A Preliminary Study
on the Semantic Representation of
the notes to Dante Alighieri's Convivio

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The context

The national Italian project "**Towards a Digital Dante Encyclopedia**" aims to:

- support the Digital Humanities scholars to formally express the **knowledge presented in Dante Alighieri's works**

- develop a system to automatically discover complex semantic relationships among different parts of the text or between the text and the related resources

We developed **a preliminary study** to investigate the **representation of the knowledge contained in the notes to Dante's Convivio** produced by an Italian scholar

Our aims is to make explicit the knowledge of the notes using **standard vocabularies and languages** (RDF)

The starting point

The annotated text and the notes were collected in a simple Excel Sheet

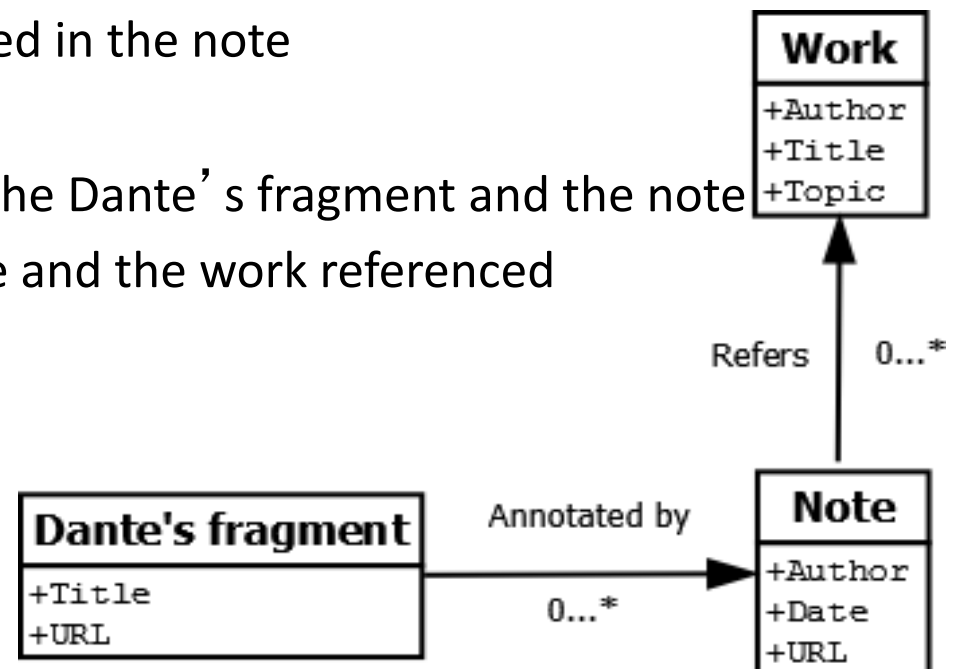|	A	B	C	D	E	F	G
1	Book - Chapter	Paragraph	Text	Note	Author	Work	Thematic area
2	1.01	1	Sì come dice lo Filosofo nel principio della Prima Filosofia	le parole con cui si apre la Metafisica di Aristotele (I 1, 980a 21). Il sintagma "prima Filosofia" è già presente in Aristotele per distinguere questa scienza dalla Fisica (cfr. Metaph. VI 1, 1026 a 27-30).	Aristotele	Metafisica	Aristotelismo

Information about Dante's fragment

Content of the note

Information about a work quoted or referenced in the note

The High-Level Model

- The high-level model aims to identify the classes and properties involved in the knowledge representation

- **3 classes**:
  - Dante's fragment: textual fragment to which the note referred to
  - Note: the textual content of the note
  - Work: a work quoted or referenced in the note
- **2 properties**:
  - Annotated by: relation between the Dante's fragment and the note
  - Refers: relation between the note and the work referenced
    in the note

Work
+Author
+Title
+Topic

Refers   0...*

Dante's fragment		Note
+Title	Annotated by	+Author
+URL	0...*	+Date
		+URL

Analized Ontologies

- We selected among the existing ontologies some classes and properties that can be used to express at least some aspects of our knowledge

