

Software/Tool Comparison Worksheet

Criteria	Evaluation
Name	Symbiota
Website/Contact	<p>http://symbiota.org</p> <p>Corinna Gries Ph.D. Center for Limnology University of Wisconsin - Madison 680 N. Park St. Madison, WI 53706 (608)-890-3446</p> <p>Thomas Nash Ph.D. Dept. of Plant Biology Arizona State University Box 871601 Tempe, AZ 85287-1601</p> <p>Edward Gilbert Lead Developer Symbiota Software Project Global Institute of Sustainability (GIOS) Arizona State University PO Box 875402 Tempe, AZ 85287-5402</p>
Description	<p>Symbiota is a collection of open source, web-based tools designed to integrate biological community knowledge and data for the stated purpose of aiding biologists with establishing specimen-based virtual floras and faunas. Symbiota is organized into three central modules: Occurrence, Floristic, and Identification Keys. The Occurrence Module gives users the ability to query specimen and/or observation records by taxonomic, geographic, or collector criteria. Results can be rendered as a simple list of specimen records, distribution map, or as a unique species list. The Floristic Module features searchable species lists. The Identification Keys Module uses species lists and/or occurrence records to dynamically generate interactive identification keys from a hierarchically arranged morphological dataset. Each of these modules can be installed separately, or configured to work in concert. When configured to work together, linking species lists to voucher records allows users to view the specimen records that verify the observation, often with an image of the specimen. Specimen occurrence records integrated with morphological data enables an identification process that allows users to limit possible identifications geographically based on expert-reviewed observations as well as morphological characters.</p>

	<p>Symbiota is currently implemented in at least eight active data portals, encompassing collection data from a variety of organismal groups, including voucher and observation records for plants, bryophytes, lichens, birds, amphibians, reptiles, mammals, fish, and insects. These eight portals include:</p> <ul style="list-style-type: none"> • SEINet (Southwest Environmental Information Network) • Consortium of North American Bryophyte Herbaria (CNABH) • Consortium of North American Lichen Herbaria (CNALH) • Cooperative Taxonomic Resource for American Myrtaceae (CoTRAM) • Herbario Virtual Austral Americano (HVAA) • Intermountain Regional Herbarium Network (IRHN) • Madrean Archipelago Biodiversity Assessment Project (MABA) • Southwest Collections of Arthropods Network (SCAN) <p>Collections desiring to use Symbiota for collections management have two options:</p> <ul style="list-style-type: none"> • Joining and contributing to an existing portal • Establishing a new portal
<p>Computer hardware Operating system</p>	<p>Collections that wish to establish a new Symbiota portal must have hardware to support the following minimum requirements.</p> <p>System Requirements</p> <ul style="list-style-type: none"> • Apache HTTP Server (2.x or better) <ul style="list-style-type: none"> ◦ See Apache HTTP Server Project for more information • PHP (5.x or better) <ul style="list-style-type: none"> ◦ PHP Project ◦ Enable extensions: GD image library, mbstring, zip, exif ◦ Optional: PHP Exif Library (PEL) - enables the preservation of exif data when images are resized ◦ Optional: PEAR package Image Barcode - enable barcode generation on specimen labels • MySQL (5.x; 5.1 or higher recommended) <ul style="list-style-type: none"> ◦ MySQL Database Server Project • SVN Client - Needed for installation via source code <ul style="list-style-type: none"> ◦ e.g. Tortoise SVN - implemented as a Microsoft Windows shell extension <p>Source Code</p> <ul style="list-style-type: none"> • Symbiota Project on Source Forge <ul style="list-style-type: none"> ◦ SVN checkout instructions • Installation Instructions from source code

