iDigBio Collection Management System (CMS) Information Gathering

Thank you for taking the time to consider and respond to the following questions. iDigBio will make your responses available to the natural history collections community, both as an online resource available to anyone, and as a reference specifically for participants in our "Introduction to Biodiversity Specimen Digitization" course. This resource will serve as an update to a similar survey we did in 2012: https://www.idigbio.org/content/biological-collections-databases.

Please return your completed survey to Erica Krimmel (ekrimmel@fsu.edu).

BASIC QUESTIONS

1. **Name and email of person responding to this survey**: Arctos Working Group Officers arctos-working-group-officers@googlegroups.com
2. **Name of Collection Management System (CMS)**: Arctos
3. **Website**: https://arctosdb.org/
4. **Company or group responsible for maintaining CMS**: Arctos Consortium
5. **Long-term funding structure for maintaining CMS (e.g., grants, membership, private)**: Member financial contributions and external funds. Arctos is currently pursuing long-term financial stability with support from NSF# 2034577.
6. **Brief summary highlighting the market niche for this CMS**: All types of physical, biological, cultural, and observation collections

USABILITY QUESTIONS

7. **Restrictions on types of collection objects and/or disciplines (e.g., cannot handle anthropology)**: None
8. **Capacity for handling complex information related to taxonomic names (e.g. taxon concept mapping, recording annotations)**: Taxon concepts and annotations, as well as complex identifications (e.g. hybrids, name strings) and identification history, are supported.
9. **Capacity for handling complex information related to geographic places and for facilitating tasks such as georeferencing:** In addition to standard locality information, localities and geography in Arctos can carry spatial (e.g. polygon) data. Georeferencing is facilitated within Arctos by the integration of the GEOLocate program. Arctos also supports locality attributes such as landowner, site information, and geological formation; and event attributes such as habitat, drainage, and environmental data. Localities for sensitive species or records (endangered species, fossil sites, etc.) can be encumbered from public view and replaced with county-level or other less specific information and georeferencing. Other coordinate conversion tools are available in Arctos (e.g., converting different formats to decimal degrees and datum). Arctos also supports multiple collecting events linked to catalog records (e.g. mark and recapture data) as well as capabilities to verify and lock geographic

information based on review status (collector- or curator-verified, checked against primary source data, etc.). Various webservice data are pulled as an additional means of standardization.

10. **Capacity for handling complex information related to people (e.g. collectors, identifiers, loan agents):** Agents as people or institutions are code-table controlled and maintained by the community. Identifiers such as ORCiD, Wikidata, and Library of Congress can be linked to agent profiles. Agents may have many alternate names and spelling variations to assist with discovery. Arctos tracks agent names and activity, e.g. number of catalog records collected, prepared, georeferenced, as well as linked publications and projects. Agent information is shared across all Arctos institutions, and Agent information can include relationships between individuals and groups (e.g. employed by, student of, not the same as).

11. **Capacity for handling complex information related to extended data facets such as traits of (e.g. morphometrics) and interactions between (e.g. parent-child) collection objects**: Arctos supports recording of traits (attributes) as well as relationships between collection objects (parent/offspring, parasite/host, same individual as, same lot as etc.) via additional identifiers for both catalog records and individual parts. All catalog records receive a globally unique identifier (GUID) in the form of a URL which can be used to form reciprocal links between Arctos collections and institutions as well as to external web resources such as GenBank. Individual parts may also be assigned a GUID as well as barcodes to facilitate object tracking and transaction management. Code-table controlled attributes allow for recording of physical traits as well complex metadata such as pathogen testing methods and results. New relationships and attributes can be easily incorporated to accommodate new data types.

12. **Capacity for facilitating linkages between collection objects and extended data stored elsewhere, such as a genetic data repository**: Arctos can use any globally unique identifier allowing for links to people (ORCiD, Wikidata, Library of Congress), places (Mindat locality identifiers), extended data (GenBank, GBIF, iDigBio, IsoBank, MorphoSource), media both within Arctos and externally, and other cataloged items both within the Arctos community and to any other systems that provide a GUID.

13. **Capacity for facilitating collection management transactions, such as loans, accessions, and transfers**: Arctos manages accessions, loans, permits, and borrows. Transfers are recorded as a special type of loan. Specific loan requirements (e.g. Nagoya benefits sharing) can be associated with catalog records via encumbrances. Arctos facilitates the creation of customizable paperwork templates for transactions such as printable loan invoices and ledger pages, as well as reminders of due dates for loans. Transactions can be linked to specific Projects in Arctos, which can collate and track the use of material across collections and institutions, as well as publications and other products resulting from transactions.

14. **Capacity for facilitating physical collections care including tracking storage locations and condition reporting**: Arctos includes an object tracking module, which may be used with barcodes, and is integrated with the catalog records and with transaction processing. Part condition and preservation is recorded with a timestamp feature, allowing users to see a condition history associated with individual parts.

15. **Capacity to manage media (e.g., 2D images, 3D images, audio, video), and/or to work in sync with a dedicated Digital Asset Management System**: Arctos provides media storage and allows for linking of media of any type with catalog records, agents, transactions, events, and more..

16. **Capacity for mobilizing collection object data (e.g., publish directly to an IPT, or export custom text files)**: After an initial connection with the IPT, collection data is automatically updated monthly. Collection data can be downloaded in csv format.

17. **Capacity for mobilizing collection object media (e.g., serve publicly online via a stable URI)**: Any media uploaded to the Arctos media storage are immediately publicly available with a stable URI. Arctos media are securely stored at the Texas Advanced Computing Center (TACC). Media may be hosted through other sources. Media not hosted by Arctos but linked to Arctos data may be public or restricted.

18. **Ability for users to customize the CMS**: The Arctos Community actively guides the development of Arctos. All members can suggest changes and participate in development discussions through a community forum at GitHub and monthly meetings.

IMPLEMENTATION QUESTIONS

19. **Computer infrastructure (hardware, software) required**: Arctos is a web-based system, with data securely hosted and backed up through the TACC supercomputing system. Users need only a computer or mobile device with a browser and Internet access.

20. **In-house IT expertise required**: None

21. **Estimated costs for initial set up**: Incoming collections pay a collections set-up fee of $105.

22. **Estimated costs for ongoing expenses such as membership or upgrades**: Member financial contributions are on a sliding scale. The first 10,000 records are free with no per record fee. See https://arctosdb.org/join-arctos/financial-contributions/

23. **Migration or other new user services offered:** The Arctos Working Group mentors incoming collections and assists with data migration and training of incoming collections staff. Training webinars, tutorials, and the Arctos handbook are available at https://arctosdb.org/learn/.

24. **Example institutions/collections using your CMS**: Our list of institutions and collections are here: https://arctos.database.museum/home.cfm

25. **Representative for potential users to contact**: Complete the Prospective Collection Information Form https://docs.google.com/forms/d/e/1FAIpQLSec0BuRKDGDjqxT1fRI31GbZc0TORLK6DoLjZReQfnl5iIyDA/viewform or email arctos-working-group-officers@googlegroups.com

26. **Best resources to point potential users to (e.g., presentations, brochures, recorded webinars)**: Arctos 2-page Highlights (downloadable PDF): https://arctosdb.org/what-is-arctos/ Arctos Website - https://arctosdb.org/ Arctos Handbook - https://handbook.arctosdb.org/ Arctos Search Portal - https://arctos.database.museum/SpecimenSearch.cfm