LifeWatch Greece data-services

On supporting metadata and semantic integration for the biodiversity domain

Nikos Minadakis, *Yannis Marketakis, Chryssoula Bekiari, Martin Doerr, Nicolas Bailly, Alexandros Gougousis, Stamatina Nikolopoulou, Dimitra Mavraki, Christos Arvanitidis*

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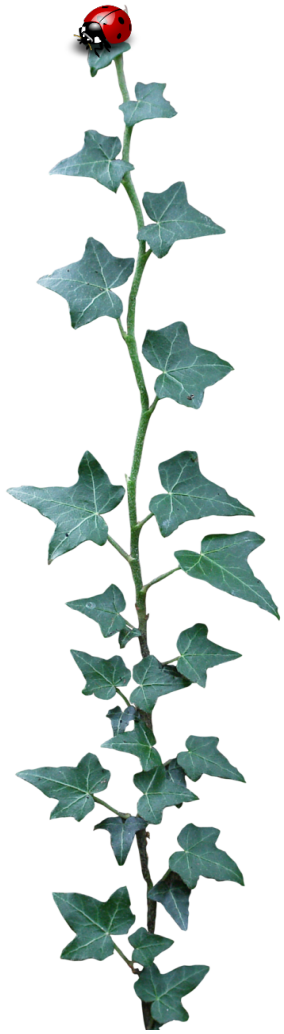
Outline

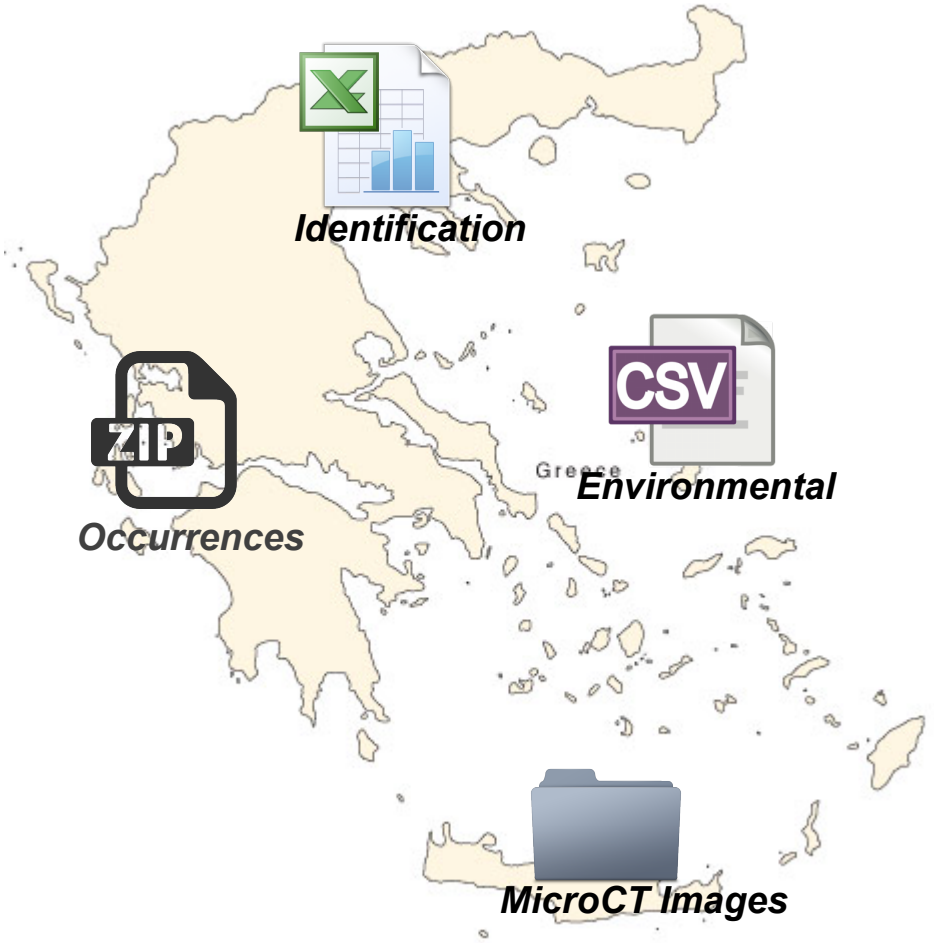
1. The Problem
2. The Goal
3. The Idea
4. Preparatory face
5. The Semantic Models
6. Data Services
7. User Interface / Examples
8. Conclusions



The problem

Main characteristics of biodiversity data:

1. Its ***cross-disciplinary character***.
2. The extremely ***broad range of data types*** and structures.
3. The variety of ***semantic concepts*** which encompasses.
4. It remains widely ***distributed*** and ***unconnected***.