- We analyzed well-known vocabularies, which were developed in the field of **cultural heritage**. In particular, we took into account the ontologies that address issues related to the **textual domain**

Analyzed ontologies:

CIDOC-CRM, FRBR, **FRBRoo**, SAWS, DM2E Model, **Dublin Core**, **SKOS**, **FOAF**, **DoCO**, **FaBIO**, **CiTO**, Annotation Ontology, **Open Annotation Core Data Model**, NEPOMUK

Dante's Fragment

	A	B	C	D	E	F	G
1	Book - Chapter	Paragraph	Text	Note	Author	Work	Thematic area
2	1.01	1	Sì come dice lo Filosofo nel principio della Prima Filosofia	le parole con cui si apre la Metafisica di Aristotele (I 1, 980a 21). Il sintagma "prima Filosofia" è già presente in Aristotele per distinguere questa scienza dalla Fisica (cfr. Metaph. VI 1, 1026 a 27-30).	Aristotele	Metafisica	Aristotelismo

- FRBRoo

1. **frbroo:Expression** corresponds to a precise edition of the Dante's text, in this case **Convivio**

1. **frbroo:ExpressionFragment** corresponds to the fragment of a work, in our example to a **fragment of Convivio** which the scholar has annotated
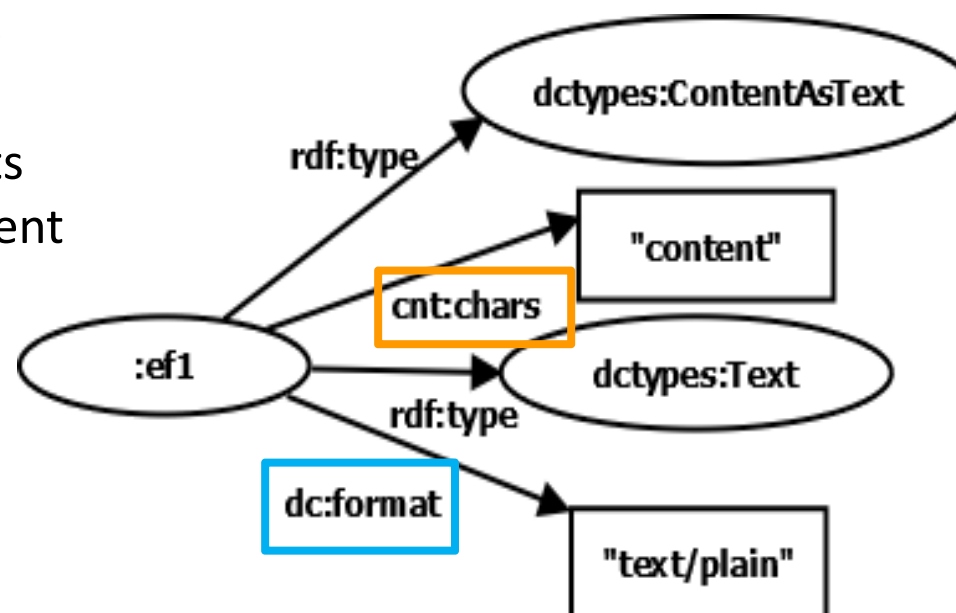
Dante's Fragment: Expression Fragment

	A	B	C	D	E	F	G
1	Book - Chapter	Paragraph	Text	Note	Author	Work	Thematic area
2	1.01	1	Sì come dice lo Filosofo nel principio della Prima Filosofia	le parole con cui si apre la Metafisica di Aristotele (I 1, 980a 21). Il sintagma "prima Filosofia" è già presente in Aristotele per distinguere questa scienza dalla Fisica (cfr. Metaph. VI 1, 1026 a 27-30).	Aristotele	Metafisica	Aristotelismo

