



EKT

ΕΘΝΙΚΟ ΚΕΝΤΡΟ
ΤΕΚΜΗΡΙΩΣΗΣ
NATIONAL
DOCUMENTATION
CENTRE

National
Documentation
Center

www.ekt.gr

The semantic enrichment strategy
for types, chronologies and historical periods
in SearchCulture.gr

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MTSR 2017

{ [Search
Culture.gr](http://SearchCulture.gr) } { Semantics.gr }

eContentEKT

digital content and services

We aggregate, collect, document, preserve and disseminate authoritative digital content & data, produced and used by the Greek and international scientific, research and cultural communities.

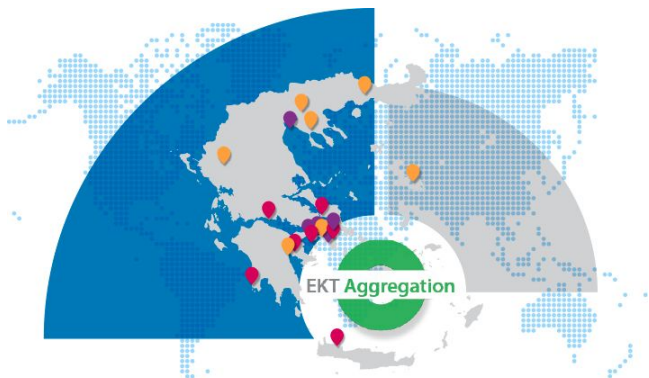


- **repositories** EKT
- **openABEKT** | proprietary Integrated Library System
- ePublishing

- Large scale **aggregators** of Greek scientific and cultural digital content

SearchCulture.gr | national aggregator for cultural content

OpenArchives.gr | scientific content



SearchCulture.gr | Greek Cultural Heritage Aggregator

Aggregates digital content from repositories

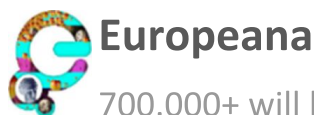
66 collections from 52 institutions

museums • archives • ephorates of antiquities • municipalities • cultural foundations

430.000+ digital assets | 600.000+ still to come

archaeological items • historical documents • folklore items • works of art • cartographic material • books • oral history

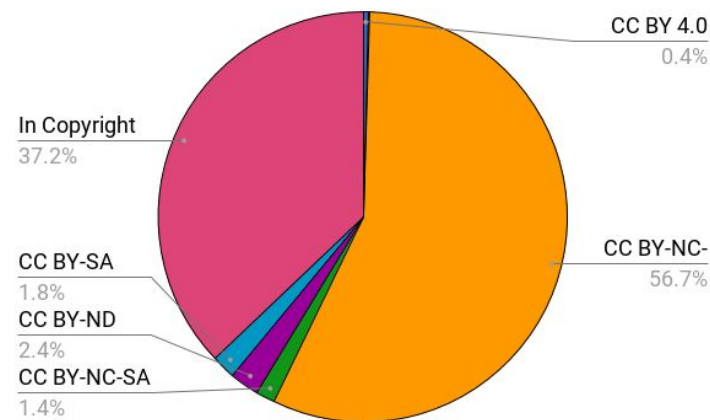
100.000+ digital assets published in



700.000+ will be published soon











for more than 60% of the digital files

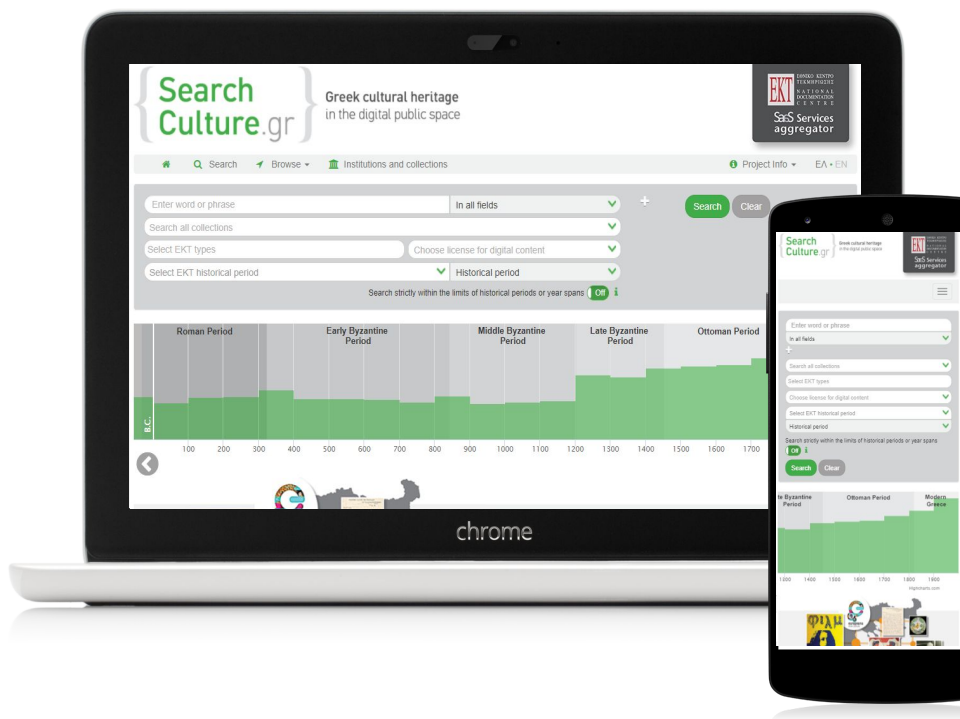


SearchCulture.gr | Greek Cultural Heritage Aggregator

The public portal www.searchculture.gr

-  modern and effective search engine
-  time-based search and filtering
-  advanced search faceting
-  advanced hierarchical browsing
-  dissemination as Linked Data
-  bilingual environment, search & browsing

-  rights licenses for digital assets
-  internal data model based on EDM



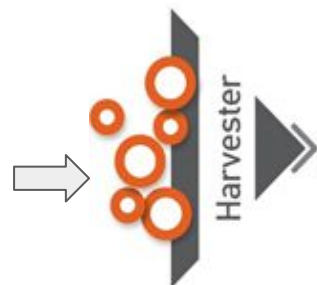
feasible thanks to or radically improved by **exhaustive semantic enrichment** on types, chronologies and historical periods

EKT aggregation infrastructure



EKT has developed an aggregation infrastructure that consists of five platforms and systems that cover the lifecycle of the digital content aggregation, from **harvesting** and **validation**, to **cleansing, transformation, semantic enrichment** and **secured preservation**.

- museums
- archives
- ephorates of antiquities
- municipalities
- cultural foundations
- universities
- scientific institutions
- research centres
- libraries
- public organizations



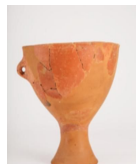
{ Semantics.gr }



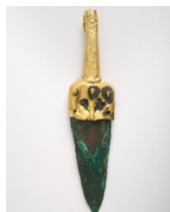
{ Search Culture.gr }

[Open Archives.gr]

Item types and temporal information | key metadata



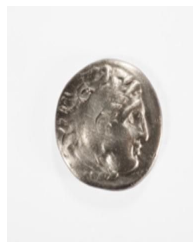
vase



weapon



ostrakon



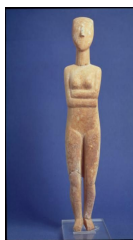
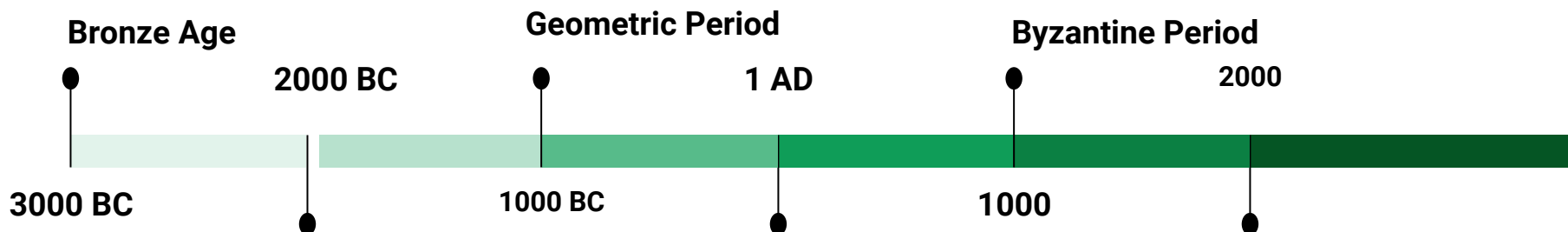
coin



jewellery



painting



figurine



disk



sculpture



inscription



icon

Modern Greece



Item types and temporal information | key metadata

When it comes to cultural and historical content, keyword-based searching is far from sufficient. Users expect to be able to:

