2017 Report of the iDigBio External Advisory Board

November 18, 2017

iDigBio External Advisory Board (EAB) membership:

Data Use Committee
● Jason Knouft, Saint Louis University (Chair)
● Linda S. Ford, Harvard University
● Paul Kimberly, National Museum of Natural History
● Vince Smith, Natural History Museum, London

Sustainability Committee
● Eva Huala, Phoenix Bioinformatics (Chair)
● Donald Hobern, Global Biodiversity Information Facility
● Mary Klein, NatureServe
● Barbara Thiers, New York Botanical Garden

● Neil Cobb, Northern Arizona University (EAB Chair)

Paul Kimberly is retiring from the committee, he will submit name(s) to Larry Page to replace himself with another representative from a Federal institution to serve on the iDigBio External Advisory Board.

This report is based on the following:
- In-person meeting with all EAB members, iDigBio key personnel, and Roland Roberts (NSF observer) on November 1, 2017 at Summit VII in Gainesville, Florida (minutes included as **Attachment 1**)
- In-person meeting with TCN participants and all EAB members to assess role of iDigBio to serve TCN community needs (notes included as **Attachment 2**).
- Two closed discussions by EAB members on November 1 and 3, 2017

The EAB in 2017 was charged with providing recommendations to iDigBio regarding sustainability, with consideration given to operating after the end of the NSF-ADBC program, and more specifically increasing data use by research as well as education-outreach activities. The two committees worked together to incorporate both sets of recommendations into one report. The EAB assessed three specific issues in preparation of the 2017 report: **1**) iDigBio actions in response to 2016 EAB recommendations (**See Attachment 3**). **2)** iDigBio role in serving TCN community needs, and **3)** Review of sustainability proposal presented by iDigBio that incorporates longer-term sustainability planning beyond ADBC funding.

General EAB Recommendations

There are three key conclusions based on the 2017 meetings at the ADBC summit.
1) The EAB was very pleased with how the iDigBio staff addressed the EAB 2016 recommendations for data use and sustainability.
2) Based on responses by TCN participants at the Nov 2 meeting with the EAB, iDigBio is meeting the needs of the TCN community, although TCN personnel provided recommendations to further increase iDigBio capacity to address community needs.
3) The EAB is optimistic that iDigBio is well positioned to complete its ADBC work and has a strong plan for moving forward beyond the current ADBC funding. We encourage iDigBio to develop specific plans to complete goals set for the ADBC program and a strategy to ensure sustainability of the national digitization effort.

Below we provide more detailed responses regarding each of these three areas.

1. Assessment of iDigBio Responses to 2016 EAB Recommendations

The EAB was very satisfied with the actions taken by iDigBio to address the recommendations by the EAB 2016 report (see Attachment 3) regarding both "data use" and "sustainability". The EAB is confident that iDigBio will continue to make progress on all items listed in the "Consolidated 2016 EAB recommendations".

Data Use Actions (2016)

The EAB was in agreement that iDigBio did an excellent job addressing the Data Use recommendations from the 2016 report. In particular, the EAB requested that iDigBio develop various estimates to allow for assessment of data use, ingestion, temporal coverage, taxonomic coverage, and incremental and cumulative trends in data use. The EAB also requested information on ratios of records viewed versus records downloaded. To address these requests, iDigBio developed a Stats Portal which is currently available in an online beta version. The Stats Portal also provides website use estimates based on a comprehensive array of statistics from Google Analytics. Trend data were also provided to the EAB regarding iDigBio's online presence (e.g., Twitter, Facebook), which is increasing, as well as information on access to the iDigBio newsletter and participation in workshops and webinars. In all, the EAB appreciates how seriously iDigBio took our previous recommendations from the 2016 report and is satisfied with their efforts.

