

Worldwide Protein Data Bank Advisory Committee (wwPDB-AC)
Report of October 7th 2016 Meeting
BMRB, Institute for Protein Research, Osaka University, Osaka, Japan

Chair: R. Andrew Byrd

PDB Site Representatives (Nominated by wwPDB partner): Paul Adams (RCSB PDB), Cynthia Wolberger (RCSB PDB), Valerie Copie (BMRB), Arthur Edison (BMRB), Sarah Butcher (PDBe), David Brown (PDBe), Genji Kurisu (PDBj), and Tsuyoshi Inoue (PDBj)

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

wwPDB Members: Stephen K. Burley (RCSB PDB), Jasmine Young (RCSB PDB), Sameer Velankar (PDBe), Gerard Kleywegt (EMBL-EBI), Rolf Apweiler (EMBL-EBI, representing PDBe), John L. Markley (BMRB), and Haruki Nakamura (PDBj)

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wwPDB AC Meeting, October 7, 2016:

wwPDB-AC Mission Statement

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

The Worldwide Protein Data Bank Advisory Committee (wwPDB-AC) and the leadership of the Research Collaboratory for Structural Bioinformatics (RCSB-PDB), the BioMagResBank (BMRB), the Protein Data Bank in Europe (PDBe), and the Protein Data

Bank Japan (PDBj) met as guests of the BMRB in the Discovery Building at the University of Wisconsin-Madison, Madison, Wisconsin, USA, on October 7th 2016.

The agenda included:

1. Introduction & overview of the wwPDB;
2. OneDep system: update on the unified deposition pipeline;
3. Outreach;
4. X-ray crystallography;
5. Electron microscopy;
6. NMR spectroscopy;
7. Looking ahead, questions, discussion topics; and
8. Executive session and feedback

Following a welcome by Prof. John Markley, the overview of the current state of the wwPDB was presented by John Markley.

Introduction & Overview of the wwPDB (presented by John Markley)

There have been considerable developments during the past year involving the wwPDB collaboration, leadership, deployment and re-branding of the unified deposition system for all modalities, and progress in the NMR arena regarding standardization of data formats.

OneDep: At the 2015 wwPDB AC meeting concerns regarding the progress and deployment of the Deposition & Annotation tool (D&A) led to establishment of an aggressive plan and commitment to completion of version 2.0 and deployment by January 8, 2016. The development of this plan included creation of a wwPDB-wide Software Development Team and appointment of Jasmine Young as the Global Team Leader. This team proved exceptionally proficient and met the aggressive timeline for deployment in January 2016. The system was re-branded as “OneDep” with release of V2.0, and this software has become the single deposition system for all sites of the wwPDB. The impact of this development and release will be described below, including the Guiding Principles established for future development.

Partnership and Leadership: A second outcome of the 2015 wwPDB AC meeting addressed the collaborative structure and leadership of the wwPDB. It was determined that a Collaboration Reboot meeting would be held to reformulate the interactions and working protocols for the wwPDB Leadership and the OneDep team. This meeting was held March 2-3, 2016, in New Brunswick, NJ, and participation included the PIs from all wwPDB partners, the Advisory Committee Chair (Dr. R.A. Byrd), and a Professional Leadership Coach (Ms. Suzanne Matteson). The OneDep Leadership Team was also involved in the meeting and worked both separately and jointly with the PIs. This meeting was very successful at re-invigorating the wwPDB partnership, establishing clear communication and cooperation workflows, and establishing a development plan for the OneDep team for 2016, including the commitment of partner resources and leadership support.

PDBe announced at the 2016 wwPDB AC meeting that Dr. Sameer Velankar has taken over the leadership of PDBe and will represent PDBe in all activities of the wwPDB.

Archive milestones: The wwPDB Archive has continued to grow and reveal outstanding progress in management of the archive by the wwPDB partners throughout 2016. The number of depositions in 2016 has exceeded 12,000, with growth predicted to continue through 2018 when it will be >13,500 depositions/year. The total number of depositions in the archive has surpassed 120,000, and one billion atoms.

The use and impact of the archive continues to increase with approximately 1.5 million downloads per day across all sites. The user base is virtually the entire globe with FTP connections and downloads from all but 2-4 countries in the world. Furthermore, approximately 75% of the users are non-depositors, which emphasizes the impact and significance of the archive to both the scientific community and the general public.

