

End-user storytelling with a CIDOC CRM - based semantic wiki

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Some slides are adapted from a presentation by Martin Doerr and Stephen Stead at Imperial College, London, UK, May 22, 2009

Agenda

- **Exemple – Bilbo Baggins found the One Ring**
- **A semantic wiki equipped with an ontology**
- **Capabilities level**
- **Discussion**

Whom, when and where the Ring came into Bilbo's possession ?

□ Google “bilbo ring”:

◆ http://en.wikipedia.org/wiki/One_Ring

After Gollum hid under the Misty Mountains for hundreds of years, the Ring abandoned him, and Bilbo Baggins picked it up.

◆ http://en.wikipedia.org/wiki/Bilbo_Baggins

Underground, near Gollum's lair, Bilbo accidentally finds a magic ring of invisibility, which he uses to escape from Gollum.

◆ <http://www.tuckborough.net/bilbo.html>

As Bilbo groped along the dark tunnels, he found the Ring lying on the ground and slipped it into his pocket. By a subterranean lake Bilbo met Gollum, the creature who had lost the Ring.

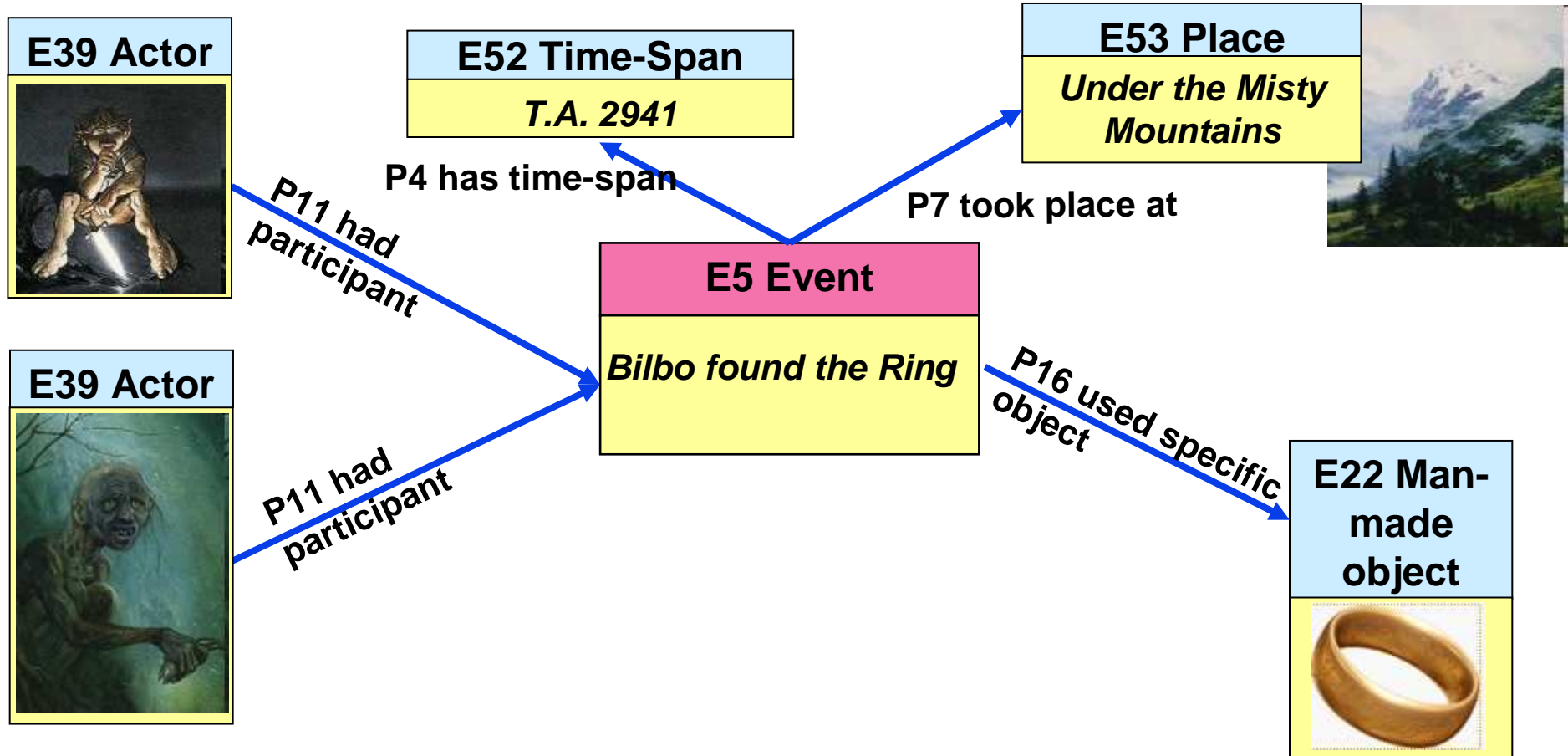
□ Google “bilbo gollum ring”:

◆ <http://www.tuckborough.net/gollum.html>

Gollum was of no further use to the Ring, so one day in the summer of 2941 while Gollum was hunting Orc meat, the Ring abandoned him.

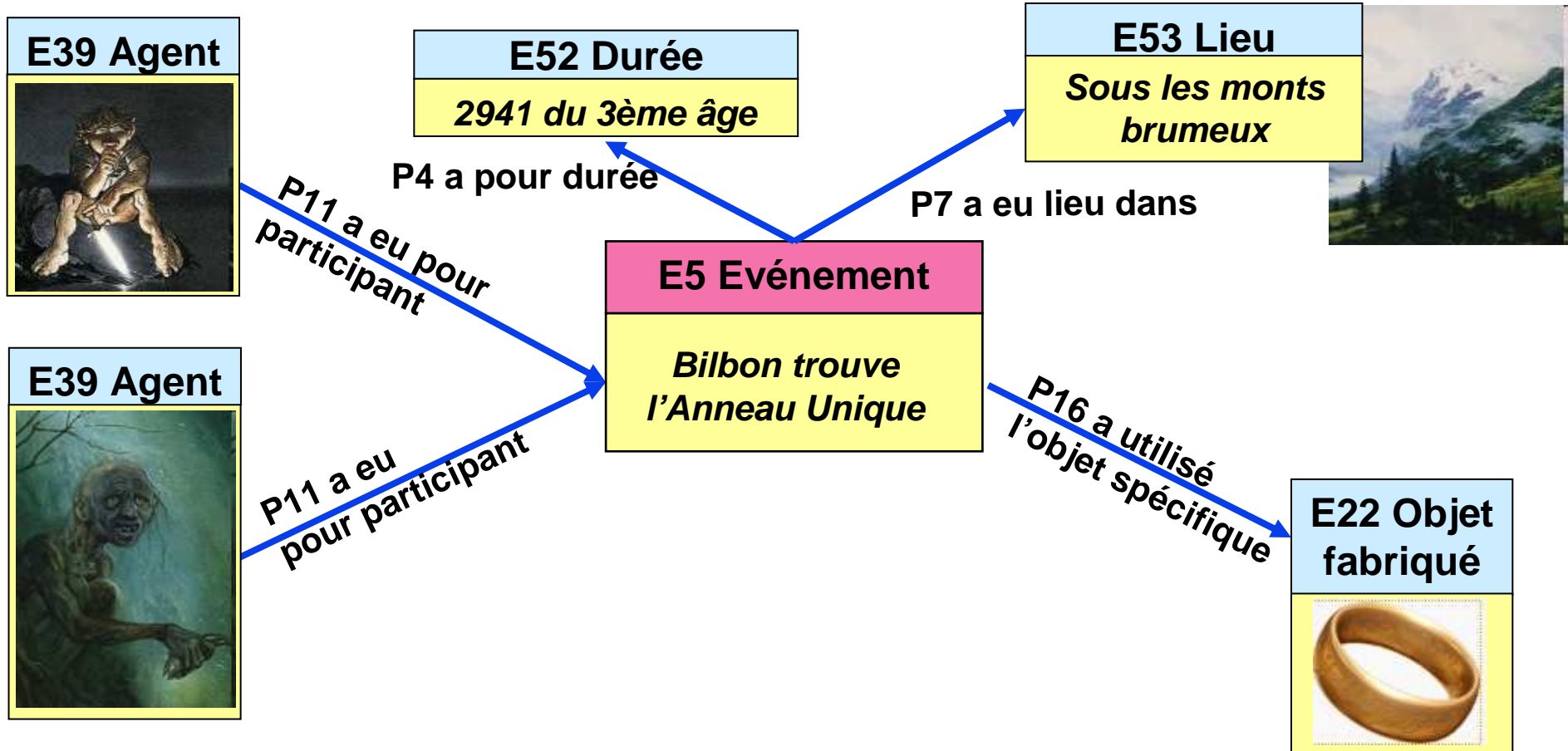
But then something unexpected occurred. The Ring was found by Bilbo Baggins, a Hobbit from the Shire who was lost in the Misty Mountains.