The range of iDigBio activities aimed at expanding data use is impressive, with Pam Soltis leading by example. One area of possible expansion would be to increase engagement with the TCNs to find ways to expand data use. In their "lightning talks" at the 2017 Summit, it appeared that several TCNs were beginning to see researchers accessing their data through the TCN portals. In addition, TCNs expressed a desire for greater engagement with iDigBio on advancing research uses of the data. iDigBio staff may wish to consider how to increase collaboration with the TCNs in this area. Specific suggestions from TCNs regarding research uses of the data include:

- Providing better taxonomic information to users (especially paleontological names and better separation between paleontology and neontology)

- Finding ways for iDigBio to ingest more types of data (e.g., genetic, metadata, links between specimens) that are available from the TCNs, but not currently transferrable to the iDigBio portal
- Publishing a workflow aimed at researchers downloading data from the iDigBio portal (e.g., how to clean the data for research use).

Although it is not necessarily iDigBio's role to advocate on behalf of the TCNs with NSF, it may be possible for the TCNs and iDigBio to work together seeking NSF support to fund Post-Doctoral research using iDigBio/TCN digital data.

Sustainability Actions (2016)

The EAB also agreed that iDigBio made significant progress toward addressing the 2016 recommendations on sustainability. Metrics presented by iDigBio at the 2017 meeting and the new metrics page on the beta website provided the requested monthly breakdown of unique visitors, sessions and page views as well as geographical location of users. iDigBio staff should be able to access institutional affiliations of many direct users of the iDigBio portal from the list of service providers accessible in Google Analytics under Audience/Technology/Network. The comprehensive usage metrics assembled by the iDigBio team will be useful as a starting point for approaching the more difficult questions of which user communities are using iDigBio and what impact it is having on research. Additional work to diversify the user community and quantify data use across different fields of research is still needed. Determining data use across fields might be accomplished through surveys of portal users both at iDigBio and at the TCN portals.

Although there has been a recent decline in the number of users of the iDigBio portal from 150 per day (late 2015 through early 2017) to 75 per day (May-November 2017), the board understands that iDigBio project data can be accessed at other sites including the TCN portals and GBIF, and it may be that some usage has shifted from iDigBio to one of these sites. It will be valuable to gather usage from TCNs and other sites where the data are exposed in order to assemble a more complete picture of the data use and impact.

Good progress has been made by the iDigBio team in gathering data on the number of institutions, collections and specimens remaining to be digitized. These numbers should continue to be updated as more information becomes available. We did not see any targets for digitization progress for the remaining years of funding, so it remains unclear what iDigBio hopes to accomplish by the end of the current funding period. But once that target is established, it should be possible to estimate the effort needed to finish digitizing specific collections, or to continue adding new collections in 2021 and beyond. In the data ingestion graph (Slide 4, David Jennings presentation), the metrics page shows that the rate of data ingestion has been very low since May, 2017. Data ingestion appears to have leveled off (and started to decline). iDigBio staff could use this metric to identify possible causes of the slowdown, and investigate whether this is a temporary lull, or something to be concerned about.

2. TCN-EAB meeting: Assessing the role of iDigBio in meeting the needs of the community

The EAB discussed the role of iDigBio with representatives from 12 of the 20 TCNs. All points of discussion that were covered during the TCN-EAB meeting are summarized in Attachment 2. Overall, TCNs were pleased with the support received from iDigBio, although they provided suggestions that both iDigBio and TCNs could address to make the ADBC program even more effective. Several key ideas emerged regarding sustainability of the TCNs, and their ability to remain contributors to iDigBio over the long term:

- There are advantages to having most of the Symbiota portals on one set of servers (e.g., at iDigBio). Hosting these datasets may be a business opportunity for iDigBio.
- iDigBio staff could conduct an "exit interview" with TCNs nearing the end of their ADBC grant to identify unfinished business and challenges to continued data sharing.
- There is a matrix of ownership of the datasets among TCN institutions that requires a long-term plan for who will take responsibility for activities including hosting the data, data cleanup, and serving new data.
- Succession issues for staff are important challenges at both the TCN and collections levels.
- iDigBio could do more to communicate with the TCNs about its preparedness for business continuity in the event of an emergency or natural disaster.

