Curate and Storyspace: An Ontology and Web-Based Environment for Describing Curatorial Narratives

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Abstract. Existing metadata schemes and content management systems used by museums focus on describing the heritage objects that the museum holds in its collection. These are used to manage and describe individual heritage objects according to properties such as artist, date and preservation requirements. Curatorial narratives, such as physical or online exhibitions tell a story that spans across heritage objects and have a meaning that does not necessarily reside in the individual heritage objects themselves. Here we present *curate*, an ontology for describing curatorial narratives. This draws on structuralist accounts that distinguish the narrative from the story and plot, and also a detailed analysis of two museum exhibitions and the curatorial processes that contributed to them. *storyspace*, our web based interface and API to the ontology, is being used by curatorial staff in two museums to model curatorial narratives and the processes through which they are constructed.

Keywords: Cultural heritage, story, plot, narrative, ontology, museum.

1 Introduction

Current museum metadata schemes and content management systems focus on the description and management of the individual heritage objects that the museum holds in its collection. An important responsibility for museums, as well as preserving the collection, is to communicate to the public. One key form of communication is through the development of curatorial narratives. These curatorial narratives may take the form of physical museum exhibitions (possibly supplemented by other materials such as audio guides and booklets) or online presentations. Curatorial narratives express meaning across a number of heritage objects. The meaning of the narrative cannot be expressed or derived purely from the metadata of the heritage objects that it contains. Currently, there is therefore no support for the description and search of museum narratives based on their meaning rather than the objects that they contain.

This work is being conducted as part of DECIPHER, an EU Framework Programme 7 project in the area of Digital Libraries and Digital Preservation. A key aim of DECIPHER is to allow users interactively to assemble, visualize and explore, not just collections of heritage objects, but the knowledge structures that connect and give them meaning. As part of this work, the curate ontology has been developed in order that we can understand and describe the reasoning behind a curatorial narrative.

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This can the be used to describe and search of narratives based on their meaning rather than just the heritage objects that they contain. The ontology will also be used to drive computational assistance for the human construction of narratives.

The rest of this paper is structured as follows. The next section describes related research in the formal description of events and its use in providing navigation across heritage objects. Section 3 describes the curate ontology and how it can be used to describe curatorial narratives. It draws on structuralist theories that distinguish the narrative presentation from the conceptualization of the story and plot. Section 4 describes storyspace, an API and web interface to the ontology. Section 5 describes the use of storyspace to model curatorial narratives on the conceptual, story level. Section 6 summarises the findings of a structured interview with two members of museum curatorial staff that used storyspace to model curatorial narratives over a two month period. Section 7 presents conclusions and ongoing work.

2 Related Work

Although there has not been any previous attempt to develop an ontology of curatorial narrative, some previous research has used metadata to generate or describe presentations that include multiple heritage objects. These have made use of event-based ontologies and metadata schemes to conceptually interconnect heritage objects.

Bletchley Park Text [1, 2] uses historical interviews described according to CIDOC CRM [3] event-based metadata to assemble an online newspaper in response to a query. Interviews are grouped according to the common people, places and objects mentioned in their constituent events. Hyvonen et al. [4, 5] used event-based metadata to assemble further heritage objects around another that acted as a hub or backbone to the presentation. In one case a movie about the ceramics process was represented as events and linked to other resources related to concepts (e.g. people objects) featured in the events [5]. In the other, events were used to generate links within a poem and to external resources giving additional information [5].

Wang et al. [6, 7] use content metadata and user preferences to suggest related heritage objects of interest. van Hage et al. [8] combine this with a real-time routing system to provide a personalized museum tour guide creating a conceptual path across a number of heritage objects. The personalized tour guide developed by Lim and Aylett [9] associated heritage objects with a metadata structure they termed a story element that comprised events, people, objects, museum location and causal relationships to other story elements. Recommendations were made based on casual relationships and shared items contained in story elements.

Finally, van Erp et al. [10] describe a prototype system for event-driven browsing. The system suggests related heritage objects based on their associated events. By selecting related heritage objects the user can create a pathway through the heritage objects.

Research related to the interconnection of heritage objects based on event metadata has made use of a number of ways of formally representing events. CIDOC CRM is an upper level ontology for the cultural heritage sector [3]. CIDOC CRM affords an event-based representation of metadata. This provides a way of representing the

changing properties of a heritage object over time (for example the changing ownership of a painting). Another particular advantage of the CIDOC CRM ontology is that it facilitates interoperability among museum metadata schemes. Other approaches to the formal representation of events have been proposed such as LODE [11] and SEM [12]. These aim to limit ontological commitment in order to broaden the range of events that can be represented and are not focused specifically on the heritage domain.

