

# Building ontology-based dictionaries for Greek material culture terms

Maria Papadopoulou

Christophe Roche

LISTIC Lab

Université Savoie-Mont Blanc - France

Knowledge Engineering & Terminology Research Centre

University of Liaocheng - China

{maria.papadopoulou, christophe.roche}@univ-savoie.fr

## Abstract

Define what the objects of the domain and the terms that designate them are, are constant ontological concerns in researching antiquity. As archaeological finds come down to us like a picture book without names, and as texts furnish names for objects without providing illustrations, deciding ‘what was what’ is not easy. Names for things are what the discipline of Terminology calls “terms”. In Terminology, the terms of a given domain are defined by means of concepts, which are, by default, extra-linguistic, and like the objects they are abstracted from, can be formalized and standardized. Semantic web requirements for interoperability point in the direction of adding a computable layer to human-readable terminologies. The best digital artefacts to do that are ontologies. Our chosen field of application is the field of ancient Greek dress, in order to propose a solution to the terminology problem that greatly hinders communication among experts. The article will show that the complexity of the terms of this domain justifies the use of a tool-based method which provides useful automations to help scholars define the concepts and terms of this knowledge domain and publish them on the web as human readable ontology-based dictionaries and in machine tractable semantic web compliant formats, i.e. OWL. The result is a W3C compliant ontology-based dictionary of the domain built with Tedi, a new tool, comprised of a set of editors, which implements the ISO-1087 definition of term and concept.

## 1 Introduction

This paper presents the building of the first ontology-based dictionary in the domain of ancient Greek dress. The objective is to propose a tool-assisted method on how to organize and represent this important domain. To achieve this we combine insights from the ISO (International Organization for Standardization) 1087-1 standard on terminology work, aimed at the standardization of concepts and terms, with ontology, introduced into computing by the Artificial Intelligence community from Philosophy, aiming to define natural language-independent conceptualizations (sometimes called “vocabularies”) for researchers who need to share information from heterogeneous sources in a domain. The focus of our approach lies in the ISO definition of concept and term. The approach is implemented by a specifically built tool that captures both the concepts and terms of a domain separately, while putting them into relation. This paper presents the use case of ancient Greek dress, as a significant part of ancient Greek cultural heritage, to illustrate the approach. The paper first presents the problem of how to standardize terms from the point of view of domain experts (section 2), and goes on to describe the methodology adopted in order to build the ontology of the domain of Greek dress using two ontology editors, the well-known Protégé (Stanford University) and the recently build Tedi (ontoTerminology editor) (University Savoie-Mont Blanc).

## 2 Material culture terms: a terminological problem as a starting point

Material culture, i.e. the tangible evidence of past cultures is shaped by broader social realities and cultural imperatives, not merely by practical utility. Understanding the texts as well as the material culture, i.e., the objects and human-made environments created within a cultural context no longer extant, is a pathway towards understanding how non-verbal and verbal meanings were co-produced. For cultures such as that of ancient Greece, with its authoritative textual production, a wealth of ancient Greek ‘emic’ names for ancient Greek things (material objects) provides explicit, albeit often incidental, evidence from ancient authors contemporary with these objects [1]. ‘Etic’ terms used by later authors providing lists and descriptions of these objects is a second source of names for Greek things. A third group comprises names coined by modern scholars, further subdivided into terms modelled upon extant ancient terms, equivalent terms already existing

in the modern language, or neologisms coined for the purpose of naming these objects. The terms of ancient provenance, even those which are not evidenced by the ancient sources, have been stabilized through continual use and have high currency among scholars [2-5], since what scholars deplore most is the terminological vacuum, as well as the lack of systematicity and consistency of terminology.

A need omnipresent in the study of material culture terminology is to agree on and share the terms of the domain, whether the domain is ancient Greek dress (d, e, h), dress of medieval Scandinavia (cf. c), Greek material culture (a), ancient Egyptian art (b), clay pottery from different cultures (cf. f, g). Scholars in classics and cognate disciplines express the need for stable terms that correspond to the objects vividly and clearly:

- i) Determine what term labels what object combining textual, iconographic, material sources:
  - a. “Only studies that combine archaeological and iconographic data with knowledge derived from texts give the opportunity to correlate a word with an object [6].
  - b. “What was what in ancient Egypt?” [7].
  - c. “Research into dress history, whether the approach is founded in history, art or archaeology, incorporates terminology, one way or another.” [8].
- ii) Adopt a standard common vocabulary of terms and definitions:
  - d. “Although the standard Greek and Latin terminology employed by scholars to describe ancient clothing may not be that which was used in antiquity... it is a useful vocabulary of dress and will be used here.” [9].
  - e. “Studies of garment-terms in historical societies tend to be hampered by a lack of understanding of the specific vocabulary of dress.” [10].
  - f. “it would help if we could work out a list of standard vessel shapes, clearly de-fined and illustrated, and a set of terms for them.” [11].
  - g. “An intelligent discussion of pottery shapes is rendered more difficult by lack of definitive nomenclature.” [12].
  - h. “we need to adopt a common workable veil-vocabulary so that our investigation of the Greek veil can proceed without further complication or impediment.” [13].

### **3 On building an Ontology-based Dictionary of ancient Greek Dress**

#### **3.1 Why dress?**

Dress is the assemblage of things to wear, i.e., any object that humans wear clinging closest to the body from the cradle to the grave, for protection against the elements, for adornment, or by social convention. It is a multifaceted socio-technical and aesthetic phenomenon and a visual method of marking difference, particularly of rank, status, race, region, religion, age, gender and sexuality through. As such it has the ability to represent culture as it can be a powerful social signifier.