- search the content with time criteria; year ranges or historical periods
- explore the content by browsing through historical periods and a timeline
- explore the content by browsing through types
- filter search results on types, year ranges and historical periods
- submit combined queries like
 - **icons** from the **late byzantine period**
 - **manuscripts** dated from **1850 to 1910**
 - **sculptures** dated strictly within the **middle classical period** of Greece

Huge challenge for large scale cultural aggregators
due to the **heterogeneity of metadata**



The heterogeneity of types

Heterogeneity in dc:type metadata field

- **Representation-related**
ex. different languages, synonyms, plural / singular numbers, different case styles
- **Documentation-related**
ex. use of very broad or very narrow (specialized) terms



The heterogeneity of temporal values

Archaic - Byzantine period
 427-421 BC. ^{1912/12} 11/12/1980
 1897-1900 Roman 10-12-1987
 14ος αι. μ.Χ. 1980/12
 2nd half of the 6th c. BC.
 Classic (5th-4th c. BC) Bronze Age
 1767 YE I-II 16th c.BC. ^{13th c.BC.}
 Ύστερος 6ος - πρώιμος 5ος αι.π.Χ.
 Μυκηναϊκή περίοδος (YE IIIΓ) 132-134 AD.

Heterogeneity in dc:date, dcterms:temporal, dcterms:issued metadata fields

- **Use of period label** values: as problematic as types
- **Use of chronological values** range from strict date format standards to descriptions that approach natural language

Our semantic enrichment and homogenization scheme

{ Semantics.gr }

- **Semantics.gr**: a platform developed by EKT where institutions can create, establish and publish vocabularies, taxonomies, thesauri and authority files
- **Enrichment tool** of **Semantics.gr**: a tool for setting *enrichment mapping rules (EMRs)* from metadata values to vocabulary terms



- **Time normalization tool** of the **aggregator platform**: a tool for setting parametric normalization patterns of time values

Semantics.gr | Platform for creating vocabularies & thesauri

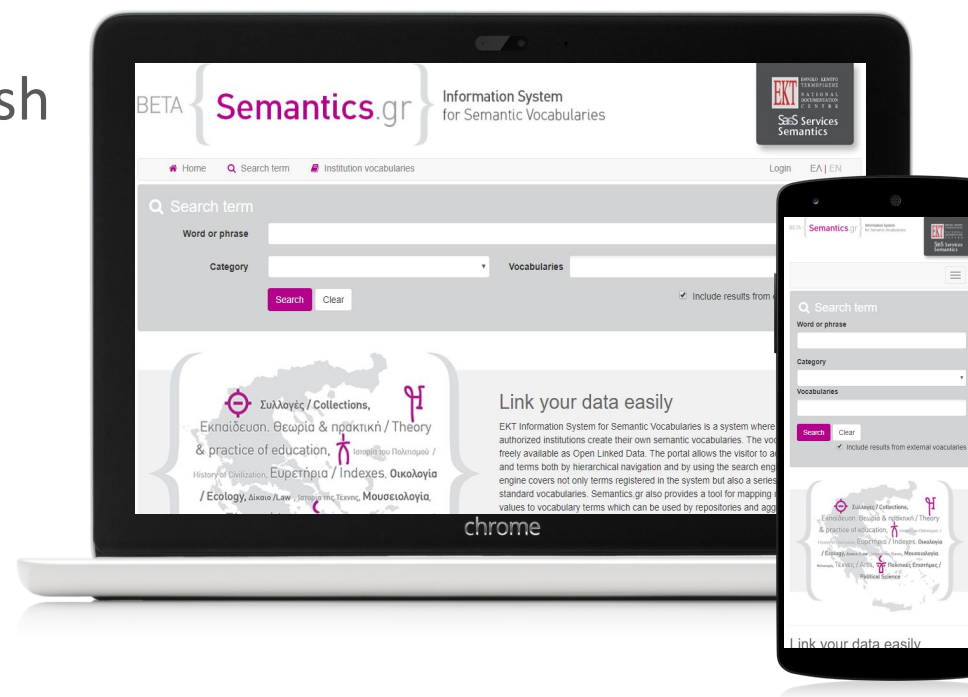
The portal www.semantics.gr

A pilot platform where EKT and other institutions create, establish & link their own semantic vocabularies and thesauri

concepts | time periods | places | agents

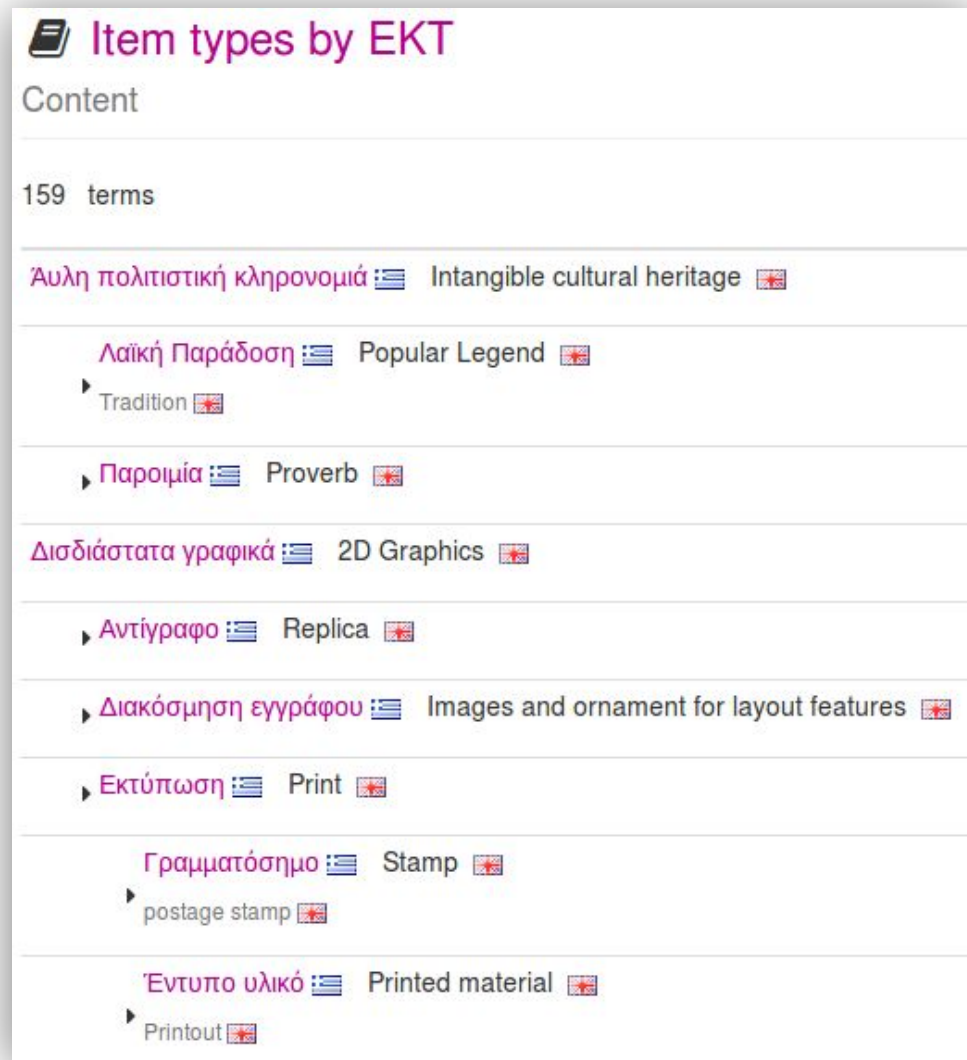
Parametric schema modeling

- create parametric **owl properties**
- group owl properties in **owl classes**
- successfully modelled:
skos:Concept | edm:TimeSpan |
edm:Place | edm:Agent