Other work has looked at separating the interpretation of events from the representation of the events themselves. This simplifies the properties of the event and allows multiple (possibly conflicting) interpretations of the same event to be modeled, for example alternative perspectives on the cause-effect relationship between events. The Descriptions and Situations (DnS) ontology design pattern applied to events [13] supports this by distinguishing a situation (e.g. two events) from its description (e.g. cause-effect relationship between them).

3 The Curate Ontology

Development of the curate ontology drew on an analysis of the curatorial processes as conducted in museums. We analyzed in detail the curatorial processes involved in the development of two exhibitions held by museum partners in the DECIPHER project. The two exhibitions were Gabriel Metsu [14] held at the National Gallery of Ireland and The Moderns [15] held at the Irish Museum of Modern Art (IMMA). The Gabriel Mestu exhibition focused on the work of a single artist. The Moderns presented an Irish perspective on Modernism in art and covered a range of artists from around 1900 to 1970. The analysis involved visiting the exhibitions (in the case of the Moderns) and analysis of associated resources (e.g. transcript of the audio guide, museum panels, booklets). A one-day workshop was held focused on each exhibition. The first half of the workshop was devoted to presentations by staff involved in the curatorial process. This included curators of the physical exhibition and others involved in interpretation and producing narratives around the exhibition such as staff working on the education programme. The second half was focussed on discussions motivated by scenarios and paper prototypes of what types of interaction could be envisaged from tools resulting from the project. Further details on the analysis of curatorial practice can be found elsewhere [16, 17].

This work produced a rich description of the curatorial process. In developing the ontology we proposed two working hypotheses to guide our interpretation of the data, and that could also be tested as part of the interpretation process. Our first hypothesis was that a curatorial narrative should have the generic properties found in other types of narrative such as a novel or a film. Structuralist theories can be used to distinguish story, plot and narrative [18]. The story is the set of events that can be told. The plot imposes a network of relationships on the events of the story signifying their roles and importance in the overall story and how they are interrelated (e.g. a causal relationship between two events). The plot therefore turns a chronology of events into a subjective interpretation of those events. The narrative is a particular telling of that story and plot in some particular media.