Knowledge about ancient Greek dress can help scholars understand the cultural construction of gender identity, age, social rank, as well as different cultural practices of the people of ancient Greece. It can also be useful in giving insight into their productive processes, materials, techniques and technological know-how. Ancient Greek dress has been studied in its own right, i.e., in terms of its materiality, in different time-periods, geographical areas, or in artistic representations on cultural objects and architectural monuments, selected texts, genres, authors, as a marker of special socio-cultural meanings in regard to beliefs about gender and sexuality, rites of passage, representation of the foreigner, gift-giving and receiving, production and consumption, tools and workforce, etc. The bibliography is vast. Indicatively see [5, 14]. Little work has been done to engage with the untapped potential of the systematic study of the different types of ancient Greek dress and the terms that denote them.

#### **3.2 Naming and representing things in the domain**

The citations in section 1 eloquently show that scholars acknowledge this problem and are very articulate in expressing it. As [11] points out in a scholarly discussion about ceramic pottery terms, which interestingly brings up the domain of clothes as well, it is necessary to be able to clearly define first the knowledge of the field (“standard vessel shapes, clearly defined and illustrated”), then the terms that speak of it, distinguishing if necessary different language levels (“and a set of terms for them that is perhaps entirely different from, and so cannot be confused with, the terms in common popular use”).

The complex problem (fig. 1) that confronts domain experts has an analogue and a digital side to it. The first type of complexity centres upon how to define the objects in a given knowledge domain of material culture, in this case, material culture pertaining to clothing in the cultural space of ancient Greece. The second centres upon how to name these objects consistently in different languages, for the convenience of communicating this knowledge among experts and non-experts. The digital side is how to make these names for objects tractable by machines.

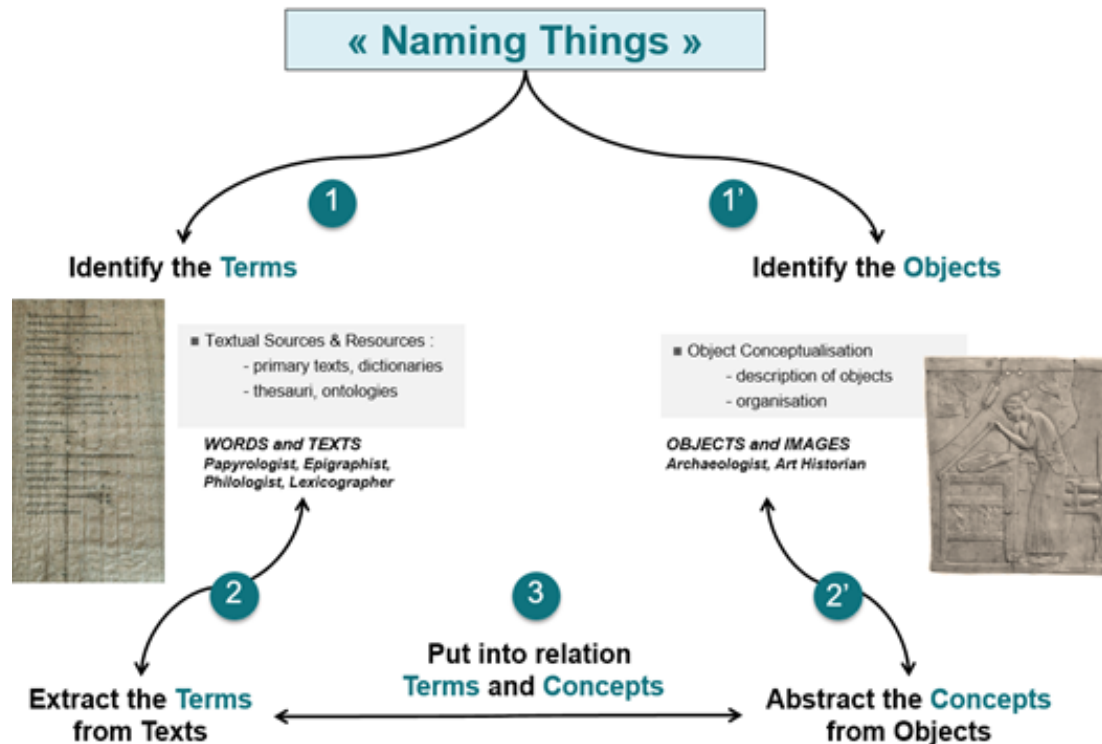


Fig. 1. The Naming Things problem in a given domain of interest

### 3.3 Classifying and defining objects by means of their characteristics

Concept characteristics can be useful to defining concepts and classifying the objects of the domain. In our proposed conceptualization, essential characteristics, i.e., those characteristics that, if removed, the object is no longer what it is, are organised in terms of dependencies-differences. The notions genus, species, differentiae (properties that distinguish different subspecies from each other) allow to express the rationale for a classification of the objects of the domain [15].

We set out to capture and represent knowledge in the domain of ancient Greek dress. This meant not only providing an efficient solution as to “how to represent knowledge about ancient Greek dress?”, but first and foremost answering the question: “What constitutes knowledge about ancient Greek dress?” In our approach, the classical scholar is empowered to build the formal domain ontology of ancient Greek dress starting with either terms or concepts. The building of the ontology as a conceptual theory about these objects is based upon the notion of essential characteristics. Essential characteristics are always discernible by domain experts. They are the types of knowledge about the objects of the domain that is relevant for the purposes of a taxonomic organization of this domain. Experts may not agree on the set of characteristics a concept is made up. They should, however, be able to have a stable basis in the form of a list of essential knowledge type against which to compare this object and upon which to found their discussions on what goes in or out when classifying an object (fig. 2).