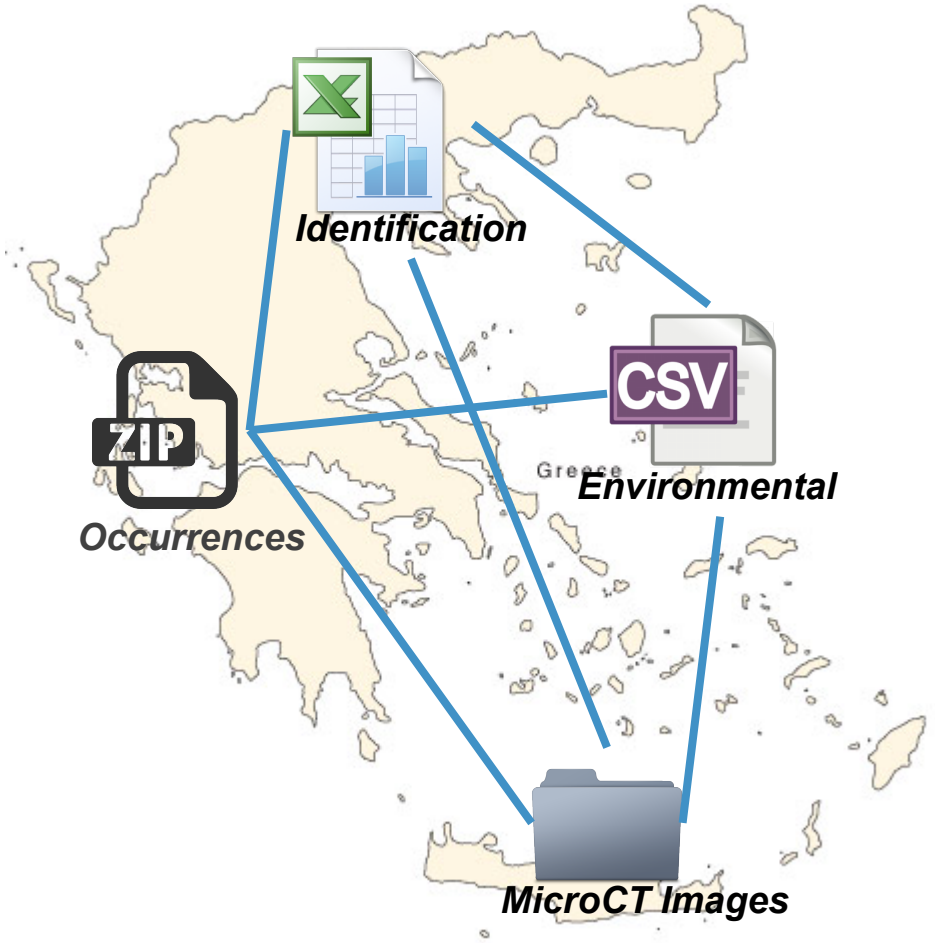
The goal

Our ***goal*** in the context of LW Greece:

1. ***support cataloguing and publishing of*** all the relevant meta-data information of the Greek biodiversity domain.

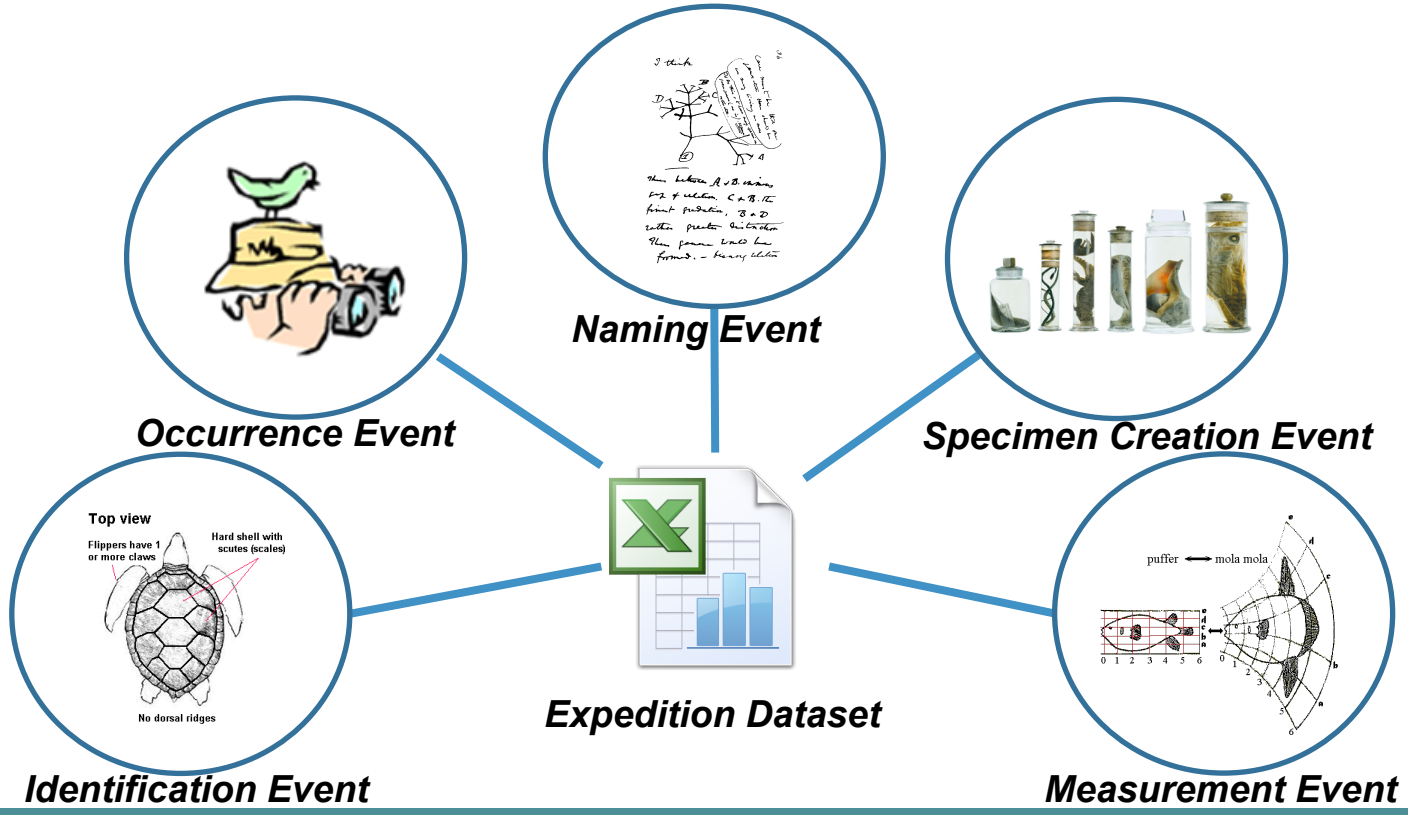
2. ***integrate data from heterogeneous sources*** by supporting the definitions of appropriate models.

