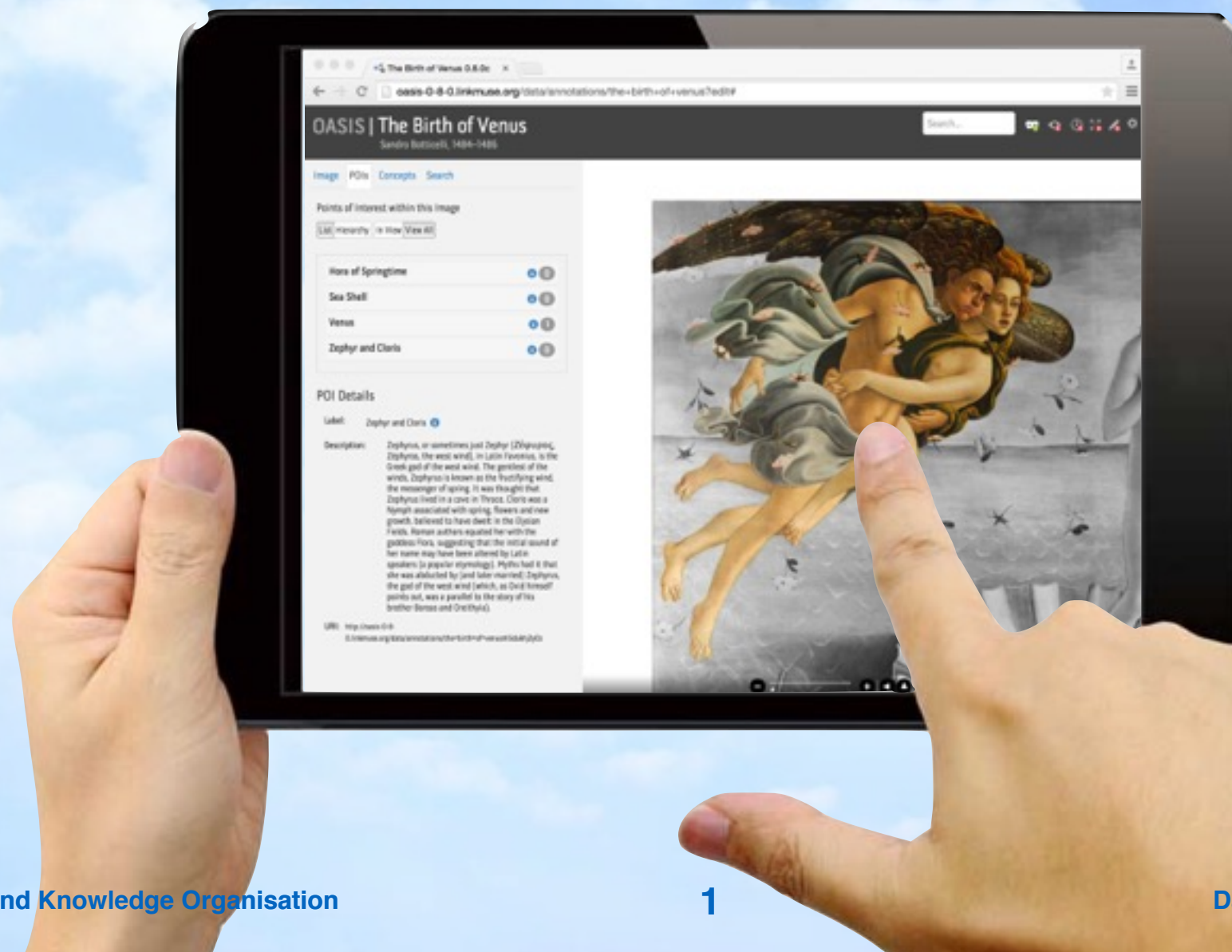


Deep Image Annotation

Making a difference in Knowledge Organisation

Dave Clarke, Synaptica



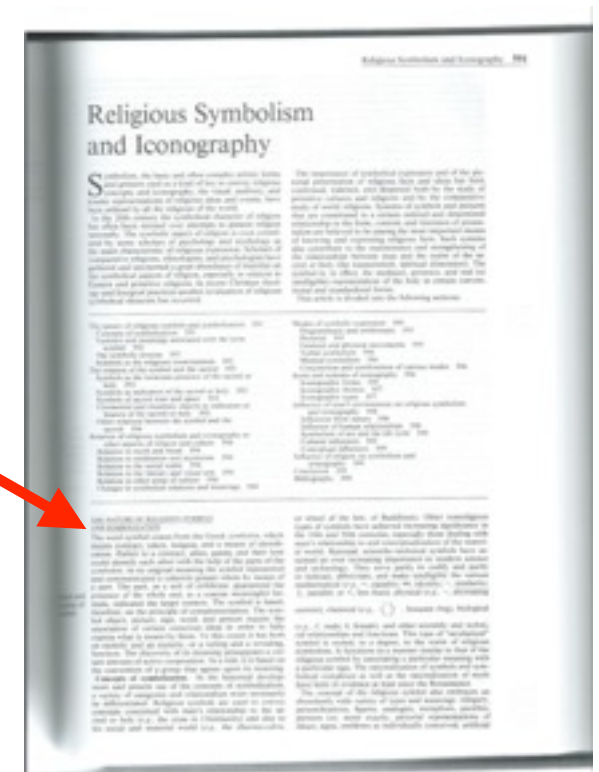
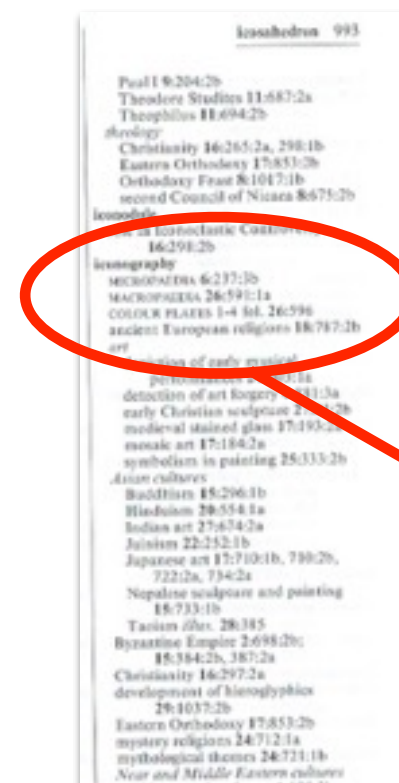
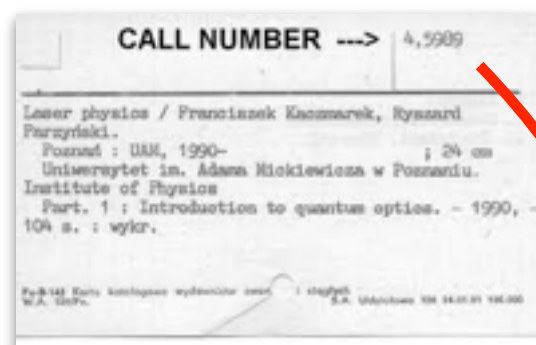
A knowledge gap exists between access to knowledge in textual content versus image-based content

Most image management systems only support image-level metadata. This necessarily can only point to whole images.

It is analogous with card catalogues that point to shelves of books or to individual books.

Textual content can also be indexed to the page, paragraph and individual word or phrase.

This ability to support pin-point access deep inside textual content has not had, until very recently, an analogous method for accessing image content.



Encyclopædia Britannica



The Garden of Earthly Delights, circa 1503 by Hieronymus Bosch, is an allegorical work with dense figurative detail. The grand narrative is built up from many separate scenes, each telling a story that is rich in allusion and symbolism.

Image-level metadata does not provide adequate access to the knowledge contained in this image. Similar issues exist in other domains, such as medical and scientific imagery.