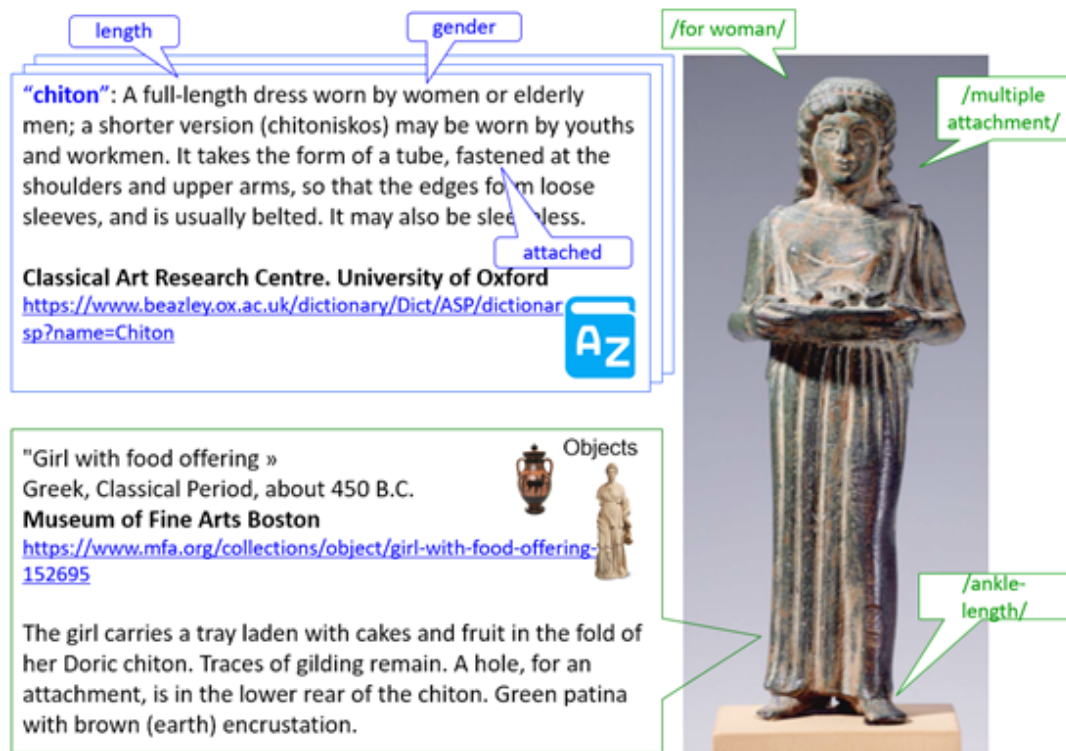


Fig. 2. Characteristics from the term definition and object description

The notion of essential characteristic is pivotal for understanding the objects of the domain, as shown by [16]: “Sometimes the meaning is clear, as when chiton (“first layer of clothing” = underwear) is opposed to himation (“mantle”, which comes on top of the chiton)”. Other scholars may argue against the relevance of this distinction especially in cases when the himation is worn without a chiton [17]. Giving to classical scholars the possibility to decide on the set of characteristics that according to them form each concept, declare these characteristics and build their definitions of these concepts based on these guarantees the degree of standardization, objectivity, and transparency upon which scholarly discussions can take place. Ontologies built in this way make ontology alignment much more straightforward. An additional advantage is that the meaning of concepts and terms does not depend on interpretation, but is governed by the concept theory underlying the formal language.

## 4 Representing the knowledge domain of ancient Greek dress

### 4.1 Concepts for describing objects

Our approach aims at representing both the hierarchy of concepts and the network of terms in the domain of Greek dress. We consider important that the representation of both the concept and term layer be linked in terms of the concept theory adopted, so that the definition of each term is based on the explicit representation of the concept denoted by this term. This gave rise to the notion of ontoterminology, a set of terms in a knowledge domain whose conceptual system is a formal ontology of the domain [18]. This approach makes it possible not only to take into account the linguistic and conceptual dimensions that make up any terminology, but also to distinguish between meanings and concepts, while reconciling the definitions of natural language terms and the formal specifications of concepts. The result is a terminological dictionary structured according to the ontology of the domain. The ontologization of terminologies aims at their operationalization for information processing purposes by means of multilingual semantic search engines.

The theoretical background of the present approach comes from the discipline of terminology, especially the conceptual approach to terminology attributed to E. Wüster [19-20], which emphasizes that the definition of terms is based on a modelling of domain knowledge. Terminology is a field that studies the terms of a domain [21-32]. It is a field cognate to Linguistics, but also to Ontology and Artificial Intelligence. The link between terminology and ontology is intrinsic to ontology, as shown in its definition by [33] “as a catalog of the types of things that are assumed to exist in a domain of interest D from the perspective of a person who uses a language L for the purposes of talking about D”. [33] also notes that “subsets of the terminology can be used as starting points for formalization”.

Our approach to naming, classifying, and standardizing the concepts of the domain of ancient Greek dress combines Terminology (in adopting a definition for the slippery notions of concept and term) [34-35], Ontology [36] and Knowledge Representation. The concept theory we adopt complies with the definitions for term and concept of the international ISO standard on terminology work [37], according to which: a term is verbal designation of a concept; a concept is a unit of knowledge created by a unique combination of characteristics; a characteristic is an abstraction of a property of an object or of a set of objects. A double dimension is adopted, both concept-oriented and term-oriented. Concepts are defined in a formal language, they are also defined in natural language(s) through their corresponding term(s). The former ensures machine tractability, the latter enables ontology localization in more than one languages / cultures.