3. ***efficiently discover biodiversity data*** of interest and enable the answering of complex queries that could not be answered from the individual sources.

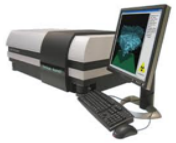


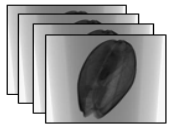
The Idea

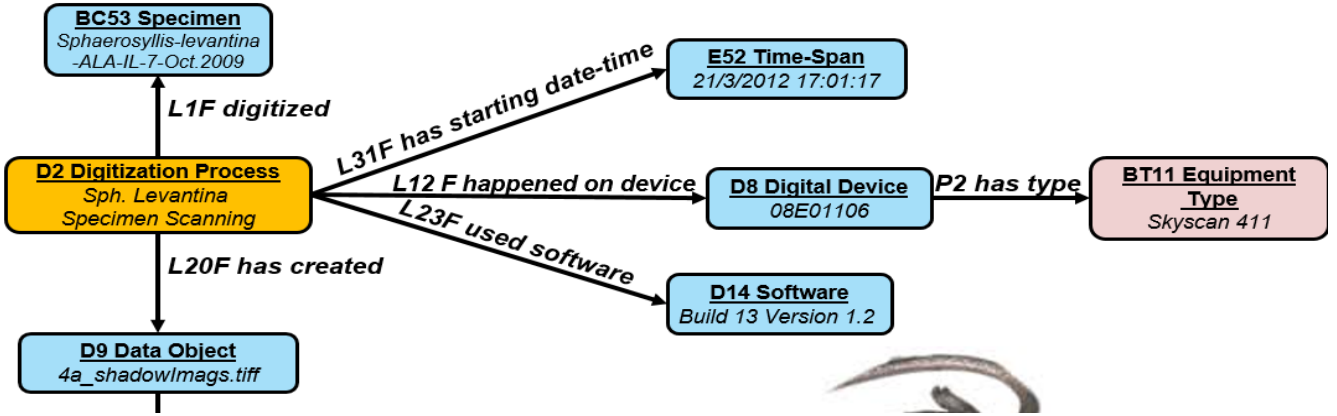
Exploit the events' information that is explicitly or implicitly contained in the datasets, ***model the different concepts and entities*** of the biodiversity domain and ***take advantage of the semantic graph***'s capabilities to navigate efficiently through the different contents and ***discover data of interest***.

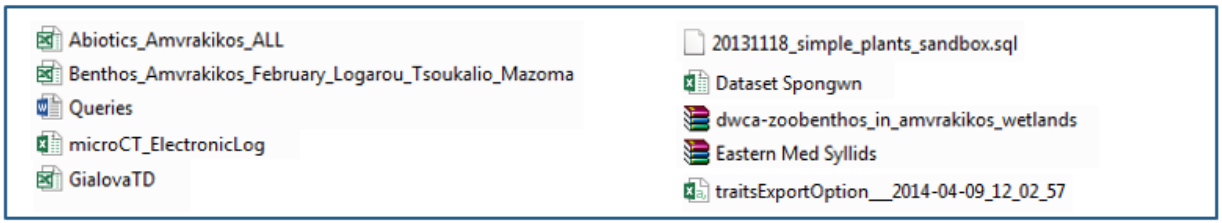


Preparatory Phase









EasternMedSyllids_110	Alykes	2011-09-26	San Martín 2003, 2004, Nygren 2004	Greece	en	Animalia
EasternMedSyllids_114	Alykes	2011-09-26	San Martín 2003, 2004, Nygren 2004	Greece	en	Animalia
EasternMedSyllids_116	Alykes	2011-09-26	San Martín 2003, 2004, Nygren 2004	Greece	en	Animalia
EasternMedSyllids_126	Alykes	2011-09-26	San Martín 2003, 2004, Nygren 2004	Greece	en	Animalia
EasternMedSyllids_129	Alykes	2011-09-26	San Martín 2003, 2004, Nygren 2004	Greece	en	Animalia