1

**Pre-existing
tools & methods**

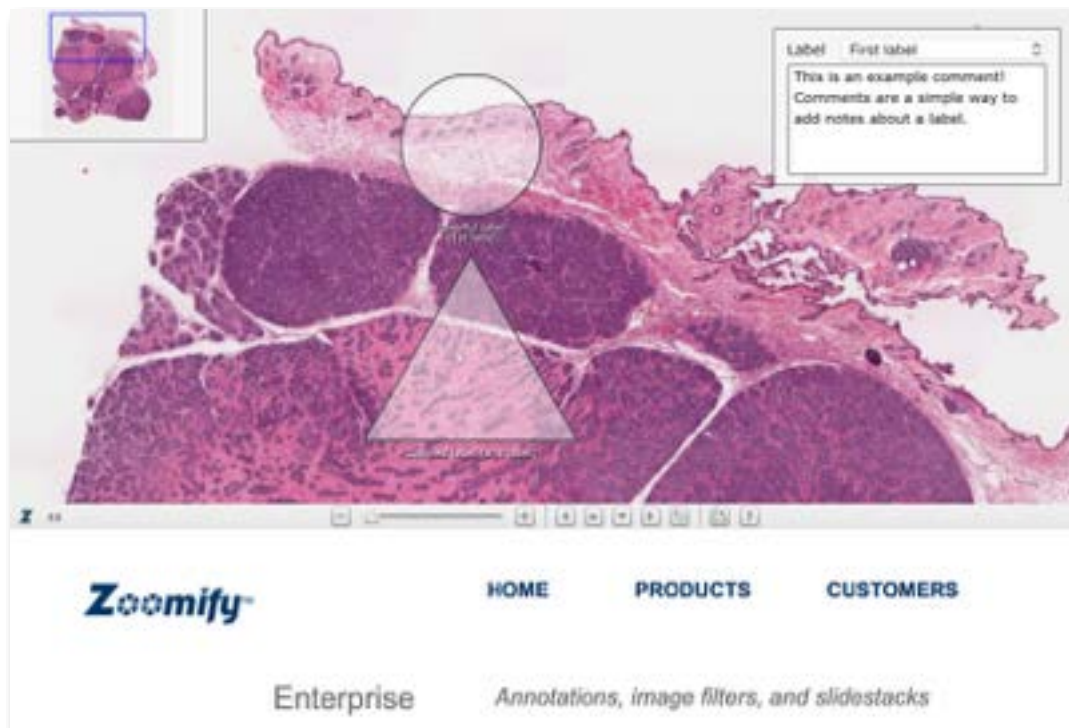
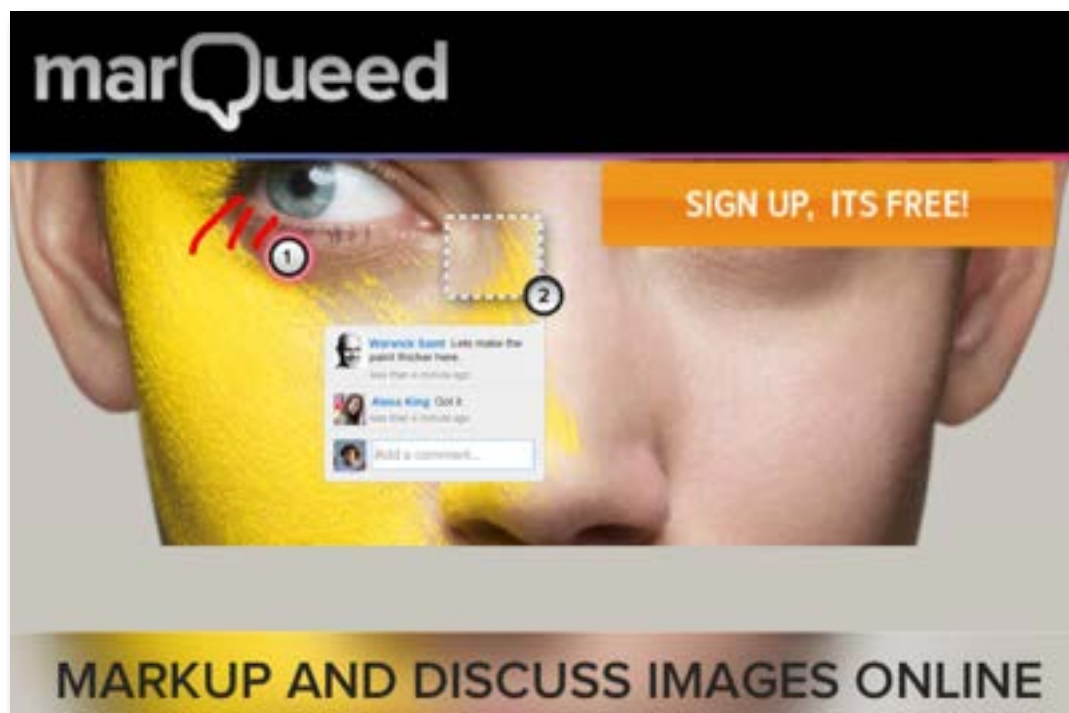
2

