

## BUILDING THE eLTER INFORMATION SYSTEM

eLTER is building an IT infrastructure based on both established community tools and new services developed specifically to support the users of the eLTER RI. This means that some elements of the infrastructure are already in service for eLTER users and well populated with information (e.g. DEIMS-SDR) while others are still in the pilot or pre-operational phase (eLTER DAR). All elements of the infrastructure are built to utilise community standards for data services to ensure that eLTER contributes to the development of FAIR principles in access and dissemination of services and data. eLTER supports cloud-based collaborative environments (e.g. DataLabs) so that the development of new analysis methods and data products can be a community effort.



The eLTER RI is designed to enable a Whole Systems Approach (WAILS) in socio-ecological research. This requires the development of a wide range of data and analytical services. The IT tools to deliver these services have been developed over a number of years and now form key components of the eLTER Information System. Through prototyping data workflows and web applications, the functionality of these tools is now being extended to the initial IT services for the evolving eLTER RI.

**The eLTER Information System** is designed to provide data management and service delivery at several levels (see Fig. 1) linking local and regional data providers to eLTER RI data product delivery by the means of common standards for finding and accessing information about eLTER's long-term research facilities, their capabilities, related data products and the IT services provided. These services interoperate so that information can be accessed by the user and providers of data through the appropriate web service or portal.

The eLTER Information System will provide the facilities to describe and discover, explore, and access long-term ecological observations from across the eLTER Site and eLTER Platform network including historic records as well as the eLTER Standard Observations. We seek to support flexible integration of the eLTER RI with partner research infrastructures using open standards to integrate across data search and access services.

### Key Components of the eLTER Information System

- Site registration (DEIMS-SDR) holds standard documentation of long-term observation facilities (<https://deims.org>)
- eLTER Digital Asset Register holds documentation of eLTER's digital assets including signpost links to where legacy datasets have been published (<https://catalogue.lter-europe.net/elter/documents>)
- Data Integration Portal (currently EcoSense) enables discovery, visualise and access data sources provided through the data nodes (<https://ecosense.biosense.rs/#/home>)
- Central Data Node (CDN) stores and disseminates standardised and quality assured data (current spatial data layers) - <https://elter.datalabs.ceh.ac.uk/geoserver/web/wicket/bookmarkable/org.geoserver.web.demo.MapPreviewPage?0&filter=false>)
- Common controlled vocabulary (EnvThes) are a semantic backbone for keyword tagging and discovery of observations (<https://vocabs.lter-europe.net/en/>)
- eLTER Data Labs are a collaborative platform for data integration and analysis (<https://datalab.datalabs.ceh.ac.uk>)



Within this architecture, data flows will enable access to a range of data including:

- **eLTER Standard Observation data** from the eLTER facilities that has been standardised to comply with eLTER data formats and nomenclatures (e.g. code lists, vocabularies and ontologies). These are held within the eLTER CDN at level 1 and 2 depending on their level of standardisation.
- **Derived data products** that have been created through synthesis of different data sets and / or modelling of eLTER Standard Observations and contextual data. This will include spatial interpolation of eLTER Site Data to form contiguous spatial coverages. These are held as level 3 data products within the CDN.
- **Contextual data** (e.g. satellite data, legacy observation data) that have been transformed to be compatible with other eLTER data assets covering observations outside the eLTER Standard Observations. These data may be restricted as they are available from other third party sources but are maintained for efficiency and provenance of eLTER RI data workflows. Nevertheless, a data licence enabling reuse of the data via a shared licence (e.g. CC-BY) needs to be ensured. These can be held in long-term third party repositories (e.g. EUDAT) or within the CDN depending on access requirements.

The concept of different levels of data assets (Levels 1 to 3) within the CDN and their derivation and provenance are also key drivers for the development of the eLTER DAR. The DAR aims to provide the metadata services required to describe how different data assets move through the eLTER Information System (more details on data harmonisation are provided in **InfoSheet 08**). This description of eLTER data assets includes standard vocabularies like EnvThes and ontologies like W3C DCAT and PROV-O. This development is critical for eLTER legacy data from long-term monitoring at research facilities to document its contribution to derived data products and how to access these data from digital repositories via the Digital Asset Register and site related information within DEIMS-SDR. Over time these data can be made more interoperable with Standard Observation data products to enable synthesised time series to be produced.

These IT components are the building blocks for the further development under the current eLTER PLUS and PPP projects towards a common data management framework for the eLTER RI and also support the wider eLTER network. We will now move from the phase of working with the eLTER researchers to produce demonstrators of eLTER functionality to engineering the core services through co-designed with eLTER stakeholders to transition them to operational RI services.

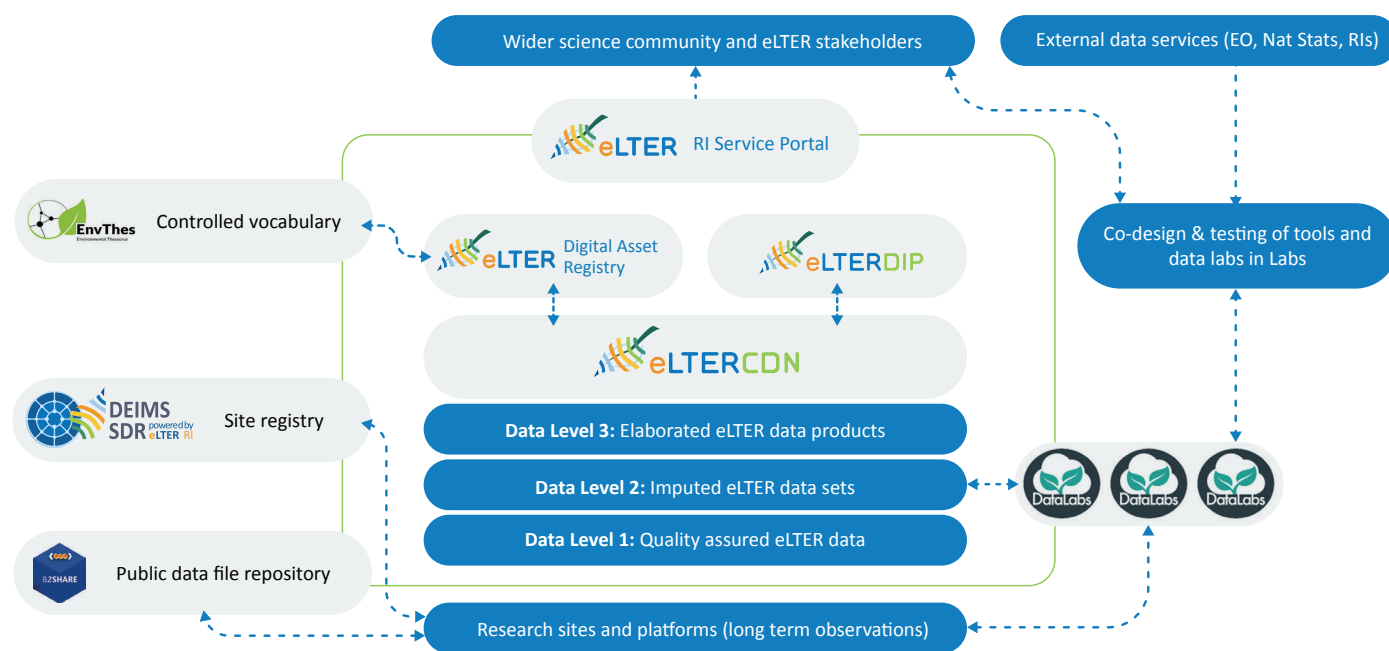


Fig. 1: eLTER Information System Architecture