

**worldwide Protein Data Bank Advisory Committee (wwPDB AC)**  
**Report of September 30<sup>th</sup> 2011 Meeting**  
**European Bioinformatics Institute, Hinxton, UK**

**Chair:** Stephen K. Burley

**PDB Site Representatives:** Wayne Hendrickson (RCSB-PDB), Michael G. Rossmann (RCSB-PDB), Randy J. Read (PDBe-EBI), Helen Saibil (PDBe-EBI), Guy Montelione (BMRB), David Neuhaus (BMRB), Genji Kurisu (PDBj), and Soichi Wakatsuki (PDBj)

**Ex Officio Community Stakeholder Representatives:** Edward N. Baker (IUCr), R. Andrew Byrd (ICMRBS), and Wah Chiu (Macromolecular EM)

**wwPDB Members:** Helen M. Berman (RCSB-PDB), Martha Quesada (RCSB-PDB), Gerard J. Kleywegt (PDBe-EBI), John Markley (BMRB), and Haruki Nakamura (PDBj)

**wwPDB Associate Members:** Manju Bansal (India), Jianpeng Ding (China)

**US Funding Agency Representatives:** Peter McCartney (NSF, absent), Ward Smith (NIGMS-NIH, absent), Roland Hirsch (DOE, absent)

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**wwPDB AC Mission Statement**

To help ensure that the Protein Data Bank is maintained for the public good as a secure, singular global archive for experimental structural biology data that is freely accessible in perpetuity.

**Meeting Summary**

The worldwide Protein Data Bank Advisory Committee (wwPDB AC) to the leadership of the Research Collaboratory for Structural Bioinformatics (RCSB-PDB), the BioMagResBank (BMRB), the Protein Data Bank Europe (PDBe-EBI), and the Protein Data Bank Japan (PDBj) met at the European Bioinformatics Institute at Hinxton, UK on September 30<sup>th</sup> 2011.

The agenda included

- (1) Responses to 2010 wwPDB AC Recommendations;
- (2) Overview and State of the PDB;
- (3) Common Deposition and Annotation (D&A) Tool;
- (4) NMR Specific Activities;
- (5) X-ray Specific Activities;
- (6) 3-D Electron Microscopy Specific Activities;
- (8) SAXS/SANS Specific Activities;
- (9) PDBj Update; and
- (10) Discussion/Advice Requested

The State of the wwPDB Overview was presented by Kleywegt, beginning with responses to the 2010 wwPDB AC Recommendations. A summary of recent activities was subsequently provided by Quesada, Berman, Markley, and Nakamura.

### Responses to 2010 wwPDB AC Recommendations

- Common D&A Tool: Make time estimates of speed and throughput once software in place for contingency planning.  
wwPDB Response: Processing time for ligands cut by 70%, with new interface; benchmarking to continue.
- Remediation: Endorsed plan for B-factors.  
wwPDB Response: Released July 2011.
- Validation Task Forces: Publish white papers as soon as possible.  
wwPDB Response: X-ray paper published. NMR and EM in preparation. SAXS/SANS to meet in 2012. Hybrid Methods to meet in 2013.
- Format Issues: Input from stakeholders in 2011, with full implementation in 2012.  
wwPDB Response: Successful meeting held with stakeholders/software developers in September 2011. Full implementation on track for 2012.

The wwPDB continues to mature as the global organization charged with safeguarding and overseeing growth of the PDB archive. The all important Common Deposition and Annotation (D&A) Tool remains the most important task at hand for the four member organizations. Timely conclusion of this collaborative effort is essential for the wwPDB to ensure the quality of the burgeoning archive, fully integrate and streamline “data in” activities, and provide value-added, competing “data out” views of the archive. Current funding levels for RCSB-PDB, PDBe-EBI, and PDBj are adequate. The recent 30% cut in BMRB funding and the need to identify an entirely new source of funding for this organization before August 2014 represent serious concerns.

The wwPDB continues to achieve significant visibility with joint publications and presentations/exhibit booths at international conferences and professional society meetings. Effective interactions with the editors of scientific journals are beginning to bear fruit in terms of both primary data submission and structure validation.

### PDB Metrics

In aggregate, 8,878 (9,088\*) depositions were processed between January 1<sup>st</sup> and December 31<sup>st</sup> 2010 with a two-week average turnaround (\* 2011 projection).