## 4.2 Resources

Our resources include the collections of objects, sculptures, bas-reliefs, paintings, vases, coins, representing clothing from ancient Greece, accessible through sites such as Europeana [38], the largest open multimedia portal that exists in the digital public space giving access to the data of European cultural institutions. We also consulted thesauri, as well as collections of ancient Greek texts accessible online mainly from the open source Perseus digital library [39]. Bilingual dictionaries were also consulted: the Greek-English dictionary Lexicon by Liddell, Scott, and Jones (LSJ) accessible online via Perseus [40], the Dictionary of Greek and Roman Antiquities (DAGR) by Daremberg and Saglio also available online [41], and the glossary dedicated to Greek and Roman clothing by [42].

## 5 Implementation

### 5.1 Modelling with Protégé

Protégé [43] is an open source ontology editor developed in Java, supporting a number of plugins. The version we used is Protégé 5, which allows the construction and management of OWL2 ontologies, the export of ontologies in a number of formats including RDF/XML, OWL/XML, JSON-LD, and the import of Linked Open Vocabularies [44]. Protégé relies on Description Logics [45] and OWL, the W3C language dedicated to ontology, “a Semantic Web language designed to represent rich and complex knowledge about things, groups of things, and relations between things” [46].

Protégé represents knowledge in terms of individuals belonging to classes (sets of individuals) and linked by binary relations (roles). However, the notion of essential characteristic does not exist in Protégé and must be translated. For example, essential characteristics (with sewing, without sewing, attached, wrapped, etc.) can be represented as classes: `Garment_with_sewing`, `Garment_without_sleeves`, `Attached_garment`, etc. The concept <Chiton> is then translated as a Protégé class called `Chiton` defined as a subclass of the classes corresponding to the essential characteristics of the concept <Chiton>. A chiton is viewed as an individual belonging to the intersection of these classes (see fig. 3).

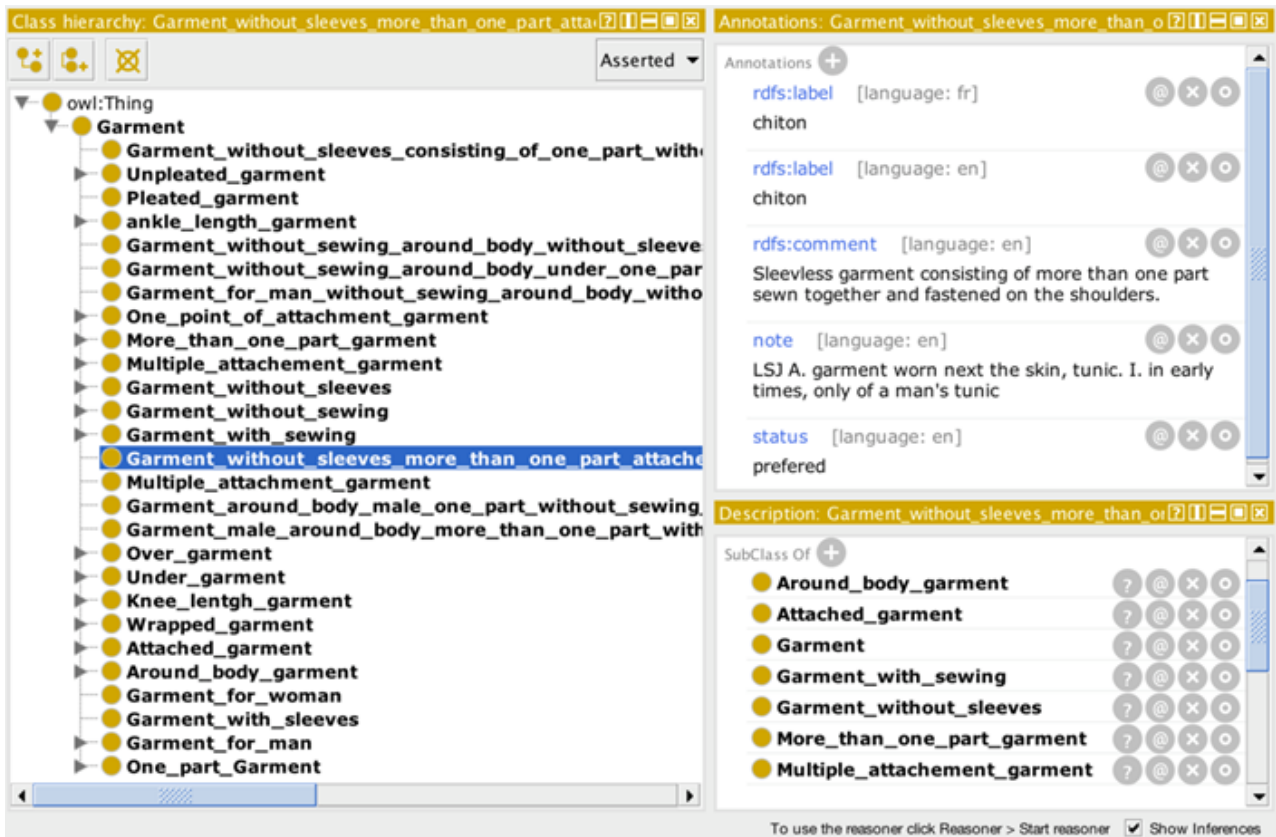


Fig. 3. The ontology of Greek garment in Protégé

## 5.2 Modelling with Tedi

Tedi [46] is a new software platform developed by C. Roche (version 1.1 - 2019) in a proprietary language (Smalltalk). The targeted community is domain experts who need to publish their terminologies on the web in both human and machine tractable formats. Tedi offers the following editors dedicated to the conceptual dimension: editor of concepts, objects, axes of analysis (or differences), i.e., sets of essential characteristics exclusive to each other, descriptive characteristics (or attributes), and relationships.