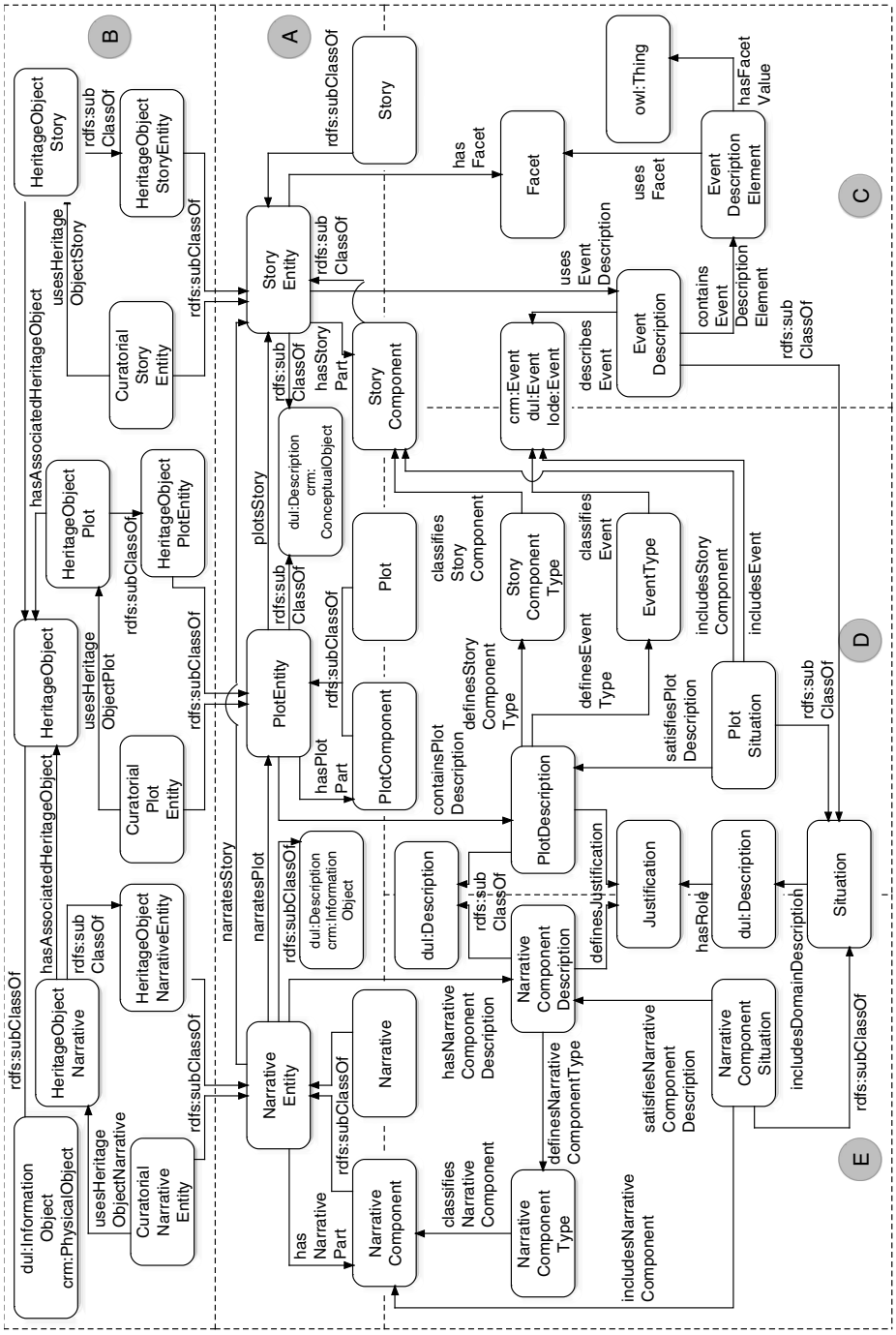

Fig. 1. Overview of the curate ontology

Second, we hypothesized that curatorial narratives are not only presentations but the product of a process of inquiry in which the heritage objects provide a source of evidence. Narrative inquiry [19] is a methodology in which research can be conducted by selecting or constructing a story of events, interpreting these by proposing and testing a plot and then presenting this as a narrative to the research community. Narrative inquiry can be contrasted with the scientific method as a research methodology. In narrative inquiry the plot can be thought of as essentially a hypothesis that is tested against the story, being the data of the experiment. Story, plot and narrative therefore constitute a process rather than only associated types of description.

These hypotheses, in combination with an iterative design process in participation with the two museums, led to the construction of the curate ontology[1]. An overview is shown in figure 1. CIDOC CRM [3] and DOLCE+DnS Ultralite (DUL)[2] are used as upper level ontologies for curate. There are five main components to the ontology, indicated by the areas A to E in figure 1. These will be described in the following five subsections.

3.1 Story, Plot and Narrative

Part A of the ontology describes the concepts of story, plot and narrative and how they are related (see figure 1). A narrative presents both a story and a plot. A story is interpreted by a plot. A number of plots may be created for the same story. In some cases a narrative may present a story but have no associated plot. This would indicate that the narrative is recounting a chonology of events (i.e. a chronicle) but offers no interpretation of them. Figure 2 shows the relationship between a story of Gabriel Metsu and an associated plot and story. The story itself contains events. The events of a story will be considered further in section 3.3.

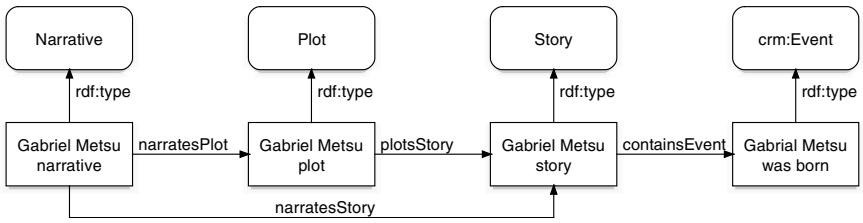

Fig. 2. Modeling narrative, plot, story and event

3.2 Stories and Heritage Objects

The relationship between heritage objects and the story, plot and narrative is illustrated in part B of figure 1. Discussions with museum partners made clear that we needed to distinguish two types of narrative. A heritage object narrative tells a story

[1] http://decipher.open.ac.uk/curate
[2] http://ontologydesignpatterns.org/ont/dul/DUL.owl

about a heritage object. A heritage object may have multiple heritage object narratives. These heritage object narratives may draw on different aspects of the heritage object such as how the object was created, some insight it gives about the life of the artist, what is depicted in the heritage object or who has owned it. A curatorial narrative threads across a number of heritage object narratives. It makes conceptual relationships across a set of exhibits, yielding more complex insights than could be made from the exhibits individually.

This approach to modeling has two advantages. First, it allows us to distinguish alternative stories of the same heritage object. Second it allows us to model, through the heritage object story, what contribution a heritage object brings to a curatorial story. The relationship between a heritage object and an event, mediated by the heritage object story, plays the role of the illustrate property in the LODE ontology [11] that associates an object with an event. The mediating role of the heritage object story though allows us to represent through which story the event is associated with the object.