	<p>Configuration Files and Custom Look & Feel</p> <ul style="list-style-type: none"> • Header - The header graphics defined within the header.php include file determines the header design for all pages • Footer - Footer layout is defined in the footer.php file • Menu - What central features are include or excluded are controlled by modifying the menu.php file • Cascading Style Sheet - A set of css can be used to customize layout, fonts, and so much more • Symbiota ini - Several configuration variables are defined within symbini.php.
<p>Additional hardware required</p>	<p>None</p>
<p>Features</p>	<p>Provides a functional, easy-to-use interface for data management and searching.</p> <p>Search algorithms allow querying by taxonomy, geography, and collector details, including an interactive bounding box to narrow searches to a specific geographic region.</p> <p>Provides synonym resolution for taxonomic searches, enabling searches to return a complete dataset including synonymous names.</p> <p>Provides taxon-specific distribution maps linked to specimen records.</p> <p>Handles various images, including field documentation, physical specimens, and vouchered observations linked to text records.</p> <p>Configured to link to images stored on a Symbiota server or another stable URL.</p> <p>Built on the open source MySQL database engine with a single, comprehensive database schema.</p> <p>Database schema is strongly aligned with the Darwin Core data exchange standard. Software supports uploads that are compliant with and can be mapped to any version of Darwin Core.</p> <p>Supports “snapshot” and “live dataset” options. Data can be ingested and edited via an administrative interface within an instance of the portal, or via data upload with one of the following protocols or mechanisms:</p> <ul style="list-style-type: none"> • Direct Upload – Database to database transfer from source to the Symbiota node, • DiGIR Upload – one of the most widely endorsed protocols for

	<p>data exchange of natural history collections,</p> <ul style="list-style-type: none"> • TAPIR Upload, • CSV File Upload – Collection data manager has the ability to perform on-demand uploads of flat text data files that are extracted from a source database, • System Script – MySQL source to Symbiota database that is located on a different server, • SQL Stored Procedure – transfer from source schema to Symbiota database located on the same MySQL database server. <p>Incorporates Optical Character Recognition software and reveals the extracted text on the data entry interface.</p> <p>Incorporates duplicate records checks across consortium databases with the capacity to harvest data from matching records.</p> <p>A major strength of Symbiota is its focus on building networked portals that serve a wide range of museums or institutions through a single interface, making it possible to search one or many related collections.</p> <p>The website includes numerous help files.</p>
Market presence	Development of Symbiota began August 2008. The first code release was May 2010.
Initial cost	<p>There is no cost for contribution of data to an existing Symbiota portal. There are also no costs related to Symbiota or its related software.</p> <p>For those who desire to create a new Symbiota portal and depending upon institutional arrangements with IT staff, there could be costs associated with server setup, server software, and portal setup, as well as with Symbiota and MySQL installation and maintenance.</p>
Maintenance cost	<p>There are no costs associated with maintenance of the Symbiota software or use of a pre-existing Symbiota portal.</p> <p>However, establishing a portal may require continuing maintenance costs. Since Symbiota is server-based software running on a MySQL platform, provision must be made for costs related to server and server software maintenance, which might include the services of IT personnel.</p>
Ease of setup/ prerequisite skills	<p>To establish a relationship with an existing data portal is not difficult. Instructions are available at http://symbiota.org (http://symbiota.org/tiki/tiki-index.php?page=Specimen+Integration).</p> <p>Workshops are offered and sometimes custom-designed for those who wish to establish or use a new portal. Further information is available at http://symbiota.org/tiki/tiki-index.php?page=SymbiotaWorkshops.</p>

	<p>Installation instructions are available from http://symbiota.org, http://symbiota.org/tiki/tiki-index.php?page=Installation+Instructions</p> <p>Available downloads include a compressed (tar) file that contains the website code and database schema. The database schema can be imported directly into MySQL via a set of pre-built queries. Portal code can be extracted into the website root directory, but must be substantially modified to produce a customized website.</p>
<p>Continuing IT support required?</p>	<p>No continuing local IT support is required when contributing to an existing portal.</p> <p>Installing and creating a new portal requires ongoing IT support to maintain server, website, and software.</p>
<p>Special skills required for maintenance</p>	<p>No special skills are required for users who wish to use a Symbiota portal as a management interface without the need to upload contributed data.</p> <p>Collections that wish to upload data to an existing portal must develop upload mapping and protocols, which requires an understanding of the source database and how to export from it.</p>
<p>Challenges</p>	<p>Challenges relate mostly to collections that wish to establish an individual web portal, which requires personnel schooled in and proficient with MySQL administration, website development, website management, and web server management.</p>