The answer :



In 2941 (Third Age) in the Misty Mountains, Bilbo found the Ring lying on the ground that was lost by Gollum.

La réponse :



En 2941 du 3ème âge, Bilbon a trouvé un anneau perdu par Gollum sous les monts brumeux.

Representing knowledge

The Hobbit
From Wikipedia, the free encyclopedia

For other uses, see [Hobbit \(disambiguation\)](#) and [There and Back Again \(disambiguation\)](#).

The Hobbit, or There and Back Again, better known by its abbreviated title *The Hobbit*, is a [fantasy novel](#) and [children's book](#) by [J. R. R. Tolkien](#). It was published on 21 September 1937 to wide critical acclaim, being nominated for the [Carnegie Medal](#) and awarded a prize from the *New York Herald Tribune* for best juvenile fiction. The book remains popular and is recognized as a classic in children's literature.

The Hobbit, or There and Back Again

Cover of the 1937 first edition

Author [J. R. R. Tolkien](#)

Illustrator J. R. R. Tolkien

J. R. R. Tolkien
From Wikipedia, the free encyclopedia

"[Tolkien](#)" redirects here. For other uses, see [Tolkien \(disambiguation\)](#).

John Ronald Reuel Tolkien, CBE (3 January 1892 – 2 September 1973), who pronounced his surname /ˈtɒlkiːn/^[1]^[2] was an English writer, poet, [philologist](#), and university professor, best known as the author of the classic [high fantasy](#) works *The Hobbit*, *The Lord of the Rings*, and *The Silmarillion*.

J. R. R. Tolkien

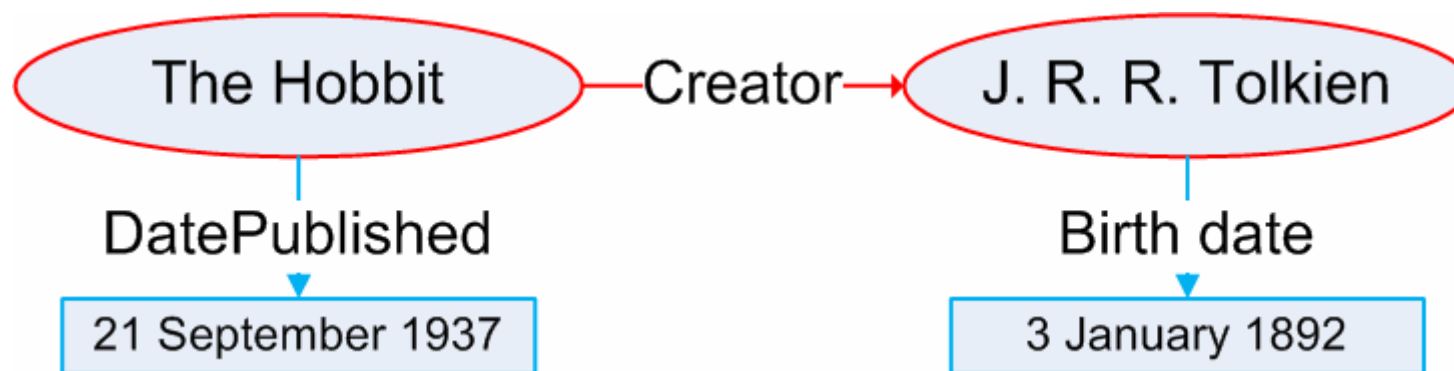
Tolkien in 1916

Born John Ronald Reuel Tolkien
3 January 1892
Bloemfontein, Orange Free State

Died 2 September 1973 (aged 81)
Bournemouth, England

□ Resource Description Language (RDF)

- ◆ RDF models (meta)data as 3-uplet (triples) : <subject, property, value>
- ◆ A resource (identified by a URI) has a property which has a value
- ◆ The value can be given **literally** or identified by a **URI**