Figure 3 shows two heritage object stories of the painting "A Woman Reading a Letter". One is concerned with how the painting illustrates the brush technique of the artist. The other is concerned with a more recent incident in which the painting was stolen and recovered. The story about brush technique is relevant to the curatorial story. The curatorial story shows how Metsu's technique changed over time, drawing on a number of heritage object stories illustrating technique at a particular point in time.

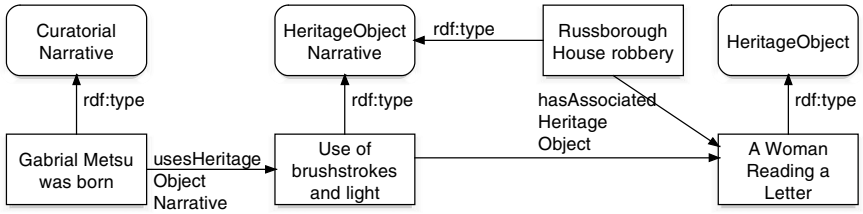

Fig. 3. Modeling curatorial stories, heritage object stories and heritage objects

3.3 Facets, Events and Event Descriptions

The relationship of stories to events and their description within a story is represented in part C of figure 1. An event included in a story has an associated event description. This describes the event according to the facets of the story. The facets are dimensions according to which the event can be described. Following [11], this interpretation of an event in the context of a story is modeled as a DUL:Situation, the story itself constituting a DUL:Description. From a narrative inquiry perspective [19] this allows us to move from a chronicle, a set of events that just have a position in time, to what is called a storyline. A storyline also describes the events in other ways relevant to the investigation. For example, if changing patterns in the location of events over time was of interest then location would be a facet of the story used to describe the events. Similarly, if the investigation was considering the incidence of certain types of activity then activity type of the event would be a facet of the story.

This type of organization was identified in the exhibitions and recognized as a general organizational principle by curatorial staff. In the case of Gabriel Metsu, the first part of the exhibition illustrated the development of his technique early in his career. Here, time was the primary organizing principle. In the later components of the exhibition, which focus on when his technique has fully developed, organization was thematic, indicating whether the work was related to, for example, family, reputation or religion.

Figure 4 shows the association of an event with the theme of religion. Within the context of this story, the event has an event description. The event description has event description elements that assign one or more values for a defined facet of the story. The event description is used to reify the interpretative elements of the event description.

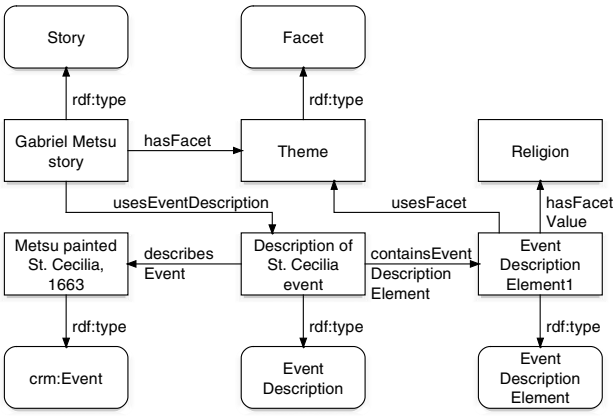

Fig. 4. Modeling events and event descriptions

3.4 Plots, Events and Story Components

The emplotment of a story (i.e. its association with a plot) is represented in part D of figure 1. The approach taken to modeling plot makes use of the Descriptions and Situations (DnS) pattern applied to events [13]. The ontology supports the definition of plot relationships across events, story components or both. For example, a plot relationship may define that one event causes another. In practice, the relationships found between events tend to be subtler, for example the specification of an influence between events. This is not only a feature of curatorial narratives. For example, in an analysis of novels, Chatman [20] highlights "happenings" that have no cause within the narrative. Similarly, plot relationships may be specified between story components (e.g. this area in space and time is more peaceful than another) or between both events and story components (e.g. this event was pivotal between two areas in space and time).

Figure 5 shows an example in which one event (Metsu drew 'Sketch of a female figure') is classified as being preparatory for another event. As in the DnS ontology design pattern a justification can be added in support of the defined relationship. Here, visual similarity is used to justify the proposed plot relationship.