- *Enrichment Mapping Rules (EMRs)* from metadata field values to vocabulary terms per collection/repository
- Metadata field : **primary field** (ex. dc:type)
- **Automatic mapping suggestion** enhanced by a **self-improving mechanism**
- Use of a **secondary metadata field** if necessary
 - secondary metadata field **values as filters** (ex. dc:subject)
 - or **key-terms** inside **descriptive fields** as filters (ex. dc:title)
 - curated **complex expressions on filters** in order to create finer and more precise rules and avoid false positives
- A mapping rule set assigned to a repository/collection is available through a REST API in json format

- 159 terms
- Hierarchical
- Bilingual (Greek and English)
- Links to Getty AAT
- Schema: skos:Concept



Item types by EKT

Content

159 terms

- Αυλη πολιτιστική κληρονομιά :≡ Intangible cultural heritage ☒
 - Λαϊκή Παράδοση :≡ Popular Legend ☒
 - ▶ Tradition ☒
 - ▶ Παροιμία :≡ Proverb ☒
- Δισδιάστατα γραφικά :≡ 2D Graphics ☒
 - ▶ Αντίγραφο :≡ Replica ☒
 - ▶ Διακόσμηση εγγράφου :≡ Images and ornament for layout features ☒
 - ▶ Εκτύπωση :≡ Print ☒
 - Γραμματόσημο :≡ Stamp ☒
 - ▶ postage stamp ☒
 - Έντυπο υλικό :≡ Printed material ☒
 - ▶ Printout ☒

1. Insert the collection in **acceptance portal**
2. Inspect the documentation quality of types
 - is **dc:type** sufficient to set EMRs on? (primary field)
 - should we use values of **dc:subject** as filters? (secondary field)
 - should we use keywords in **dc:title** as filters? (secondary field)
3. Create **EMRs** in the **Enrichment tool** of **Semantics.gr**
4. Re-index the collection in **acceptance portal** and **check**
5. Insert (or re-index) and publish the collection in **SearchCulture.gr**

Type enrichment | Our goal



Each record is enriched with a new field:
EKT Type: from the vocabulary of types

EKT Types Vocabulary

```
→ http://scs.gr/sculpture  
  skos:prefLabel "Sculpture"@en | "Γλυπτό"@el  
  → http://scs.gr/figurine keywords: "statuette"  
    skos:prefLabel "Figurine"@en | "Ειδώλιο"@el  
→ http://scs.gr/Jewellery  
  skos:prefLabel "Jewellery"@en | "Κόσμημα"@el  
→ http://scs.gr/vessel  
  skos:prefLabel "Vessel"@en | "Σκεύος"@el  
  → http://scs.gr/vase  
    skos:prefLabel "Vase"@en | "Αγγείο"@el
```

dc:type value

Entry from vocabulary

sculpture art (120 items)

<http://scs.gr/sculpture>

auto

greek vases (230 items)

<http://scs.gr/vase>

auto

statuette (15 items)

<http://scs.gr/figurine>

manual

Type enrichment | EMRs on dc:type & dc:subject values



- <http://scs.gr/sculpture>
 skos:prefLabel "Sculpture"@en | "Γλυπτό"@el keywords: "statue"
- <http://scs.gr/figurine>
 skos:prefLabel "Figurine"@en | "Ειδώλιο"@el keywords: "statuette"
- <http://scs.gr/Jewellery>
 skos:prefLabel "Jewellery"@en | "Κόσμημα"@el keywords: "earring"
- <http://scs.gr/vessel>
 skos:prefLabel "Vessel"@en | "Σκεύος"@el
- <http://scs.gr/vase>
 skos:prefLabel "Vase"@en | "Αγγείο"@el keywords: "amphora", "oenochoe"

Vocabulary
EKT Types

dc:type values	Filters: dc:subject	Entry from vocabulary V1
ceramic objects (101 items)	amphora (↗), vase (↗),	http://scs.gr/vase auto
	statuette (↗), figurine (↗),	if filter in ["vase", "amphora"] auto
	...	http://scs.gr/figurine auto
exhibits (55 items)	earring (↗), amphora (↗),	http://scs.gr/Jewellery auto
	...	if filter in ["earring"] auto
	...	http://scs.gr/vase auto
		if filter in ["amphora"] auto
		but NOT in ["earring"] manual

Vocabulary
EKT Types

- <http://scs.gr/sculpture>
skos:prefLabel "Sculpture"@en | "Γλυπτό"@el **keywords: "statue"**
- <http://scs.gr/figurine>
skos:prefLabel "Figurine"@en | "Ειδώλιο"@el **keywords: "statuette"**
- <http://scs.gr/Jewellery>
skos:prefLabel "Jewellery"@en | "Κόσμημα"@el **keywords: "earring"**
- <http://scs.gr/vessel>
skos:prefLabel "Vessel"@en | "Σκεύος"@el
- <http://scs.gr/vase>
skos:prefLabel "Vase"@en | "Αγγείο"@el **keywords: "amphora", "oenochoe"**

Example of dc:title value: "An **amphora** from the Mycenaean period"

dc:type values

Filters

(terms found in **dc:title** values)

Entry from vocabulary V1

3D objects
(240)

amphora (↗), **vase** (↗),
earring (↗), **jewellery** (↗)

<http://scs.gr/vase>

if filter in [**vase**, **amphora**]
but **NOT** in [**statue**]

auto
auto
manual

<http://scs.gr/Jewellery>

if filter in [**earring**, **jewellery**]

auto
auto

art items (85)

sculpture (↗), **statue** (↗),
figurine (↗)

<http://scs.gr/sculpture>

if filter in [**sculpture**, **statue**]

auto
auto

<http://scs.gr/figurine>

if filter in [**figurine**]

auto
auto

The GUI of the enrichment tool

Mapping Repository Delphi_Museum

Filters

Secondary field for filters
dc:subject
Automatic creation

Submit

- Total number of values : 8
- Unmapped : 0
- Validated : 8
- With suggestions : 0
- Under validation : 0

Harvest field values Delete

Field dc:type

URI <http://repository.e-delphi.gr/dspace/authorities/type/LiturgicalObject> (12 items)
Λειτουργικό αντικείμενο
Liturgical object