In the term editor (fig. 4), the user can:

- enter the terms in the languages needed;
- declare the term status (choosing from: preferred, alternative, tolerated, not recommended, obsolete) and part-of-speech (choosing from: noun, verb, adjective, none);
- add contexts and notes;
- manually reformulate the proposed definition of the term that the system generates based on the formal definition of the denoted concept.

The screenshot displays the Tedi Term Editor interface. At the top, the title bar reads "Tedi - Term editor" and the main header shows "Terminology" with a search box containing "Greek Garment". The user information is displayed as "user: Christophe", "author: Christophe", and "institution: Condillac". The language is set to "en" and the last update is "12 mai 2019".

The main editing area is for the term "chiton". The term definition is "Sleeveless garment consisting of more than one part sewn together and fastened on the shoulders." The status is "preferred", the part of speech (PoS) is "noun", and the gender is "none".

Below the definition, there are sections for "Contexts" and "Notes". The "Contexts" section shows three entries with Greek text, and the "Notes" section shows three entries with English text. There are also sections for "Orthographic variations" (containing "chiton"), "Inflected forms", and "T. Equivalent terms" (containing "fr: chiton" and "gr: χιτών").

At the bottom, there are sections for "T. Hypernyms" (containing "garment (preferred)"), "T. Hyponyms", "T. Synonyms", and "T. Linked terms". The "Denoted Concept List" section shows a list of concepts, and the "Concept definition in Natural Language" section shows the definition: "without sleeves, more than one part, with sewing, attached, multiple attachments, around body."

Fig. 4. Tedi Term Editor

In the concept editor (fig. 5), the user can:

- define essential characteristics, attributes and relations using the axes of analysis editor (the essential characteristics on the same axis of analysis are mutually exclusive), the attribute editor and the relation editor.
- define concepts as combinations of characteristics, attributes, and their relations.
- update the ontology by inserting newly created concepts into the concept system. In order to help structure the system, Tedi automatically infers only those generic concepts that are possible for a given concept based on the selected characteristics.

