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| **Purpose** | **Data type** | **User group** | **Tool name** | **Description of tool** | **Operating Systems** | **Standard supported** | **Requirements for implementation** | **Testing results** | **Link to the source, tutorials, manuals** |
| Data sharing, distributed | Occurrence data (collections, taxonomy), Monitoring data (including sample-based data) | Scientists,  Monitoring sites | GBIF Integrated Publishing Toolkit (IPT) | Tool to publish and share biodiversity data sets and metadata through the GBIF network. Allows publication of three types of biodiversity data:   * primary occurrence data (specimens, observations), * species checklists and taxonomies, * sample-based data from monitoring programs | Windows, MacOS, Linux | DwC, DwC-A, EML | Enhancement with the Event core to handle sample-based data.  Darwin Core standard enriched with quantitative measurements. | Tested by different partners.  Several datasets from test sites are published: http://www.gbif.org/dataset/search?q=&type=SAMPLING\_EVENT  There is an ongoing discussion at GBIF community site on sample-based publishing. | Download: http://www.gbif.org/ipt  User manual: <https://github.com/gbif/ipt/wiki/IPT2ManualNotes.wiki>  Community site: <http://community.gbif.org/pg/groups/47949> |
| Data sharing, centralized | Metadata (Monitoring, environmental science, ecology) | Monitoring sites | DEIMS (Drupal Ecological Information Management System) | Drupal open-source, collaborative platform, that provides a web interface for scientists and researchers' networks, projects and initiatives with a metadata management and data sharing system. | Windows, Linux | EML, ISO |  | Tested by CSIC. Datasets from Doñana LTER site are published. | Repository: <https://data.lter-europe.net/deims/>  EML handbook: <https://data.lter-europe.net/deims/sites/data.lter-europe.net.deims/files/emlbestpractices-2.0-FINAL-20110801_0.pdf> |
| Data sharing and exchange, distributed | Data | Scientists, Monitoring sites, Citizen scientists | Spreadsheet processors (e.g. Excel, GBIF spreadsheet processor, DataUp , Dash) |  | Windows, MacOS |  | Explore ways to generate and deposit a metadata file (in EML) by DataUP and made data available for discovery and use (by GBIF) for the public. | DataUp is tested by Doñana site. | GBIF spreadsheet processor: <http://tools.gbif.org/spreadsheet-processor/> |
| Data publishing  (Scholarly publishing), centralized | Data and metadata | Scientists, Monitoring sites | PWT or ARPHA Publishing Platform | Narrative (text) and data integrated publishing workflow, launched to mobilize, review, publish, store, disseminate, make interoperable, collate and re-use data through the act of scholarly publishing. | x | DwC, DwC-A,  EML | A new plugin developed which makes it possible to convert metadata into a manuscript for scholarly publications, with a click of a button.  A possibility to easily import occurrence records into a taxonomic manuscript in ARPHA.  An automatic export and integration of PlutoF data into Pensoft’s ARPHA platform via API. | The AWT is fully operational and currently used by three Pensoft journals – Biodiversity Data Journal, Research Ideas and Outcomes and One Ecosystem . | AWT: <http://arpha.pensoft.net/>  BDJ: <http://bdj.pensoft.net/>  RIO: <http://rio.pensoft.net>  One Ecosystem: <http://oneecosystem.pensoft.net>  A tutorial for the use of ARPHA called “Trips and tricks” is available on the website at: <http://arpha.pensoft.net> |
| Data mining | Historical data, data from publications | Scientists | GoldenGATE Imagine or TreatmentBank and DwC | A platform to store, annotate, access and distribute taxonomic treatments and the data objects within. It offers with GoldenGate[1] and respective XML schemas (TaxonX[2], TaxPub[3]) tools to convert unstructured text into semantically enhanced documents with an emphasis on taxonomic data like treatments, scientific names, materials observation, traits or bibliographic references. | x | DwC,  DwC-A | Taxpub as domain specific extension of the Journal Article Tag Suite has been developped to model the semantic content of the biodiversity literature; RDF and a treatment ontology is under development. (<https://github.com/plazi/TreatmentOntologies> ) | DwC-A are routinely used to transfer data from Plazi to GBIF since 2014;  TaxPub is used to import publications from Pensoft of Plazi;  GoldenGate conversion is operational and successfully used for conversions (Miller et al., 2015). | API: <http://plazi.org/wiki/Treatment_Data_Access>  GoldenGate Imagine software and manual: <http://plazi.org/wiki/GoldenGATE_Editor> |
| Data sharing, distributed | Metadata , ecological data | Scientists, Monitoring sites | Morpho Metadata Editor (KNB) and Metacat | Application designed to facilitate the creation of metadata so that scientist can easily locate and determine the nature of a wide range of data sets. It interfaces with the Knowledge Network for Biocomplexity (KNB) Metacat server. | Linux, PostGreSQL | EML | Explore using Morpho (editor) and Metacat (servers) for managing ecological metadata to access and expose LTER sites /datasets.  Design feasibility test to clarify and document the requirements for implementation. | Tested by CSIC and INPA. | [https://knb.ecoinformatics.org/#tools/morpho](https://knb.ecoinformatics.org/" \l "tools/morpho)  Morpho user guide: <https://knb.ecoinformatics.org/software/dist/MorphoUserGuide.pdf>  <https://knb.ecoinformatics.org/knb/docs/>  Metacat Administrator's Guide: (<http://knb.ecoinformatics.org/software/dist/MetacatAdministratorGuide.pdf>) |
| Data sharing, centralized | Occurrence data (collections, observation, molecular), monitoring data, metadata | Scientists, Monitoring sites, Citizen scientists | PlutoF Platform, PlutoF-API,  Mobile apps | Online service to create, manage, share, analyse and mobilise biodiversity data. Data types cover ecology, taxonomy, metagenomics, nature conservation, natural history collections, etc. | x    Android | EML | Implementing use of high-end devices to mobilize data from the public, while focusing on quality of data. | Tested by UTARTU, INPA and in Israel. | PlutoF: <http://plutof.ut.ee>  App: [On Google Play](https://play.google.com/store/apps/details?id=com.gluecad.isawabutterfly&hl=en) |