Breakdown of depositions by discipline in calendar 2010 was as follows:

X-ray:	8,186	(92%, up from 7,640 in 2009)
NMR:	604	(~7%, up from 592 in 2009)
EM:	73	(<1%, up from 51 in 2009)
Other:	15	(<1%)

Breakdown of depositions by wwPDB processing site in calendar 2010 was as follows:

RCSB-PDB:	5,464	(62%)
PDBj:	2,041	(23%)
PDBe-EBI:	1,373	(15%)

Breakdown of depositors by location in calendar 2010 was as follows:

North America	46%
Europe	29%
Asia	16%
Industry	7%
South America	1%
Australasia	2%
Africa	<1%

### **Common Deposition and Annotation (D&A) Tool**

A description of collaborative progress by wwPDB members towards establishing common, global deposition/validation/annotation tools was presented by Quesada. The Committee was pleased to learn of recent progress *versus* goals for the Common D&A Tool project, and that completion is on track for 2012.

This important milestone will enable adoption of thorough, universally agreed procedures for evaluation of structure quality and generation of wwPDB validation reports at the time of deposition. Mandatory submission of such reports together with scientific manuscripts commands broad support throughout the structural biology community. Reasonable efforts must be made by the wwPDB leadership to ensure that this practice becomes the norm for all peer-reviewed macromolecular structure publications.

The Committee reiterates its earlier commitment to work with wwPDB leaders and advisors to RCSB-PDB, PDBe-EBI, PDBj, and BMRB to develop and circulate a petition among high-profile structural biologists and super users of the PDB archive calling on journal editors to require submission of wwPDB structure validation reports together with scientific manuscripts.

Recent benchmarking of ligand deposition activities confirms that the Common D&A Tool can greatly speed up transactions between depositors and annotators (up to a 70% reduction in this case). Benchmarking of the entire deposition process will be essential for understanding how best to load balance among the various data deposition sites. It will also be important to model the longer term impact of various deposition growth scenarios to plan for future contingencies, including the possibility that one or more of RCSB-PDB, BMRB, PDBe-EBI, and PDBj is forced to cease operations.

Given the importance of the Common D&A Tool for the long-term viability of the wwPDB and the archive, the Committee requests that a brief interim report on progress *versus* goals be prepared and circulated in April 2012.

### **NMR Specific Activities**

Markley described support for mandatory chemical shift deposition in collaboration with PDBj. This development provides an important proof-of-concept for load balancing between wwPDB data deposition sites and an example of the synergies that the Common D&A Tool will eventually provide for all methods across the organization.

The outcome of the final meeting of the NMR Validation Task Force (VTF) in January 2011 was described by Montelione. Publication of the NMR VTF report/"white paper" represents an important deliverable for this group in 2012.

Markley also explained that the US National Library of Medicine (NLM) will no longer support the BMRB beyond August 2014. As of October 2011, BMRB suffered a 30% reduction in funding, which has already resulted in loss of a key member of technical staff. BMRB currently provides value added processing of chemical shifts, restraints, etc. for all NMR structure depositions to the PDB archive, which account for ~7% of all structure depositions annually. In addition, BMRB contributes to various wwPDB collaborative projects, the most important of which remains work on the Common D&A Tool.

Any interruption in BMRB funding in 2014 and beyond would be extremely deleterious to the PDB archive and wwPDB activities, and by extension to the global NMR community.

The leadership of RCSB-PDB, PDBe-EBI, and PDBj and the Committee reiterated earlier commitments to provide coordinated letters of support for BMRB directed at US funding agencies.

### **X-ray Specific Activities**

Berman reported recent publication of the X-ray VTF report/"white paper" in *Structure* (Read *et al.*, 2011). Considerable progress on remediation of the archive, including work on B-factors, Antibiotics/Peptide Inhibitors, Non-standard Crystallographic Coordinate Frames, Biological Assemblies, Non-standard Polymer Linkages, and Hybrid X-ray/Neutron Experiments, was also described. The breaking news of acceptance of PDBx as the working/deposition format by various stakeholders/software developers was enthusiastically received. The Committee strongly endorses adoption of this new format and the wwPDB plan for completion of its phased implementation in early 2013.