Funding status and resources update:

The AC was encouraged to learn that all partners are funded through 2018, with the understanding that the funding of PDBj is only guaranteed annually, but that is anticipated to be continued through this period. The RCSB anticipates a competitive renewal process in the next round of funding, and PDBe has strong commitments for 7 positions from EMBL-EBI and 2 positions from the Wellcome Trust. The commitment of each partner to the OneDep development is to be lauded and serves as an example for future cooperativity.

While this is a solid position, the AC continues to support ***two points of action***:

1. Ongoing activities to obtain stable, long term funding, seeking joint or cross-partner cooperation where feasible. A clear opportunity here is the approach to developing resources for hybrid structure deposition and standardization activities.
2. Transparent reporting of resources to the AC for consideration at the annual AC meeting. As funding mechanisms vary for each partner, the AC proposes that the partners consider establishing a common format for all partners, which will report the total number of positions funded for the partner, with a breakdown of positions allocated to (for example) wwPDB joint software development (OneDep and other future projects), biocuration, and data out activities.

Meetings: The wwPDB sponsored three important meetings during the year

- (i) Integrative/Hybrid Methods (I/HM) Task Force meeting held November 30, 2015.
- (ii) wwPDB Software Engineering Reboot/Planning meeting held March 2-3, 2016
- (iii) Joint wwPDB NMR VTF/NEF Workshop meeting held August 26-27 2016.

These meetings reflect the leadership that the wwPDB is providing to the varied structural biology communities. They are critical and strongly supported by the wwPDB AC.

OneDep System report (presented by Jasmine Young)

The OneDep system is the unified common deposition tool that was rebranded from the D&A development system. The establishment of the OneDep team was reviewed, and a summary of the aggressive timeline and achieved milestones was presented. The AC was very impressed that this new team committed to and achieved an aggressive development plan stretching from October 2015 through full deployment and delivery of validation reports for X-ray, NMR and 3DEM. During this process, the team shared progress reports with the AC Chair, and these reports were shared with the AC, thus providing a strong support and review system. The AC complimented the wwPDB partners and, particularly, Jasmine Young for her leadership and team-building skills and an outstanding accomplishment.

The wwPDB has achieved implementation of OneDep across all partners, including training and continued improvement of the biocuration process with annotators at all sites.

At the time of the AC meeting, the phase out of the legacy deposition systems was complete, and all new entries (for X-ray, NMR, and 3DEM) coming into the PDB are being handled by OneDep. Furthermore, the distribution of entry handling over the partner sites is now possible, yielding geographic balancing, and was presented as the RCSB PDB handling the Americas and Oceania, PDBe handling Europe and Africa, and PDBj handling Asia. Under this system, the RCSB PDB is handling 45% of depositions, the PDBe is handling 36% of depositions, and the PDBj is handling 19% of depositions. The load balancing achieved is a critical component for the wwPDB to manage the expected increase in depositions while funding/resources remain relatively constant.

A dramatic improvement in entry processing has already been achieved, with processing times having fallen by as much as 7-fold, from an average of 4-5 days down to a median of ~15 hours. Processing times are observed to distribute into three modes: (i) simple structures can be processed in ~ 1 hr, (ii) more complex structures without issues in ~4 hr, and (iii) complex structures where issues arise and depositor response/communication is required have a peak at ~15 hr. These are dramatically reduced times, indicating an outstanding success for OneDep. The improvement in entry processing is critical to the ability of the wwPDB partners to manage the continued growth with fixed resources.

The AC was very pleased with the efficiency achieved. This trend is key to handling increased depositions and load balancing in the future.