-The abundance records have the following format:

	A	B	C	D	...	AW	AY
1	ABUNDANCE						
2		WIST1R1	WIST1R2	WIST1R3		AUST4R3	CLASS
3	Abra segmentum	0	0	0	..	3	BIVALVIA
4	Axinulus croulinensis	0	0	0		0	BIVALVIA
5	Cerastoderma glaucum	0	0	0		5	BIVALVIA
6	Chamelea gallina	1	1	1		0	BIVALVIA
7	Clausinella brongniartii	0	0	0		0	BIVALVIA
8	Corbula gibba	0	0	0		0	BIVALVIA
9	Ctena decussata	0	0	0		0	BIVALVIA
10	Lucinella divaricata	0	0	1	..	0	BIVALVIA
11	Donacilla cornea	0	0	16		0	BIVALVIA
12	Donax venustus	0	0	0		0	BIVALVIA
13	Gouldia minima	1	0	3		0	BIVALVIA
	⋮		⋮			⋮	
71	Turbonilla lactea	0	1	0		0	GASTROPODA
72	Turbonilla striatula	0	0	0		0	GASTROPODA
73	Fustiaria rubescens	0	0	0		0	SCAPHOPODA
74					..		
75	SAMPLING	WI	WI	WI		AU	
76	STATION	1	1	1		4	
77	REPLICATE	1	2	3		3	

Find all scans depicting marine species
How many marine species have been originally described from the Mediterranean Sea?
How many stations have pH over or lower than x?

The Semantic Models

- **CIDOC CRM:** provides definitions and a formal structure for describing the implicit and explicit ***concepts and relationships*** used in cultural heritage domain, that can be applied effectively to a variety of domains such us ***biodiversity, geology, etc***. *(ISO 21127:2006).*

- **CRM*sci*** is a formal ontology indented to be used as a global schema for integrating metadata about scientific observation, measurements and processed data in descriptive and empirical.

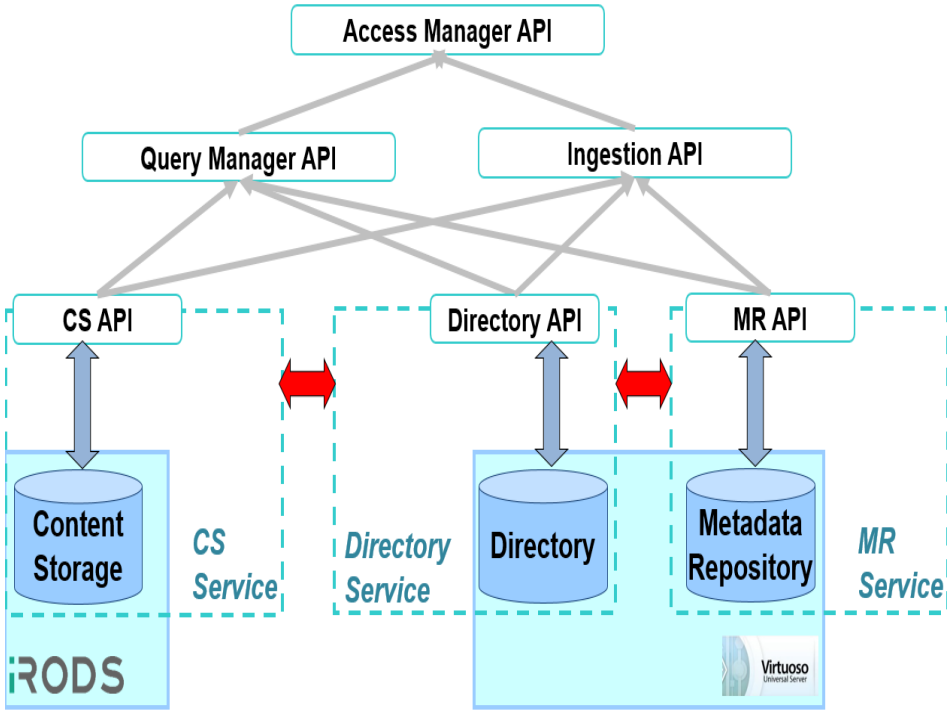
- **MarineTLO** aims at being a **global core model** that provides a common, agreed-upon and understanding of the concepts and relationships holding in the marine domain to enable knowledge sharing, information exchanging and integration between heterogeneous sources covers with suitable abstractions the marine and the terrestrial domain to enable the most fundamental queries,

Design and Implementation

- *3 Components Architecture*:
  1) Directory Service
  2) Metadata Repository
  3) Content Storage

