

---

**OBEOS – Linked Data Prototype Software Release Document**

---

# **OBEOS**

## **Linked Data Prototype Software Release Document**

**Title** : OBEOS  
Linked Data Prototype Software Release Document

**Abstract** : This document describes the initial version of the OBEOS Linked Data Prototype software.

In particular, the document details the status of the software, the known problems and its current limitations.

---

**OBEOS – Linked Data Prototype Software Release Document**

---

## Table of Contents

<b>1</b>	<b>Introduction.....</b>	<b>1</b>
1.1	Purpose of the Document.....	1
1.2	References .....	1
1.3	Glossary of Terms .....	2
1.4	Acronyms and Abbreviations.....	3
<b>2</b>	<b>Software Release Overview.....</b>	<b>4</b>
2.1	Introduction .....	4
2.2	Delivered Version .....	4
2.3	Software Status .....	4
2.4	Advices for Use .....	4
<b>3</b>	<b>Status of the software configuration item .....</b>	<b>5</b>
3.1	Evolution since previous version .....	5
3.2	Known problems or limitations.....	5
<b>4</b>	<b>Advice for use of the software configuration item .....</b>	<b>6</b>
<b>5</b>	<b>On-going changes .....</b>	<b>6</b>

## List of Tables

Table 1 – References .....	1
Table 2 – Glossary of Terms .....	2
Table 3 – Known Problems and Limitations .....	5

## OBEOS – Linked Data Prototype Software Release Document

# 1 Introduction

## 1.1 Purpose of the Document

The document describes the status, the known problems, and the current limitations of the Linked Data Prototype software, initially developed in ESA project OBEOS.

Apart from the current chapter, this Linked Data Prototype Software Release Document is structured as follows:

- Chapter 2 gives an overview of the released software.
- Chapter 3 indicates the status of the software, the known problems and limitations.
- Chapter 4 describes in which context the software should be used.
- Chapter 5 provides information on the on-going changes and the planned evolution of the software.

## 1.2 References

Table 1 – References

Id	Reference
[EO-LD]	<b>EO Metadata Discovery using Linked Data</b> OBEOS-SPB-D3100.1 OGC Discussion Paper referenced OGC 16-074, Version 0.2.0, 25-Mar-2016
[LDP-SCF]	<b>OBEOS Linked Data Prototype Software Configuration File</b> OBEOS-SA-D5220.4, Issue 2.0.0, 12-Apr-2016
[LDP-SUM]	<b>OBEOS Linked Data Prototype Software User Manual</b> OBEOS-SA-D5220.9, Issue 2.0.0, 12-Apr-2016
[LDP-SVS]	<b>OBEOS Software Validation Specification Contribution (Restricted)</b> OBEOS-SA-D5220.5, Issue 1.2.0, 18-Feb-2016
[LDP-SVR]	<b>OBEOS Software Verification Report Contribution (Restricted)</b> OBEOS-SA-D5220.6, Issue 1.0.0, 18-Feb-2016
[CKAN]	<b>CKAN – The Open Source Data Portal Software</b> <a href="http://ckan.org/">http://ckan.org/</a>
[ISO-19115]	<b>Geographic information — Metadata — Part 1: Fundamentals</b> Reference: ISO 19115-1:2014(en) <a href="https://www.iso.org/obp/ui/#iso:std:53798:en">https://www.iso.org/obp/ui/#iso:std:53798:en</a>
[INSPIRE]	<b>INSPIRE Glossary</b> <a href="http://inspire.ec.europa.eu/glossary">http://inspire.ec.europa.eu/glossary</a>
[W3C-3Store]	<b>Triple Store</b> <a href="https://www.w3.org/2001/sw/Europe/events/20031113-storage/positions/rusher.html">https://www.w3.org/2001/sw/Europe/events/20031113-storage/positions/rusher.html</a>
[GEOSS]	<b>Global Earth Observation System of Systems</b> <a href="http://www.earthobservations.org/geoss.php">http://www.earthobservations.org/geoss.php</a> <a href="http://www.geoportal.org/web/guest/geo_home_stp">http://www.geoportal.org/web/guest/geo_home_stp</a>
[GEMET]	<b>GEneral Multilingual Environmental Thesaurus</b> <a href="http://www.eionet.europa.eu/gemet">http://www.eionet.europa.eu/gemet</a>
[GCMD]	<b>Global Change Master Directory</b> <a href="http://gcmd.nasa.gov/">http://gcmd.nasa.gov/</a>