### **EM Specific Activities**

Berman reported on the growth of the EM map archive, plans to integrate the PDB and EMDB archives, and the outcome of the EM Modeling Challenge Workshop. The EM VTF report/"white paper" is in preparation for publication. An application for NIH funding was submitted in July 2011 to support implementation of the EM VTF recommendations.

### **SAXS/SANS Specific Activities**

Berman described requirements for inclusion of SAXS/SANS-derived structural models in the PDB archive, which were endorsed by the Committee in 2010. The first meeting of the SAXS/SANS VTF (Trewhealla, Svergun, Sali, Sato, and Tainer) will occur in Q2 2012. Completion of the SAXS/SANS report/"white paper" is anticipated in Q1 2013, with journal submission to follow shortly thereafter.

### **PDBj Update**

Nakamura summarized recent restructuring of PDBj funding following formation of the National Bioscience Database Center (NBDC). Current annual PDBj support is ~100MM JPY, which represents a ~16% decline *versus* FY2010 levels. Despite this funding reduction, the PDBj remains a going concern, as evidenced by presentation of various exciting new initiatives. The Committee recommends that the wwPDB leadership consider broader adoption of the Resource Description Framework format for use with the semantic W3C Web Ontology Language.

The Committee congratulates the leadership of PDBj for their successful efforts in ensuring continued funding and operations. PDBj currently processes ~25% of all PDB depositions worldwide. In addition, PDBj plays an essential role in many wwPDB collaborative projects, the most important of which remains work on the Common D&A Tool.

A further change in the mechanisms by which Japanese biological databases are funded is expected in 2014, which will create a new set of challenges for PDBj and the wwPDB. Any reduction in or interruption of PDBj funding at that time would be extremely deleterious to the PDB archive and wwPDB activities, and by extension to the global scientific community.

The leadership of RCSB-PDB, PDBe-EBI, and BMRB and the Committee reiterated earlier commitments to provide coordinated letters of support for PDBj directed at appropriate Japanese funding agencies.

The coincidence of this change in Japan with discontinuation of NLM support for BMRB in 2014 represents a significant existential threat to the PDB archive and the future of the wwPDB organization.

The Committee recommends that pre-emptive action be taken by each wwPDB member organization to maximize the likelihood of continued funding and operations at each site beyond 2014. In addition, creation of additional PDB data deposition/annotation/validation centers in China and India should be seriously contemplated.

### **Discussion/Advice Requested**

Discussion topics included deposition of additional experimental data, wwPDB Foundation fundraising, and the importance of further enhancing the profile of the wwPDB and its member organizations.

*Deposition of Additional Experimental Data:* There is a great deal of discussion within the structural biology community at present re the possibility of archiving additional experimental data underpinning both X-ray and NMR structure determinations. Much of this discussion appears to be occurring in the absence of a rigorous understanding of the complexity of such undertakings or their potential costs.

The Committee recommends that the wwPDB leadership develop and publish a concise articulation of the issues at hand to apprise the structural biology community and help guide ongoing discussions within the International Union of Crystallography and elsewhere. For the avoidance of doubt, the Committee has not attempted to reach unanimity on recommendations re what, if any, additional experimental data should be archived and which organization(s) could best take responsibility for establishing and maintaining such archives.

*wwPDB Foundation Fundraising:* wwPDB Foundation fundraising in support of the PDB 40<sup>th</sup> anniversary scientific meeting was extremely successful, with more than US\$100,000 raised to cover speaker travel and registrations and 34 early career scientist travel awards.

Given the success of this important proof-of-concept exercise, the Committee recommends that the wwPDB Foundation develop vision/mission statements and a strategic plan that together will enable ongoing, robust fundraising from, public, industrial, and philanthropic sources.

*wwPDB Profile:* wwPDB presentations and exhibits at international scientific and professional society meetings and the large number of advance registrants for the PDB 40<sup>th</sup> anniversary scientific meeting at Cold Spring Harbor have served to raise the profile of the wwPDB and its member organizations.

The Committee recommends that the wwPDB leadership develop and implement a long-term strategic plan to further enhance the profile of the wwPDB and its member organizations. The expected UNESCO designation of the 2014 as the International Year of Crystallography represents a potentially useful vehicle for doing so.