Each instance of **frbroo:ExpressionFragment** is constituted by a **text**. We model following the recommendations of the **W3C's Content in RDF**:
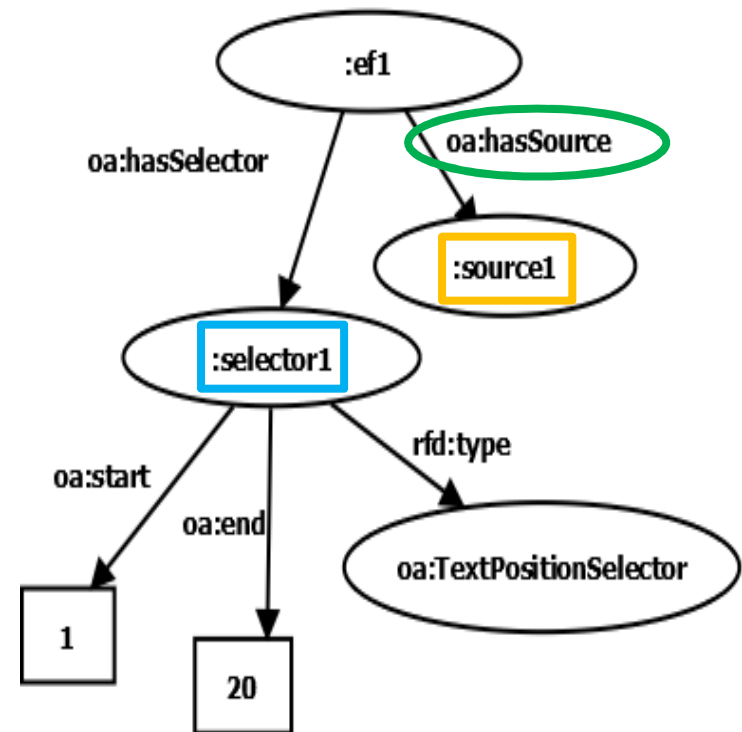
1. The property **dc:format** gives the media type of the body
2. The property **cnt:chars** represents the character sequence of the content

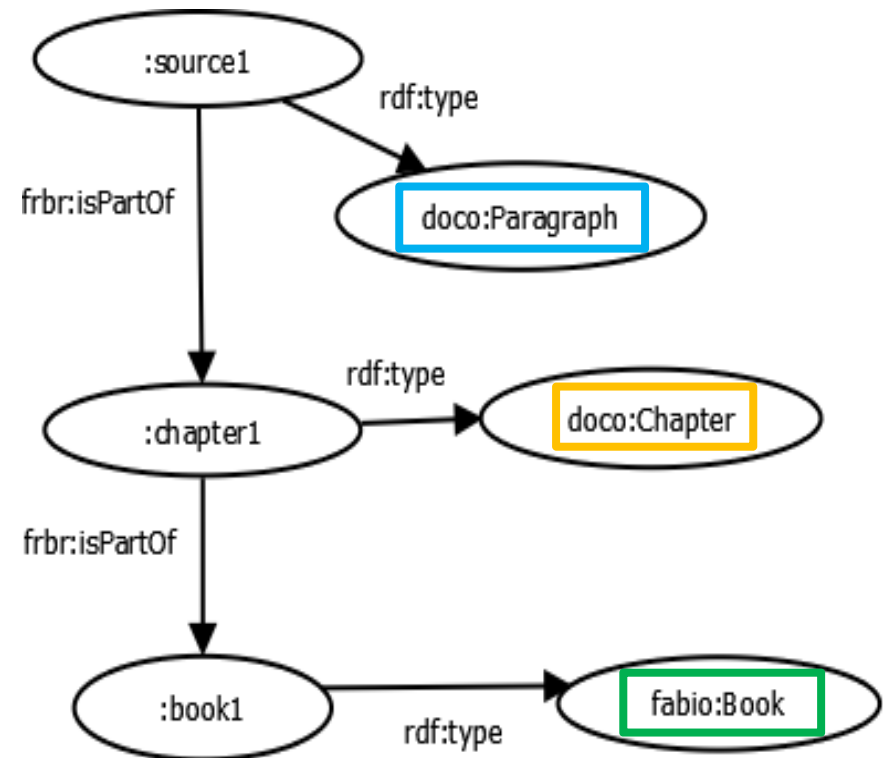# Dante's Fragment: Identification

- Open Annotation Core Data Model

- the concept of **Selector** (TextPositionSelector) in order to identify in the most precise way a specific fragment of a text based on its start and end positions within a paragraph