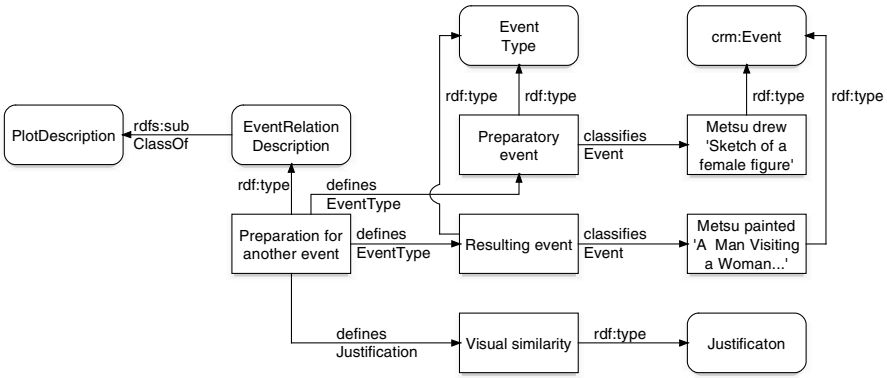

Fig. 5. Modeling plot relations between events

3.5 Narrative Components

The narrative presentation of a story and plot is represented in part E of figure 1. This also makes use of the Descriptions and Situations (DnS) pattern to specify structural relationships between components of the narrative. A curatorial narrative within a physical museum space may vary considerably from the underling story due to different types of physical constraint. First, differences may be due to the fixed structure of the museum space. For example, the exhibition space at IMMA is made up of a number of relatively small rooms and interconnecting doors and corridors. This can result in a story component spanning a number of physical spaces, with the organization of heritage objects and interpretation panels across those spaces being as much determined by aesthetic and size constraints as the conceptual organization of the story.

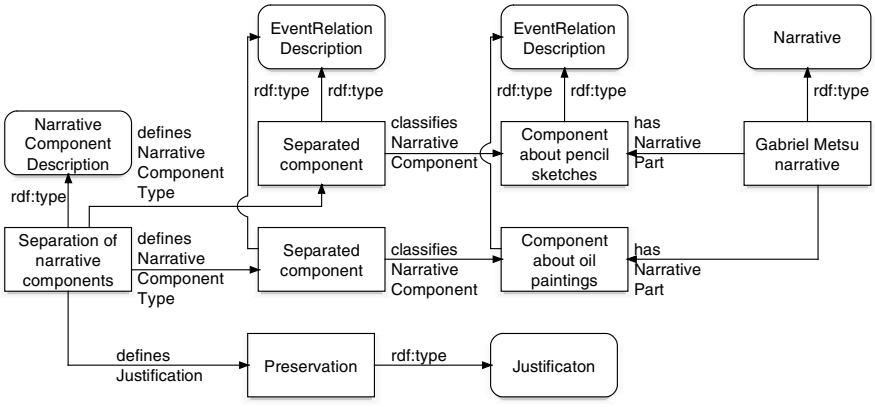

Fig. 6. Modeling relationships between narrative components

Some differences between story and narrative organization may result from preservation constraints of the exhibits. For example, pencil sketches need to be displayed in darker conditions than are used for displaying paintings, therefore need to be separated in a physical museum space though not on the conceptual space of the story. Figure 6 represents this example in which a narrative has been broken down in order to separate components for preservation reasons.

4 Storyspace

Storyspace is an API to the curate ontology and currently a web interface to the story and heritage object components of the ontology (i.e. sections B and C of figure 1). The decision was taken to develop a web interface in order that museum participants in the design process could try to model aspects of curatorial narratives for themselves, understand the implications of the ontology and provide feedback on both the ontology and web interface. The web interface was developed using the Drupal CMS[3]. In Drupal, pieces of content (which may be rendered as a whole or part of a web page) are represented as nodes. A Drupal node is of a node type that defines the content fields of the node. For example, a node type for representing film reviews may have fields for the film title, a textual review of the film and integer representing a rating of the film. Corlosquet et al. [21] drew on the parallel between Drupal content type, fields and nodes and the classes, properties and individuals of an ontology and knowledge base. They developed support for Drupal content to be published semantically according to this mapping.

Building on this idea we developed a set of Drupal content types for representing the story and heritage object parts of the curate ontology. The content types developed were: story, event, facet, heritage object, data and reference. The story content type is used to represent both heritage object and curatorial stories. The reference content type does not map to the curate ontology and represents a bibliographic source for a curatorial or heritage object story. This was added at the request of the museums and can be represented formally using existing bibliographic ontologies such as BIBO[4]. The data content type represents additional metadata associated with an individual of the curate ontology represented in storyspace. For example this is used to represent additional metadata associated with an event imported into storyspace. An rdfs:seeAlso property is defined between the entity (e.g. the event) and the additional metadata.