## OBEOS – Linked Data Prototype Software Release Document

Id	Reference
[CSCDA]	<b>Copernicus Space Component Data Access</b> <a href="https://spacedata.copernicus.eu/">https://spacedata.copernicus.eu/</a>
[Strabon]	<b>Strabon semantic spatiotemporal RDF store</b> <a href="http://www.earthobservatory.eu/Strabon">http://www.earthobservatory.eu/Strabon</a> <a href="http://www.strabon.di.uoa.gr/">http://www.strabon.di.uoa.gr/</a> <a href="http://www.strabon.di.uoa.gr/userguide">http://www.strabon.di.uoa.gr/userguide</a> <a href="http://hg.strabon.di.uoa.gr/Strabon/">http://hg.strabon.di.uoa.gr/Strabon/</a>
[GeoTriples]	<b>GeoTriples: a Tool for Publishing Geospatial Data as RDF Graphs Using R2RML Mappings</b> K: Kyzirakos, S: Manegold (CWI), I: Vlachopoulos, D: Savva, and M: Koubarakis (NKUA). In TerraCognita 2014. <a href="http://event.cwi.nl/terracognita2014/terra2014_3.pdf">http://event.cwi.nl/terracognita2014/terra2014_3.pdf</a> <a href="https://github.com/LinkedEOData/GeoTriples">https://github.com/LinkedEOData/GeoTriples</a>
[ISO-19139-GMI]	<b>Geographic Information -- Metadata -- XML schema implementation -- Part 2: Extensions for imagery and gridded data</b> Reference: ISO 19139-2:2012 <a href="http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=57104">http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=57104</a>
[OGC-EO-OM]	<b>Earth Observation Metadata profile of Observations &amp; Measurements</b> Reference: OGC 10-157r4 Version 1.1, 10/06/2014 <a href="http://www.opengeospatial.org/standards/om">http://www.opengeospatial.org/standards/om</a>

### 1.3 Glossary of Terms

Table 2 – Glossary of Terms

Dataset	Identifiable collection of data [ISO-19115] In the EO Community, a dataset is typically called “product”. A CKAN Dataset is a collection of data resources (such as files), together with a description and other information, at a fixed URL. Datasets are what users see when searching for data. [CKAN]
Dataset Series	Collection of datasets sharing the same product specification [ISO-19115] In the EO Community, a dataset series is also called “collection” or “dataset” (in CSCDA).
Metadata	Information describing spatial data sets and spatial data services and making it possible to discover, inventory and use them [INSPIRE Directive] NOTE A more general definition provided by ISO 19115 is “data about data”.
Ontology	Representation of a set of concepts within a domain and the relationships between those concepts [Wikipedia], [INSPIRE]
RDF Database	A storage tool for the persistent storage, indexing, and query access to RDF data. It is the W3C’s definition of <i>Triple Store</i> applied to RDF.
Triple Store	A triple store is designed to store and retrieve identities that are constructed from triplex collections of strings (sequences of letters). These triplex collections represent a subject-predicate-object relationship that more or less corresponds to the definition put forth by the RDF standard. [W3C-3Store]

---

## OBEOS – Linked Data Prototype Software Release Document

---

### 1.4 Acronyms and Abbreviations

The following acronyms are used in this manual. It is however not necessary to be familiar with them to make use of the OBEOS Linked Data Prototype software.

AD	Applicable Document
CKAN	Comprehensive Knowledge Archive Network
CSCDA	Copernicus Space Component Data Access
EO	Earth Observation
EOP	Earth Observation Product
ESA	European Space Agency
FP7	Seventh Framework Programme
GEMET	GEneral Multilingual Environmental Thesaurus
HTML	HyperText Markup Language
HTTP(S)	HyperText Transfer Protocol (Secure)
ISO	International Standards Organisation
LDP	Linked Data Prototype
O&M	Observation & Measurement
OBEOS	Ontology-Based Earth Observation Search
OGC	Open Geospatial Consortium
QR	Query Resolver
RD	Reference Document
RDF	Resource Description Framework
SPARQL	SPARQL Protocol and RDF Query Language
UoA	University of Athens
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
WKT	Well-Known Text

---

## OBEOS – Linked Data Prototype Software Release Document

---

## 2 Software Release Overview

### 2.1 Introduction

The Linked Data Prototype is a distributed platform exposing a Web-based user interface that allows users to search and discover Earth Observation and other geo-localized data encoded and published as Linked Data. The search engine communicates with an external component that performs a semantic-based analysis of the user queries.

The platform is powered by an augmented version of the CKAN Web access portal. In particular, a CKAN extension has been developed that integrates an ontology browser, adapts the user interface, and extends the default search engine with disambiguation and external communication capabilities.

The integrated ontology browser allows users to select in ontologies concepts related to his needs. The query disambiguation service assigns senses to user search strings and translates these senses (concepts, toponyms, time constraints, named entities, etc.) into low-level search criteria (area and time of interest, keywords, specific product properties).

Geospatial data is converted into Linked Data using a tool called GeoTriples (see [GeoTriples]), developed by the University of Athens (UoA) in EU FP7 project LEO. GeoTriples takes as input data that reside in plain files and converts them to RDF graphs. The transformation is driven by R2RML mapping definition files. Instructions for converting EO Dataset Series (ISO 19139-2:2012 GMI [ISO-19139-GMI]) and EO Datasets (OGC EOP O&M [OGC-EO-OM]) metadata into Linked Data, compliant with the schema proposed in the "EO Metadata Discovery using Linked Data" discussion paper [EO-LD], are provided in the Linked Data Prototype (LDP) Software Configuration File (SCF, see [LDP-SCF]).