Select a filter

Automatic match Delete

Vocabularies Item types

URI ekt-item-types/glypto

Γλυπτό

Filters Γλυπτική Μικροτεχνία

URI ekt-item-types/aggeio

Αγγείο

Filters Κεραμική

URI ekt-item-types/arxitektoniko-melos

Αρχιτεκτονικό μέλος

Filters

But not any of Γλυπτική

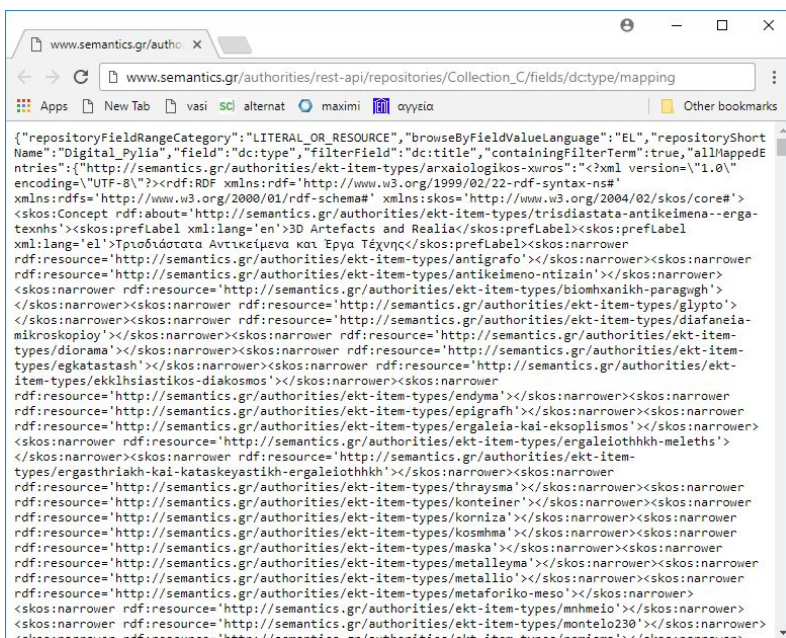
URI ekt-item-types/glypto

ekt-item-types/alypto

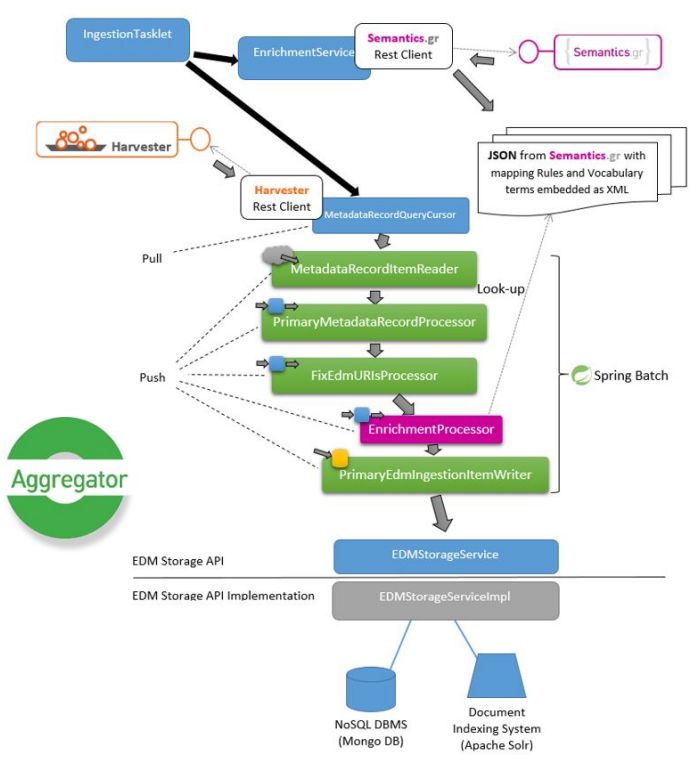
The actual enrichments are done by the **Aggregator**

ERMs are offered by **Semantics.gr** in JSON through a REST API

Aggregator uses ERMs as guidelines for the enrichment step of the ingestion data flow



```
{ "repositoryFieldRangeCategory": "LITERAL_OR_RESOURCE", "browseByFieldValueLanguage": "EL", "repositoryShortName": "Digital_Pylia", "field": "dc:type", "filterField": "dc:title", "containingFilterTerm": true, "allMappedEntries": { "http://www.w3.org/2000/01/rdf-schema#": { "xml version='1.0' encoding='UTF-8'><rdf:RDF xmlns:rdf='http://www.w3.org/1999/02/22-rdf-syntax-ns#' xmlns:rdfs='http://www.w3.org/2000/01/rdf-schema#' xmlns:skos='http://www.w3.org/2004/02/skos/core#'><skos:Concept rdf:about='http://semantics.gr/authorities/ekt-item-types/trisdiasata-antikeimena--ergatexnhs'><skos:prefLabel xml:lang='en'>3D Artefacts and Realia</skos:prefLabel><skos:prefLabel xml:lang='el'>Τρισδιάστατα Αντικείμενα και Έργα Τέχνης</skos:prefLabel><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/antigrafo'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/antikeimeno-ntizain'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/biomhxanikh-paragigh'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/gypto'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/diafaneia-mikroskopioy'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/diorama'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/egkatakastash'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/ekklhsiasitikos-diakosmos'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/endyma'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/epigrafh'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/ergaleia-kai-ekspolismos'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/ergaleiothkhk-meleths'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/ergasthriakh-kai-kataskeuastikh-ergaleiothkhk'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/thraysma'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/kontainer'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/korniza'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/kosmhma'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/maska'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/metallima'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/metallico'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/metaforiko-meso'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/mhmelio'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/montelo230'></skos:narrower><skos:narrower rdf:resource='http://semantics.gr/authorities/ekt-item-types/nomisma'></skos:narrower>
```

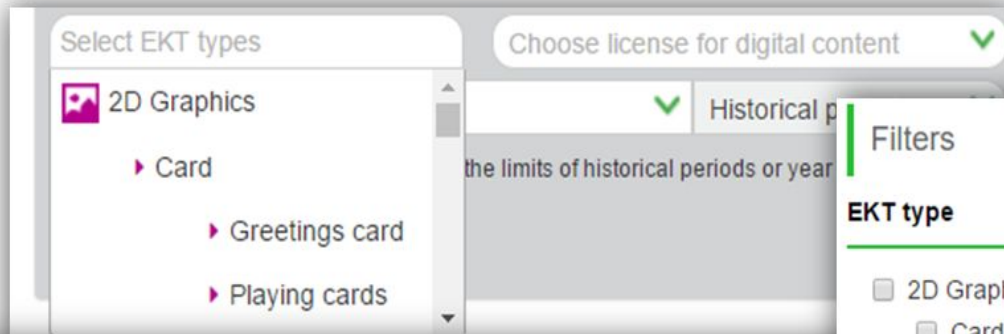


New searching, filtering & browsing features | based on type

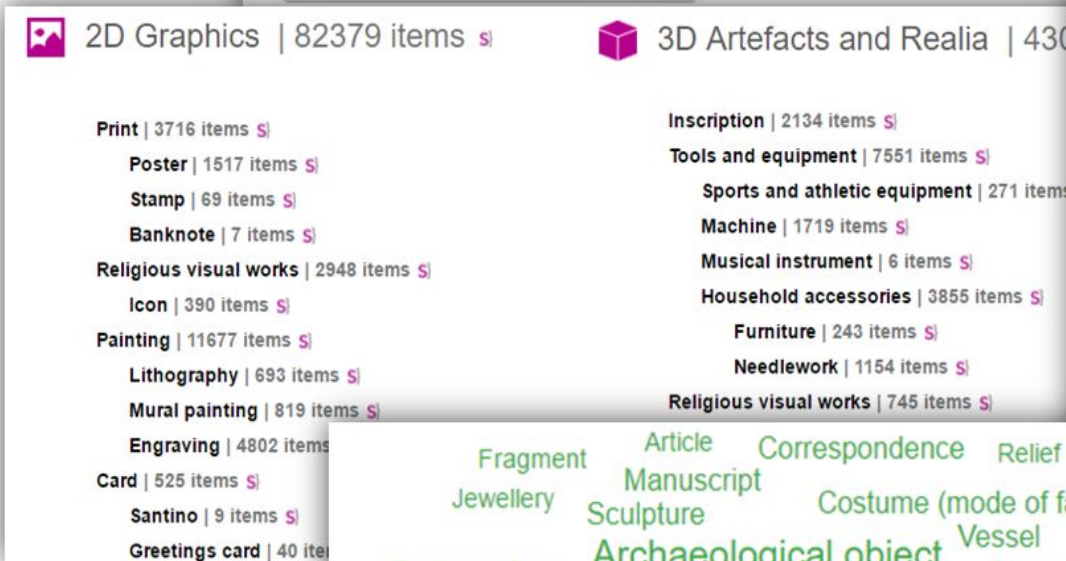
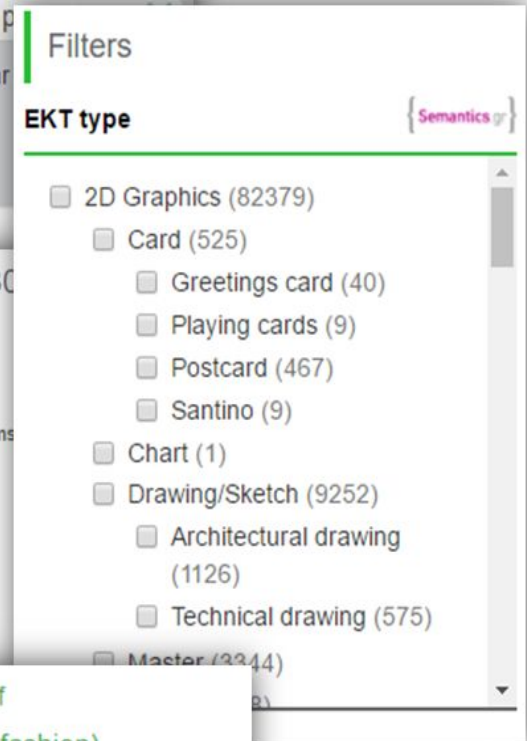
{ Search Culture.gr }