**A semantic
approach to image
indexing**

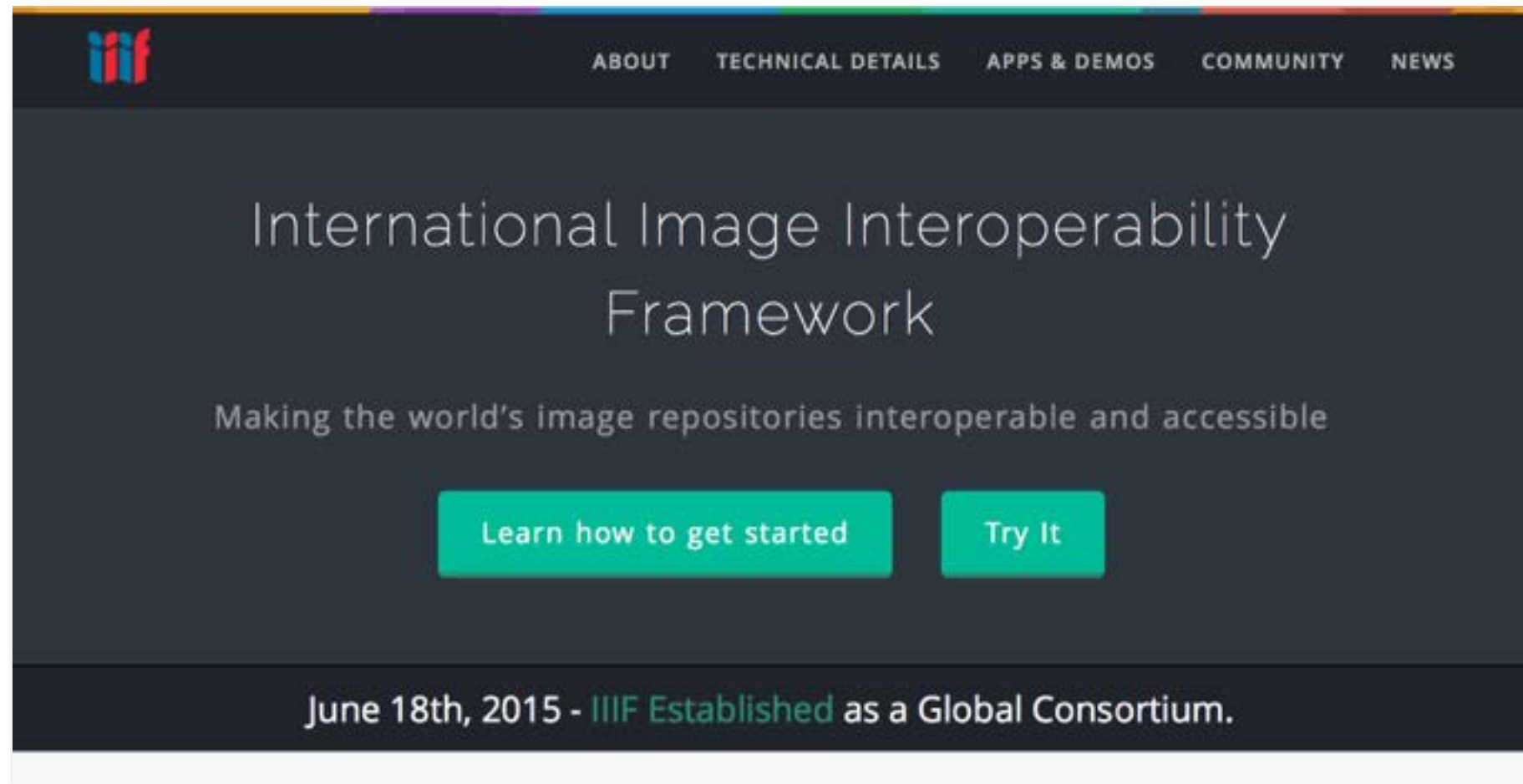
3

**Knowledge
organisation &
discovery**

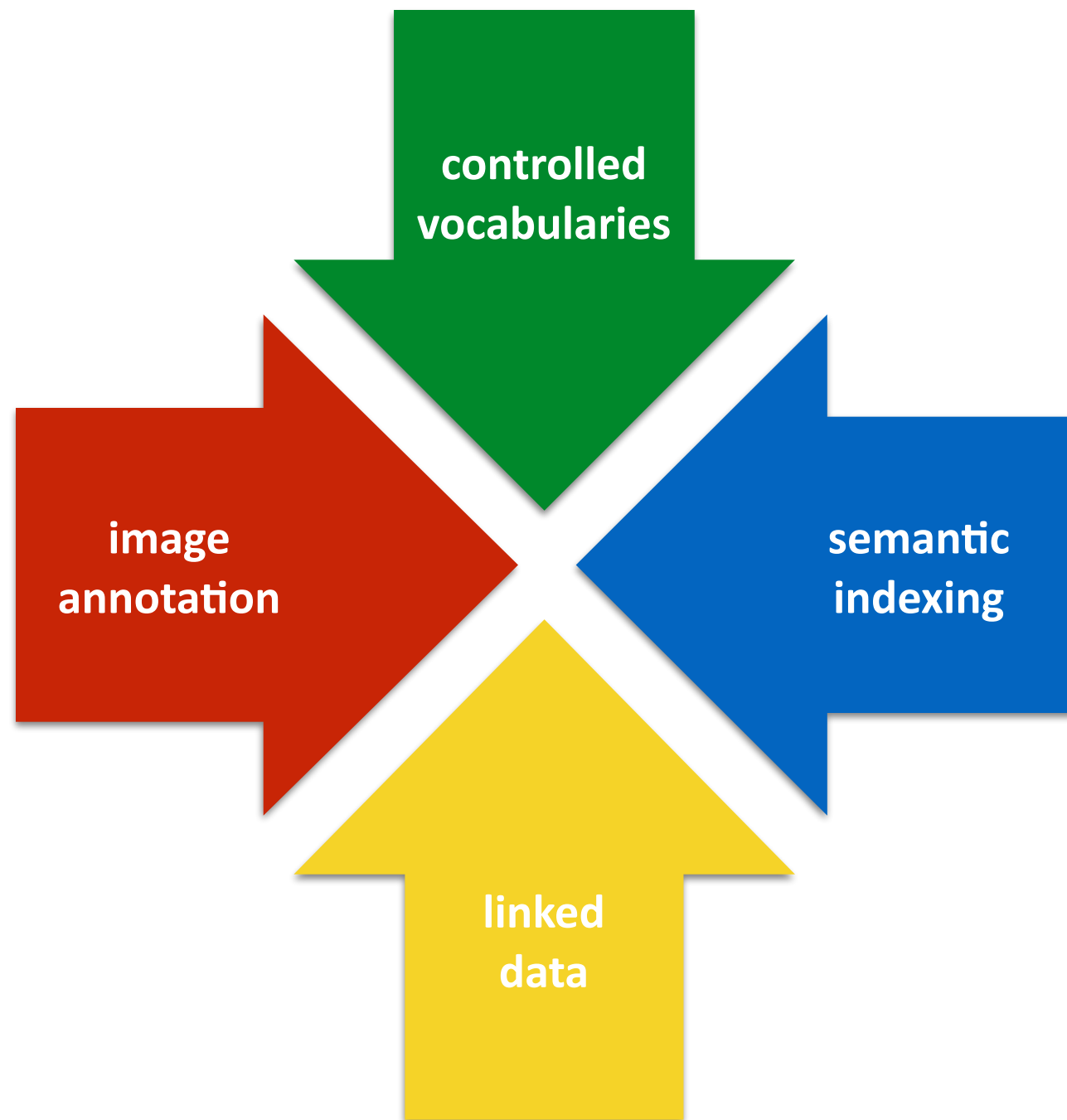
Existing image annotation tools



- Established technology with multiple providers and tools
- Pan-and-zoom around images and add annotations to points or areas
- Annotations are free-text labels and descriptions



- International effort to promote standardised APIs for accessing images via http-uris
- Allows parts of images to be identified using x,y coordinates and offsets
- Strong adoption by libraries and the cultural heritage community

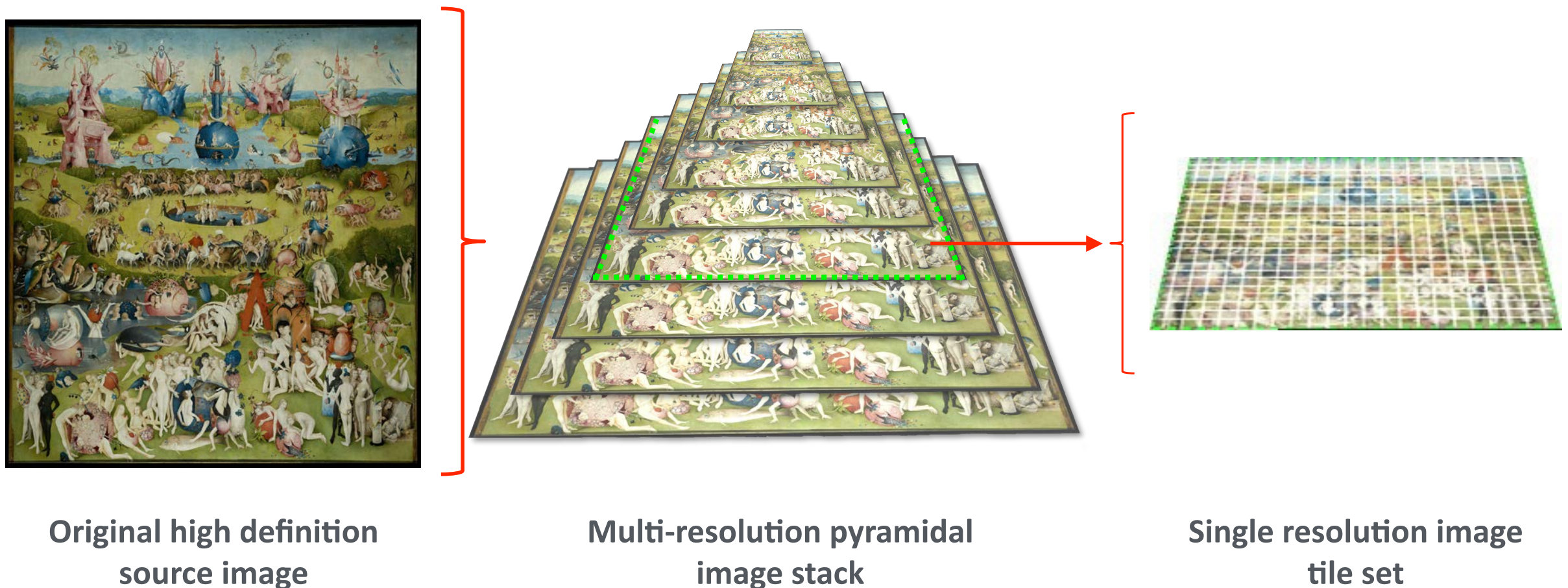


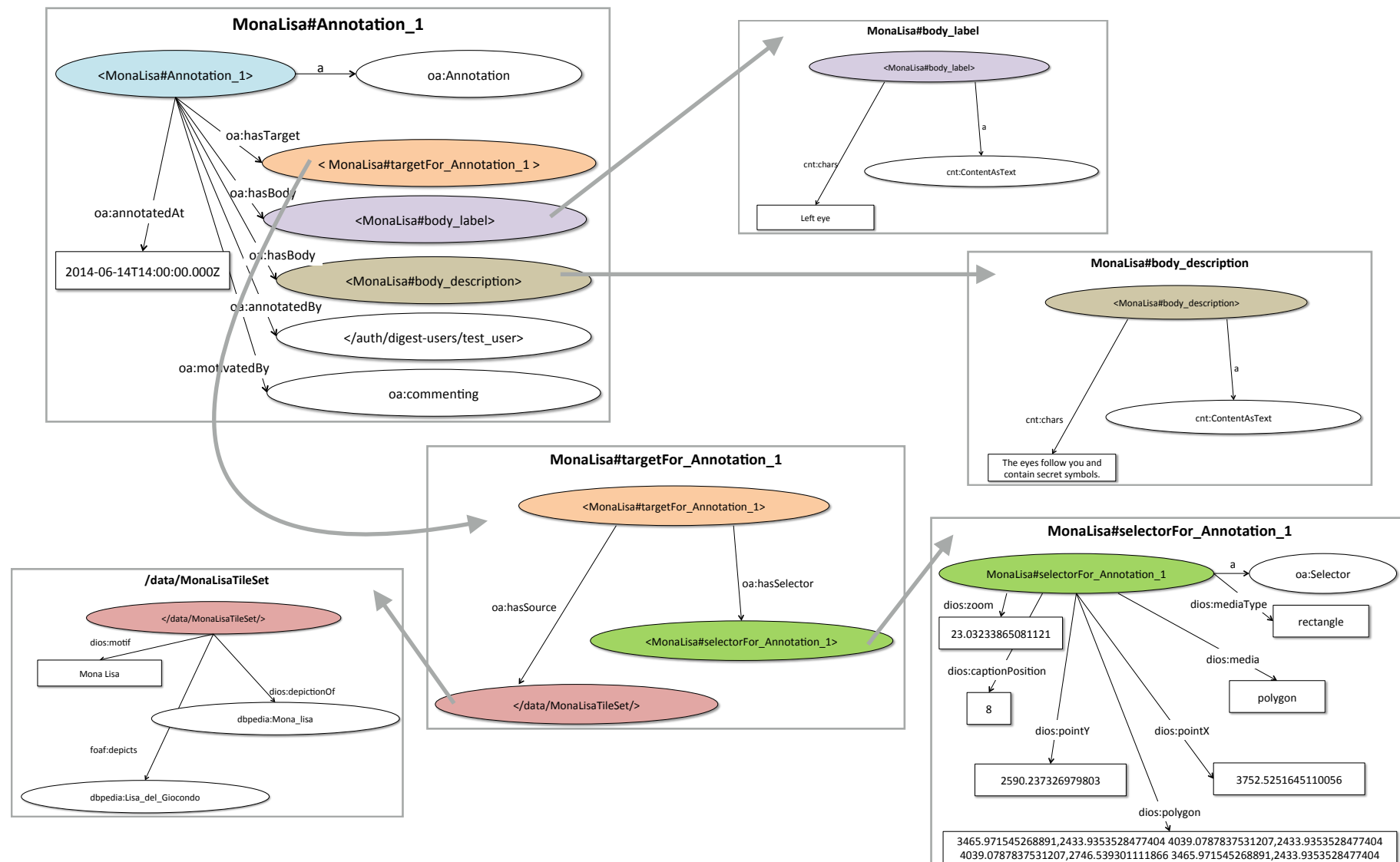
- OASIS combines current image annotation technology with best practices from controlled vocabulary and semantic indexing
- It uses linked data to provide access to reference vocabularies and to generate URIs for the individual visual features contained within images



Very large and complex images can be Gigabytes in size, making it impractical to deliver them over the web as discrete image files. Multi-resolution imaging technology solves this problem by converting a large discrete source image into a pyramidal stack of images rendered at different resolutions.

Each resolution is then split into a mosaic of small image tiles that can be stitched together based on their Cartesian coordinates. This technology supports pan-and-zoom browsing of GigaPixel images over the web, including on mobile devices.