3. iDigBio Priorities for Remaining ADBC period and Planning for Post-ADBC Sustainability

Transition to long-term Sustainability

To address long-term sustainability iDigBio proposes two significant adjustments that will maintain core functioning and achieve financial sustainability. To maintain core functioning, iDigBio proposes to become a US node for GBIF and solicit specific funding from NSF to support four areas that are expected of a US GBIF node:

1) Enabling digitization of biodiversity collections data

2) Providing portal access to curated biodiversity data

3) Facilitating use of biodiversity data through data analysis and research, and

4) Coordinating national biodiversity-related initiatives, including participating in the GBIF network.

iDigBio is already providing these four services as part of their ADBC responsibilities. The challenge will be to downsize to a core support staff that includes a project manager for the library of archived resources, a mobilization manager that will work directly with the US biodiversity community, a database/portal manager, and personnel to coordinate training and workforce development. These are considered the most fundamental services iDigBio provides to the ADBC community, thus becoming a US GBIF node will also mean that iDigBio continues to serve the ADBC community. Becoming a US GBIF node does not preclude supporting additional staff and services with external grants and possible subscription of services.

The second aspect of the iDigBio transition plan is to shift support for research-education-outreach efforts to external and institutional funding. A likely consequence of this transition is that activities will be more project-based to meet the needs of the external funding and will likely involve more short-term planning. Currently, research-education-outreach efforts are shared between the University of Florida and Florida State University. The proposed options for organizational structure for these efforts include the Florida Museum of Natural History, Biodiversity Institute, or an eMuseum.

EAB Recommendations: Transition to long-term Sustainability

The EAB wholeheartedly supports the sustainability planning proposed by iDigBio to ensure maintenance of core iDigBio functions beyond the ADBC program. The EAB found the proposal for sustaining iDigBio after the end of the current funding period to be a significant step forward toward the ultimate goal of a robust plan of action. The iDigBio leadership has done a good job of analyzing the different components of the cyberinfrastructure and developing the outline of a plan for how each element will be sustained in the future. This is a great starting point for developing a more detailed plan that breaks down work and responsibilities across the minimum staffing level of four positions, and explores institutional resources that could also contribute to the effort. The EAB encourages iDigBio to develop specific plans for the transition to a US node for GBIF and establishment of the administrative structure for the research-education-outreach effort.

The proposed transition plan currently includes significant cuts to staffing and services that will likely achieve financial sustainability. However, there was concern as to whether iDigBio will be able to sustain the ADBC effort without additional resources. The EAB encourages iDigBio to consider an additional staff position for software development and broader IT support for the Symbiota portals and other infrastructure currently hosted by iDigBio on behalf of the TCNs. This is also an area where it may be possible to move in the direction of cost recovery for these services. In addition, we hope that in the development of a business plan to maintain the four proposed areas of work (project management, data mobilization, database/portal management, and training/workforce development), that iDigBio will thoughtfully consider future staffing needs so that resources can be developed to support a larger, minimum staff if needed.

Post-ADBC sustainability will depend in part on the degree to which iDigBio achieves its ADBC goals by 2021. In addition, securing ongoing, core support from NSF should bolster the ability to attract other types of funding for work that extends beyond the end of the ADBC program. As part of this planning, the EAB recommends collaborating with the collections community to seek additional funding for such work. This planning should also consider options for the node and the research-education-outreach functions to operate under a single, administrative umbrella, even if it is a less formal relationship than currently exists. There should also be consideration for maintaining the existing partnership between Florida State University and the University of Florida.

iDigBio Priorities for remaining ADBC Program

iDigBio identified five key ADBC issues to address in a more concerted effort before the full transition to post-ADBC funding.

1) Find and engage remaining collections (How many collections and specimens are there really?)
2) Funding model for ADBC

3) Improving quality of data in iDigBio, especially taxonomy (next "moonshot" for collections?)