Hierarchical navigation through all types

Search by type



Faceting on types



Temporal enrichment |

The vocabulary of EKT Historical Periods



- 94 terms
- Hierarchical
- Bilingual (Greek and English)
- Schema: edm:TimeSpan
 - year ranges: edm:begin, edm:end
- **Absolute periods:** cover the entirety of hellenic territory
- **Relative periods:** have a strict local scope (e.g. minoan, cycladic and helladic periods)

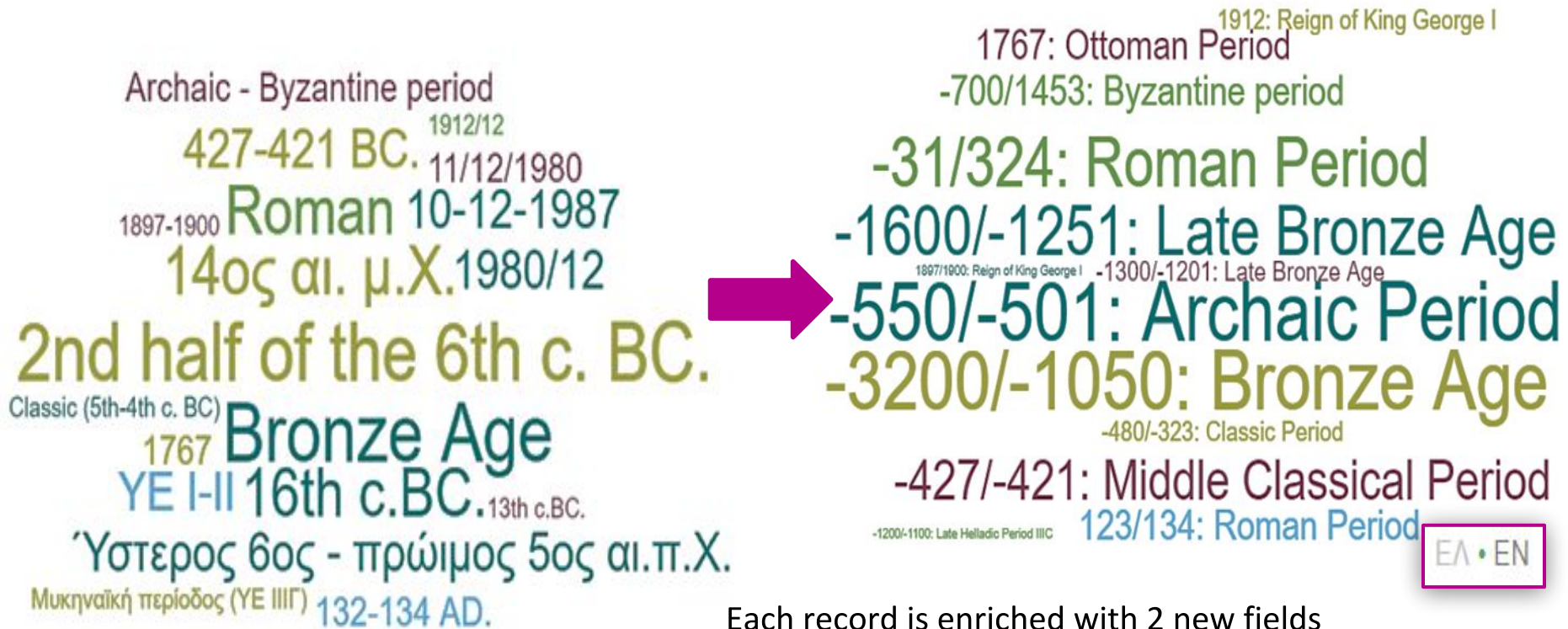
EKT Historical Periods

Category: Time periods
Semantic class: edm:Timespan
Creator: National Documentation Center
Default language: [icon]

94 terms

- Μεσολιθική Εποχή [icon] Mesolithic Period [icon]
8000 - 7000 π.Χ. [icon] 8000 - 7000 B.C. [icon]
- Νεολιθική Περίοδος [icon] Neolithic Period [icon]
7000-2800 π.Χ. [icon] 7000-2800 B.C. [icon]
 - Προκεραμική Περίοδος [icon] Aceramic Period [icon]
7000-6000 π.Χ. [icon] Ακεραμική Νεολιθική περίοδος [icon] 7000-6000 B.C. [icon]
 - Πρώιμη Νεολιθική Περίοδος [icon] Early Neolithic Period [icon]
6000 - 5000 π.Χ. [icon] Αρχές Νεολιθικής Περιόδου [icon] Αρχή Νεολιθικής Περιόδου [icon] Αρχαιότερη Νεολιθική Περίοδος [icon]
 - Μέση Νεολιθική Περίοδος [icon] Middle Neolithic Period [icon]
5000 - 4000 π.Χ. [icon] Ωριμη Νεολιθική Περίοδος [icon] 5000 - 4000 B.C. [icon]
 - Ύστερη Νεολιθική Περίοδος [icon] Late Neolithic Period [icon]
4000 - 3200 π.Χ. [icon] Ύστεροι Νεολιθικοί Χρόνοι [icon] Τελική Νεολιθική Περίοδος [icon] Τέλη Νεολιθικής Περιόδου [icon]
- Εποχή του Χαλκού [icon] Bronze Age [icon]
3200 - 1050 π.Χ. [icon] Χαλκοκρατία [icon] 3200 - 1050 B.C. [icon]

Temporal enrichment and homogenization | Our goal



Each record is enriched with 2 new fields

- **EKT Chronology**: year/year range (e.g. -31/324)
- **EKT Historical Period**: from the vocabulary of historical periods (e.g. Roman Period)

Exhaustive temporal homogenization | Two approaches

Historical period-driven enrichment



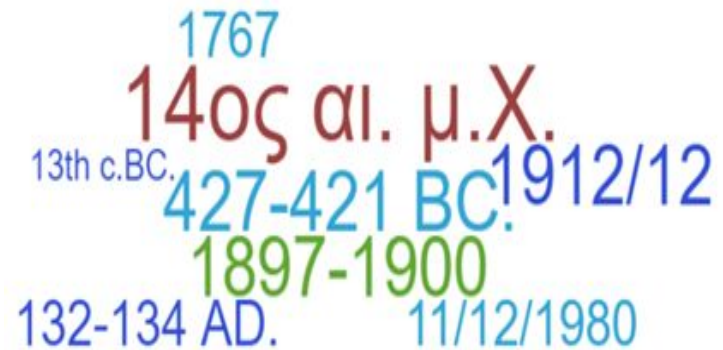
Period Label →

EKT Historical Period → EKT Chronology

↑
year ranges in voc terms

↑
according to **EMR** set in the
enrichment tool of **Semantics.gr**

Chronology-driven enrichment



Chronology →

EKT Chronology → EKT Historical Period

↑
year ranges in voc terms

↑
according to the **chronological patterns** set in
the **time normalization tool** of the **aggregator**

Historical period-driven enrichment |



Steps per collection

1. Insert the collection in **acceptance portal** (if not already)
2. Inspect the documentation quality. Is there a metadata field containing period labels?
 - **dc:date?** **dcterms:temporal?** (primary field)
 - should we use keywords in **dc:title** as filters? (secondary field)
3. Create **EMRs** in the **Enrichment tool** of **Semantics.gr** (just like types)
4. Re-index the collection in **acceptance portal** and **check**
5. Insert (or re-index) and publish the collection in **SearchCulture.gr**

Historical period-driven enrichment | Collection A



Period Label → **EKT Historical Period** → **EKT Chronology**

	dcterms:temporal	EKT historical period Step 1: EMR - primary field	EKT chronology Step 2: extract year span
Metadata records	Post-Byzantine Period	→ Ottoman Period	→ 1453/1821
	Second War	→ World War II	→ 1940/1944
	Middle - Late Hellenistic Years	→ Middle Hellenistic Period - Late Hellenistic Period	→ -220/-31