< J.R.R. Tolkien, **Birth date**, 3 January 1892 > or < The Hobbit, **Creator**, J.R.R Tolkien >

Representing knowledge in a semantic wiki

The screenshot displays two pages from a semantic wiki. The left page is titled "The Hobbit" and features a "Facts about The Hobbit" box with the following data:

AwardedFrom	New York Herald Tribune
Creator	J. R. R. Tolkien
DatePublished	21 September 1937
Genre	fantasy novel, and children's book
Nomination	Carnegie Medal

The right page is titled "J. R. R. Tolkien" and features a "Facts about J. R. R. Tolkien" box with the following data:

Birth date	3 January 1892
Death date	2 September 1973
Has created	The Hobbit, The Lord of the Rings, and The Silmarillion

Below the facts boxes is a "Semantic search" interface. The query entered is `[[Has created::The Hobbit]]`. The results table shows:

	Birth date	Death date
J. R. R. Tolkien	3 January 1892	2 September 1973

□ Each page is a « triple tank »

- ◆ The Factbox depicts triples having the page as a subject
- ◆ Most properties have an **inverse property**, but RDF manages it as 2 separate triples

□ Semantic search

- ◆ Specify 1. Which pages to select 2. What information to display about those pages
- ◆ An interface that assists users with creating and executing semantic queries
- ◆ Inline queries dynamically include query results into pages

A semantic wiki

□ Constructs

◆ Categories ↔ Classes

A category is a set of individuals

A category groups pages sharing characteristics

◆ Pages ↔ Instances

A page describes « something »

« something » is an individual, an occurrence, an instance

« something » belongs to one or several categories

◆ Properties

Attributes : properties having a data type
type String, Date, ...

Typed links : properties linking to a page
E53 Place, E39 Actor, ... type Page

□ Textual part

◆ Annotated and hyperlinked text

Bilbo is called [[P1 is identified by::Elf-friend]]

Bilbo Baggins is a [[P2 has type::Hobbits]]

◆ May or may not be a structured

□ Facts about

◆ Triple RDF < subject, property, value >

< *Bilbo Baggins*, *P2 has type*, *Hobbits* >

The screenshot shows a wiki page for "Bilbo Baggins". At the top, there is a navigation bar with buttons for "page", "discussion", "edit", "history", "delete", "move", "protect", "watch", and "r". Below the navigation bar is the title "Bilbo Baggins". The main content is a paragraph of text: "Bilbo Baggins (called Elf-friend is a Hobbit. In comfortable middle age at 50 years old, he was hired in spite of himself as a burglar by Gandalf and thirteen dwarves led by their king Thorin Oakenshield on a quest to reclaim the Lonely Mountain and its treasure from the dragon Smaug. The adventure takes Bilbo and the companions through the wilderness, to the haven of Rivendell, across the Misty Mountains and the black forest of Mirkwood, to Esgaroth in the middle of Long Lake, and eventually to the Mountain itself. Here, after the dragon is killed and the Mountain reclaimed, the Battle of Five Armies takes place." Below the text is a box labeled "Category: E39 Actor". At the bottom, there is a section titled "Facts about Bilbo Baggins" with an "RDF feed" icon. This section lists several facts: "P107B is current or former member of Company of dwarves + 🔍", "P11B participated in Quest of Erebor + 🔍, and Battle of Five Armies + 🔍", "P1 is identified by Elf-friend + 🔍", and "P2 has type Hobbits + 🔍".

A semantic wiki (2)

```
{{Tolkien character
| character_name = Bilbo Baggins
| character_alias = Ring-bearer, Elf-friend ...
| image_character =
| character_race = Hobbits
| Book(s) = The Hobbit, The Lord of the Rings
}}
```

□ Structured part

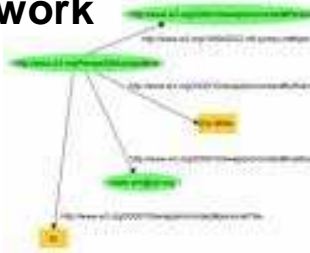
- ◆ Based on a semantic template
- ◆ Field are related to semantic properties

□ Category

- ◆ Associated with template and form
- ◆ Defining a set of properties that may be used to annotate pages of the category

