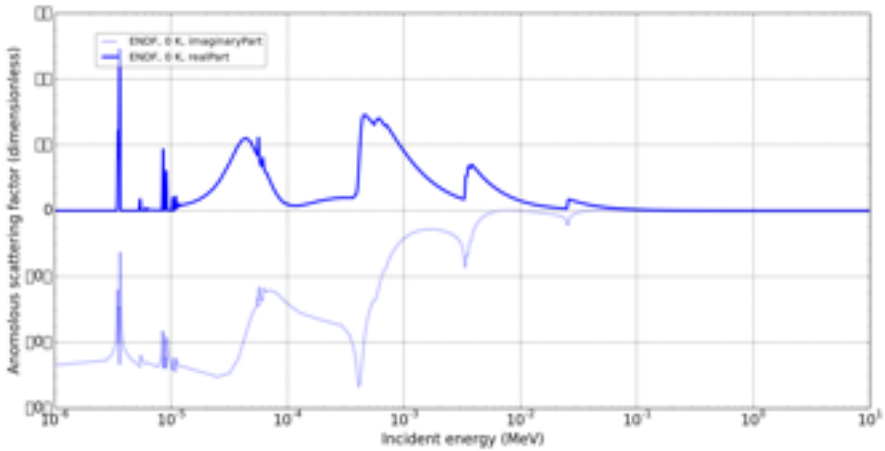
Major change made this year: Testing atomic data to support EPICS

- **All atomic data tested by**
  - NNDC Codes (STAN, STANEF, CHECKR, FIZCON, PSYCHE)
  - PREPRO (LINEAR)
  - Fudge
- **Generate plots of**
  - photon and electron cross sections
  - photon form factors
  - photon anomalous scattering factors

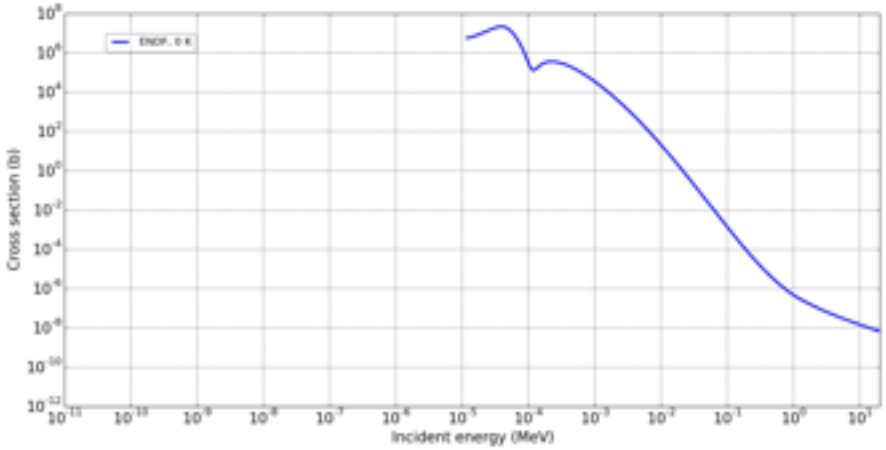
gamma+Ag, Total photon interaction (MT=501)



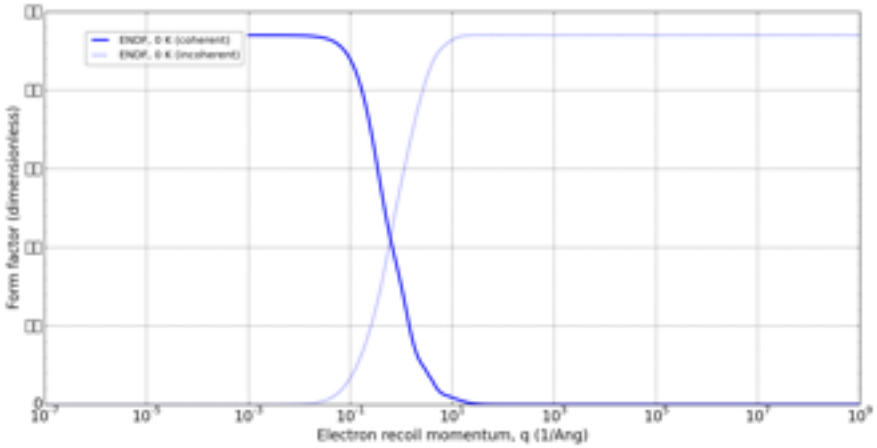
gamma+Ag, Photon coherent scattering (MT=502), anomolous scattering factor



gamma+Ag, N5 shell ionization (MT=547)

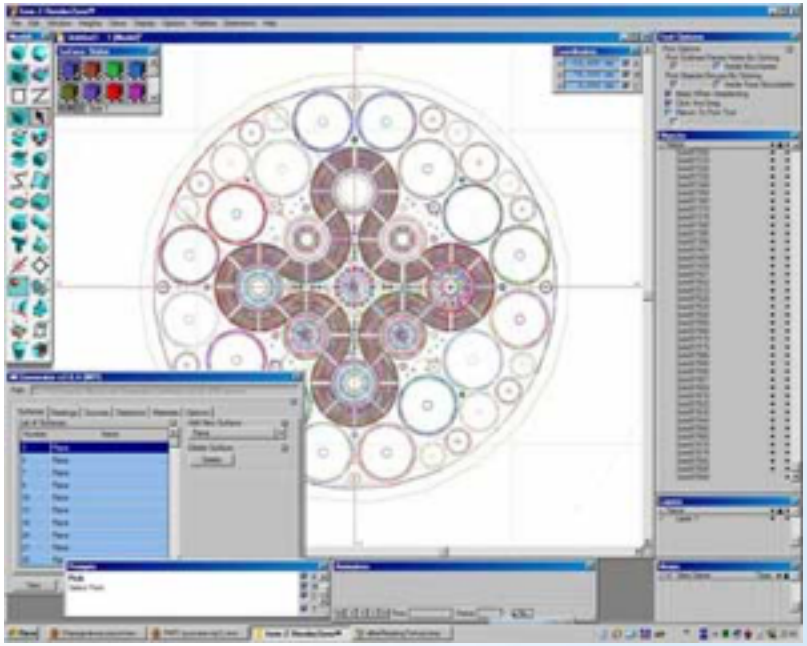


gamma+Ag, Photon (in)coherent scattering form factors (MT=502,504)



Will have summer student to start adding automated benchmarking to ADVANCE

- **We will start with COG (Thanks Dave & Chuck)**
  - Have COG and COG library builders
  - Have ICSBEP test suite from COG
- **If there is time, will automate MCNP as well**
  - Have MCNP6
  - Have Russ Mosteller's test suite
- **Would like to add SCALE and AMPX, but AMPX requires GUI, so can't be automated yet**



GForge System Upgrade

Ongoing Activities

- File Compare (Unix Diff): Integration/testing of plug-in (Python) which removes line numbers in ENDF files before comparing
- Data Verification: Integration/testing of plug-in (Python) which checks an ENDF evaluation & determines whether to commit it or not into Subversion repository

Near Future Activity (next few weeks)

- **Upgrade of GForge software from v6.3.1 to 6.4.0**
  - Improved user interface and performance
  - Enhanced security and major bug fixes