An important part of the common tool, OneDep, is the generation and provision of Validation Reports. This has been in place for X-ray structures and under development for NMR and 3DEM. With OneDep, the team has worked with the NMR Validation Task Force and produced the NMR Validation Report. The report and its features were reviewed. OneDep now provides this for all NMR structures deposited. The wwPDB continues to work with journal editors on the use or requirement of these validation reports with respect to manuscript reviews and acceptance. OneDep has been modified to enable collection of ORCID IDs, as committed to by the wwPDB in previous AC meetings. It was

implemented in April 2016, and the metrics show that ~8% of depositions have ORCID IDs thus far, representing 170 unique ORCID IDs. **Plans to increase adoption are fully supported by the AC.**

The wwPDB partners and the Global Team have a strong development plan for the coming year, which is supported by the AC. The priorities are clear and **supported by the AC**. These will include core infrastructure support, new content (carbohydrate remediation, NMR-SAXS hybrid method deposition, capturing experimentally determined assembly data), improvement of the deposition experience, further enhancement of validation tools and reports, and improvements in the annotator interaction with the platform. This also includes a plan for publication in the literature of the developments and tools, providing a reference document for users that enables comparison across different methods, validation, workflow description, and approaches pertinent to 3DEM. The **AC supports this approach** to continue the established leadership and communication with the structural biology community.

The OneDep system has been developed to enable facile adaptation and management of new features. One issue that was, and has been, discussed deals with file versioning. The proposal is to develop a procedure to allow revision of atomic coordinates by the Depositor of Record. Equally important is the development of an extensible protocol to enable versioning of all archival data. The plan was presented and discussed with the AC. Particular concerns were to develop a format and protocol that would enable text mining in the future, both of the archive and the literature.

The plan involves development of a new PDB ID code format, and a versioned ftp tree for data access of the latest minor revision. The wwPDB has conducted a user feedback survey, obtaining a 63% favorable response, albeit from a relatively small sampling. Hence, a measured roll-out plan has been devised including a public announcement (6 months in advance), a public announcement (60 days in advance) of the implementation, followed by announcement of the rollout. **This plan is supported by the AC.**

Overall, the AC was very impressed and pleased with the developments. The progress and the team-management put in place support continued development.

Outreach report (presented by Haruki Nakamura)

The wwPDB has been very active in the past year, with contributions from all partners. The wwPDB Symposium following the 2015 AC meeting was well received and is planned to lead to a book project led by Prof. Nakamura.

Of particular significance is the joint cooperation of the partners in several technology development areas: (i) a new data transmission format to support efficient data downloads, which is critical as the complexity and size of entries is continually increasing, (ii) new compression approaches, (iii) shared core technologies leading to new molecular graphics visualizers on partner websites, (iv) new models for web-component data

presentation, and (v) database integration activities. These joint developments are a significant demonstration of the power of the partnership. **The AC is strongly supportive** and encourages continued activities in this arena, as the AC feels it will be a strong contributor to future funding support.

Numerous reports regarding presentations by wwPDB partners at major scientific meetings and workshops were reported to the AC. These activities are vital to the impact of the partnership in the community and should be continued. The development of the OneDep poster and its presentation at meetings world-wide is considered very important for the partnership. The AC engaged in considerable review and suggestions for the poster. The discussion was animated and very constructive, leading the **AC to be very supportive of the enhancements, consideration of audience-specific versions of the poster, and supportive of distribution and presentation frequently over the next year**. These activities will provide visibility for the developments and progress, as well as the community leadership of the wwPDB.

Crystallography report (presented by Stephen Burley)

Growth in the database was robust in 2016, with a projection of >9,000 new protein structure entries solved by X-ray crystallography. This represents approximately 8% of the total archive. Interestingly, the average resolution limit is not moving significantly; however, the number of structures with molecular weight > 500,000 is growing significantly, as are the number of entries with many chains and more than 100,000 atoms. These metrics illustrate the complexity of the data depositions and the ability for the wwPDB to adapt and integrate these data smoothly with the entire archive.

The X-ray component was the first modality to develop and introduce the validation reports and tools, and the wwPDB remains very active in continuing and extending the validation work. The X-ray Validation Task Force (VTF) is tackling important topics, particularly ligand, co-factor, and carbohydrate issues. An example of this effort is the publication of a white paper on ligand validation in 2016. **The AC is very supportive of these efforts and encourages the wwPDB to continue the work of this VTF.**

Two other important developments in 2016 involve the two-stage PDB data release and new efforts supporting batch depositions. The two-stage data release was supported by the AC in previous meetings. In 2016, there has been a pre-release on Saturday of new entries that will appear in the regular Wednesday release. The pre-release contains information on sequence and definitions that enable the structure prediction community to do blind predictions of the three-dimensional structures and compare them with the Wednesday release of coordinates. The metrics reported indicate significant use by CAMEO, CAPRI, CASP, and D3R. **This effort is an important value-added contribution to the community and the AC is very supportive.**