Storyspace required a slightly more flexible mapping to the ontology than demonstrated by Corlosquet [21] as, for example, heritage object and curatorial stories and their components are all represented by the same Drupal content type but map to different classes in the ontology. A Drupal module was developed in storyspace to allow the rdf:type of a node to be defined according to any combination of fields and values of the Drupal node. A formal description of the storyspace

[3] http://drupal.org
[4] http://bibliontology.com

content is held in a Sesame[5] triple store using the ARC2 library[6]. The ontology API is tied to the creation, update and deletion functions of the Drupal nodes and can be triggered programmatically or via the web-based user interface. Also, similar to Corlosquet et al. [21], appending rdfxml to a Drupal path presents the metadata of the node. Storyspace also makes use of Simile Exhibit[7] to allow the user to visualize events of the story according to selected facets. The next section describes how storyspace has been used by curatorial staff at the museums to model curatorial stories. For this exercise the curatorial staff took the two exhibitions that had been studied previously (The Moderns and Gabriel Metsu) and modeled the underlying story of the exhibitions and related resources. The longer term intended use for storyspace is to model a future exhibition and use it in working toward the narrative presentation. However, the reverse engineering of the stories from the final narratives provided a good test case and access to a number of existing resources that could be managed in storyspace.

5 Modeling Stories with Storyspace

Although storyspace is being used to model a number of classes within the curate ontology (e.g. storyspace, heritage object, facet, event, event description) in the interface we chose to emphasise the story and subjugate the role of the other components in the interface as elements of a story. In the primary menu (the dark band toward to top of the screen in figure 7) curatorial and heritage object stories are therefore represented in the primary menu and other entities are accessible either through the stories in which they are contained or through the Resources menu.

In figure 7 a curatorial story has been selected entitled “Our collection: IMMA publication of art packs for children aged six to twelve years old”. In the left hand menu the Drupal fields (i.e. ontological properties) of the story can be accessed. These correspond to components of the story, the events it contains, its facets, references and also Simile Exhibit visualisations that can be used to visualize the story’s events according to its defined facets.

Figure 7 is showing the heritage object stories of a curatorial story developed to communicate an exhibition to schoolchildren. The heritage object stories contain a view of the heritage object comprising its title in bold, a thumbnail and standard collection information. The heritage object may participate in multiple heritage object stories. Each of these heritage object stories may themselves be used in multiple curatorial stories.

Figure 8 shows a list of the heritage object stories of a particular heritage object. This list is accessed by selecting Heritage Objects from the Resources menu, and then selecting the heritage object, in this case Sounion by Cecil King, and then selecting the Object stories for that heritage object from the left hand menu.

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[5] http://www.openrdf.org
[6] http://arc.semsol.org
[7] http://www.simile-widgets.org/exhibit

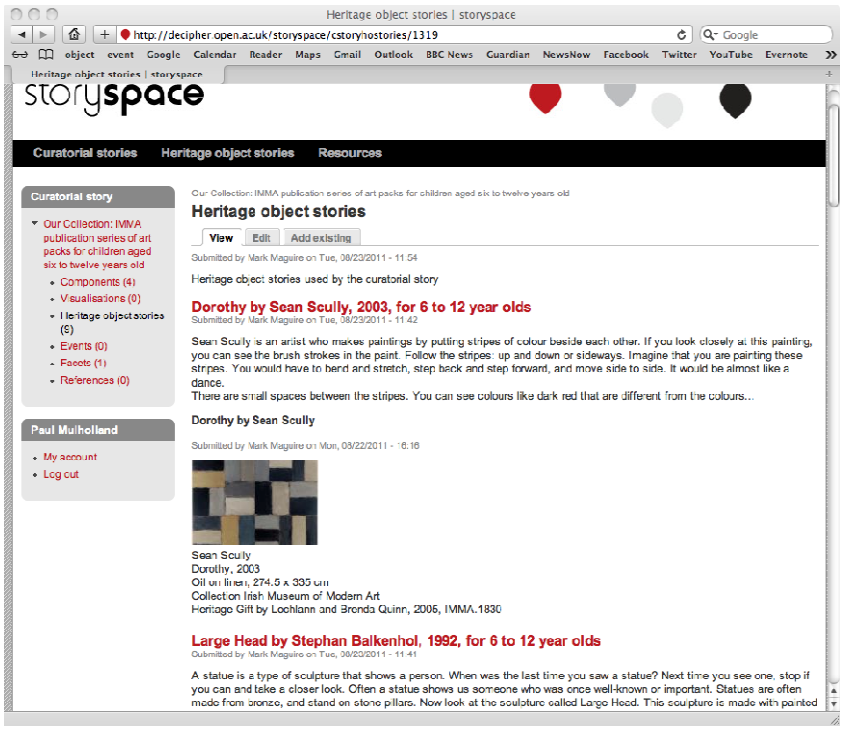

Fig. 7. Heritage object stories within a curatorial story aimed at children

When an event is included in a story it can be described according to the facets of the story. In figure 9 the event of Gabriel Metsu painting a self-portrait is being viewed. Values have been specified for the three facets of the story. In storyspace, facets can be defined as accepting manually entered values or mapped to a property. In this second case, object values from the event metadata triples that have the event as a subject for that property are displayed. Simile exhibit visualisations can be generated for a story from a forms-based interface in which the facets to be visualised, colour-coded and included in the lens are specified. Figure 10 shows a visualisation of events from the Gabriel Metsu story.