The new W3C Open Annotation specification provides a data model for the semantic annotation of images and other media types

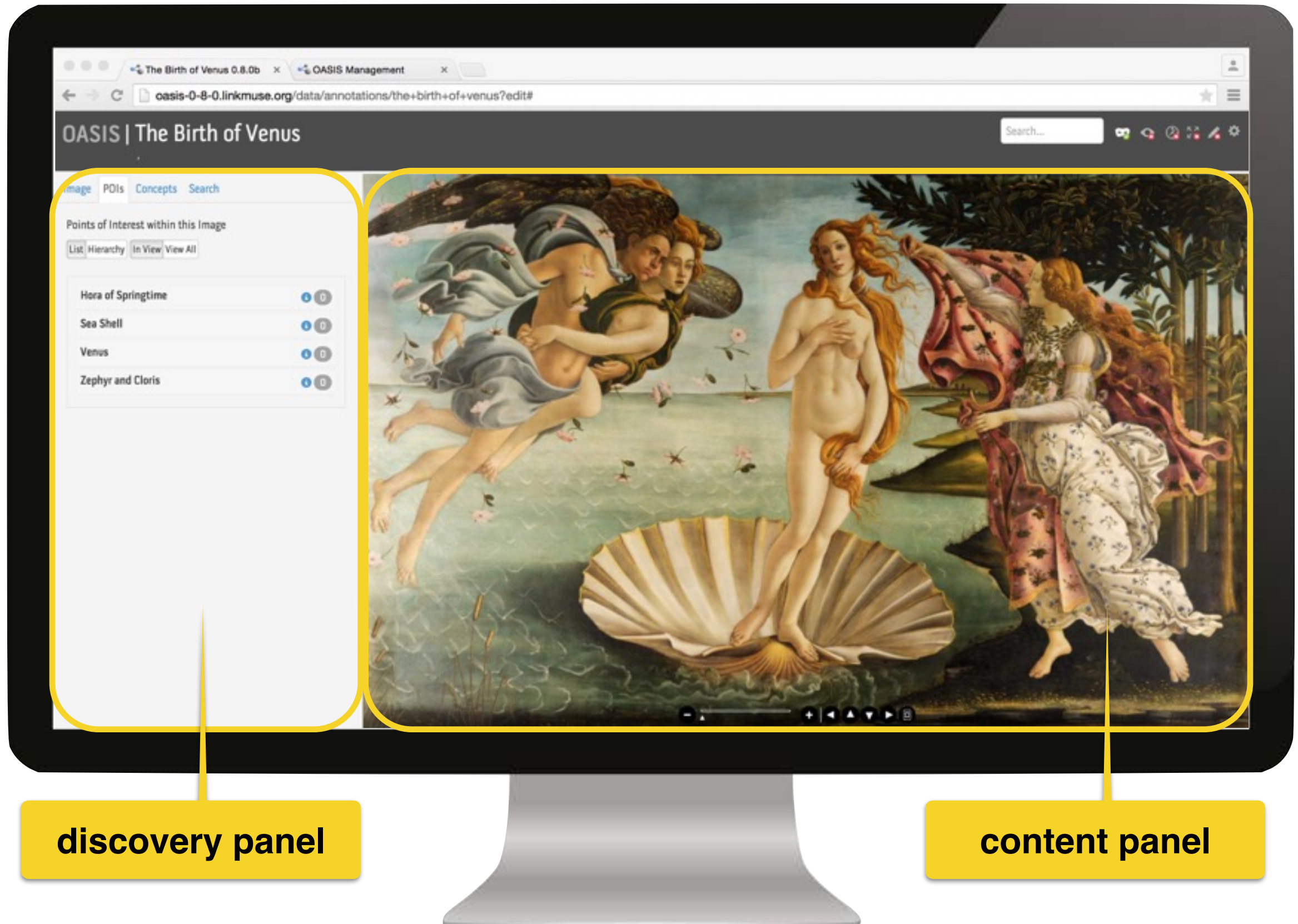
Applying Knowledge Organisation methods to image access and discovery

1. Every image should have a URI and an extensible set of metadata
2. Visual features within images should have URIs and an extensible set of metadata
3. Visual features should be identifiable in-line with the image, i.e. by using point or bound-area markers
4. Visual features should be presentable as alphabetical lists
5. Visual features should be presentable as ordered lists or hierarchical structures
6. Images and visual features should be indexable using controlled vocabularies
7. All image, annotation and indexing metadata should be searchable
8. Users should be able to pan-and-zoom to specific parts of an image from search results or browse lists
9. Users should be free to pan-and-zoom anywhere on an image and discover the visual features in view and their related concepts
10. The system should support the discovery of images and parts of an image that are conceptually related to any other image or part of an image