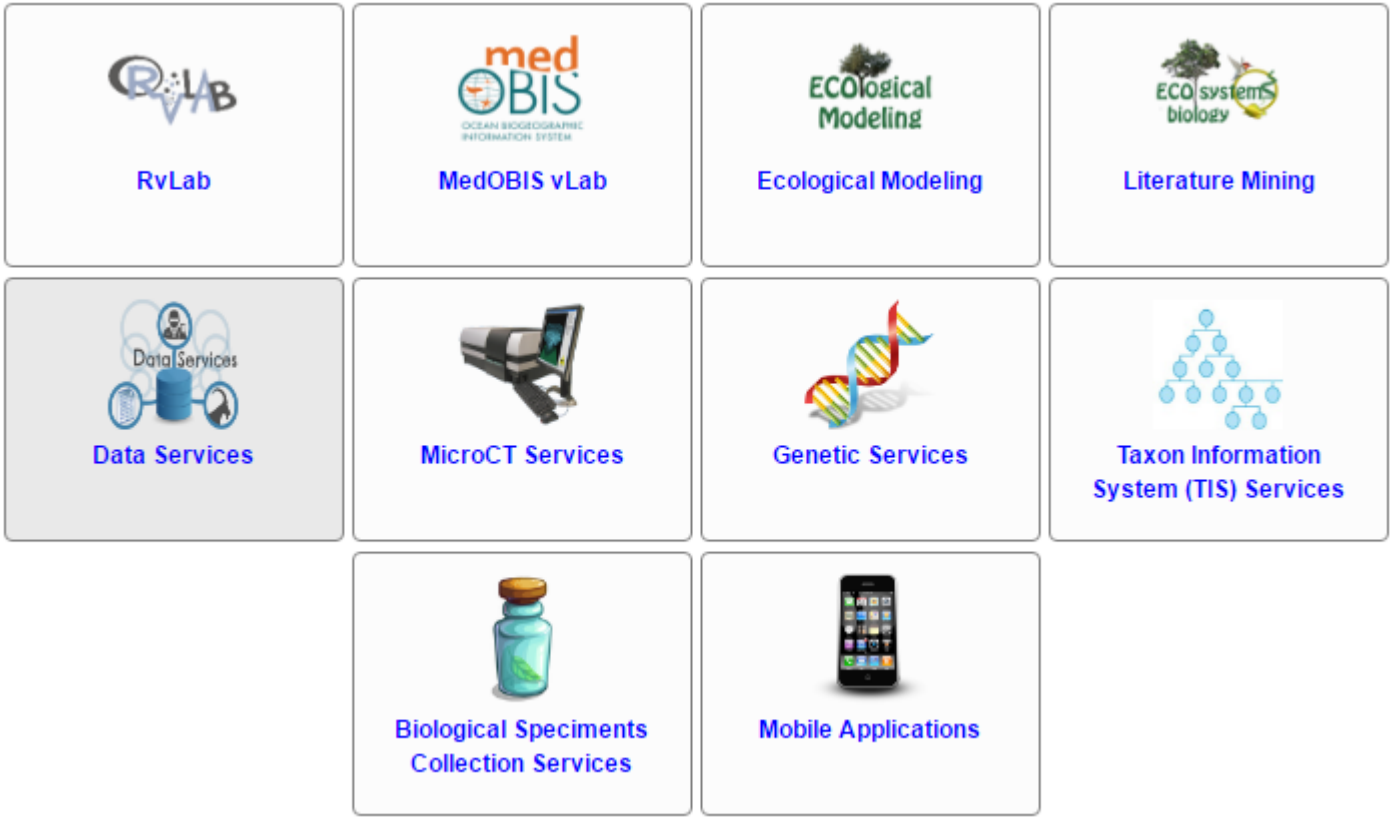
- More than ***20 Web Services***.
  1) Publishing Metadata/Data
  2) Searching Metadata
  3) Discovering Data
  4) Browsing Services
  5) Mapping Services
  6) Transforming Metadata/Data
  7) Annotation Services

- The ***Web Application*** that is hosted by the LifeWatch Greece's Portal making all these functionalities available to the LifeWatch users.