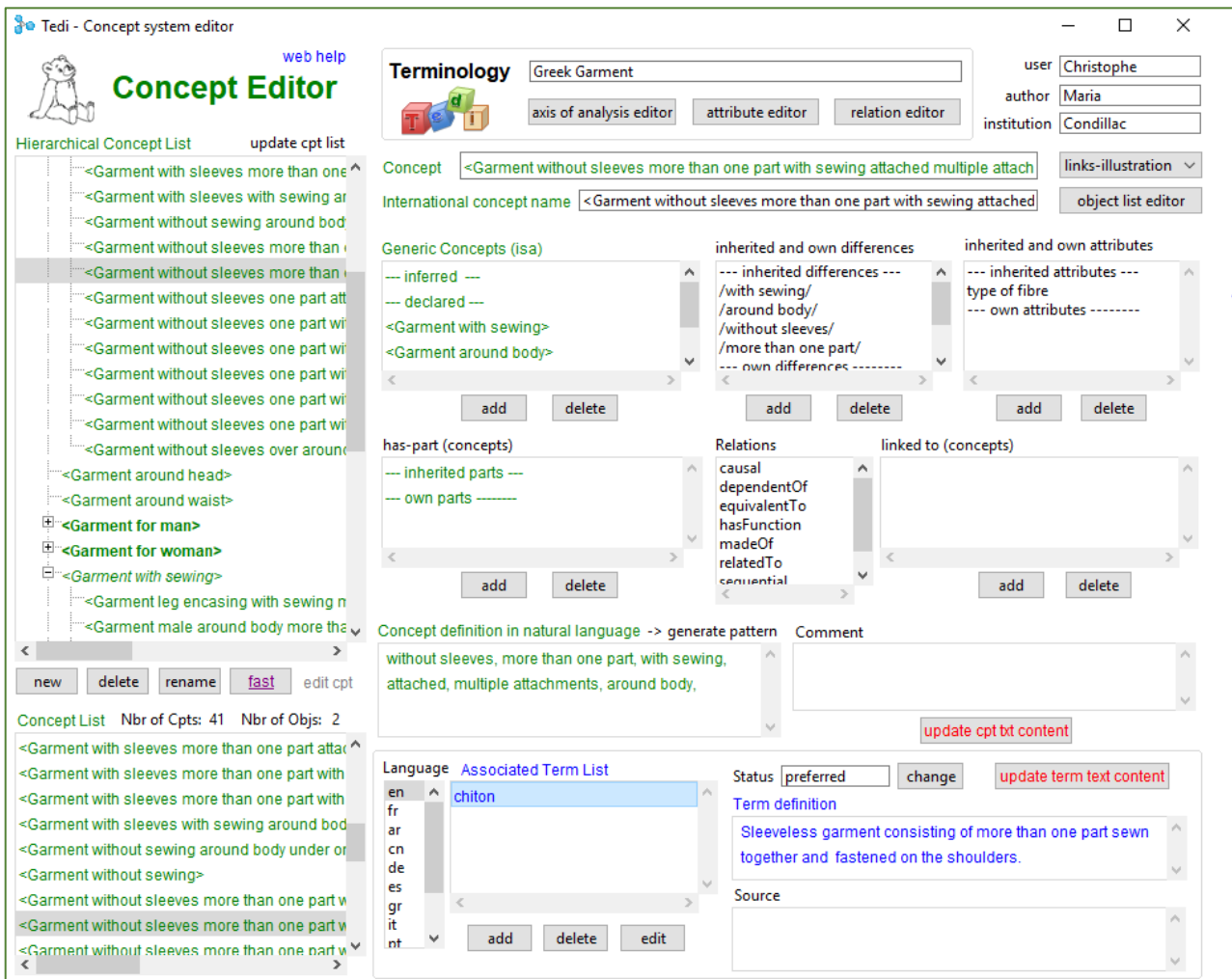


Fig. 5. Tedi Concept Editor

The system's in-built reasoner checks the compatibility of the declared characteristics in order to propose only those that are possible at a given moment. It also infers those that can be logically inferred and generates the formal definition of the concept, helping the expert to manage the combinatorial explosion ( $n$  axes of analysis made up of two exclusive essential characteristics potentially define  $2n$  concepts). If there is no concept corresponding to the set of essential characteristics denoted by a term, Tedi proposes to create a new concept based on the selected essential characteristics. Tedi exports in JSON, RDF/OWL, CSV, HTML, SKOS.

The Fast Editor links terms and concepts proposing to the expert only the possible characteristics, taking into account the compatibility and dependency relationships. If there is no corresponding concept, Tedi proposes to create a new concept whose name is constructed from the essential characteristics and whose definition is the set of characteristics selected by the expert. E.g., the term "chiton" in English denotes the following essential characteristics: /attached/, /multiple attachments/, /with sewing/, /around body/, /without sleeves/, /more than one part/. This set of characteristics constitutes the formal definition of the concept denoted by this term. As shown in fig. 6 the dynamic HTML export for this term is no different from an e-dictionary entry, except for the visualization of the concept, and the terminological equivalents in additional languages.



## Tedi Onto-Dictionary on "Greek Garment" (en)

Date: 5 mars 2019 - Time: 12:18:23 - Version: 1.1 - [www.ontoterminology.com/tedi](http://www.ontoterminology.com/tedi)

search: <input type="text"/> allix anaxyrides <b>chiton</b> chiton arrhaphos chiton cheiridotos chiton chortaios chiton orthostadios chiton poderes chitoniskos chlaina chlamys chlamys ephestris ependytes exomis garment himation himation nymphikon kandys peplos zeira	<h3>chiton</h3> <p><b>Definition:</b> Sleeveless garment consisting of more than one part sewn together and fastened on the shoulders.</p> <p><b>Status:</b> preferred</p> <p><b>Context(s):</b>          1) <i>Hdt. 5.87 κομισθεῖς ἄρα ἐς τὰς Ἀθήνας ἀπήγγελλε τὸ πάθος: πυθομένης δὲ τὰς γυναῖκας τῶν ἐπ' Αἴγιαν στρατευσαμένων ἀνδρῶν, δεῖνόν τι ποιησάμενος κείνον μόνον ἐξ ἀπάντων σωθῆναι, περὶ τὸν ἀνθρώπον τοῦτον λαβούσας καὶ κεντεύσας ἤθαι περόνησι τῶν ἱματίων εἰρωπῆν ἐκαστην αὐτέων ἄκου εἶη ὁ ἐπιπῆς ἀνὴρ. [3] καὶ τοῦτον μὲν αὐτῶ διασφαρῆσαι, Ἀθηναῖοι δὲ ἐπὶ τοῦ πάθεος δευτέρων τι δόξαι εἶναι τὸ τῶν γυναικῶν ἔργον. ἄλλῃ μὲν δὴ οὐκ ἔχον ὅτεμ ζημιώσασαι τὰς γυναῖκας, τὴν δὲ ἐσθήτη μετέβαλον αὐτέων ἐς τὴν ἰάδα: ἐφόρεον γὰρ δὴ πρὸ τοῦ αἰ τῶν Ἀθηναίων γυναῖκες ἐσθήτη Δωριδα, τῆ Κορινθίη παραπληρωσάτην: μετέβαλον ὧν ἐς τὸν λίνεον κιθῶνα, ἵνα δὴ περόνησι μὴ χρέωνται.</i></p> <p><b>Note(s):</b>          1) <i>LSJ A. garment worn next the skin, tunic. I. in early times, only of a man's tunic (the woman's being πέπλος, Sch.BT II.2.42). "χιτώνια περὶ χροῖ δύνει" Od.15.60; "κιθῶνας ὑποδύνειν τοιαύτως" Hdt.1.155: sts. with a girdle, Od.14.72; "περμόεις" 19.242, Hes.Op.537; μαλακός, εὐνήνητος, Od.1.437, II.24.580; [Χ.] λαμπρός... ἡέλιος ὡς"Od.19.234; "χλαῖνάν τε χιτώνά τε" 14.132, 154; "οἱ δ' ἀραῆρες ἡρειακονχθῶνα διὰν ἐπιστολῶν δὲ χιτώνας ἐστάλατ'" Hes.Sc.287. 2. later worn also by women, "ἅμα κιθῶν ἐκδυσόμενυ συνεκδύεται καίτην αἰδῶ γυνή" Hdt.1.8; "σύροισα χιτώνα" Theoc.2.73; the Ionian sleeved χ. was distd. fr the Dorian, fastened with "περόνησι, μετέβαλον[αἰ τῶν Ἀθηναίων γυναῖκες] ἐς τὸν λίνεον κ. ἵνα δὴ περόνησι μὴ χρέωνται" Hdt. 5.87; "οἱ πρεσβύτεροι [τῶν Ἀθηναίων] οὐ πολὺς χρόνος ἐπειδὴ χιτώνας λίνους ἐπέασαντο φοροῦντες" Th1.6, cf. Eust.954.50; χ. ποδῆρης, ὀρθοστάδιος, στατός (v. sub voc.); κιθῶνποδηνηκῆς, worn by Babylonians, Hdt.1.195; κιθῶνες λίνεοι περὶ τῶσκέλα θυσαννοῖ, worn by Egyptians, Id.2.81; κιθῶνες εἰρήνιοι, worn by Cilicians, Id.7.91; dub. in E.IT288(pl.).</i></p> <p><b>Equivalent(s):</b>          - fr: chiton          - gr: χιτών</p> <p><b>Concept:</b> &lt;Garment without sleeves more than one part with sewing attached multiple attachments around body&gt;  <b>essential characteristic(s):</b> /more than one part/, /attached/, /multiple attachments/, /with sewing/, /around body/, /without sleeves/,  <b>a kind of:</b> &lt;Garment with sewing&gt;, &lt;Garment around body&gt;, &lt;Garment without sleeves&gt;.</p> <p><b>Illustration:</b> Oil flask (lekythos) with man and woman. The man clothed in himation, leaving right shoulder bare, leads a woman by the hand. The woman stands profile to left, wears chiton, chitoniskos, and himation. Most of her head is missing. Inscribed in Greek to left of man's body "Hip[ρ]jon is handsome" HIP[P]ON KALOS. Most of the face and upper part of the man's head also missing. Some restorations in the figures. Athens, c. 470–460 B.C. By the Providence Painter The Met, NY 95.44</p> 
--	---