4) More response from TCNs on research, education and outreach

5) International collaboration

During the in-person meeting at the ADBC Summit, only the first priority was discussed in depth.

EAB Recommendations: iDigBio Priorities for the remaining ADBC Program

The priorities identified by iDigBio that focus on the remaining period of ADBC funding are reasonable and justified. The first four action items will require iDigBio to engage with the TCNs and the larger data provider community. The EAB encourages iDigBio to develop specific goals and action items that can be initiated by early 2018, and continue other ongoing efforts that will achieve goals of the ADBC program. Developing closer ties with the international community is likely to reduce redundancy and lead to a stronger cyberinfrastructure better able to serve researchers the data they need.

Attachment 1: Minutes from the 2017 iDigBio Meeting with External Advisory Board

Date/Time: Wednesday, November 1, 2017, 1:00-5:00 PM **Eastern**

Invitees: **EAB Members:** Neil Cobb, Paul Kimberly, Linda S. Ford, Vince Smith, Jason Knouft, Mary Klein, Donald Hobern, Barbara Thiers, Eva Huala

iDigBio Leadership: Larry Page, David Jennings, Pam Soltis, José Fortes, Greg Riccardi, Bruce MacFadden, Shari Ellis, Austin Mast

NSF Observer: Roland Roberts

Location: McGuire Center Director's Conference Room, 2nd Floor, Florida Museum of Natural History

Materials:

Meeting Agenda:	https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/EAB_Meeting_Agenda_2017.11.01.docx
2016 Consolidated EAB Recommendations:	https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/2016_Consolidated_EAB_Recommendations.docx
2016 EAB Reports and Documents:	https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/EAB_2016_Report_Final_11_28_16.pdf
	https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/iDigBio_Response_EAB_2016_Report_20170310.pdf
	https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/Summary_of_EAB_Comments_7_28_17.pdf
iDigBio's Cooperative Agreement with NSF:	https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/Cooperative_Agreement_Award_DBI-1547229.pdf
iDigBio's Last Annual Reports to NSF:	https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/Award_1547229_Y1_Annual_Report_SUBMITTED_with_Attachments.pdf
	https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/Award_1115210_Y6_Annual_Report_SUBMITTED_with_Attachments.pdf

AGENDA:

1:00 – 3:00 PM   iDigBio Meeting with EAB

1. Presentations by iDigBio on:
    - Sustainability: https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/2.%20EAB%20Page_iDigBio%20Summit%20Report%2C%20vers.3.pdf
    - Data use: https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/EAB%20Soltis%20data%20use%20-%20research%20final2%20comp.pdf
    - Metrics: https://www.idigbio.org/sites/default/files/internal-docs/eab/2017-11/2017_EAB_Metrics_final.pdf
2. Discussion of additional/specific issues and recommendations sent to iDigBio on 11 August 2017 (consolidated list linked above)
3. Open discussion
4. Recommendations from iDigBio to EAB on potential areas of concentration

3:00 – 5:00 PM   Room Reserved for EAB Discussion, Report Writing, etc.

MINUTES

Meeting started at 1:45 pm

IDIGBIO PRESENTATIONS

ADBC/iDigBio Sustainability – Presented by Larry Page

- ADBC was created in 2010 and was funded for 10 years starting in 2011
- NSF has indicated that TCNs will be funded through year 10
- iDigBio will likely receive additional funding through 2025 via NSF to continue support of the funded TCNs and PENs, as well as others in the collections community

Sustainability Proposal
1. Become a GBIF Node
- iDigBio is already an "other participating node"
- iDigBio already does the primary tasks of a GBIF node, so iDigBio assumes its current activity, with slight adjustments, will fit GBIF's requirements.
- iDigBio eventually will seek funding from NSF or another federal agency to sustain iDigBio's efforts as a part of GBIF
- A minimum of 4 full time positions will be required for iDigBio to operate as a U.S. GBIF Node.