- The paragraph plays the role of **source** of the selector

- The connection between a fragment of Convivio and its source is established using the property **oa:hasSource**

Convivio's structure

- **Fabio** and **Doco**

- **doco:paragraph** represents a paragraph of Convivio

- **doco:chapter** represents a chapter of Convivio

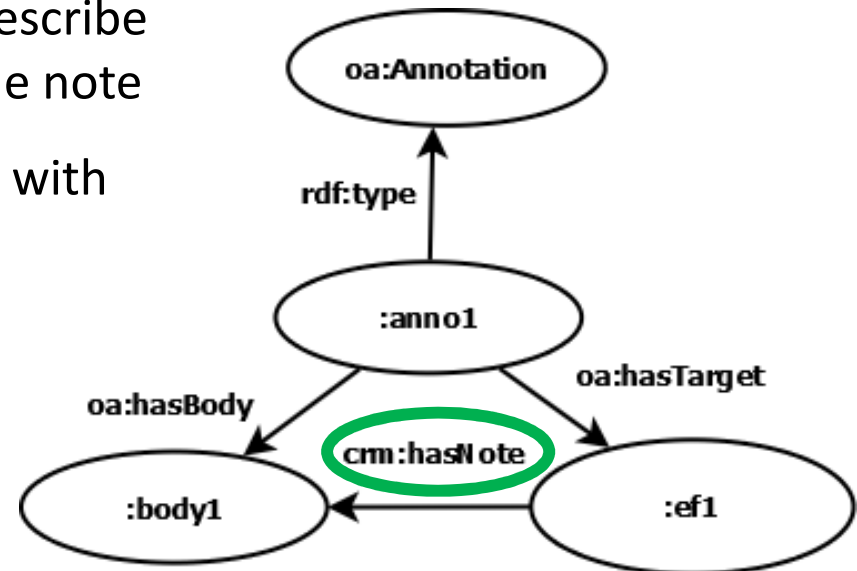- **fabio:book** represent a book of Convivio

Relation between the Dante's Fragment and the note

	A	B	C	D	E	F	G
1	Book - Chapter	Paragraph	Text	Note	Author	Work	Thematic area
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- **CIDOC-CRM**:

- We used the property **crm:hasNote** to describe the relationship between the text and the note

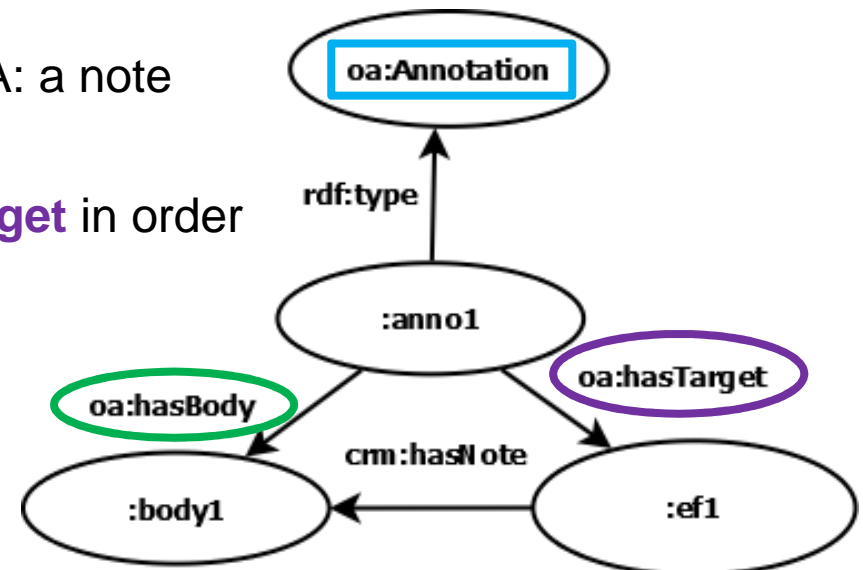- This property directly link the target text with the note

