

General requirements for LTER

Context of general requirements in LTER

Long-Term Ecosystem Research (LTER) is an essential component of world-wide efforts to better understand ecosystems. This comprises their structure, functions, and long-term response to environmental, societal and economic drivers. LTER contributes to the knowledge base informing policy and to the development of management options in response to the Grand Challenges under Global Change.

From the beginning (around 2003) the design of LTER-Europe has focused on the integration of natural sciences and ecosystem research approaches, including the human dimension. LTER-Europe was heavily involved in conceptualizing socio-ecological research (LTSER). As well as LTER Sites, LTER-Europe features LTSER Platforms, acting as test infrastructures for a new generation of ecosystem research across European environmental and socio-economic gradients.

LTER aims at providing information on ecosystem functioning and processes as well as related Drivers and pressures for a whole ecosystem (a watershed). This information is very diverse in its technical formats (sensor Information, Aerial photographs, recordings, Pictures...). The purpose of the RI is to focus on harmonized data products.

A typical use case would be to use data on selected ecosystem compartments (e.g. soil) to feed models on ecosystem change (e.g. effects of climate change and disturbance on carbon pools). The RI is aimed at providing the required datasets with help of a discovery portal (standardized metadata) and harmonized data Access rules (in Progress).

LTER-Europe represents a distributed network of data acquisition and management with central facilities on data documentation and discovery. Data acquisition and Quality control is done by the single sites and usually stored locally. The metadata on the available datasets (including time-series) are provided via the DEIMS platform centrally. IN LTER-Europe are identified three different Levels of IT-capabilities of the sites:

advanced (e.g. TERENO= a cluster of sites) providing metadata (CSW) and data (SOS, WFS, WMS) as services, **regular** (e.g. LTER Zöbelboden) providing data in local databases with Basic metadata descriptions but lacking an online metadata catalogue and

basic lacking IT capabilities to provide Long term storage and preservation of their data (e.g. small Research Groups at universities). DEIMS provides a central repository of metadata on

a) Research sites (representing the Location on different Levels for the data acquisition)

b) data sets (including Service based data Provision)

c) persons (including institutions and Networks)

and also providing a possibility to upload and share data files from basic and regular sites.

DEIMS (<http://data.lter-europe.net/DEIMS>) is the data discovery Portal providing full text and faceted search. Data Access is provided either by direct download from the DEIMS repository or the user is redirected to the local download or Service link provided by the data Provider.

In future a design of distributed metadata and data nodes (local DEIMS instances) with a central discovery platform will be implemented (see H2020 eLTER Project).

For data storage LTER uses a wide range of solutions (file based: csv, netCDF, Excel; databases: Postgres, ORACLE, MySQL; GIS: spatial databases, shapefiles, grids etc.). The decision on the software solution is done by the local data Manager

For metadata provision and discovery platform: metadata editor based on US-LTER DEIMS extended by features on site and person description. DEIMS is based on DRUPAL 6 currently being migrated to DRUPAL 7.

The responsibilities of the users involved in the use case are distributed as follows:

- local data manager: data acquisition, quality control, metadata provision
- LTER data Manager (Johannes Peterseil): Discovery Portal and Metadata Editor (DEIMS)
- data user: download and use without registration

As how it concerns data exchange data are described and shared using **DEIMS**. Dataset are provided with the relevant metadata (EML /ISO19115). Metadata can be harvested from DEIMS. Data either can directly be downloaded or accessed via services, if provided by the data owner. A final data policy needs to be implemented.

Strength: integrative documentation of research sites, datasets, persons, networks, publication. Can easily be extended to other types of information e.g. sensors, stations

Weakness: export of data needs to be programmed, no relational database, no standards currently for research site MD exchange (except for INSPIRE EMF)

Other software in use for thesaurus are PoolParty / TopBraid and for data repository B2SHARE which is in testing phase.

Use of standards: for metadata EML / ISO19115 are used. Data are not standardized; using EnvEurope data reporting sheet for file based data exchange. Some data provider provide data as time series using SOS as standard data model.

strength: harmonization of MD

weakness: harmonization of underlying data often difficult and depend on the use of the data

LTER is considering the application of Prov-O for provenance tracking and description

1. OAI-PMH for Metadata exchange needs to be evaluated as well as data exchange standards (e.g. iMarine, SeaDataNet, ...). currently testing of TopBraid, alternative Thesaurus managers (e.g. iqVOC) are in considerations. Working practices are in development as part of the eLTER H2020 project.

Relevant links:

<http://data.lter-europe.net/deims/research-site/documentation>

<http://data.lter-europe.net/deims/dataset/documentation>

<http://data.lter-europe.net/deims/person/documentation>

<http://data.lter-europe.net/deims/network/documentation>

<http://vocabs.lter-europe.net/EnvThesDev.html>

Parts to be improved for LTER to achieve the operational goals are:

- Migration of DEIMS MD portal and editor to Drupal 7 (nearly done) as core element of the LTER data infrastructure.
- integration of data repository into the workflow (e.g. B2SHARE)
- development of a integrated data portal (e.g. with timeseries viewer)

Open Source: Tools developed within the RI and related project can be shared with the scientific community. Metadata are free without restrictions. Data are free in principal if collected in European scale scientific projects but local restrictions could apply.

The big open problems are:

- data documentation and online availability
- data harmonisation

Summary of LTER general requirements

Detailed requirements

Formalities (who & when)

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Period of requirements collection	20150901
Status	gathering