2. Transition research and E&O activities to the Florida Museum

- Rely on museum and external funding sources

Discussion
- iDigBio funding starts to decrease in year 8 (next year), requiring iDigBio to lose two positions per year.
- The portal will continue to exist, although future development will depend on funding for staff.
- Complications of maintaining multiple data portals include data homogeneity and measuring impact.

Overall issues for iDigBio & ADBC

1. Find and engage remaining collections
- By our estimates, arthropods and marine invertebrates are the two communities that are the least digitized/published in proportion to the number of institutional collections.
- Currently working with around 40% of collections in the US (that we have identified). Remaining institutions are most likely small, but many remaining collections are large.

2. Funding model for ADBC
- The above proposal is a starting point and needs refinement.

3. Improving quality of data in iDigBio, especially taxonomy
- Perhaps improvement of taxonomy in collections is the next "moonshot" for the biodiversity community?

4. More response from TCNs on research and E&O
- The collections community is unique in that many museum professionals are not research-focused. Maybe not a realistic expectation to have data providers also serve as the data users. We need to think outside the collections community to increase data use.
- As a reminder, ADBC does not provide funding for research directly.

5. International collaboration
- Becoming a node for GBIF will increase international collaboration, as will development of other links to international entities such as ALA, Catalog of Life, etc.

iDigBio Data Use Presentation from Pam Soltis

iDigBio has promoted research use through:

- Training workshops for professionals along with undergraduate and graduate training. We are also collaborating with Data Carpentry™ and Software Carpentry™ to increase data skills.
- Sample publications that demonstrate the use of iDigBio architecture and proper data attribution.
- Developing research programs. Examples include data integration with GenBank, linking genomic data with environmental information, and phenology
- Promoting research use through workshops, symposia, and special publications

- Enabling research through tool development. Working on a set of vetted software and tools that will be linked to the portal.
- We are now tracking citations of data use and iDigBio resources.
  - Tracking data use at the provider level is still very difficult. We have metrics available on the iDigBio portal, but tracking publications comes down to citations in publications. Needs to be a community effort to change norms of attribution of data in publications
  - GBIF now assigns DOIs for every downloaded dataset to aid increased attribution. iDigBio is interested in seeing how this model resonates with the community. iDigBio will consider adopting this practice if it is well received. If iDigBio becomes a GBIF node, we would most likely adopt GBIF's attribution methods.

Statistics and Metrics – David Jennings

- There are data statistics live in the portal as well as some additional features being tested in the beta portal:
  - https://www.idigbio.org/portal/portalstats
  - http://beta-portal.idigbio.org/portalstats
- Google Analytics have been embedded into the portal and website statistics pages:
  - https://www.idigbio.org/content/idigbio-website-analytics
- The plan is to integrate portal-wide analytics graphs onto the recordset pages.

DISCUSSION

Statistics and Metrics

- Judging from the metrics, the webinar system is a real success in engaging with the TCNs
- By looking at the workshop and webinar demographics, webinars seem to be reaching a different audience (more women), meaning webinars can serve an audience that cannot be reached by in-person workshops.
- We are not reporting individual TCN portal analytics and that means we are drastically underreporting ADBC web presence.
- How easy would it be to request Google Analytics from each of the TCNs about their website and portal usage? iDigBio will reach out to each TCN and see if it is possible to add this into their regular reporting.

EAB membership

- This will be the last meeting for Paul Kimberly. We would still like the Smithsonian and/or other federal agencies involved in the EAB. Paul Kimberly will create a list of recommendations for replacements for himself.
- In the cooperative agreement, it says that membership will change every couple of years, but this is not being enforced. If anyone wants off the board, we ask that the board member submit recommendations for replacements like Paul is doing.

- Roland Roberts wanted to emphasize that this group's primary purpose is to advise iDigBio, but also these meetings give the board a chance to talk with the NSF representative -- but iDigBio staff must be present.