Relation between the Dante's Fragment and the note

	A	B	C	D	E	F	G
1	Book - Chapter	Paragraph	Text	Note	Author	Work	Thematic area
2	1.01	1	Sì come dice lo Filosofo nel principio della Prima Filosofia	le parole con cui si apre la Metafisica di Aristotele (I 1, 980a 21). Il sintagma "prima Filosofia" è già presente in Aristotele per distinguere questa scienza dalla Fisica (cfr. Metaph. VI 1, 1026 a 27-30).	Aristotele	Metafisica	Aristotelismo

- **Open Annotation Model**

We decided to be compliant also to OA because it is a standard *de facto* adopted by the WC3, then we used:

- the definition of the note reported by the OA: a note is an instance of the class **Annotation**

- the properties **oa:hasBody** and **oa:hasTarget** in order to link the annotation with its components
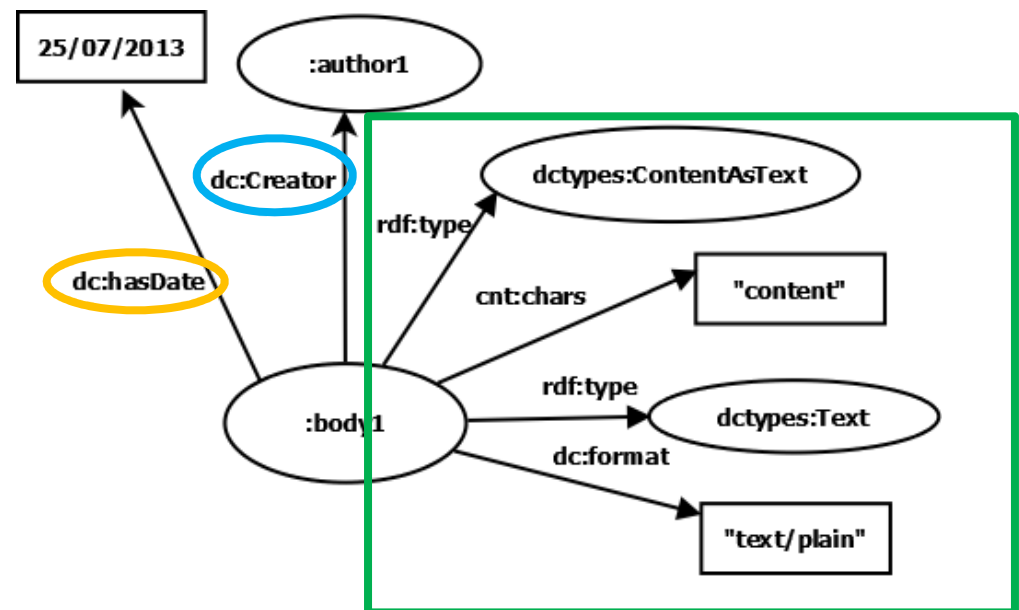
The Body of the Note

▲	A	B	C	D	E	F	G
1	Book - Chapter	Paragraph	Text	Note	Author	Work	Thematic area
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- **CIDOC-CRM**

A note has:
- an author, represented using the DC property **dc:creator**

- a creation date represented using the DC property **dc:hasDate**
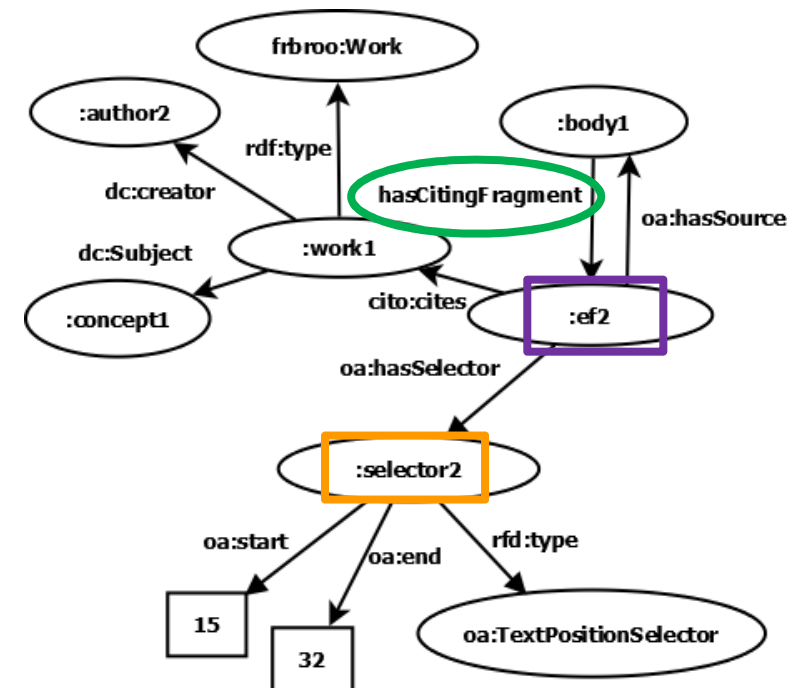
- a **textual body**.