□ Facts about

- ◆ Coming from textual and structured parts
- ◆ Each page is a small set of triples
- ◆ All sets together are a semantic network
- ◆ Searches work on the network



page discussion edit history delete move protect watch r

Bilbo Baggins

Name	Bilbo Baggins
Aliases	Ring-bearer, Elf-friend, Bilba Labingi
Image	
Race	Hobbits
Book(s)	The Hobbit, The Lord of the Rings

Bilbo Baggins (in comfortable middle age at 50 years old) was hired in spite of himself as a burglar by Gandalf and thirteen dwarves led by their king Thorin Oakenshield on a quest to reclaim the Lonely Mountain and its treasure from the dragon Smaug. The adventure takes Bilbo and the companions through the wilderness, to the haven of Rivendell, across the Misty Mountains and the black forest of Mirkwood, to Esgaroth in the middle of Long Lake, and eventually to the Mountain itself. Here, after the dragon is killed and the Mountain reclaimed, the Battle of Five Armies takes place.

Category: E39 Actor

Facts about Bilbo Baggins ⓘ

RDF feed ⓘ

- P107B is current or former member of [Company of dwarves](#) + 🔍
- P11B participated in [Quest of Erebor](#) + 🔍, and [Battle of Five Armies](#) + 🔍
- P1 is identified by [Ring-bearer](#) + 🔍, [Elf-friend](#) + 🔍, and [Bilba Labingi](#) + 🔍
- P2 has type [Hobbits](#) + 🔍
- P48 has preferred identifier [Bilbo Baggins](#) + 🔍
- P70B is documented in [The Hobbit](#) + 🔍, and [The Lord of the Rings](#) + 🔍

... based on an ontology

```
{{ infobox Tolkien character
| character_name      =
| character_alias     =
| image_character     =
| image_caption       =
| character_race      =
| Book(s)
...
}}
```

```
{{Star Wars character
| name      =
...
| image     =
| caption   =
| species   =
...
| gender    =
...
}}
```

```
P48 has preferred identifier
P1 is identified by

P138B has representation
P2 has type
P70B is documented in
...
```

□ An ontology with classes and properties

- ◆ A class is a set of items sharing common characteristics
- ◆ A property is used to define a relationship between classes

Domain : departure set

Range : arrival set

□ CIDOC CRM, international standard ISO 21127:2006

- ◆ event-centered
- ◆ freely available on the site <http://www.cidoc-crm.org/>
- ◆ around 90 classes and 150 properties
- ◆ ontological kernel with 40 classes and 30 properties
- ◆ extensible

How do we tell a story ?

- What did happen to the individuals (objects) that we are describing ?
The model heart is constituted with Temporal Entities, expressing
 - ◆ either the fact that a given object is « in a certain state » (operational, destroyed, etc.) *Condition State* class);
 - ◆ or the fact that « something happened »
(an *Event*, an *Activity*, a *Beginning* or an *End of Existence*, etc.).

- From this notion of Event, some fundamentals questions :
 - ◆ When did it happen ? We are answering with the *Time-span* class;
 - ◆ Where did it happen? This question implies existence of the *Place* class;
 - ◆ Who did it ? Question that carries out the notion of *Actor* (intentional) ;
 - ◆ What did it happen ? (what is the material object being described?), that leads to the notion of *Physical Thing* (physical or man-made) ;
 - ◆ What did it happen? (what is the conceptual object being described?), question that leads up to the notion of *Conceptual Object* (a product of a human activity).

- Human beings arrange, classify and give names :
 - ◆ Classification activity carries out the notion of *Type*;
 - ◆ In order to speak easily of these things, we need to give them a name, that implies the notion of *Appellation*.

Main properties of Temporal Entities

□ E2 Temporal Entity

◆ Properties: **P4 has time-span (is time-span of):** E52 Time-span

□ E4 Period

◆ Properties : **P7 took place at (witnessed):** E53 Place
P9 consists of (forms part of): E4 Period
P10 falls within (contains): E4 Period

□ E5 Event

◆ Properties : **P11 had participant (participated in):** E39 Actor
P12 occurred in the presence of (was present at): E77 Persistent Item

□ E7 Activity

◆ Properties : **P14 carried out by (performed):** E39 Actor
P16 used specific object (was used for): E70 Thing
P20 had specific purpose (was purpose of): E5 Event
P21 had general purpose (was purpose of): E55 Type
P134 continued (was continued by): E7 Activity

Experimentation

□ 17 “groups” of students from 1 to 4 people

- ◆ 10 films or series, 1 cartoon
- ◆ 3 bands’ biographies, 3 video games.