Final Remarks

- Larry's proposal addresses the issues of sustainability and duplication of effort in the community, and the data metrics and research use presentations were adequate to address previous EAB requests.
- NSF is envisioning using iDigBio to better leverage US participation in GBIF.
- GBIF, ALA, and iDigBio should talk more on how to pool resources and collaborate on shared issues of cyberinfrastructure, data quality, etc.
- NSF wants to increase emphasis in international collaborations with projects like iDigBio and NEON
- There will be a reverse site visit for iDigBio in Alexandria on March 15-16, 2018.
- The EAB's recommendations from the last meeting have driven a lot of introspection and progress in iDigBio over the past year.
- How iDigBio is sustained will be dependent on what services and products are identified as essential to the collections community. The four-person team is the minimum required to keep the core areas of iDigBio functioning as a GBIF node: project management, data mobilization, data portal, and workforce training.
- The metrics should guide which efforts in iDigBio are sustained and, therefore, which staff should be sustained. Four positions may not be enough. One concern would be staff redundancy—for example, running a portal or website with only one person could be a risk.

Meeting adjourned at 4:00pm

Attachment 2: Notes from Sustainability Discussion with TCNs on November 2, 2017

Overview

Since 2011, the NSF-ADBC program has funded 20 Thematic Collection Networks (TCNs) and 24 Partners to Existing Networks (PENs). The role of TCNs is to mobilize a community of museums and herbaria to provide specimen related data and media to iDigBio. Additionally, they collaborate with each other and iDigBio to promote the use of digitization products for research and education. As part of its role in advising iDigBio, the External Advisory Board (EAB) wants to better understand the relationship between iDigBio and the TCNs in order to assess how iDigBio is meeting community needs. The description and makeup of the EAB can be found here: https://www.idigbio.org/wiki/index.php/IDigBio_External_Advisory_Board

Every year the EAB meets with iDigBio and NSF at the ADBC Summit. For the upcoming 2017 meeting in Gainesville, the EAB would like to meet with TCN leaders to discuss the role of iDigBio in supporting TCN activities.

Participants
EAB and TCN participants
- Species File Group
- SERNEC TCN
- FLMNH
- oVert TCN
- VA Institute of Marine Science / oVert TCN
- SERNEC TCN / SC Heritage Trust
- N AZ Univ / Symbiota & LepNet TCNs
- MAM TCN
- EPICC TCN, Museum of Paleontology Berkeley
- U KS, Cretacous World, PaleoNiches TCNs
- LBCC (an early TCN)
- NY Botanical Garden / EAB - PI on a TCN
- LepNet TCN, SCAN / EAB
- Smithsonian /EAB
- Phoenix / EAB
- Natural History Museum London / EAB
- St Louis Univ / EAB
- GBIF / EAB
- AIBS / EAB

Note: a handful of participants arrived after the introductions were over, and are not represented in the list above.

Main Points / Action Items
(Extended notes are available on the 2017 Summit Wiki page: https://goo.gl/mn5z8P)

The iDigBio services that are used the most by the TCNs are:
- <u>Digitization workforce training</u>: webinars, trainings, workflows, general information about TCNs and iDigBio, participation in the Summit.
- <u>Informatics/website/portal/database</u>: feedback to TCNs on data quality, info about research uses of data contributed by TCNs, publishing TCN news on the iDigBio website, uploading of TCN data to the iDigBio portal.
- <u>Education & outreach</u>: participating in symposia, WeDigBio
- <u>Other valued services</u>: use of Adobe Connect for meetings, participation in the Summit (enhances communication within the community), IT services (especially collaboration with Symbiota/MorphoSource development teams and hosting of Symbiota datasets)

TCNs contribute to ADBC beyond providing data to the portal by:
- Helping to develop software, educational modules and workflows
- Leading webinars and assisting with training events
- Providing feedback to iDigBio about the services they are offering, and how the data are presented by iDigBio in an aggregated format.