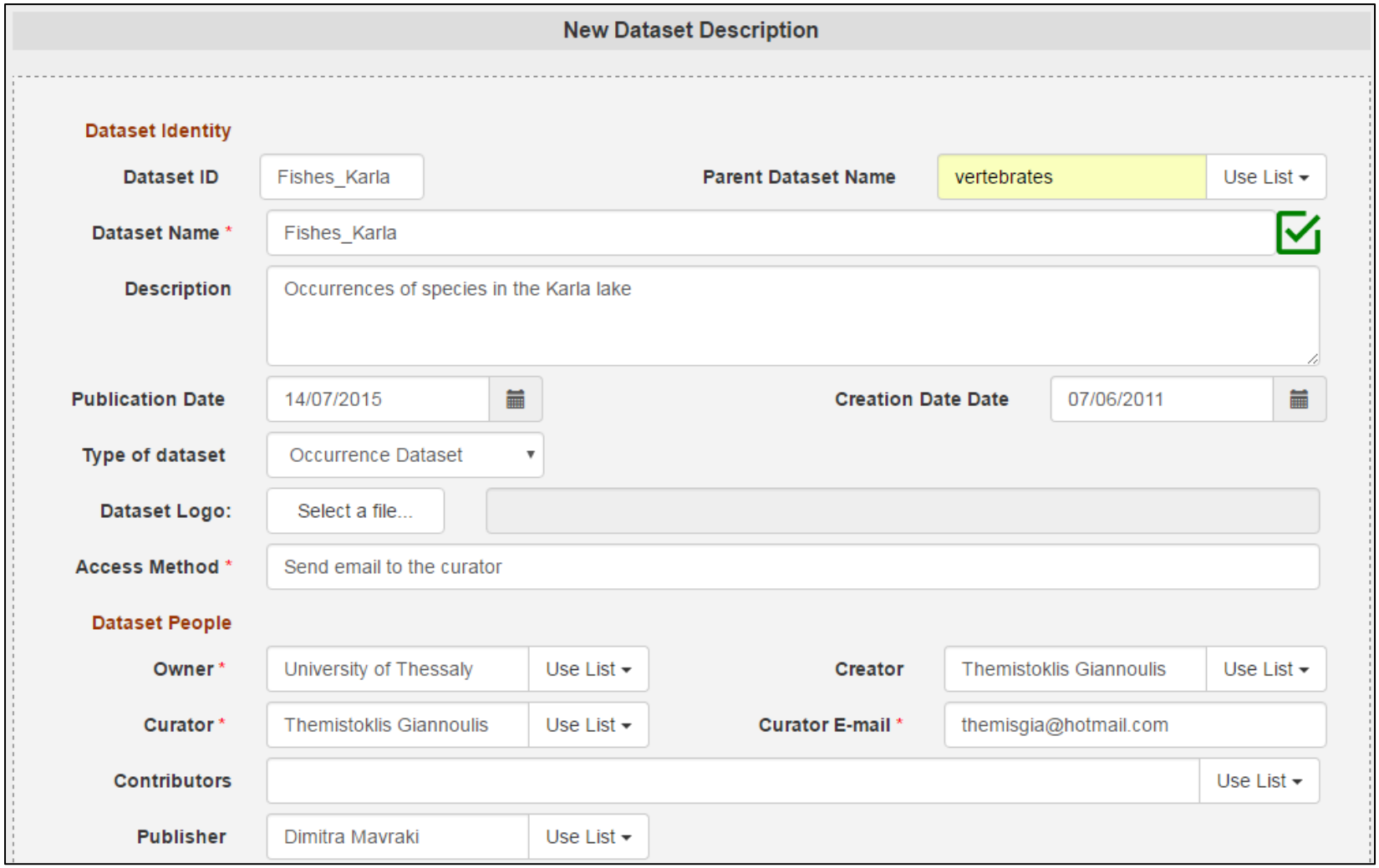


LW Greece Portal

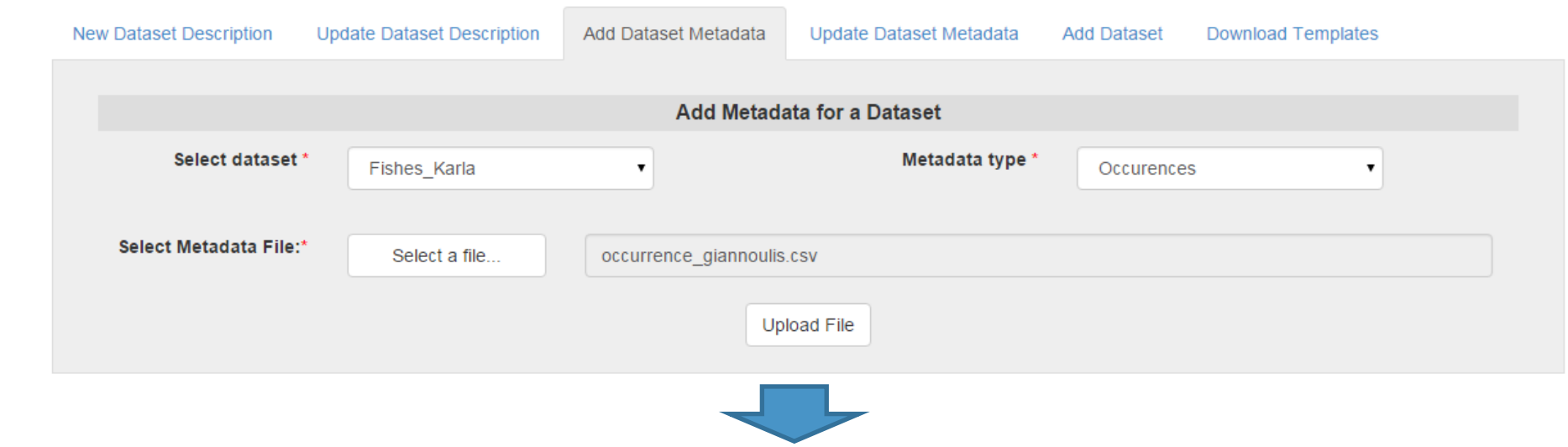
http://metacatalogue.portal.lifewatchgreece.eu/



Publishing 1/2



Publishing 2/2



Searching

1	Pola_Expedition_Polychaeta	Library of the Museum of Comparative Zoology at Harvard College	Panagiotis Damianidis	Occurrence Dataset	Download	More info