The Linked Data is ingested in RDF databases (triplestores) powered by Strabon (see [Strabon]), developed by UoA in FP7 project TELEIOS. Strabon exposes a SPARQL interface and supports geo-temporal extensions compatible with GeoSPARQL. Instructions for setting-up and populating a Strabon instance may also be found in the LDP SCF.

### 2.2 Delivered Version

This document applies to the first public release of the OBEOS Linked Data Prototype software available from the following GitHub repository:

<https://github.com/SpaceApplications/ckanext-obeos-ldp>

### 2.3 Software Status

The software has passed, sometimes with comments, the Acceptance Test Procedures specified in the SVS Contribution document [LDP-SVS] and as reported in the SVR Contribution document [LDP-SVR]. Both documents are restricted.

Note: The LDP SVS and SVR documents are not publicly available.

Read more about the software status and the future plans in Chapter 3.

### 2.4 Advices for Use

The OBEOS Linked Data Prototype software must be considered as a working prototype to be used to demonstrate a number of concepts. The software has not been made designed and implemented to make it usable in an operational environment.

Read more about the use of the software in Chapter 4.

## OBEOS – Linked Data Prototype Software Release Document

### 3 Status of the software configuration item

#### 3.1 Evolution since previous version

This document describes the first public version of the OBEOS Linked Data Prototype. There is thus no previous version to compare with.

After the execution of the Acceptance Test Procedures (ATP) and before releasing the code, the user experience has been enhanced by providing better performances (e.g. by caching fetched data) and by displaying information in a more convenient manner (e.g. displaying maps instead of WKT strings, and showing "please wait" messages).

The software implements the features described in the LDP Software User Manual [LDP-SUM].

#### 3.2 Known problems or limitations

Execution of the Acceptance Test Procedures (ATP) specified in the SVS Contribution document [LDP-SVS] has shown that the software is not always behaving as intuitively expected, still without impacting the compliance with the requirements.

The observations collected during the execution of the test procedures may be found in the SVR Contribution document [LDP-SVR] and have been reproduced in Table 3, below. Strikethrough text is used to describe the issues that have been addressed and fixed.

We consider here a problem as an abnormal behaviour that cannot be avoided (no alternative or workaround available). On the other hand, a limitation is a problem for which there exists a workaround.

**Table 3 – Known Problems and Limitations**

Id	Description	Type
1	When the RDF Navigator is used to display EO Collection properties, it also displays the full list of associated EO Products. In the case of Landsat-8 L1T and L1GT, there are hundreds of them. This takes a lot of time to fetch and render on the screen. A solution should be found to limit the length of the list (in a generic manner) and indicate that the displayed list is not complete.	Problem
2	<del>In the Cross-Ontology Browser, switching ontologies works as expected in Google Chrome but not work in Mozilla Firefox.</del>	<del>Limitation</del>
3	When the OpenSource Query Resolver is used, the CKAN Dataset Search page shows a different amount of datasets than when the COTS QR is used. The reason is RESTo returns only a geo:geometry value for toponyms whereas the COTS Query Resolver returns geo:lat, geo:lon, geo:box, and a geo:geometry (for countries). The FedEO Gateway OpenSearch template only uses the geo:box value, if present. RESTo also returns "searchTerms=country:nepal", which is probably understood by FedEO.	Limitation

---

## OBEOS – Linked Data Prototype Software Release Document

---

### 4 Advice for use of the software configuration item

The OBEOS Linked Data Prototype User Interface is a Web-based software application accessible on-line using a classical Internet browser. It is advised to use a recent browser to access the application. The Web browser must have cookies and Javascript support enabled.

Because the user interface runs entirely in a Web browser, it can run on virtually any Operating System, even mobile ones. It must be noted however that some Web pages require the client browser to process incoming data and transform it into Web page. When the volume of the data is important, this can take some time. It is thus advised to use a relatively powerful client system.

The software has been developed to demonstrate a number of concepts, including:

- Disambiguation of free-text search queries and generation of product specific search criteria.
- Encoding of EO Dataset Series and EO Datasets metadata as Linked Data according to a future OGC Discussion Paper and discovery through OpenSearch (with the "geo", "time" and "eo" extensions) and GeoSPARQL interfaces.
- Use of ontology concepts for searching for semantically annotated entities.
- Generic visualization and navigation in Linked Data.

The verification (test procedures) applied on the LDP focussed on the above concepts. No verification has been performed to verify the proper functioning of other features supported by third party software (incl. CKAN, GeoTriples, and Strabon).

The OBEOS LDP is implemented as an extension for the CKAN Web portal. It is unlikely that the LDP extension may co-exist with other extensions.

### 5 On-going changes

No changes are currently worked on.