Structure of the Note

	A	B	C	D	E	F	G
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- The **frbroo:ExpressionFragment** is also used to represent a fragment of note and a **selector** is used to identify the exact portion of the note.
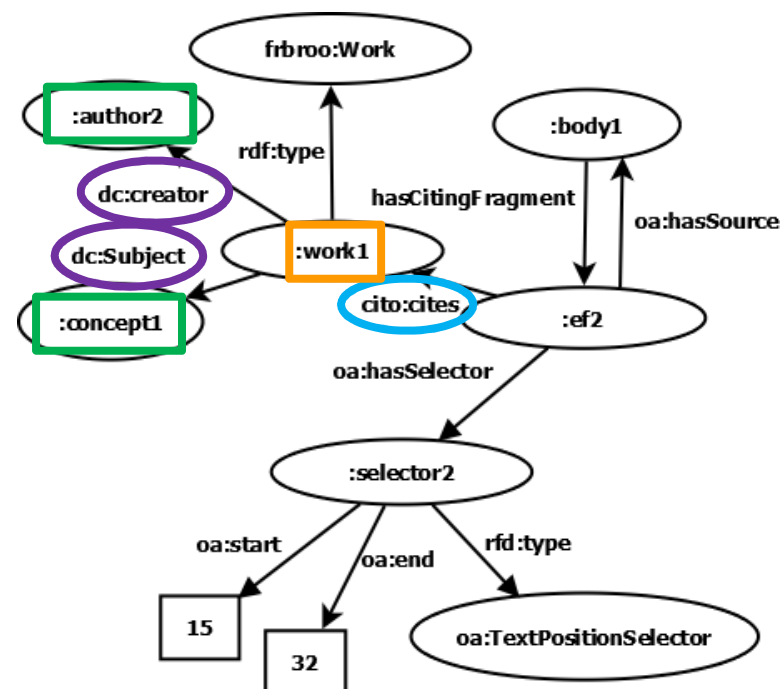
- We added the new property **hasCitingFragment** to relate the annotation with its own fragments. We defined the hasCitingFragment as a subproperty of the frbroo:hasFragment.

Information about a work referenced in the note

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- **cito:cites** refers the note fragment to a work

- **frbroo:Work** corresponds to a specific work, cited by the note (e.g. Metaphisics) without reference to a specific edition

- The frbroo:Work class has an author and a thematic area (e.g. Rhetoric, Aristotelianism) represented with the classes **foaf:Person** and **skos:Concept**

- To link the frbroo:Work with such classes we used the Dublin Core properties: **dc:creator**, and **dc:subject**

Conclusions

- The preliminary study concerns the representation of the notes to the Dante's Convivio

- We started from a document, created by a scholar, containing notes to Convivio and we created a high-level model of the notes, expressed in UML

- On the basis of the UML model, we created an RDFS schema

- Most of the classes and properties in our ontology are drawn from existing vocabularies but in order to represent the whole knowledge we added some terms

- The developed ontology is useful to represent the knowledge of the notes to Convivio, but it could also be used to represent the knowledge of the notes to other Dante's works or to works of other authors

Future Works

- We are currently working to convert the initial document provided by the scholar into an RDF graph which conforms to the RDFS schema

- The resulting graph will be stored into a triple store

- We will develop web applications (e.g. to browse the graph or to variously visualize the references of the notes) in order to support scholars in writing a complete encyclopedia about Dante's works