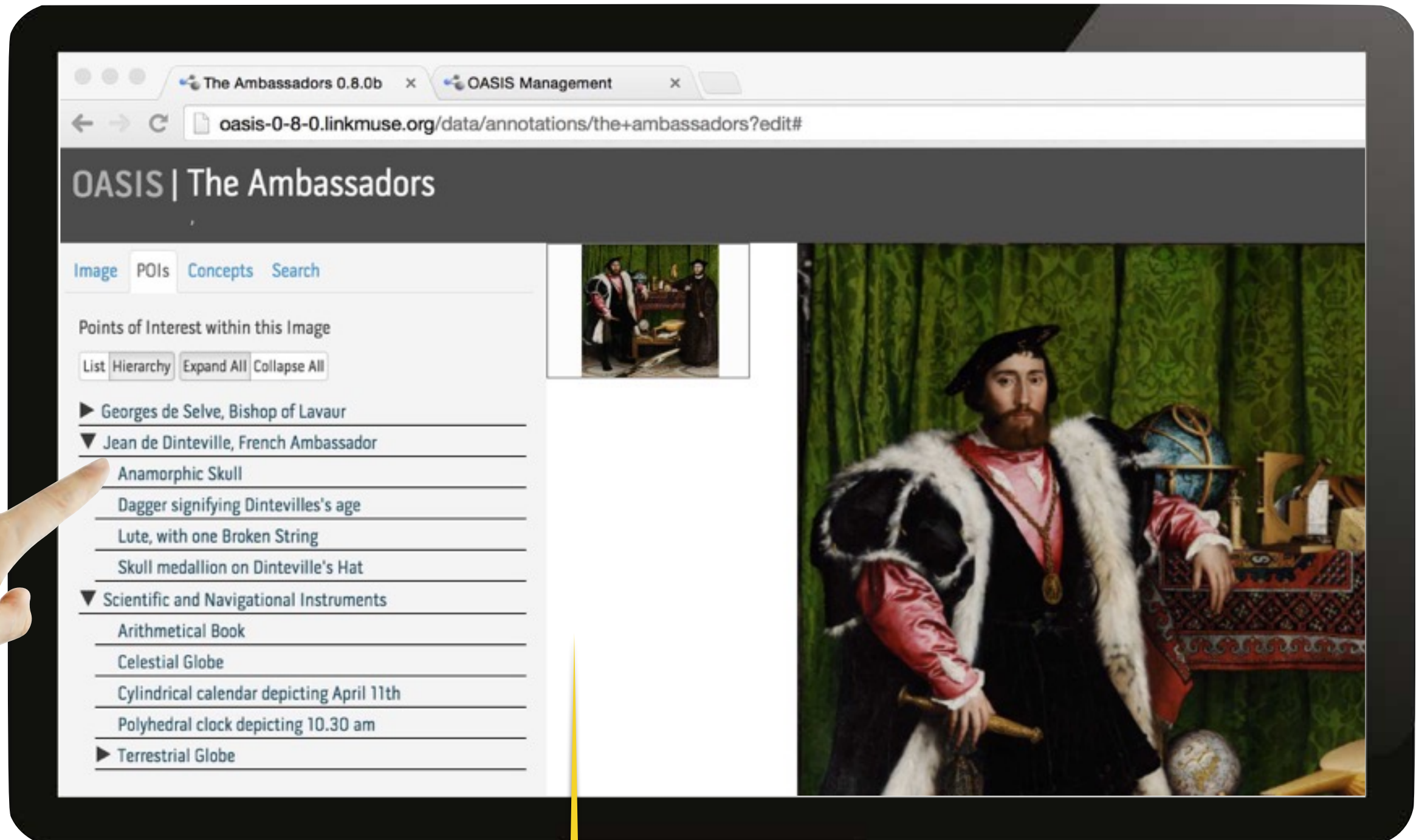
OASIS screen flow 1

Examples of end-user discovery

a discovery panel lists the points of interest

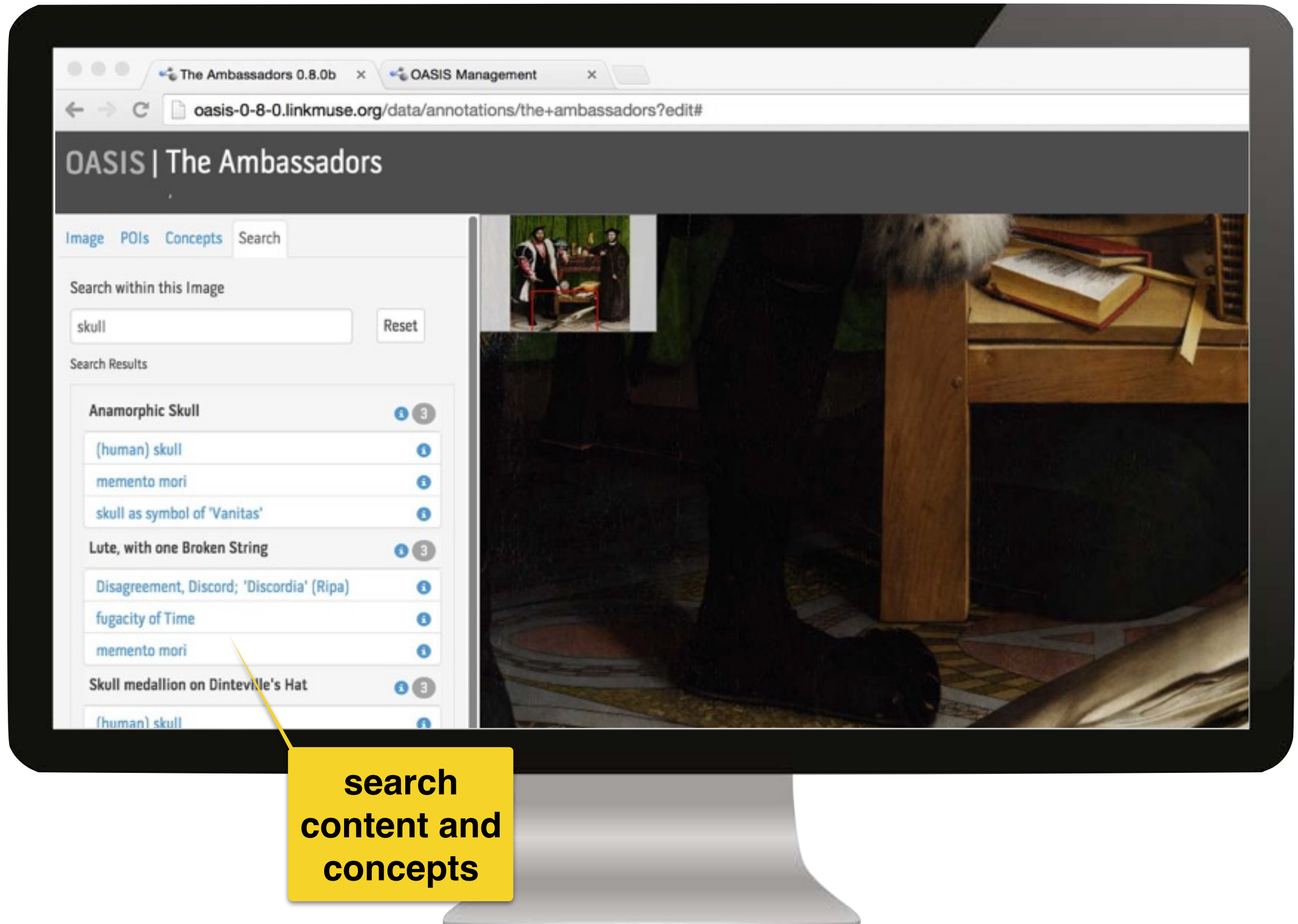


features can be arranged into a table of contents

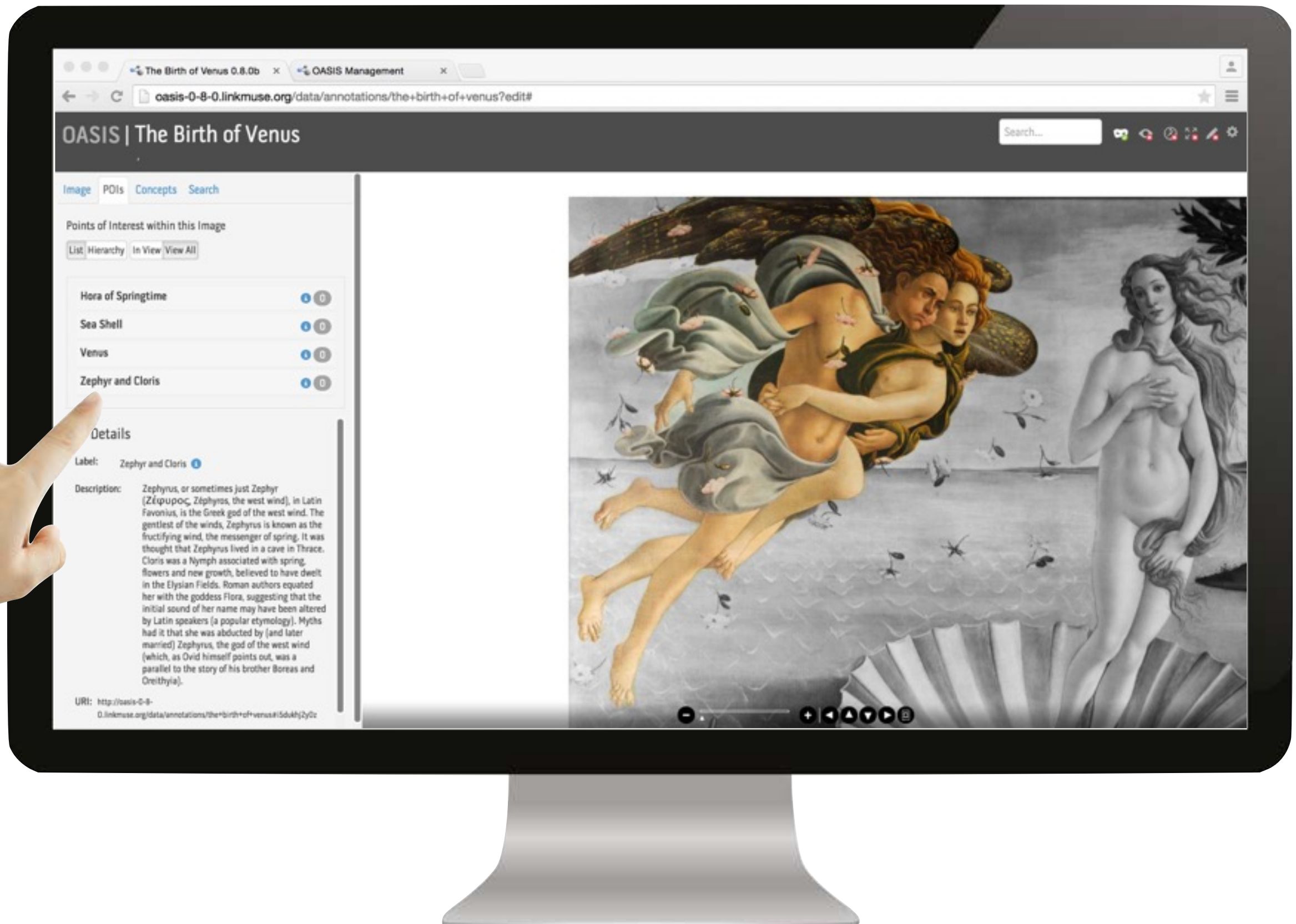


a mini hierarchical table of contents for a specific image presents additional 'browsing' options

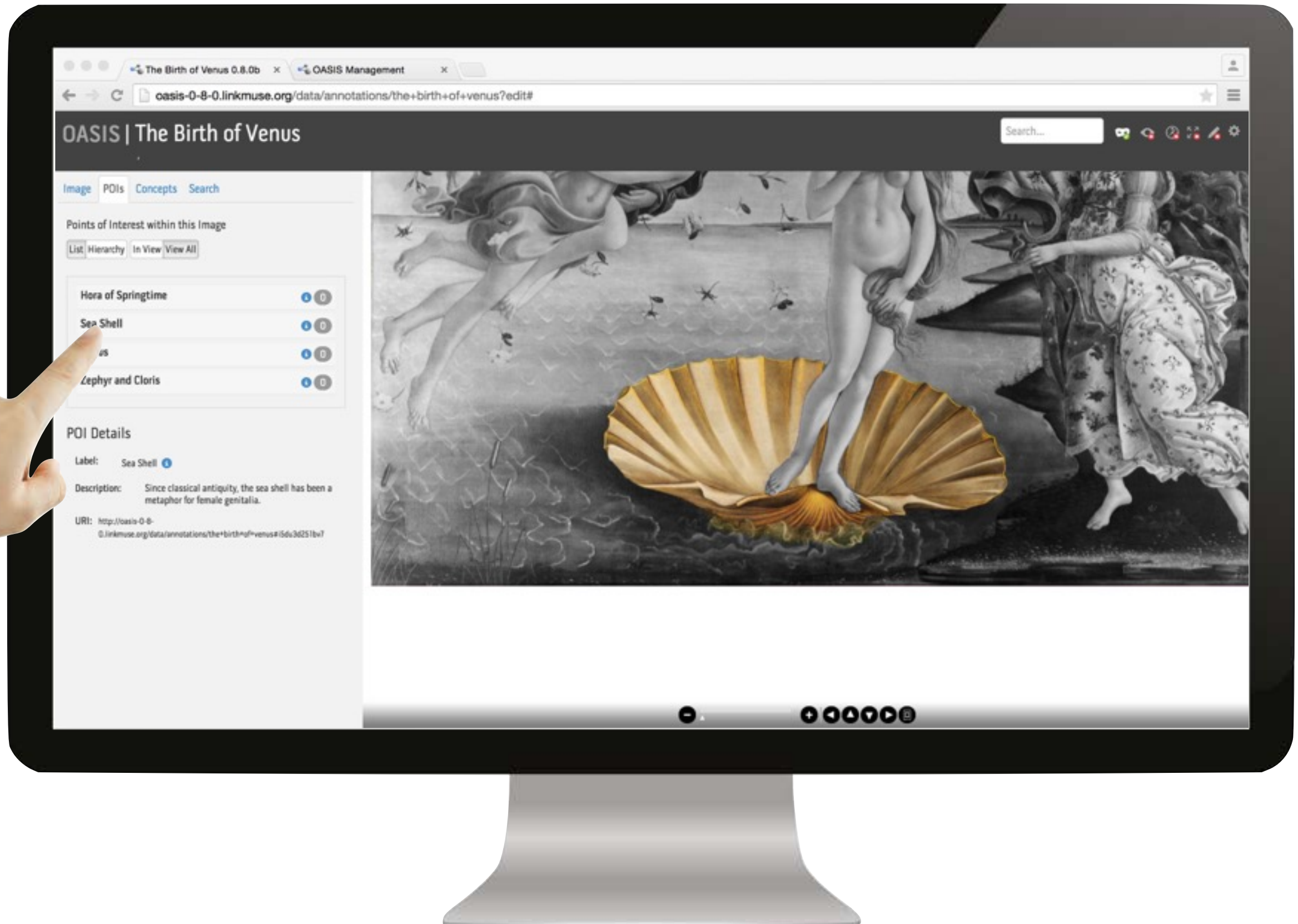
or you can 'search inside' the image content