Dataset URI:	http://www.lifewatchgreece.eu/entity/dataset/pola_expedition_polychaeta
Contact Point:	damian@bio.auth.gr
Access Method:	Send email to curator
Description:	A faunistic report on the polychaetes collected during the oceanographic expedition of Pola in the eastern Mediterranaen Sea between 1890 and 1892. 25 polychaeta species are listed and described. 4 tables with detailed figures of 18 of them are provided as appendix. Details on sates, exact locations, depths and habitat are given for each species
Keeper:	Library of the Museum of Comparative Zoology at Harvard College
Publisher:	Panagiotis Damianidis
Publication Date:	2014
Creator:	Panagiotis Damianidis
Creation Date:	1890-1892
Contributor:	-
Location:	http://lifewww-00.her.hcmr.gr:8080/medobis/resource.do?r=edler_polychaetes
Embargo Period:	
Dataset ID:	Pola_Expedition_Polychaeta

Searching

Row	Species	Country	Date	Related Dataset	
1	Apomatus globifer	Libya	1890	View dataset	More info
2	Apomatus globifer	Turkey	1892	View dataset	More info
3	Haplosyllis hamata	Greece	1891	View dataset	More info
4	Laonome salmacidis	Turkey	1892	View dataset	More info
5	Melinna adriatica	Israeli Exclusive Economic Zone	1892	View dataset	More info
6	Panthalis oerstedi	Israeli Exclusive Economic Zone	1892	View dataset	More info
7	Polycirrus aurantiacus	Greece	1891	View dataset	More info
8	Salmacina incrustans	Libya	1890	View dataset	More info
9	Vermilia multicristata	Libya	1890	View dataset	More info
10	Vermilia multicristata	Cyprus	1892	View dataset	More info

Searching

Row	Species	Country	Date	Related Dataset	
7	Polycirrus aurantiacus	Greece	1891	View dataset	More info

Dataset Title:	Pola_Expedition_Polychaeta
Occurrence Event ID:	Occurrence of Polycirrus aurantiacus in east of Kythira
Individual ID:	Polycirrus aurantiacus_1891_15
Actor:	Panagiotis Damianidis
Place:	east of Kythira
Water Area:	Aegean Sea
Habitat:	Yellowish mud with sand and stones
Equipment Type:	
Ecosystem:	
Description:	
Station URI:	http://www.lifewatchgreece.eu/entity/place/stationpola_expedition_polychaeta_15
Station Notes:	maximumDepth:415,minimumDepth:415
Bibliographic Citation:	
Sampling Protocol:	
Coordinates:	36.0917,23.1583

Searching

Info about node: Polycirrus aurantiacus_1891_15

Relation	Object	Object Type
LC10_belongs_to	Polycirrus aurantiacus	BT27_Species
type	BC38_Biotic_Element	-
label	Polycirrus aurantiacus_1891_15	-

Display all

Subject	Subject Type	Relation
Identification of Polycirrus aurantiacus individual in east of Kythira	E17_Type_Assignment	P41_classified
Occurrence of Polycirrus aurantiacus in east of Kythira	S19_Encounter_Event	O32_has_found_object
Transformation of Polycirrus aurantiacus_1891_15 into a specimen	E81_Transformation	P123_resulted_in

Display all

Searching

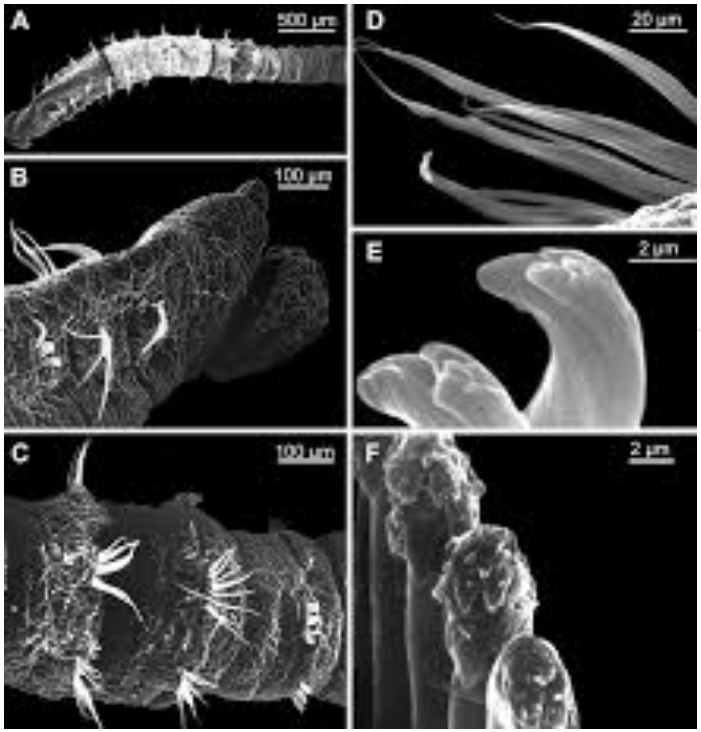
Info about node: Transformation of Polycirrus aurantiacus_1891_15 into a specimen

Relation	Object	Object Type
P14_carried_out_by	Matina Nikolopoulou	E39_Actor
P14_carried_out_by	Matina Nikolopoulou	E21_Person
P123_resulted_in	mCT-00047	BC53_Specimen
P33_used_specific_technique	preserved in ethanol	
P124_transformed	Polycirrus aurantiacus_1891_15	BC38_Biotic_Element
type	E81_Transformation	-
label	Transformation of Polycirrus aurantiacus_1891_15 into a specimen	-
P4_has_timespan	2013	-