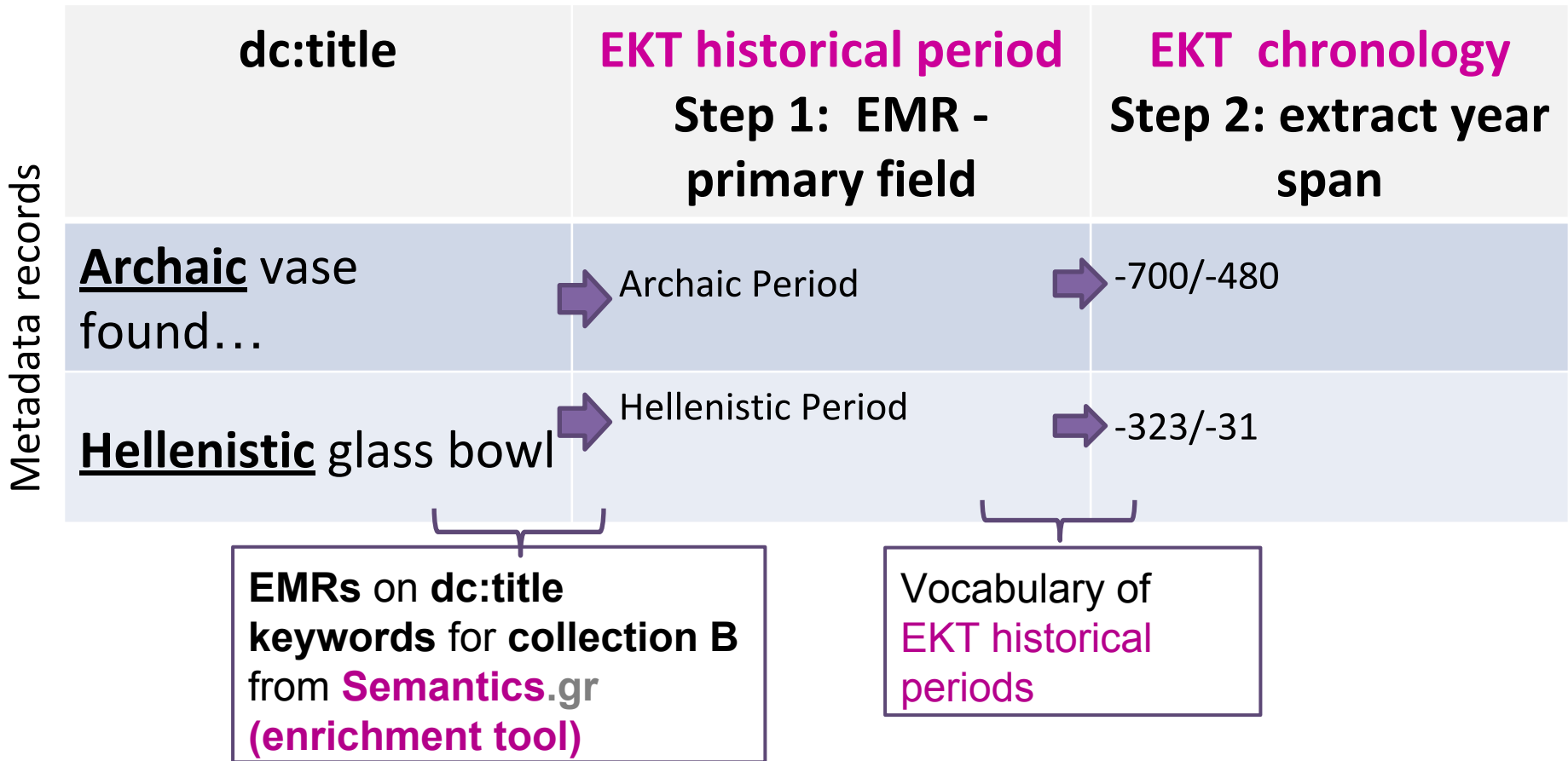
EMRs on dcterms:temporal for collection A from Semantics.gr (enrichment tool)

Vocabulary of **EKT historical periods**

Historical period-driven enrichment | Collection B



Period Label → **EKT Historical Period** → **EKT Chronology**



A tool for time normalization

Chronology → **EKT Chronology** → **EKT Historical Period**

- based on **regular expression** processing
- 4 classes of chronological patterns, each with different extraction algorithm
 - century range | century | year/date range | year/date
- Predefined and custom parametric placeholders are used inside patterns
 - **placeholder for “BC”**: “BC”, “BCE”, “π.Χ.”
 - **placeholder for “first half of”**: “first half of”, “1st half of”, “first A”, “πρώτο μισό του”
 - **placeholder for “century”**: “century”, “c.”, “cent.”, “αιώνας”, “αι.”
- completely parametric and extensible
- unlike EMRs which are created per collection, once you create a pool of chronological patterns, you almost done for all collections
- we created 30 patterns to cover the diversity of **SeachCulture.gr** collections

A tool for time normalization | a pattern example

Chronology → EKT Chronology → EKT Historical Period

Pattern name: early Xth century

Pattern class: **century**

Pattern: `\[?(\#century_identifier)(.*\s)?(\d{1,4})\s?\#s0?(\s)?(\#bc_ad(\s*))?(\s\#s1\.)?`

Extraction pointers: 4



Predefined placeholders:

- **#century_identifier**
 early: “early”, “first quarter of”, “beginning of”, “αρχές” ...
 late: “late”, “end of”, “end of”, “τέλος”, ...
- **#bc_ad**
 BC: “bce”, “bc”, “b.c.e.”, “b.c.”, “b.c”, “π.χ.”, “π.Χ”, “πΧ”
 AD: “μ.χ.”, “μ.Χ”, “μΧ”, “ad”, “a.d.”, “a.d”, “ce”, “c.e.”, “c.e”

Custom placeholders:

- **#s0**: ος|ος|ου|st|nd|rd|th
- **#s1**: αιώνας|αι|α|century|cent|c

Examples:

early 6th c. BCE → -600/-571

early 6th c. AD → 500/530

first quarter of the 2nd c. AD → 100/130

end of the 12th cent. → 1171/1200

αρχές 5ου αι. π.Χ. → -500/-471

A tool for time normalization | our pool of 30 patterns



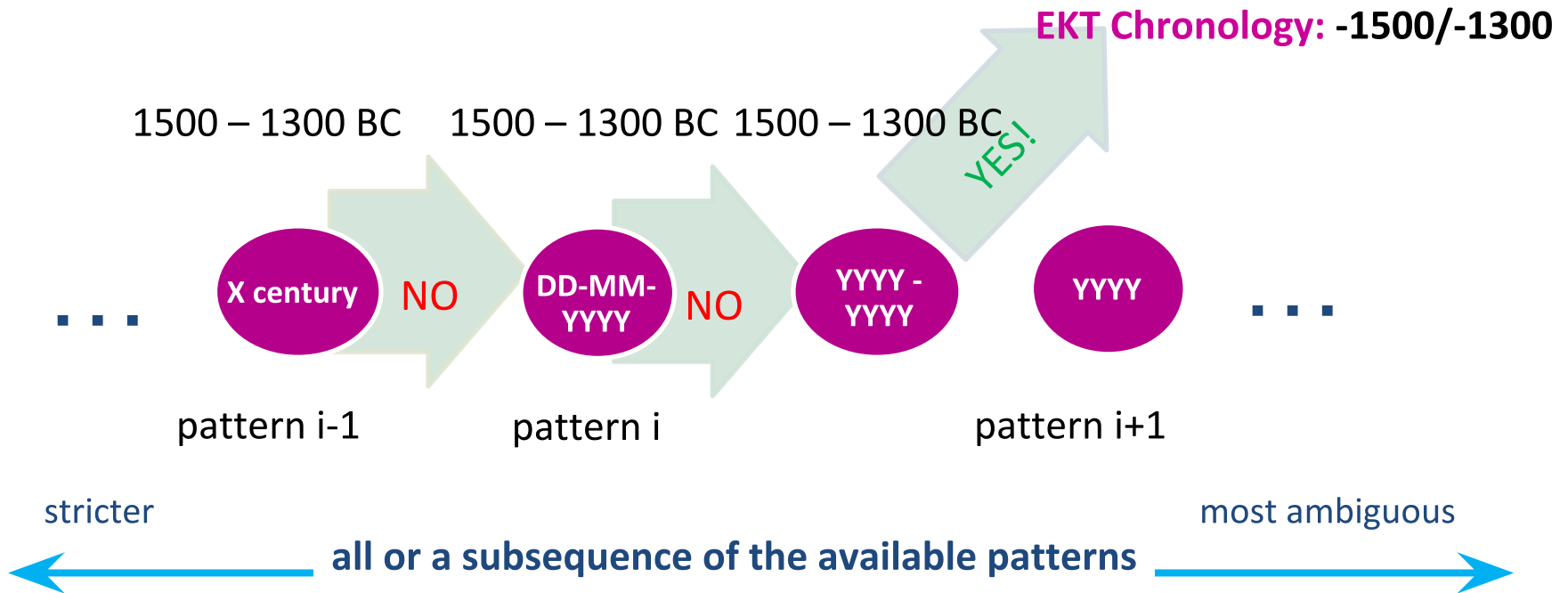
Chronology → **EKT Chronology** → **EKT Historical Period**