□ Capability level

◆ Level 1: Reproduction

Able to reproduce constructs: pages, property selection, values assignment, file uploading, straightforward typesetting. Able to enrich wiki data (content).

◆ Level 2: Customization

Able to create new constructs: categories, properties, templates. Able to customize wiki presentation. Able to enrich wiki content and structure as well.

◆ Level 3: Transformation

Able to evolve the wiki structure. Able to model the story domain with the CIDOC CRM and to implement it in a semantic wiki.

◆ Level 4: Reflection

Reaching a true capability level on the Semantic Web

□ Measurement

- ◆ N Not achieved - Little or no evidence of achievement of the defined objective.
- ◆ P Partially achieved - Some evidence of an approach to, and some achievement of, the defined objective.
- ◆ L Largely achieved - Evidence of a systematic approach to, and significant achievement of, the defined objective.
- ◆ F Fully achieved - Evidence of a complete and systematic approach to, and full achievement of, the defined objective.

Overview of difficulties

page discussion edit history delete move protect watch refresh

Battle of Five Armies

The *Battle of Five Armies*, depicted in *The Hobbit*, was fought between the [Goblins](#) and the [Wargs of Moria](#) and the [Misty Mountains](#) against the [Men of the Long Lake](#), the [Elves of Mirkwood](#), the [Dwarves](#) on and near the [Lonely Mountain](#) and the great [Eagles](#) of the [Misty Mountains](#). The hobbit [Bilbo Baggins](#), the wizard [Gandalf the Grey](#), and [Beorn](#), also took part and are more single characters involved on the side of the men, dwarves and elves, rather than forming a separate army.















Decomposition [edit]

The battle begins when [Smaug](#) was killed and consists of 4 phases :

- [Siege of the mountain](#)
- [Theft and negotiation of the Arkenstone](#)
- [Arrival of Goblins and Wargs](#)
- [Venue of the Eagles and Beorn](#)

Category: [E5 Event](#)

Facts about Battle of Five Armies ⓘ RDF feed

P11 had participant	Goblins  , Wargs  , Men of the Long Lake  , Elves of Mirkwood  , Dwarves  , Eagles  , Bilbo Baggins  , Gandalf  , and Beorn 
P70B is documented in	The Hobbit 
P9 consists of	Siege of the mountain  , Theft and negotiation of the Arkenstone  , Arrival of Goblins and Wargs  , and Venue of the Eagles and Beorn 

1 - Reproduction

A battle has participants, date, place

A battle is an instance of E5 Event

A battle has its own characteristics

A battle is a kind of E5 Event

A battle is a class

2 - Customization

New class : Battle

Each battle is an instance of Battle

Battle has been won Actor

One to many, many to one, many to many

3 – Transformation

Battle parts : P9 consists of

Each part P9B forms part of the whole

Actor died in Battle

A shortcut to

Actor P100B died in Death

Death P9B forms part of Battle

Intermediary appraisal

□ Appraisal one month before the deadline

- ◆ 1 abandoned wiki; 1 wiki not reaching Level 1;
- ◆ 6 wikis reached Level 1; 5 wikis reached Level 2;
- ◆ 5 wikis reached Level 3.

□ Confusion Immaterial work / Work manifestation

◆ Immaterial work

The Hobbit is created by J.R.R Tolkien

The english version is realized by J.R.R Tolkien

The genre is Children's literature

◆ Work manifestation : the first edition

First edition is illustrated by J.R.R. Tolkien

The publisher is George Allen & Unwin

The number of pages is 310

□ Supplementary instructions

- ◆ Most wikis created a “blended” class Work
- ◆ Distinction to be introduced in the ontological core
- ◆ FRBRoo

The Hobbit, or There and Back Again



Cover of the 1937 first edition

Author	J. R. R. Tolkien
Illustrator	J. R. R. Tolkien
Cover artist	J. R. R. Tolkien
Country	 United Kingdom
Language	English
Genre(s)	Children's literature Fantasy novel
Publisher	George Allen & Unwin (UK)
Publication date	1937
Media type	Print (Hardback)
Pages	310 pp (first edition)
ISBN	n/a
Followed by	<i>The Lord of the Rings</i>

Final assessment

□ Advices were mostly taken in account, and finally :

- ◆ 1 wiki not reached Level 1; 1 wiki reached Level 1;
- ◆ 1 wiki ~ reached Level 2, 5 wikis reached Level 2;
- ◆ 2 wikis ~ reached Level 3, 7 wikis reached Level 3.