The second development involves support for batch deposition of structures from a single depositor. The pipeline deposition system designed to interoperate with OneDep enabled the prototyping and development of a system to enable a single depositor to deposit a

large set of structures using the same procedure. The wwPDB OneDep Team led the development and provided support for D3R Blind Challenges. There were four early users of the facility through whom literally tens of structures were deposited, annotated and released in a largely automated fashion. ***This effort is an important value-added contribution to the community and the AC is very supportive.***

The last item reported was the continued development of the PDBx/mmCIF dictionary and format by the Working Group. This is a vital activity, and the Working Group provides the conceptual development and evaluation of the format to be extensible to new and integrative methods. ***These activities are strongly encouraged and supported by the AC.***

Electron Microscopy report (presented by Sameer Velankar)

The wwPDB is seeing a dramatic and exciting growth in the deposition of atomic coordinates associated with EM reconstructions, and the wwPDB is playing a very active role in the community to address uniformity of deposition tools, validation, and discussion of developments in the field.

The growth of EM entries is following similar trends that have been observed with previous methodologies (X-ray and NMR), wherein the growth is almost exponential. As of August 2016, the PDB archive contained >1100 EM entries, with 178 new entries deposited in 2016. This number is likely to exceed 200 entries by the end of the year. The data metrics also reveal that the resolution of EM structures is continuously improving with the highest resolution structure at 1.8Å and a rapidly increasing number of structures in the 2-4 Å range.

All new entries are being deposited and annotated using OneDep, and an EM Validation Report is created and provided to the depositors. Progress is growing with journals to implement policies equivalent to other modalities, requiring deposition of structural models and submission of validation reports with submission of manuscripts for publication.

The wwPDB took action, effective September 6, 2016, with the support of the wwPDB AC, to require concomitant deposition of 3DEM mass density maps to the EMDB and coordinate model deposition to the PDB. The wwPDB and EMDB are coordinating to have appropriate cross-referencing and linking of these entries. There are emerging problems with this field regarding diverse refinement strategies, and the wwPDB is encouraged to remain engaged with the community in the discussion of the approaches and their impact on the ability to archive relevant data. The opportunity is recognized to help guide developments with leading software developers (REFMAC and PHENIX) to adapt formats and workflow procedures. ***The AC also strongly supports the continuing activity of engaging the EM community with the PDBx/mmCIF Working Group and the EM Validation Task Force of the wwPDB.***

NMR report (presented by John Markley)

Responsibilities for handling depositions based on NMR are handled by the BioMagResBank (BMRB) with its affiliated operation within PDBj. The BMRB has established a new source of funding through the R01 mechanism of the NIGMS, NIH. This funding provides support through March, 2019. The level of support is lower than was previously held through the NLM, NIH, and BMRB is acting, and encouraged, to seek additional funding. The reduction in funding has led to reduction in staffing; however, the BMRB is handling all depositions. The BMRB has a new director, Dr. Pedro Romero, following the retirement of Dr. Eldon Ulrich. Dr. Ulrich continues to participate in an Emeritus position.

The PDBj component of BMRB activities is supported until March, 2017. This activity includes the Director, Dr. T. Fujiwara, and three staff members.

BMRB reported on activities from its Advisory Board and the recommendations to strengthen and expand its vision for the BMRB, which would also be valuable to the wwPDB. One aspect of development that was presented is a collaboration with a P41 Research Center project at the University of Connecticut, referred to as NMRbox. This collaboration aims to provide better integration of BMRB data activities with common software platforms, creating smoother and more automated workflows that will enhance the quantity of data collection by BMRB. The auxiliary data associated with an NMR study that is not directly connected to the coordinate depositions into the PDB remain of great significance for the future of hybrid structural methods. ***The AC is strongly supportive of these developments at the BMRB.***

The BMRB handles both NMR data depositions associated with a structure deposition to the PDB and NMR data to be archived from general studies. The metrics indicate that transition to OneDep from the previous AutoDep platform has proceeded well, with 208 depositions handled by OneDep compared to 9 entries from the legacy AutoDep. Hence, all components of the wwPDB have transitioned successfully to the new platform. All NMR structure entries are now handled by OneDep, while BMRB continues to use ADIT-NMR for depositions of other data to the BMRB database.