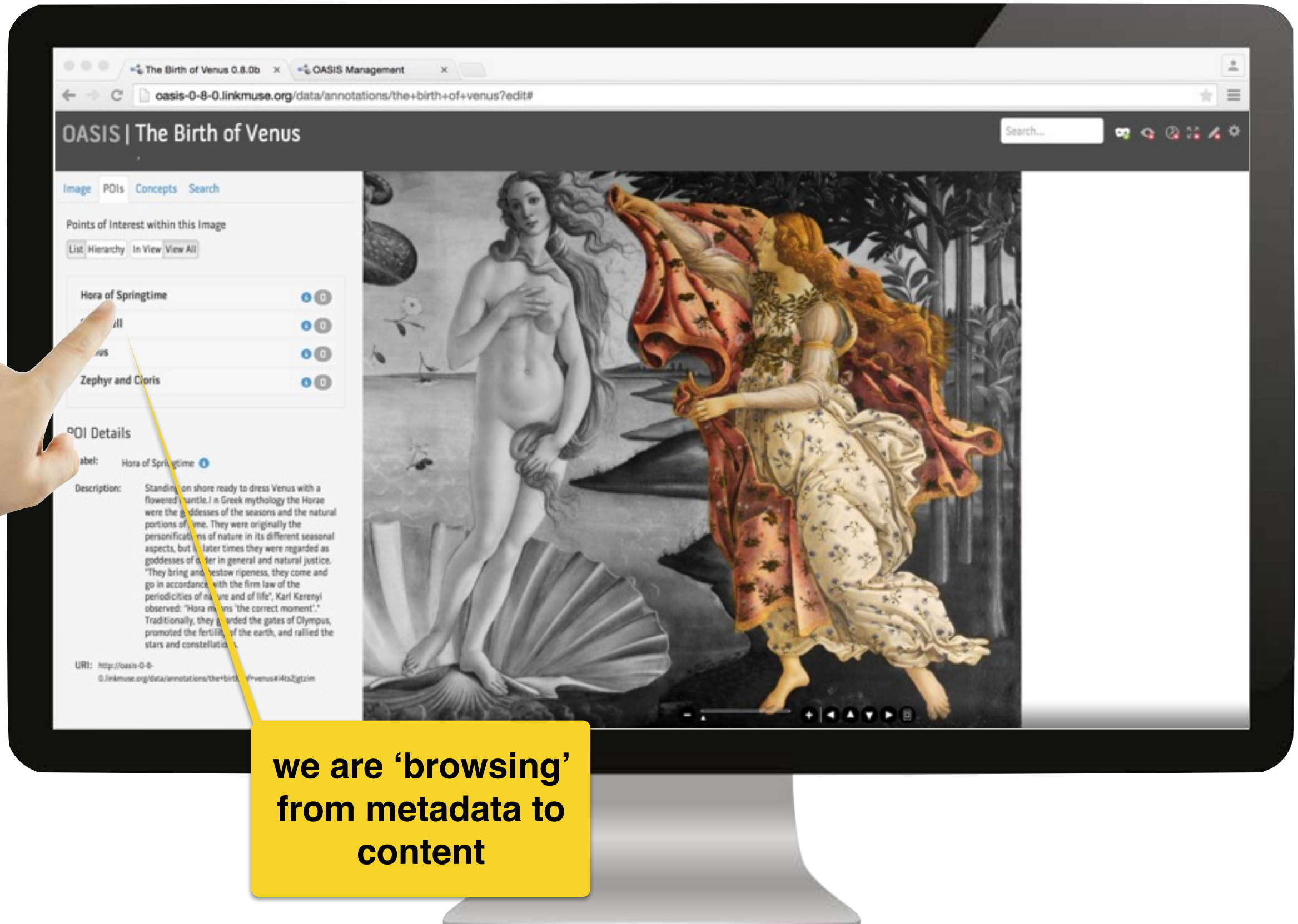
selections pan-and-zoom around the image



highlighting each feature as they go



and provide explanatory notes



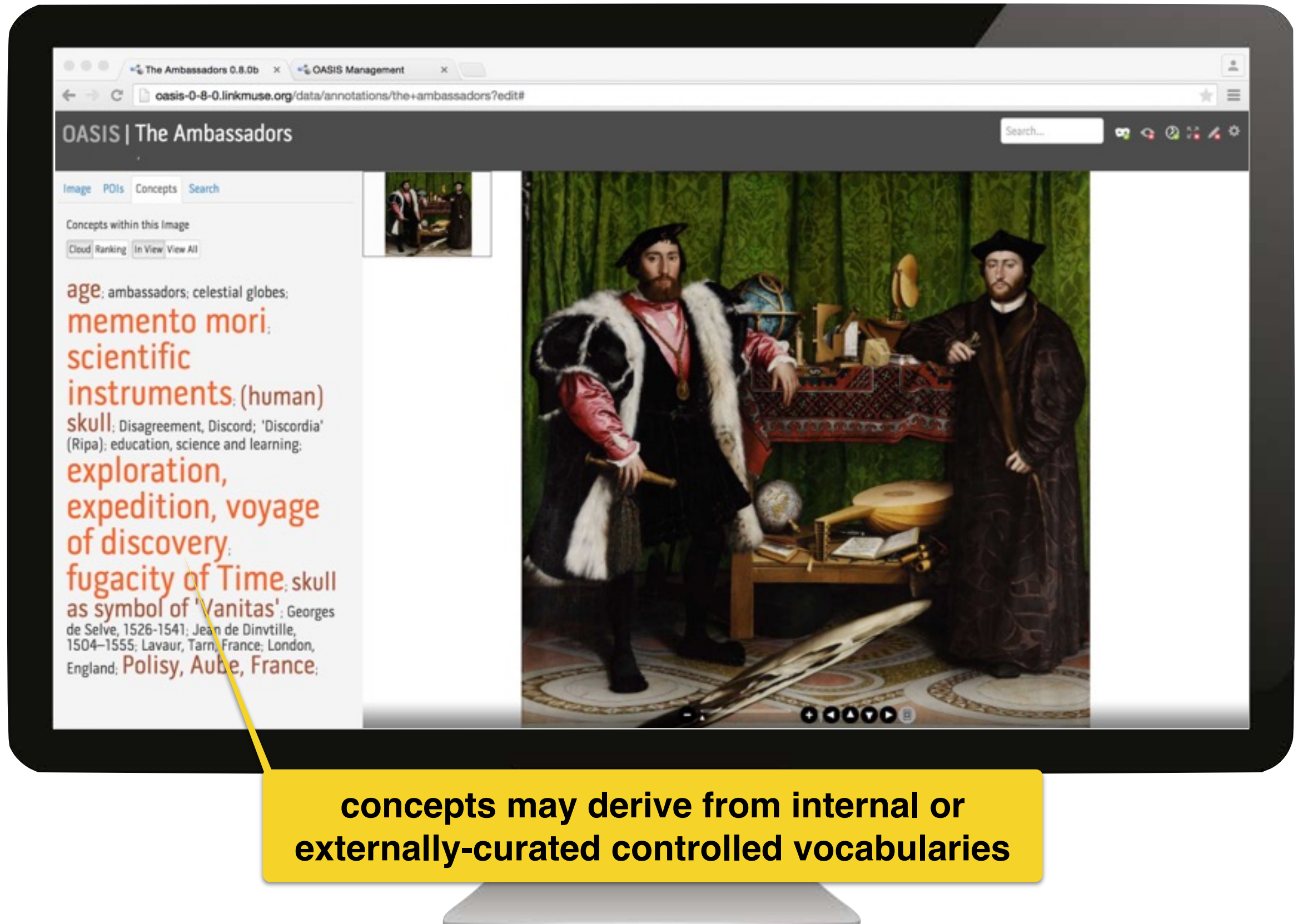
each visual feature gets its own HTTP-URI



My name is Venus,
you can find me at:

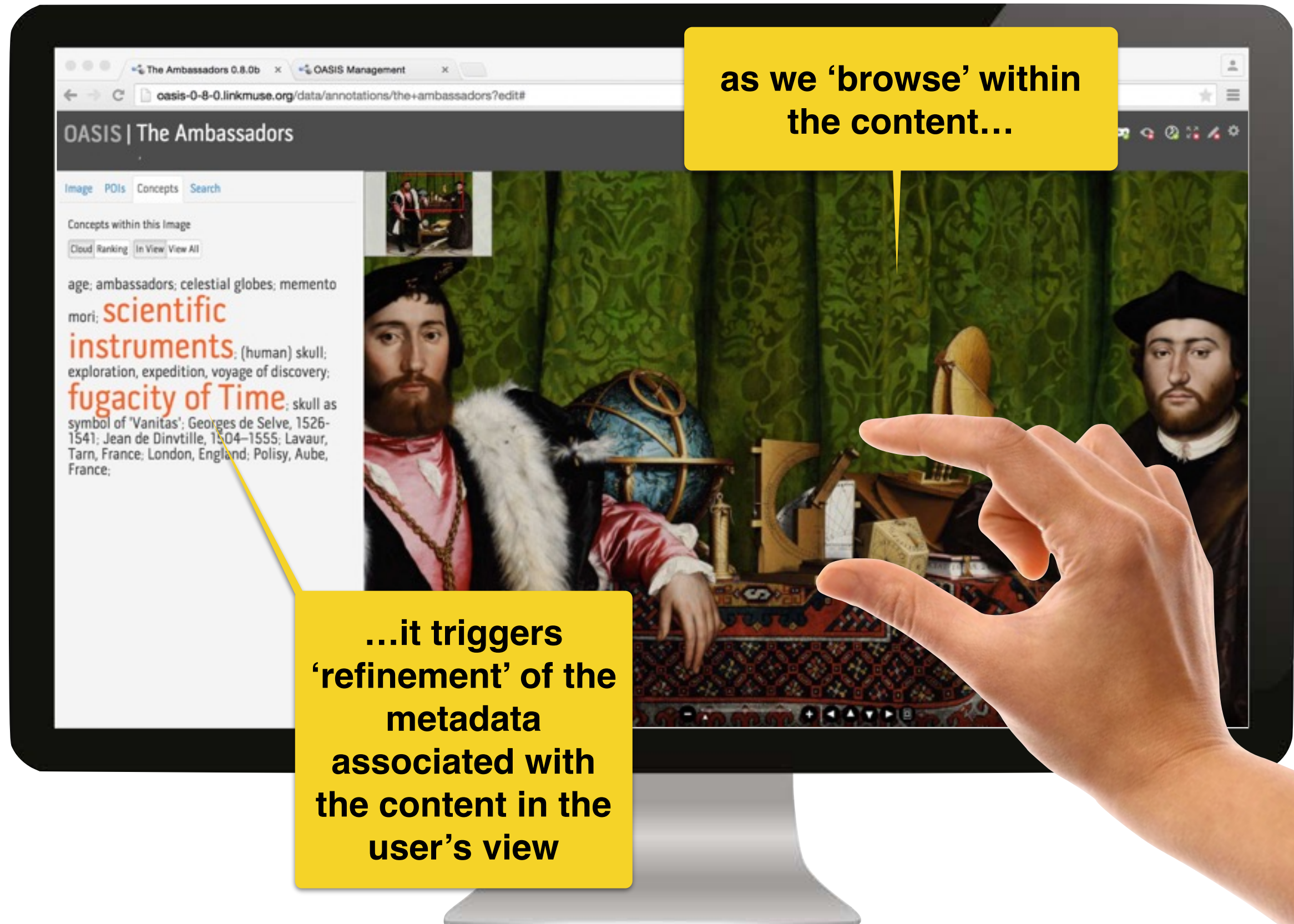
<http://oasis-0-8-0.linkmuse.org/data/annotations/the+birth+of+venus#i4skg93t1453>

images are conceptually indexed

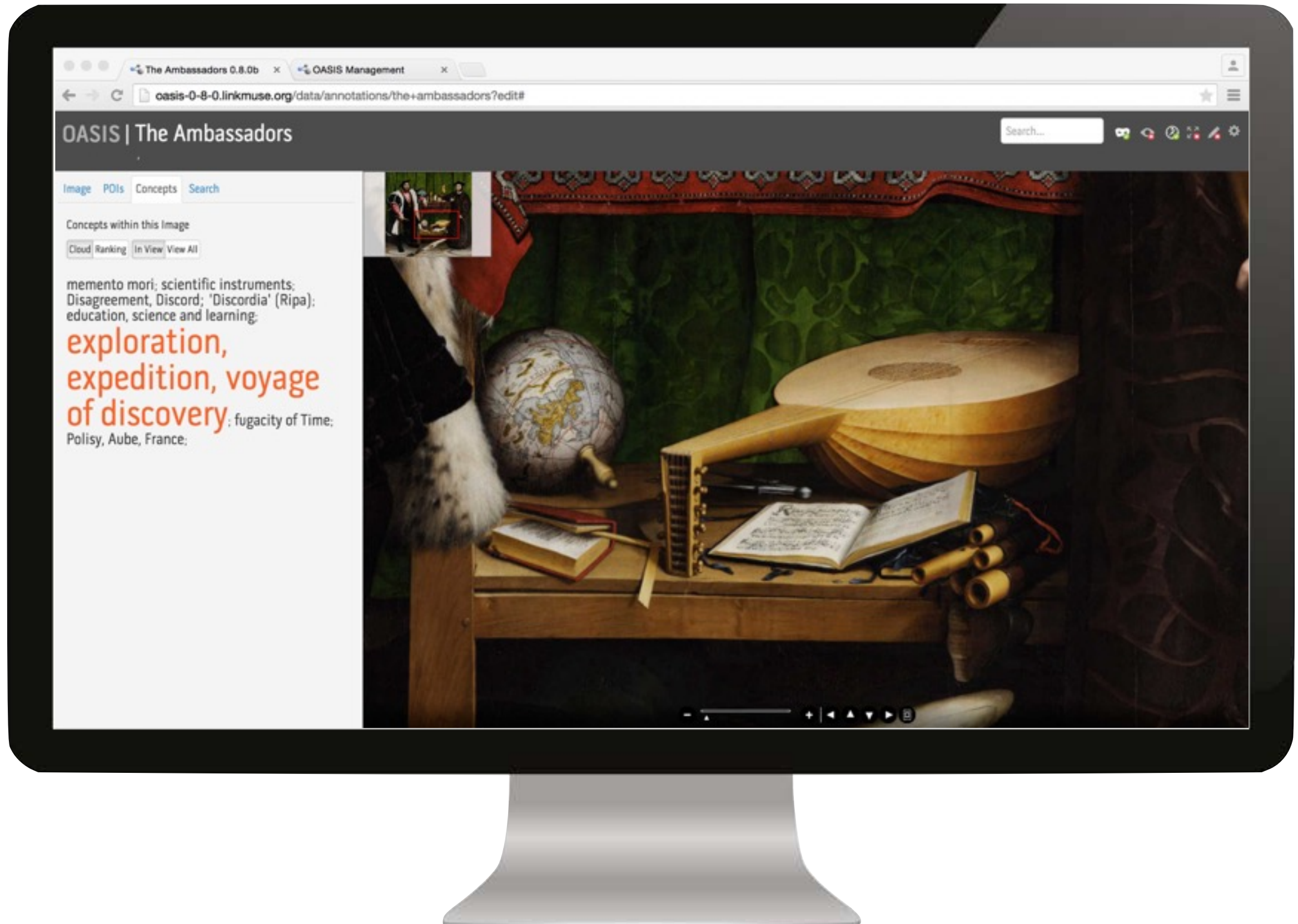


concepts may derive from internal or externally-curated controlled vocabularies

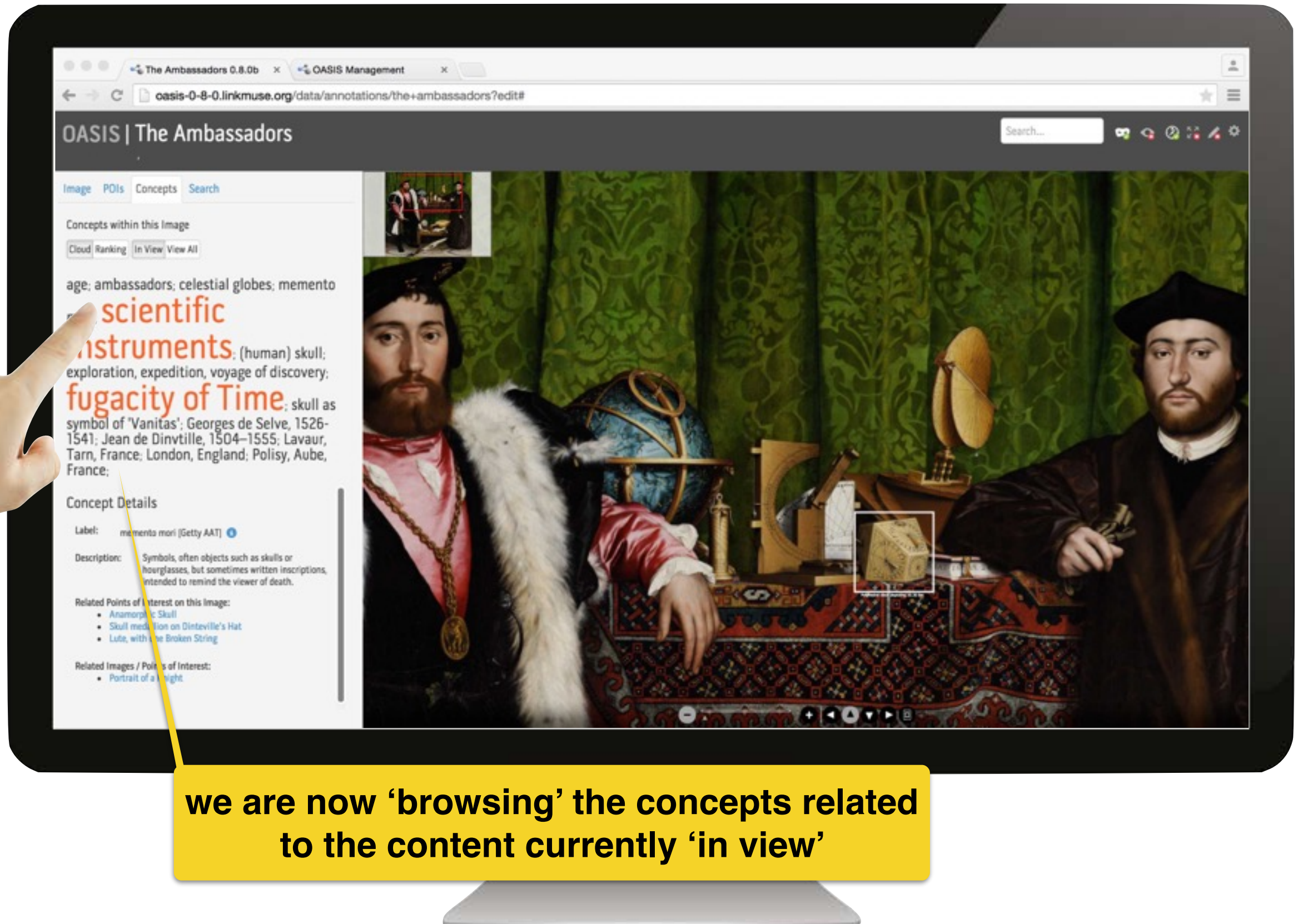
a tag cloud updates as the image is moved



revealing the ideas behind the image




clicking on any concept allows redirection



and discovery of other images on the same idea

Legacy of Time; skull as symbol of 'Vanitas'; Georges de Selve, 1526-1541; Jean de Dintville, 1504-1555; Lavaur, Tarn, France; London, England; Polisy, Aube, France;