Currently, the events of a story can be either entered manually or imported from Freebase[8]. Text associated with a story can be selected to display a list of events using the Freebase search API. In figure 11, George Bernard Shaw has been selected from the story text (left) and a list of events are displayed related to this text string. These events can be viewed and added into the story. Metadata related to a selected event is imported as a related data node. Facets associated with Freebase properties (e.g. /time/event/start_date) can be used to automatically add facet values to the story.

[8] http://www.freebase.com

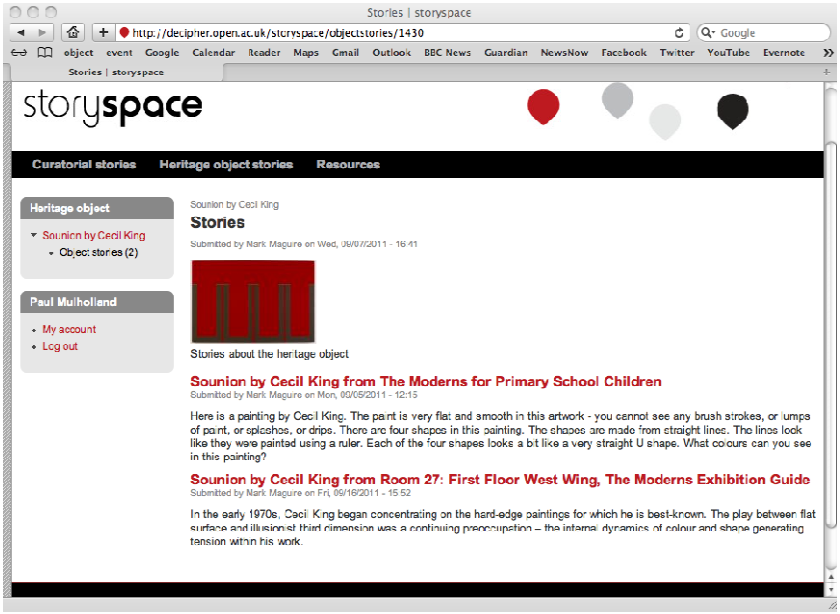

Fig. 8. Heritage object stories of the same heritage object

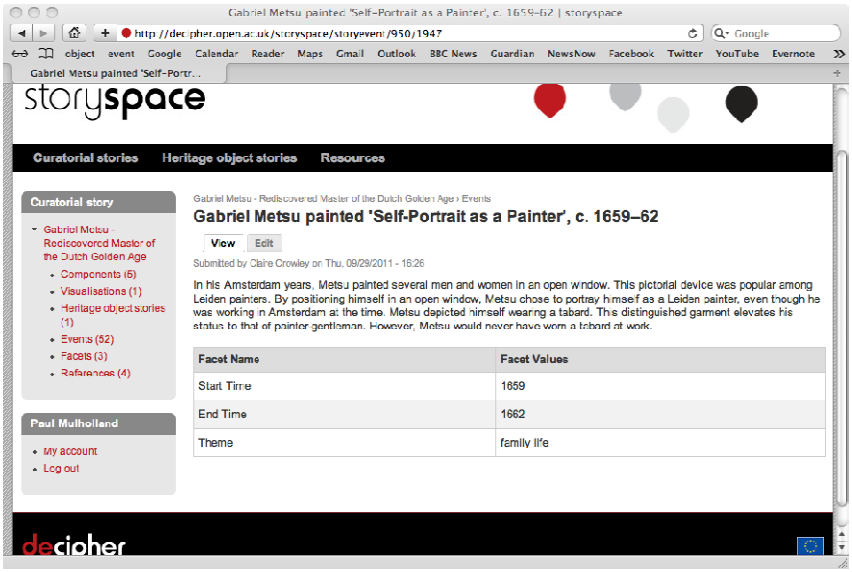

Fig. 9. Facet values of an event described within a story

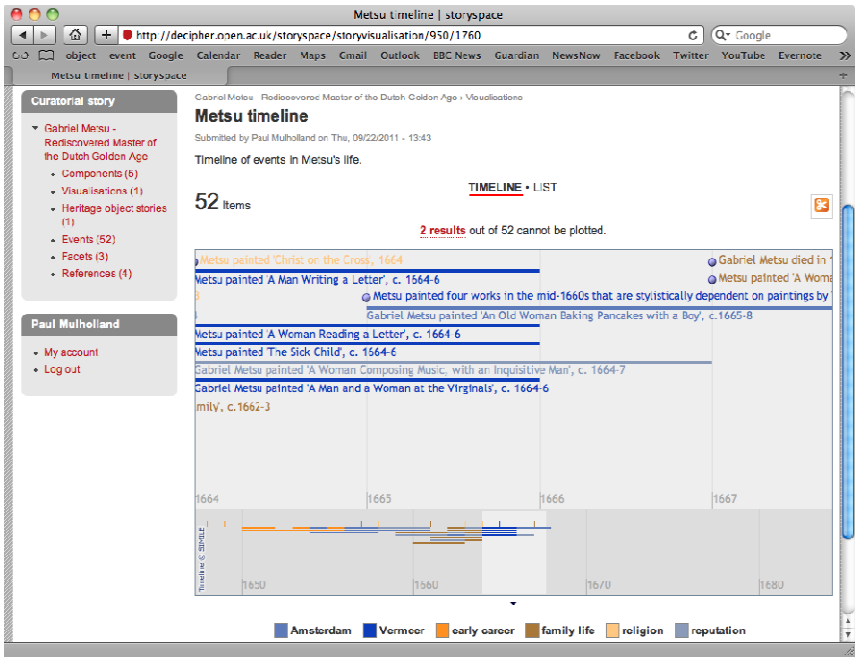

Fig. 10. Timeline visualization of events in the Gabriel Metsu story

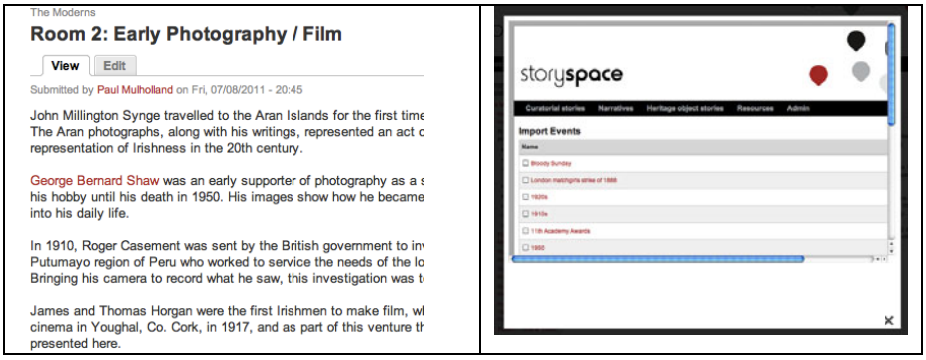

Fig. 11. Adding events from Freebase to a story

6 Structured Interview

A structured interview was conducted with the two members of curatorial staff who had contributed the most to storyspace over a two month period. One was from each of the participating museums. Questions covered the main concepts of curate and how they are navigated and authored in storyspace. Overall they reported finding it easy to navigate storyspace and add the main types of content. This was evidenced by the content that had been added related to the two exhibitions. The modelling of heritage objects, heritage object stories and curatorial stories was found to be relatively straightforward. It was also found to be useful to navigate the different heritage object

stories that had been told related to a heritage object and the curatorial stories in which they had been included.

The representation of events within a story was found to be more difficult with contemporary art as found in The Moderns exhibition. For the stories in the Gabriel Metsu exhibition and even the earlier parts of The Moderns exhibition, the events in the story were easier to identify. For the more recent works (e.g. from the 1960s or 1970s) the events were less clear. For living artists and in situations were many sources of evidence are not in the public domain, a historical perspective is harder to establish and therefore key events of the story are harder to identify.