The annual growth of NMR-based structure entries has slowed; however, the significance and integration of these data into the wwPDB remains an essential activity for the wwPDB. As stated, the role of NMR in integrated or hybrid methods studies is anticipated to grow and the activities of the wwPDB in the NMR area are very important. NMR Validation report formats have been established and OneDep now provides a validation report with each deposition. BMRB is actively working with the NMR VTF and wwPDB Partners to expand the validation report to include restraints.

A major development in the NMR community is the establishment of a common format for restraints, called the NMR Exchange Format (NEF). The NEF has been proposed to facilitate interoperability of software platforms. Working with the BMRB and wwPDB, the NEF will become compatible with the mmCIF/PDBx format.

There are ongoing sponsored activities, e.g. the Joint wwPDB VTF-NEF meeting held in Osaka, Japan on August 26-27, 2016, which will continue development of NEF and NMR validation. The proposed plan is to move toward mandatory NEF or NMR-STAR format and deposition of restraints with structure deposition. ***The AC is strongly supportive of these developments at the BMRB.***

Looking Ahead (presented by John Markley)

Plans 2017 include

- Remediation of carbohydrates and post-translational modifications in the archive
- Continued development of PDBx/mmCIF dictionary
- Establishment of an audit of the weekly release process and preparation of an assessment for the next wwPDB AC meeting at RCSB PDB Rutgers.

Plans for 2018

- Development of a plan for extending the wwPDB franchise to appropriately qualified partner sites in China and India
- Begin planning for the PDB 50th Anniversary in 2021

The AC is supportive of these activities. There was considerable discussion about the general concept of a qualified partner. The AC recommends that the partners develop the terms for such action and present this for discussion at the 2017 AC meeting.

Action Item: The AC would like the wwPDB to summarize the short and long term challenges and their vision for addressing them. This could be provided as briefing material for the 2017 AC meeting.

Questions posed to the wwPDB AC (presented by Stephen K. Burley)

1. Concurrence was sought from the AC on the proposal to establish a new data item for Public Preprint Archive citation and utilize deposition in such an archive as the trigger to release the entry to the public archive. Further details of the proposal are provided in Appendix 1.

The AC supports the release of PDB archival entries associated with publicly-archived preprints (e.g., bioRxiv) and strongly encourages inclusion of a validation report with the preprint. The AC also supports use of the preprint DOI as the primary citation in the PDB entry.

2. Concurrence with the Implementation Plan for Versioning of PDB Archival Entries as outlined in Appendix 2.

The proposal developed by the wwPDB partners was discussed and *the AC approves this action*. The AC supports that the final plan will be communicated to the community and disseminated via web and other communications. The plan allows the original depositor of record to update or create a new version of an entry. Atomic coordinate replacements will receive a version number rather than a new accession code. The PDB code format will be enhanced to support this new feature and will also assist in text mining of the literature, as time goes forward. The latter development will assist documenting use and impact of the archive.

3. Concurrence with the Implementation Plan to broaden capture of ORCID identifiers for more than the contributing author of the deposition, as outlined in Appendix 3.

The AC supports the collection of ORCID identifiers for all depositors. The AC also supports the proposal to enable inclusion/release of ORCID identifiers with data downloads in 2017 and to make ORCID identifier submission mandatory for all depositors in 2018.

4. Inclusion of the individual RCSB PDB, PDBe, PDBj, and BMRB Advisory Committee reports provided in Appendix 4.

The AC finds inclusion of these reports valuable and recommends continuing this practice for each AC meeting. If possible, these reports should be distributed to the AC prior to the meeting, with the preliminary information already provided.

General comments and requests from the AC:

Overall the AC was very strongly in support of the activities of the wwPDB throughout the past year. Particular points to be highlighted, in addition to comments in the text of this report, are summarized here:

1. The accomplishments associated with the team management, completion, deployment, and rebranding of D&A V2.0 as OneDep to yield the *single unified deposition system* for X-ray, NMR and EM are unanimously commended and supported. The efficiencies accomplished for load balancing, streamlining the annotation process, and enabling the wwPDB to meet the challenges of increasing depositions are critical to the continued success of the wwPDB.
2. The wwPDB Reboot meeting (March 2016), undertaken to address challenges revealed at the October 2015 wwPDB AC meeting, reflect the strong organization with the ability to work together with increased communication and transparency. These aspects are critical in establishing future vision and working cooperatively to retain funding support and grow.