Fig. 6. The Tedi Onto-dictionary entry for chiton in HTML format\*

## 6 Conclusion

This paper presents the first ontology-based dictionary in the domain of ancient Greek dress proposing a tool-assisted method on how to organize and represent this important domain. To achieve this we combine insights from terminology work as defined by the ISO 1087-1 standard and A.I. models of representing descriptive knowledge concerning the objects of the world. Our approach is driven by the need to respond to the experts' needs for an easy-to-use tool-assisted method to represent both domain concepts and terms. Our contention is that this novel approach has a lot to offer to diverse communities of scholars and practitioners in Digital Humanities and Cultural Heritage, especially those in need of a user-friendly method and tool to publish their terminologies as human-readable ontology-based dictionaries and machine-tractable Semantic web compliant ontologies (vocabularies).

\* For a fragment of the onto-dictionary of ancient Greek dress see <http://ontoterminology.com/e-dictionaries>.

## References

1. Isaksen, L.; Simon, R.; Barker, E.T.E., de Soto Canameres, P. (2014). Pelagios and the emerging graph of ancient world data. In: WebSci '14: Proceedings of the 2014 ACM conference on Web science, pp. 197–201. ACM, New York (2014).
2. Sparkes, B.: Greek Pottery: an Introduction. Manchester University Press, Manchester (1991).
3. Richter, G., Milne, M.: Shapes and Names of Athenian Vases, The Metropolitan Museum, New York (1935).
4. Stears, K. E.: Dress and Textiles. In: Bispham E., Harrison T., Sparkes B. A. (eds.) The Edinburgh Companion to Ancient Greece and Rome, Edinburgh University Press, Edinburgh (2006).
5. Lee, M.: Body, Dress and Identity in Ancient Greece. Cambridge University Press, Cambridge (2015).
6. Ballet, P., Fournet, J.L., Mossakowska-Gaubert, M.: Artefacts from Egypt. Archaeology and Texts. Call for Papers. Workshop. IFAO-Cairo (2016).