For both exhibitions the most problematic concept was facet. These could be used to model various themes of the events but it was not always clear how best to model this. For example, a single theme facet could be defined with a number of possible values or it could be broken down into a number of facets each representing a sub-theme.

A further issue discussed in the interviews was alternative nomenclature for some of the concepts, such as heritage object stories and facets, when used in storyspace by specific audiences. Although the concepts were found to enable the successful representation of museum storytelling there are no existing, generally used terms in museum practice that can be mapped to them. The option of specialized labels in storyspace for particular museum groups was discussed as a possible extension. This will be considered further during wider trials with museum staff.

7 Conclusions and Future Work

We have developed curate, an ontology for describing curatorial narratives. This draws on structuralist theories that distinguish story, plot and narrative. Storyspace has been developed as an API and web interface to the ontology. Two exhibitions and their related stories have been used to motivate development of the ontology and also help validate it by modelling the stories using storyspace. Current work is focussed on using the curate ontology to provide assistance in the construction of curatorial narratives on each of the story, plot and narrative levels. On the story level, we are investigating how the author can be assisted in organising the story in terms of its components and their organising facets. On the plot level we are investigating how the plot descriptions can be suggested for a given story. Finally, on the narrative level, we looking at how the composition of the narrative structure can be suggested, given a story and plot.

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