Opportunities for iDigBio to help the greatest number of TCNs:
- Raise awareness among users of the ability to access (and ideally search) original data (especially important for Paleo community)
- Work with TCNs to determine the best default info for certain fields, especially taxonomy.
- Increase efforts to facilitate research applications of data across TCNs.
- Increase the ability of iDigBio to ingest more types of data (e.g., genetic data, metadata, and links between specimens).
- Publish a workflow for researchers downloading data that describes the best practices for cleaning up iDigBio data for research use.
- Facilitate participation of more collections in a TCN (beyond the formal TCN and PEN process). As iDigBio reaches out to other collections for their data, help make connections with the active TCN/PENs.
- Provide "aggregated" recommendations back to tool developers on how to improve the tool (e.g., Symbiota), based on iDigBio's knowledge of broader community needs.
- Pursue a long-term strategy for handling multi-media storage.
- Develop and share information about iDigBio's disaster recovery preparedness.

Plans for sustaining TCNs after ADBC funding ends:
- Conduct an "exit interview" with PIs of sun-setting TCNs to identify unfinished business, and challenges moving forward to continue sharing data.
- Many of the taxonomy-specific TCNs will probably follow a similar model to SERNEC in looking for help from professional associations/societies.
- iDigBio could provide guidance to societies on what is required to take on the role of sustaining the systems (see Symbiota working group paper re: the different levels of effort needed to maintain the system, long-term)

Attachment 3: Consolidated EAB Recommendations

2016 Report of the iDigBio External Advisory Board (11/28/2016)
Response to the 2016 Report of the iDigBio External Advisory Board (3/10/2017)
The iDigBio External Advisory Board Recommendations for 2017 (8/11/2017)

DATA USE

1. Accurately quantify data use
   - Targeted suite of metrics that are comparable with GBIF
      i. Monthly data to show trends in data use
      ii. Incremental tends are more useful than cumulative trends
      iii. Ratio of records in search results to records in downloads (or records viewed)
      iv. Events vs. records in searched and downloads
      v. Mobilization of data over time
      vi. Number of species represented in the mobilized data over time
      vii. Temporal distribution of records
   - Distinguish between dataset-specific metrics and portal-wide metrics
   - Quantify the impact of events on data trends (e.g., WeDigBio)
   - List of peer-reviewed articles that utilize the data
   - Quantify usage in other portals of data that originated in iDigBio
   - Display publication metrics
2. Expand data use by nontraditional users
   - Prioritize use of data generated by TCNs
   - Produce commentary or review publications
   - Give seminars at universities with programs in disciplines needing engagement
   - Expanded reach of newsletter and social media
   - Explore ways to stimulate/fund the creation of a suite of tools that facilitate research and/or make data/research more publicly known

SUSTAINABILITY

1. Promote broad use of data across variety of disciplines
   - Diversify the user community
   - Google Analytics (excluding iDigBio and bots)
      i. Unique visitors, sessions, and page views per month (size of user community)
      ii. Geographical location of users
      iii. Institutional affiliation of users
      iv. New vs. repeat users (usefulness to user community)

- Identify user communities that most value iDigBio's data, tools, and expertise
    i. Quantify data use in different scientific fields
    ii. Survey on portal page
2. Define iDigBio's distinct, future role within the global biodiversity ecosystem
    - Unique elements of iDigBio cyberinfrastructure that should be preserved
3. Consider all four core areas in sustainability planning: engaging the collections community, digitization, database/informatics, and research/education
    - Identify quantifiable/measurable metrics to assess progress in each area
    - Current/future needs assessment in each area
    - Develop better metrics to assess digitization progress
        i. Number of specimens vs. quantity digitized
        ii. Number of data providers vs. quantity digitized
        iii. Number of institutions vs. quantity digitized
        iv. Number of collections vs. quantity digitized
        v. Digitization progress across taxonomic groups
    - Targets for data mobilization in each remaining funding year
    - Translate the existing sustainability plan into a robust plan of action
        i. Rough conceptual budget for years 2021-2026
            1. Costs and revenue broken out by each major activity
            2. Timeline of tasks