Searching

Row	Specimen	Device	Enhancement Method	Related Dataset	
1	mCT-00047	SkyScan 1172	none	View dataset	More info

Dataset Title: microCT_ElectronicLog
Scanning ID: scan-00049
Product: scan-00049.zip
Actor: Sarah Faulwetter
Date: 26/2/2013
Zoom: 1,58
Exposure Time: 1110
Filter: none
Voltage: 59



Dan Sykes

Dimitra Mavraki

DrTheodoreStephanides

Economidis

Emilia Jankowska

Eva Chatzinikolaou

Evelina Griniene

Christos Arvanitidis

« 1 2 3 4 5 6 7 8 9 10 11 »

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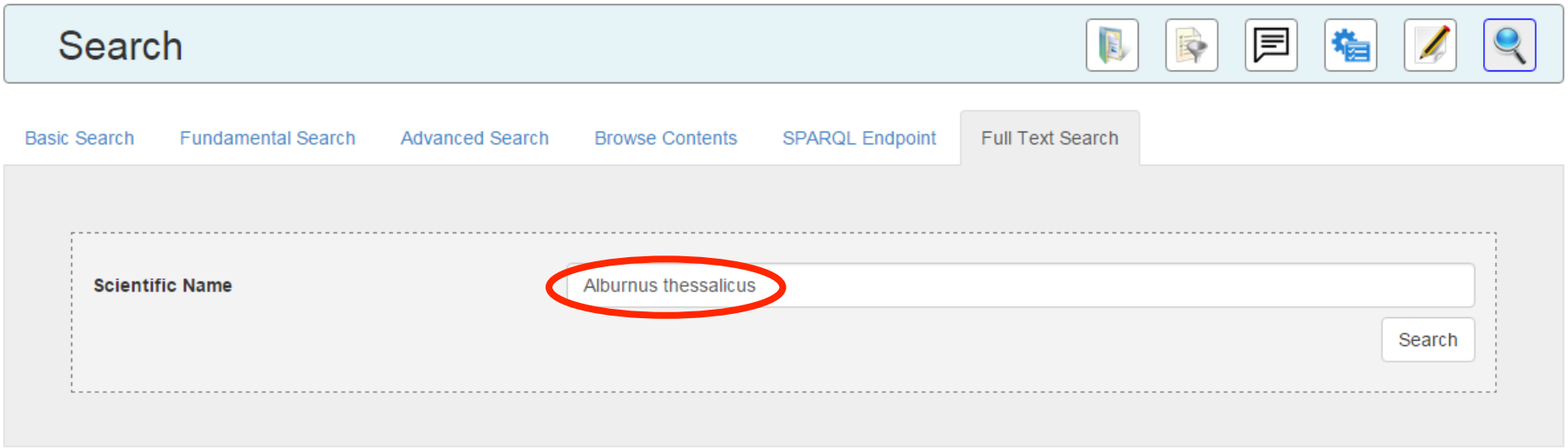

The ***Alburnus thessalicus*** species belongs to the ***Alburnus*** genus, ***Cyprinidae*** family, ***Cypriniformes*** order , ***Actinopterygii*** class, ***Chordata*** phylum and ***Animalia*** kingdom. ***Alburnus thessalicus*** was discovered by ***Alexander I. Stephanidis*** in 1950. Individuals that belong to this species have been occurred in ***Greece***, ***Italy***, ***Spain*** etc. Individual ***alburnus_thessalicus_22*** was transformed into ***alb_thes_22_specimen*** by ***Sara Faulwetter*** in 2015. ***alb_thes_22_specimen*** was scanned by ***Niki Keklikoglou*** in 2014 using a ***SkyScan*** MicroCT tomograph and results to the ***alb_thes_scans.zip*** dataset.

Also

- Recovery Mechanisms
- Update Functions
- Browsing Service
- Annotation Service
- Data Refinement Service
- Public Endpoints

Conclusions

- ✓ First biodiversity fully semantic tech - based infrastructure.
- ✓ New Prototypical Architecture for e-science research infrastructure.
- ✓ Efficient data discovery.
- ✓ Exploitation of deductions and implicit knowledge.
- ✓ Implementation of web services, semantic models, e-services.
- ✓ Innovation and cross disciplinary scientific interest.

References

LifeWatch Greece Data-Services: On Supporting Metadata and Semantics Integration for the Biodiversity Domain. Minadakis, Marketakis, Bekiari, Doerr, Bailly, Gougousis, Nikolopoulou, Mavraki, Arvanitidis.

Ontologies and Linked Open Data in the LifeWatch Greece Research Infrastructure. Allocca, Doerr, Bekiari, Bailly, Minadakis, Marketakis, Mavraki, Nikolopoulou, Arvanitidis.

https://github.com/isl/LifeWatch_Greece

http://metacatalogue.portal.lifewatchgreece.eu/

http://metacatalogue.portal.lifewatchgreece.eu/DataServices-middleware/

https://github.com/LifeWatchGreece/metacatalogue

https://github.com/LifeWatchGreece/medobis/tree/master/src/java/eu/lifewatchgreece/medobis/coords

http://medobis.portal.lifewatchgreece.eu/coords

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Thank you