□ Gender issues

◆ Groups mostly (or totally) composed of female students

Almost all at the best places at the intermediary appraisal

Groups with 3 or 4 members

They divided naturally the work to be done

Mutual encouragement and help

◆ Groups mostly (or totally) composed of male students

Single or couple with a leader carrying on the project

5 « groups » rush out from last to first places

Encouragement and help from the tutor

□ Internet generation

◆ The wiki is hosted on the Internet, accessible to “friends”

◆ The wiki allows the tutor to figure out problems, even to work directly

◆ Students are at ease with interactions and help through e-mail and wikis

Limits of implementing the CRM in a semantic wiki

□ CRM fully objet-oriented

- ◆ The CRM is using properties between objects
- ◆ To simplify, we need to have datatype properties for literal values
- ◆ A S before a property : a shortcut, mostly converting to datatype
P7 took place at : E53 Place ↔ SP7 took place at : String

□ Inverse properties

- ◆ **Example of P14 carried out by (performed)**
Domain: E7 Activity P14 carried out by Range: E39 Actor
Domain: E39 Actor P14B performed Range: E7 Activity
- ◆ **Locality principle**
We have to manually update former or future pages related with inverse property

□ Type control for domain and range

- ◆ For object property, the wiki provides only the type Page
- ◆ We present the property in the category associated with the domain
- ◆ And the inverse property in the category associated with the range
- ◆ No automatic control within the wiki

Level 3 : transformation

Relationships

Logical structure of a work

Organization

It reflects the explicit organization of logical abstractions representing the work parts.

A work of type **Book** is constituted of a **Book Title** and one or several **Chapter**, themselves formed with **Section Title** and one or several **Section**.

Relationships

The organization relies on relationships between information entities.

The logical structure of a work of type Book, Film, TV series is using two relationships :

- * Part-whole relationship describes entities agregation (structural elements) in the hierarchy
- * Sequence relationship describes the entities schedule (sequence order), that means the consulting order within the work



page discussion modifier historique supprimer renommer protéger

Le Seigneur des anneaux

Adapté d'un [Article de Wikipedia](#)

Le Seigneur des anneaux (titre original : *The Lord of the Rings*) est un roman en trois tomes de John Ronald Reuel Tolkien paru entre 1954 et 1955:

- La communauté de l'anneau (*The Fellowship of the Ring*),
- Les deux tours (*The Two Towers*),
- Le retour du Roi (*The Return of the King*).

Faits relatifs à Le Seigneur des anneaux ⓘ — Recherche de pages similaires avec + 🔍

Voir comme RDF 🔗

P106 est composé de La communauté de l'anneau + 🔍, Les deux tours + 🔍 et Le retour du Roi + 🔍

[[Le Seigneur des anneaux]] (titre original : "The Lord of the Rings") est un roman en trois tomes de [[John Ronald Reuel Tolkien]] paru entre 1954 et 1955 :

- * [[P106 est composé de::La communauté de l'anneau]] ("The Fellowship of the Ring"),
- * [[P106 est composé de::Les deux tours]] ("The Two Towers"),
- * [[P106 est composé de::Le retour du Roi]] ("The Return of the King").

Level 3 : transformation

Inverse attributes

page discussion edit history delete move protect watch

La communauté de l'anneau

La communauté de l'anneau est la première partie de [Le Seigneur des anneaux](#). Elle est suivie de la deuxième partie [Les deux tours](#).

Facts about La communauté de l'anneau 

P106B fait partie de [Le Seigneur des anneaux](#) + 

Tome suivant [Les deux tours](#) + 

"La communauté de l'anneau" est la première partie de `[[P106B fait partie de::Le Seigneur des anneaux]]`. Elle est suivie de la deuxième partie `[[Tome suivant::Les deux tours]]`.