3. The wwPDB outreach in promoting education to the community (via the poster, presentations at meetings, demos of OneDep, etc.) is very positive.
4. The status of X-ray deposition/annotation/validation is commended for its smoothness and improved performance. This performance is an example for other modalities, and the AC encourages the partnership to reach the same level of performance in all areas. This action is occurring via the initiation of NMR and EM depositions and validation using OneDep.
5. The collective action and leadership in all the communities served by wwPDB has had real impact on structural biology community; actions that would not be accomplished by any single partner.
6. The activities of the wwPDB partners working with the cryoEM field (EMDB and EMDDataBank) to stay abreast and press for keeping PDB pre-eminent in this rapidly developing area is very strongly supported.
7. The effort to get more data in, via D3R and group depositions, is positive and should continue. This activity supports further development of docking and the understanding of small molecule interactions. It also opens the way to greater data deposition via enabling group depositions, as the AC would hope may occur from the private sector.

Requests for information to be provided to the AC in advance of, or at, the 2017 AC meeting:

1. The AC would welcome a report on the performance of OneDep on the process and time for biocuration. In conjunction with this monitoring activity, the AC would welcome a plan for handling future growth in depositions based on anticipated improvements in efficiency.
2. The AC recommends development of a strategic plan, beyond OneDep, to address expansion of the archive, hybrid methods, and long term sustainability.
 - a. Consider how plans for growth of the database might be impacted by franchises and distribution of tasks/resources.
3. Plan for the extension of the PDB franchise to other members (e.g. China and India) by developing specific terms, requirements and details for the selection and designation of new partners.
 - a. AC supports the concept of expansion to meet world-wide growth
 - b. Partners should set terms of reference for membership and standards for operation and review with the AC
 - c. Discuss how plans for growth of the database would be impacted by franchises and distribution of tasks/resources.
 - d. Elucidate and include the role of Federated Databases
4. The AC would welcome an agreed upon common format for all partners, which will report the total number of positions funded for the partner, with a breakdown of positions allocated to (for example) wwPDB joint software development (OneDep and other future projects), biocuration, and data out activities.

Recommendations:

1. Recommendations were provided to the wwPDB partners for edits to the *OneDep poster* with the aim to make it both an announcement and an educational tool. The poster can and should serve as an outreach through which all structure centers can inform and educate, consistent with the increasing community leadership role of wwPDB.
2. Move the definition of franchise requirements up to the agenda for the 2017 AC meeting, in recognition of current developments in both India and China.
 - a. Consider blind tests of existing sites to inform future actions; to assist in setting training and quality control processes.
3. Set a high priority for the development and launch of the “secure API” for access to validation procedures, which will enable better cooperation with the software community. The goal is to enable the software community to directly incorporate the validation procedures into structure determination and refinement protocols, as an enhancement for users.
4. Review the current wwPDB operating model of collaboration on data-in and competition on data-out. In a changing funding environment, the wwPDB should evaluate whether the current model is the best for their individual or joint funding opportunities. To what extent is there support for the partners competing on data out as opposed to sharing developments, particularly in recognition of the successful team concept with OneDep.
5. The AC urges continuation, expansion, and improvement of cross-partnership transparency and communication. This will build on the success of the past year and the initial phase of the Reboot.

AC Points of concern:

1. There is a need to develop a strategic plan, beyond OneDep. Include expansion and hybrid methods, long term sustainability.
2. How might plans for growth of the database be impacted by franchises and distribution of tasks/resources?
3. The AC expressed concern over the model of collaboration on data-in and competition on data-out, especially in planning for future funding environments. To what extent is there support for the partners competing on data out versus sharing developments, particularly in recognition of the successful team concept with OneDep? The partnership should remain cognizant of potential shift in funding provider’s priorities and be prepared to respond.
4. The AC urges continuation, expansion, improvement of cross-partnership transparency and communication. This will build on the success of the past year and the initial phase of the Reboot.