7. Müller, M.: What was what in ancient Egypt? Terminology development project: art history and iconography. Paper read at the Egyptologie et informatique meeting, Würzburg, July 14th, 2000 (2000).
8. Dahl, C. L.: The Use of Terminology in Medieval Scandinavian Costume History: An Approach to Source-Based Terminology. In: Andersson-Strand, E., Gleba, M., Mannering, U., Munkholt, C. (eds.) North European Symposium for Archaeological Textiles NESAT X. Ancient Textile Series 5. pp. 41-51. Oxbow Books, Oxford, (2010).
9. Stears, K. E.: Dress and Textiles. In: Bispham E., Harrison T., Sparkes B. A. (eds.) The Edinburgh Companion to Ancient Greece and Rome, Edinburgh University Press, Edinburgh (2006).
10. Llewellyn-Jones, L.: Aphrodite's Tortoise: The Veiled Woman of Ancient Greece. Classical Press of Wales, Swansea (2003).
11. Kim, W.-Y.: On the standardization of ceramic terminology. *Current Anthropology* 11 (2) 168 (1970).
12. Kirkland Lothrop S. (1926). Pottery of Costa Rica and Nicaragua, Museum of the American Indian, Heye Foundation, New York.
13. Llewellyn-Jones, L.: Aphrodite's Tortoise: The Veiled Woman of Ancient Greece. Classical Press of Wales, Swansea (2003).
14. Roccas, L.: Ancient Greek Costume: An Annotated Bibliography, 1784 - 2005. McFarland and Co., Jefferson, N.C., (2006).
15. Cimiano, P.: Ontology Learning Using Corpus-Derived Formal Contexts. In: Hitzler, P., Schärfe, H. (eds.) *Conceptual Structures in Practice*, pp. 199-222. Taylor and Francis Group, Boca Raton London New York (2009).
16. Clarysse, W., Geens, K.: Textiles and architecture in the Graeco-Roman and Byzantine Egypt. In: De Moor, Antoine Fluck, C. (eds.) *Proceedings of the 5th conference of the research group Textiles from the Nile Valley, 2007/10/06 - 2007/10/07, Antwerp (2007)*.
17. Losfeld, G.: *Essai sur le costume grec. Avec 8 planches de l'auteur, Préface de François Chamoux. De Boccard, Paris (1991)*.
18. Roche, C.: Ontoterminology: How to unify terminology and ontology into a single paradigm. LREC 2012, Eighth international conference on Language Resources and Evaluation, Istanbul, Turkey, pp. 2626-2630 (2012).
19. Kingscott, G.: Tribute to the founder of terminology: 1998 marks the centenary of Eugen Wüster's birth. *Language Today* 11, 14-19 (1998).
20. Smith B., Ceusters W., Temmerman, R.: Wüsteria. *Studies in Health Technology and Informatics* 116: 647-652 (2005).
21. Rey, A.: *La terminologie : noms et notions, collection Que sais-je ? P.U.F., Paris (1979)*.
22. Rey, A.: *Essays in Terminology (translated by Juan C. Sager)*. John Benjamins, Amsterdam/Philadelphia (1995).
23. Felber, H.: *Terminology manual. Unesco and Infoterm, Paris (1984)*.
24. Roche, C.: Terminologie et ontologie. *Revue Langages*, 39(157), 48-62 (2005).
25. Roche, C.: Le terme et le concept : fondements d'une ontoterminologie. *Terminologie & Ontologie: Théories et applications - TOTh 2007, Annecy*, pp. 1-22 (2007).
26. Rastier, F.: Le terme : entre ontologie et linguistique, *La banque des mots, Special issue Terminologie et Intelligence Artificielle*, 7, pp. 35-65 (1995).
27. Sonneveld, Helmi B., Loening K. L. (eds.): *Terminology: applications in interdisciplinary communication*. John Benjamins, Amsterdam (1993).
28. Kageura, K.: *The dynamics of terminology*. John Benjamins, Amsterdam (2002).
29. Kockaert, H. J., Steurs, F. (eds): *Handbook of Terminology. Volume 1*. Amsterdam/Philadelphia: John Benjamins. (2015).
30. L'Homme, M.-C. *La terminologie: principes et techniques*. Montréal, Les Presses de l'Université de Montréal, Coll. Paramètres (2004).
31. Roche, C.: Ontological definition. *Handbook of Terminology, volume 1*. Amsterdam, John Benjamins Publishing, pp. 128-152 (2015).
32. Khan, Shair A.: The Distinction between Term and Word: A Translator and Interpreter Problem and the Role of Teaching Terminology, *International Conference on Teaching and Learning English as an Additional Language, GlobELT 2016, 14-17 April 2016, Antalya, Turkey (2016)*.
33. Sowa, J.F.: *Knowledge Representation: Logical, Philosophical, and Computational Foundations*. Brooks Cole Publishing Co., Pacific Grove, CA. (2000).
34. Smith, B.: Beyond Concepts: Ontology as Reality Representation. In: Varzi, A., Vieu, L. (eds.), *Proceedings of FOIS 2004. International Conference on Formal Ontology and Information Systems, Turin, 4-6 November 2004 (2004)*.
35. Goguen, J. 2005. What is a concept? In: Frithjof, D., Mugnier, M.-L., Stumme G. (eds.). *Proceedings of the 13th international conference on Conceptual Structures: common Semantics for Sharing Knowledge (ICCS'05)*, Springer-Verlag, Berlin, Heidelberg, pp.52-77.
36. Guarino, N., Oberle, D., Staab, S.: What Is an Ontology. In: Staab, S., Studer, R. (eds.) *Handbook on Ontologies*, Springer-Verlag, Berlin, pp. 1-16 (2009).
37. ISO 1087-1. *Terminology work - Vocabulary - Part 1: Theory and application*. Geneva: International Standards Organisation (2000).
38. Europeana Homepage, <https://www.europeana.eu/portal/en>, last accessed 2019/05/22.
39. Perseus 4.0 Digital Library Homepage. <http://www.perseus.tufts.edu/hopper/resolveform?redirect=true>, last accessed 2019/05/22.
40. LSJ = Henry George Liddell, Robert Scott, Henry Stuart Jones *A Greek-English Lexicon*. Oxford. Clarendon Press. 1940. 9ème édition. Online via Perseus 4.0.
41. DAGR = DAGR = *Dictionnaire des Antiquités Grecque et Romaines*. Charles-Victor Daremberg and Edmond Saglio (éds.), 1877-1919. 5 tomes, 10 vols. < <http://dagr.univ-tlse2.fr/>>
42. Cleland, L., Davies G., Llewellyn-Jones L.: *Greek and Roman Dress from A to Z*. Milton Park, Abington, Oxon UK, New York, USA, Canada: Routledge (2007).
43. Musen, M.A. and Team Protégé: The Protégé project: A look back and a look forward. *AI Matters. Association of Computing Machinery Specific Interest Group in Artificial Intelligence*, 1(4), June 2015 (2015).
44. LOV Homepage, <https://www.w3.org/OWL/>, last accessed 2019/05/22.

45. Baader, F., Calvanese, D., McGuinness, D., Nardi, D., Patel-Schneider, P.: *The Description Logic Handbook*. Cambridge University Press, Cambridge (2003).
46. Papadopoulou, M. Roche, C.: “Tedi: a Platform for Ontologisation of Multilingual Terminologies for the Semantic Web.” With C. Roche. In M. Spranger, P. Lorenz (eds.) *SEMAPRO 2018, 12th International Conference on Advances in Semantic Processing, SEMAPRO 3: Semantic Applications, Platforms, and Tools Athens, Greece 21/11/2018* (2018). Think Mind Homepage: <https://www.thinkmind.org/index.php?view=instance&instance=SEMAPRO+2018>, last accessed 2019/05/22.