Chronological Pattern Class	# of patterns	Examples
century range	5	2nd half of 5th c. BC until 4th c. BC → -450/-301 5th c. bc (2nd half of) - 4th c. bc → -450/-301
century	7	early 18th century → 1700/1730 first half of 5th c. BC → -500/-451 τέλος 4ου αι.π.χ. → -330/-301
date/year range	8	1342/48 → 1342/1348 1342 - 1654 → 1342/1654 579 - 570 π.Χ. → -579/-570
date/year	11	526 BC → -526 11/01/1980 → 1980 May the 1 st 1870 → 1870

A tool for time normalization | how it works?

Chronology → EKT Chronology → EKT Historical Period

- patterns have a natural order: from the stricter to the most ambitious
- when a chronological value is to be normalized, it passes through all the chronological patterns sequentially, until the first match is found.



Chronology-driven enrichment | Steps per collection

Chronology → EKT Chronology → EKT Historical Period

1. Insert the collection in **acceptance portal** (if not already)
2. Inspect the documentation quality. Which metadata field better describes chronologies?
 - dc:date? dcterms:temporal? dcterms:issued?
 - or a descriptive field such as dc:title?
3. Add all *common* chronological patterns in collection's configuration
 - or add only specific ones (subsequence)
4. Re-index the collection in **acceptance portal and check**
5. Insert (or re-index) and publish the collection in **SearchCulture.gr**

Chronology-driven enrichment | Collection C



Chronology → EKT Chronology → EKT Historical Period

Metadata records

dc:date	EKT chronology Step 1: normalize chronologies	EKT historical period Step 2: enrich with corresponding <u>absolute</u> period
Late 5th century	➔ 471/500	➔ Early Byzantine Period
7th c. B.C - mid 6th c. BC	➔ -700/-551	➔ Early Archaic to Middle Archaic Period
03/11/1980	➔ 1980	➔ Regime change

Subsequence of chronological patterns chosen for collection C (time normalization tool)

Vocabulary of EKT historical periods
Index from year range to terms

New searching, filtering & browsing features | based on temporal enrichment



Hierarchical navigation through all historical periods

Search by historical period

Select EKT historical period Historical period

limits of historical periods or year spans Off i

- ▶ Early Christianity Period
- ▶ **Byzantine Period**
 - ▶ Early Byzantine Period
 - ▶ Middle Byzantine Period
 - ▶ Late Byzantine Period
- ▶ Latinocracy



Search by date / chronology

Select EKT types Choose license for digital content

600 - 500 BC Year span Off i

Search strictly within the limits of historical periods or year spans Off i

Faceting on periods and chronology

▶ Neolithic Period (7000 - 2800 B.C.) | 111 items si

- ▶ Aceramic Period (7000 - 6000 B.C.) | 63 items si
- ▶ Early Neolithic Period (6000 - 5000 B.C.) | 93 items si
- ▶ Middle Neolithic Period (5000 - 4000 B.C.) | 92 items si
- ▶ Late Neolithic Period (4000 - 3200 B.C.) | 89 items si

▶ Bronze Age (3200 - 1050 B.C.) | 2108 items si

- ▶ Early Bronze Age (3200 - 2000 B.C.) | 416 items si
 - ▶ Early Cycladic Period (3300 - 2000 B.C.) Cycladic civilization | 43 items si
 - ▶ Early Cycladic Period I (3300 - 2900 B.C.) Cycladic civilization | 32 items si
 - ▶ Early Cycladic Period II (2900 - 2300 B.C.) Cycladic civilization | 38 items si
 - ▶ Early Cycladic Period III (2300 - 2000 B.C.) Cycladic civilization | 33 items si
 - ▶ Middle Bronze Age (2000 - 1580 B.C.) | 311 items si
 - ▶ Middle Cycladic Period (1900 - 1600 B.C.) Cycladic civilization | 16 items si
 - ▶ Middle Cycladic Period I-II (1900 - 1700 B.C.) Cycladic civilization | 16 items si
 - ▶ Middle Cycladic Period III (1700 - 1600 B.C.) Cycladic civilization | 16 items si