Inverse properties

- ◆ **Domain E74 Group P107 has current or former member Range E39 Actor**
 - The Ring Community P107 has current or former member Gandalf
- ◆ **Domain E39 Actor P107B is current or former member of Range E74 Groupe**
 - Gandalf P107B is current or former member of The Ring Community

Semantic searches

- ◆ **Queries are running on annotations (the underlying RDF graph)**
- ◆ **Query language is very closed to annotation language:**
 - Query `[[P7 took place at::Boston]]` is retrieving pages that « took place at » Boston
- ◆ **Queries can be used to implement inverse attributes**

Rather than annotating with the property (P106), we look for pages annotating with the inverse attribute (P106B)

`[[Le Seigneur des anneaux]]` est composé de :
`{{#ask: [[P106B fait partie de::Le Seigneur des anneaux]] }}`

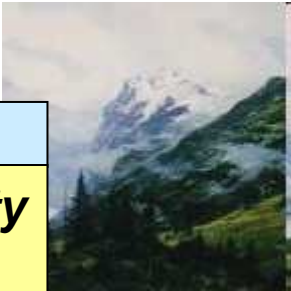
page discussion edit history delete

Le Seigneur des anneaux

Le Seigneur des anneaux est composé de :

- La communauté de l'anneau
- Le retour du Roi
- Les deux tours

A precise answer :



E39 Actor

E52 Time-span
T.A. 2941

E53 Place
Under the Misty Mountains

P4 has time-span

P7 took place at

P11 had participant
P29 custody received by

E5 Event
Bilbo found the Ring

E38 Image

P138 represents

P9 consists of

P16 used specific object

E39 Actor

P11 had participant

E10 Transfer of Custody
*

P28 custody surrendered by

P30 transferred custody of

E22 Man-Made

From the necessity having an ontology

Ontology KNOWLEDGE ENGINEERING. *Standardized specification representing the classes of objects being recognized as existing in the domain and the relationships between domain objects.*

- ❑ **Emphasis is put on concepts and relationships of the domain**
- ❑ **Modelling domain knowledge that are **sound for an application** , or **a given task****
- ❑ **Conceptualization with general/specialized classes, relationships (properties) and rules**
- ❑ **Application of **normalization principles** , of « correct building » and/or reference to existing ontologies**

From wikis to ...

Bilbo Baggins

From Wikipedia, the free encyclopedia

Bilbo Baggins is the protagonist of *The Hobbit* and also makes a few appearances in *The Lord of the Rings*, two of the most well-known of J. R. R. Tolkien's fantasy writings. The story of *The Hobbit* featuring Bilbo is also retold from a different perspective in the Chapter *The Quest of Erebor* in *Unfinished Tales*.

Bilbo Baggins

Character from J. R. R. Tolkien's *legendarium*

Aliases *Ring-bearer*, Elf-friend, *Bilba Labingi*

Race *Hobbits*

Book(s) *The Hobbit* (1937)
The Lord of the Rings (1954-1955)
Unfinished Tales (1980)

Contents [hide]

- 1 Appearances
 - 1.1 The Hobbit
 - 1.2 The Lord of the Rings
 - 1.2.1 The Appendices
 - 1.3 Bilbo's Last Song
- 2 Names and titles
- 3 Portrayals in adaptations
- 4 Family tree
- 5 References
- 6 External links

Categories: Middle-earth Hobbits | Fictional writers | Characters in The Lord of the Rings | Characters in The Hobbit

□ Textual part :

- ◆ Hypertext
- ◆ Structured content
- ◆ Belonging to categories (Hobbit, Character...)
- ◆ Inter-lingual links

□ Structured part (Infobox) :

- ◆ Based on a template (Tolkien character)
- ◆ Using named parameters, i.e. couples *parameter=value*
- ◆ Values can be literals or links towards others pages
- ◆ May have redundancy with the textual part

```
{{Infobox Tolkien character
| character_name = Bilbo Baggins
| character_alias = [[Ring-bearer]], Elf-friend,
" Bilba Labingi"
| character_race = [[Hobbit]]s
... }}
```

"Bilbo Baggins" is the protagonist of "[[The Hobbit]]" and also makes a few appearances in "[[The Lord of the Rings]]" two of the most well-known of [[J. R. R. Tolkien]]'s [[Tolkien's legendarium|fantasy writings]].

...
[[Category:Middle-earth Hobbits]]
...
[[fr:Bilbon Sacquet]]

- ▼ Languages
 - Bosanski
 - Български
 - Català
 - Česky
 - Dansk
 - Deutsch