Cycladic civilization
Mycenaean civilization
Minoan civilization

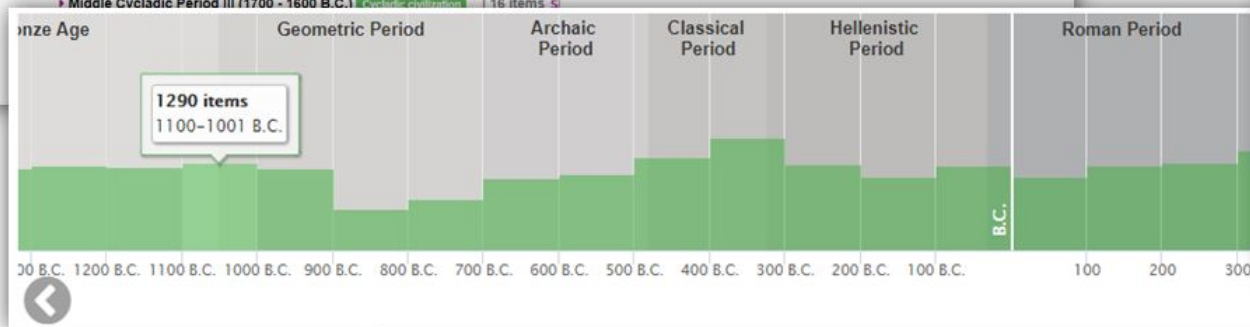
Filters

EKT historical period { Semantics }

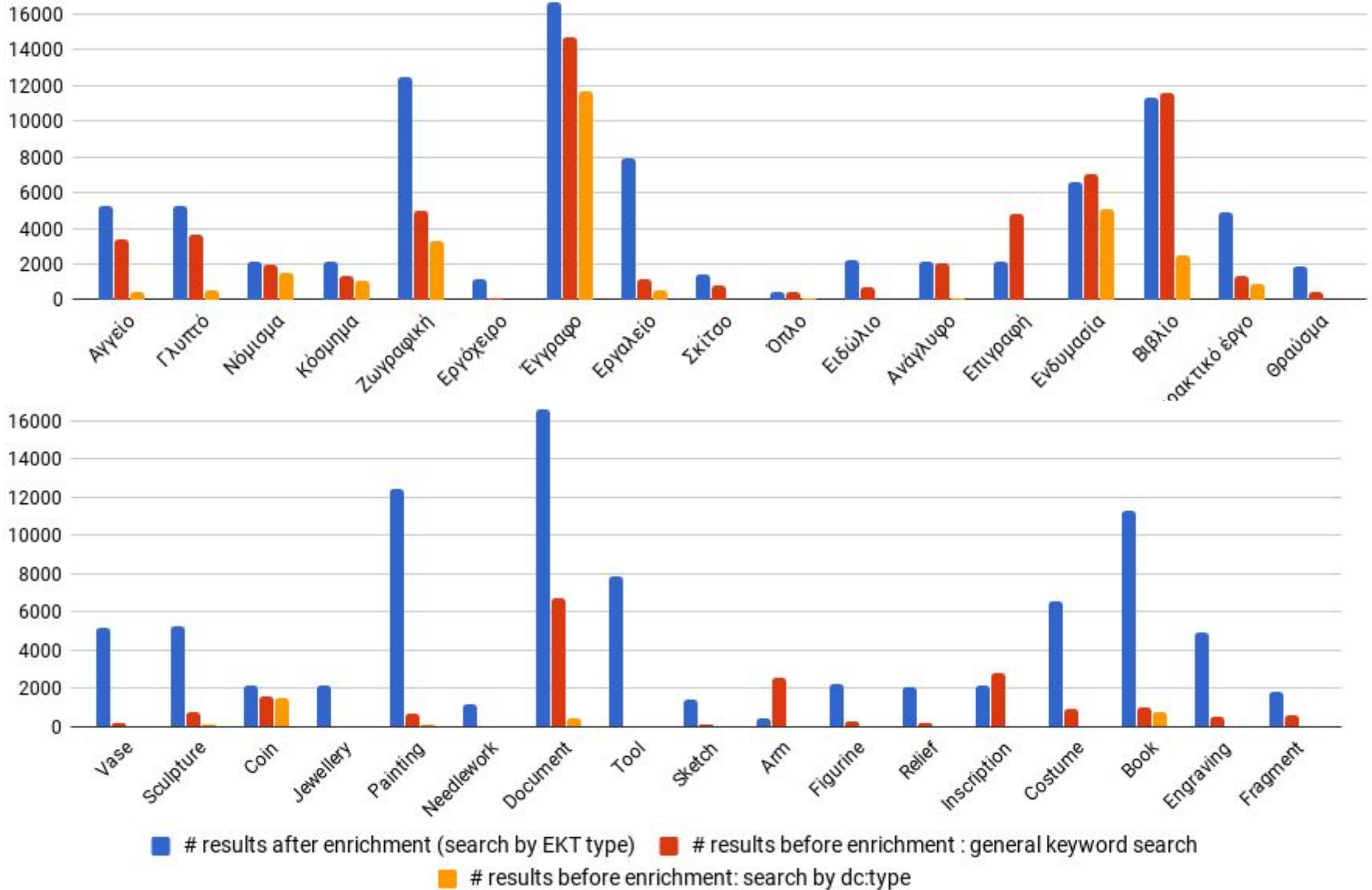
- Neolithic Period (12)
 - Aceramic Period (9)
 - Early Neolithic Period (9)
 - Middle Neolithic Period (9)
 - Late Neolithic Period (12)
- Bronze Age (2110)
 - Early Bronze Age (416)
 - Early Helladic Period (226)

EKT chronology

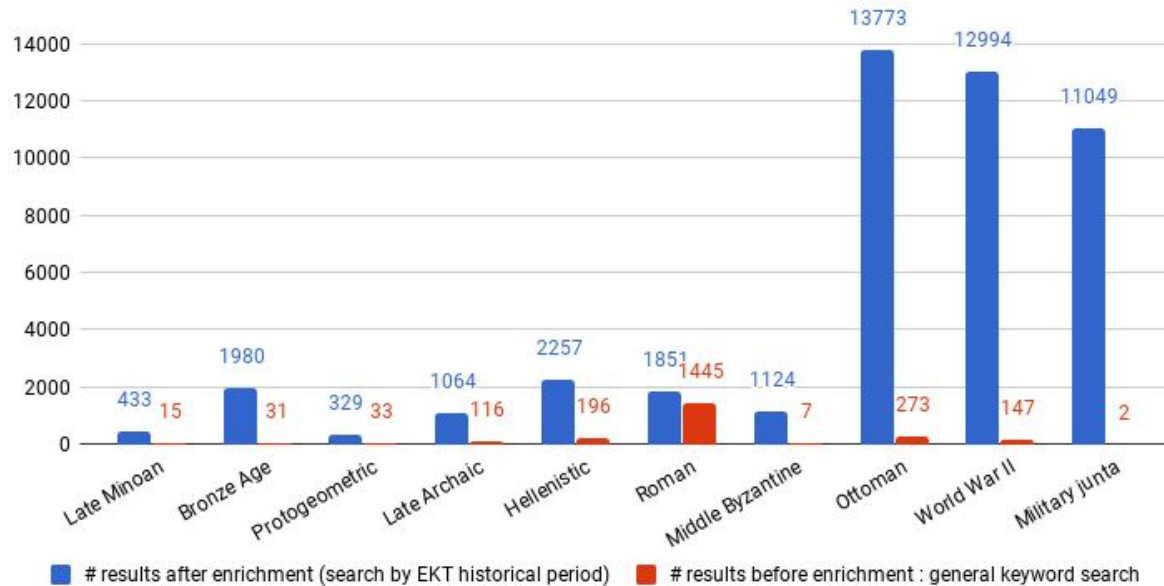
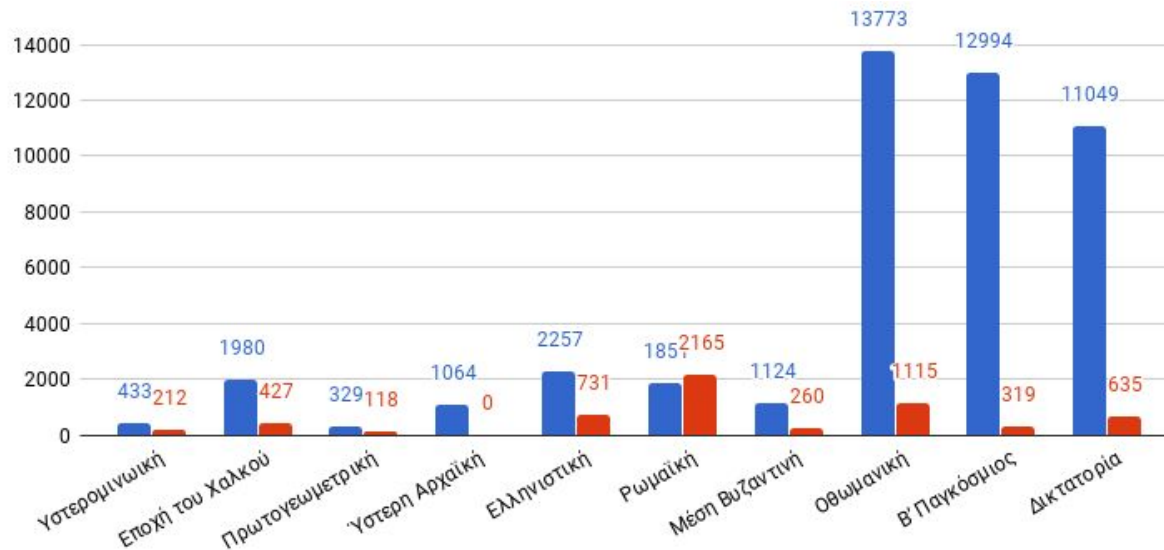
- 1050 - 1001 B.C. (848)
- 1100 - 1051 B.C. (1000)
- 1150 - 1101 B.C. (909)
- 1200 - 1151 B.C. (1036)
- 1250 - 1201 B.C. (1056)
- 1300 - 1251 B.C. (1078)



Type enrichment: improve in searchability



Temporal enrichment: improve in searchability



Learn more

1. Haris Georgiadis, Agathi Papanoti, et al: **The semantic enrichment strategy for types, chronologies and historical periods in SearchCulture.gr**, In Proc. **MTSR 2017**
2. Haris Georgiadis, Agathi Papanoti, et al: **Semantics.gr: A self-improving service to repositories and aggregators for massively enriching their content**. In Proc. of the **DHC Workshop of MTSR 2016**
3. Ioanna Ourania Stathopoulou, Haris Georgiadis, Vangelis Banos, et al: **An Open Cultural Digital Content Infrastructure**, In Proc. **DL'2014**
4. Haris Georgiadis, Vangelis Banos, Ioanna Ourania Stathopoulou et al: **Ensuring the quality and interoperability of open cultural digital content: System architecture and scalability**, In Proc. of **IISA'2014**



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