Concept Details

Label: memento mori [Getty AAT] 

Description: Symbols, often objects such as skulls or hourglasses, but sometimes written inscriptions, intended to remind the viewer of death.

Related Points of Interest on this Image:

- [Anamorphic Skull](#)
- [Skull medallion on Dinteville's Hat](#)
- [Lute, with one Broken String](#)

Related Images / Points of Interest:

- [Portrait of a Knight](#)

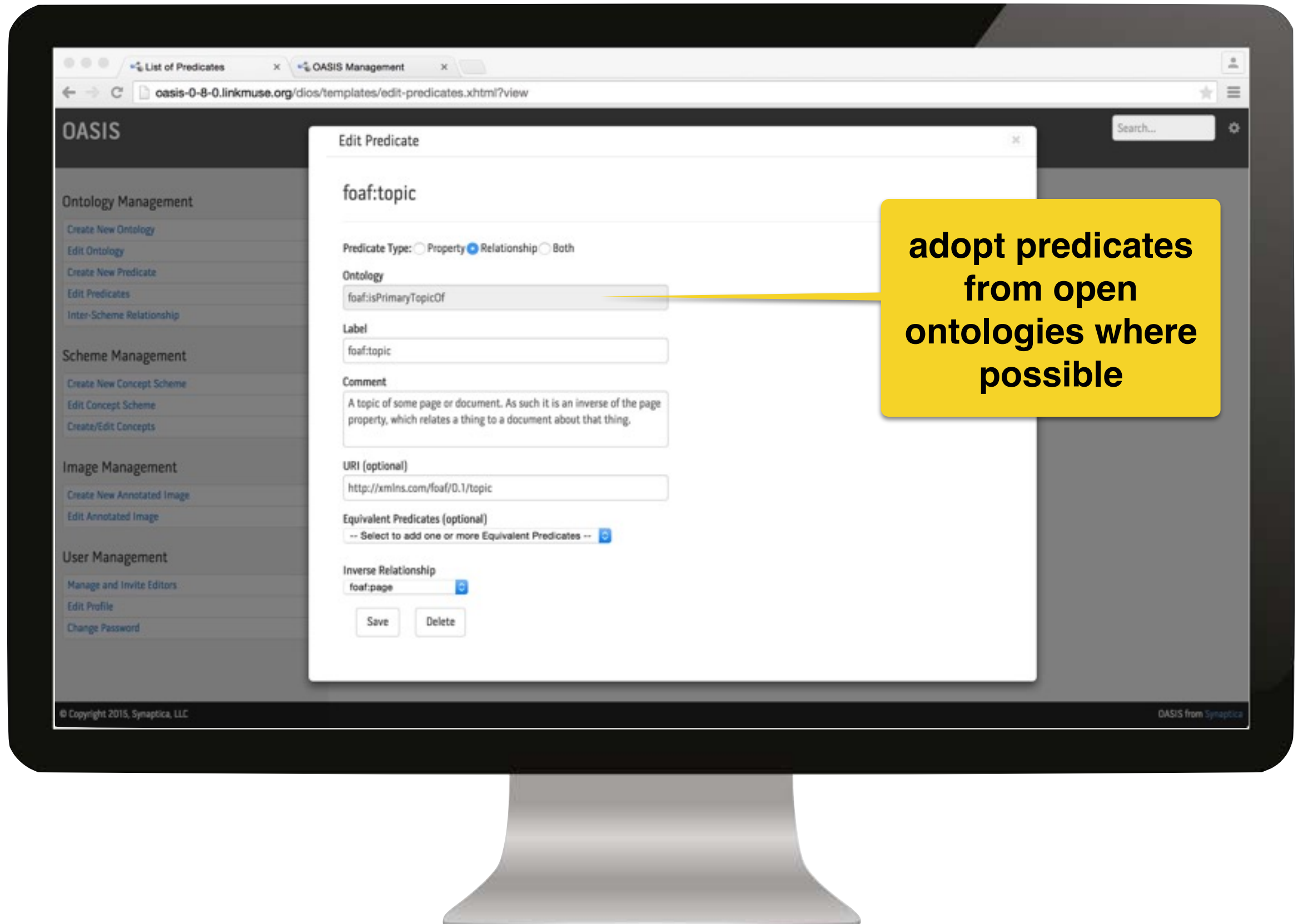


revealing 'discovery' options to other images related via associated KOS concepts

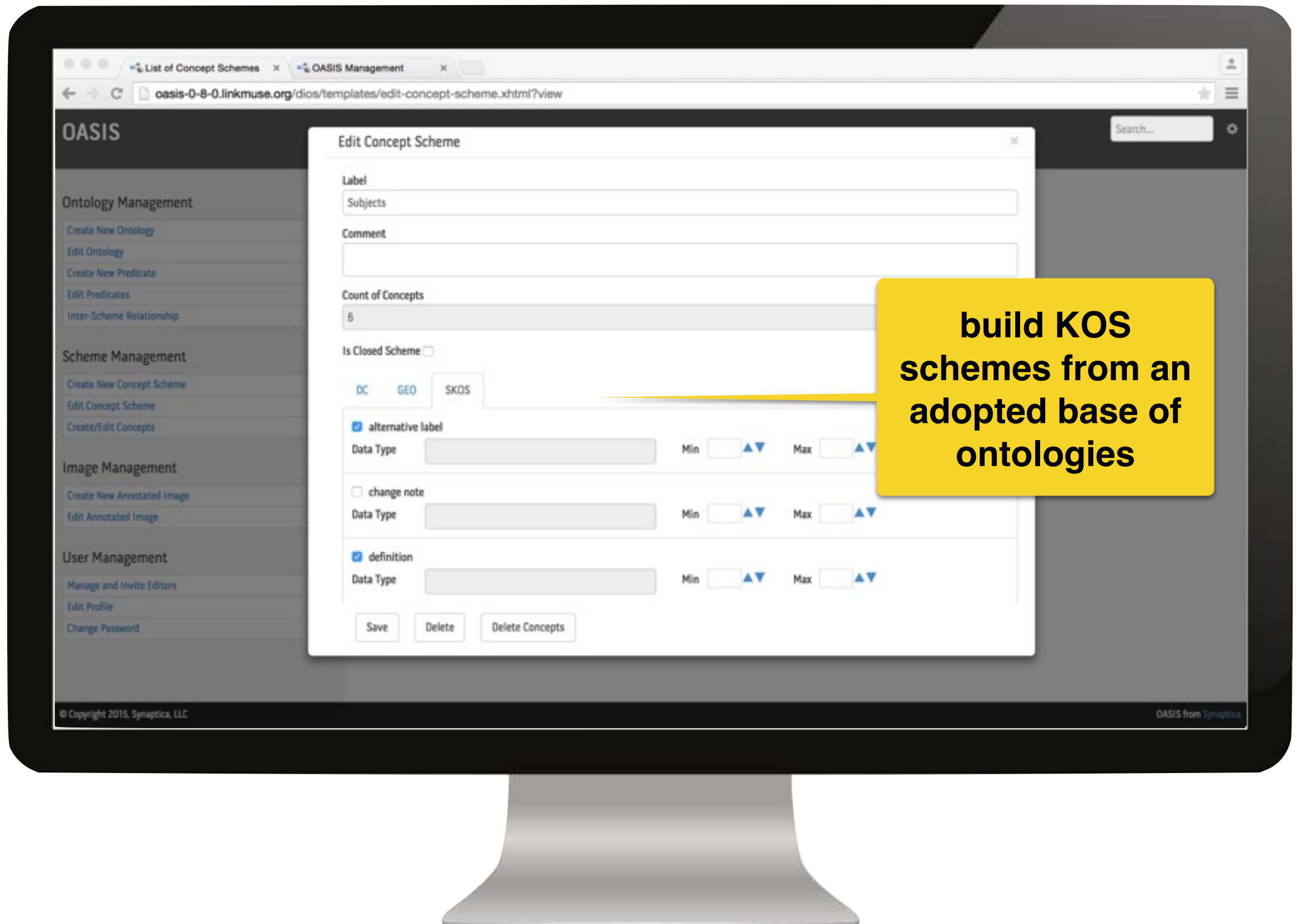
OASIS screen flow 2

Examples of ontology and taxonomy management

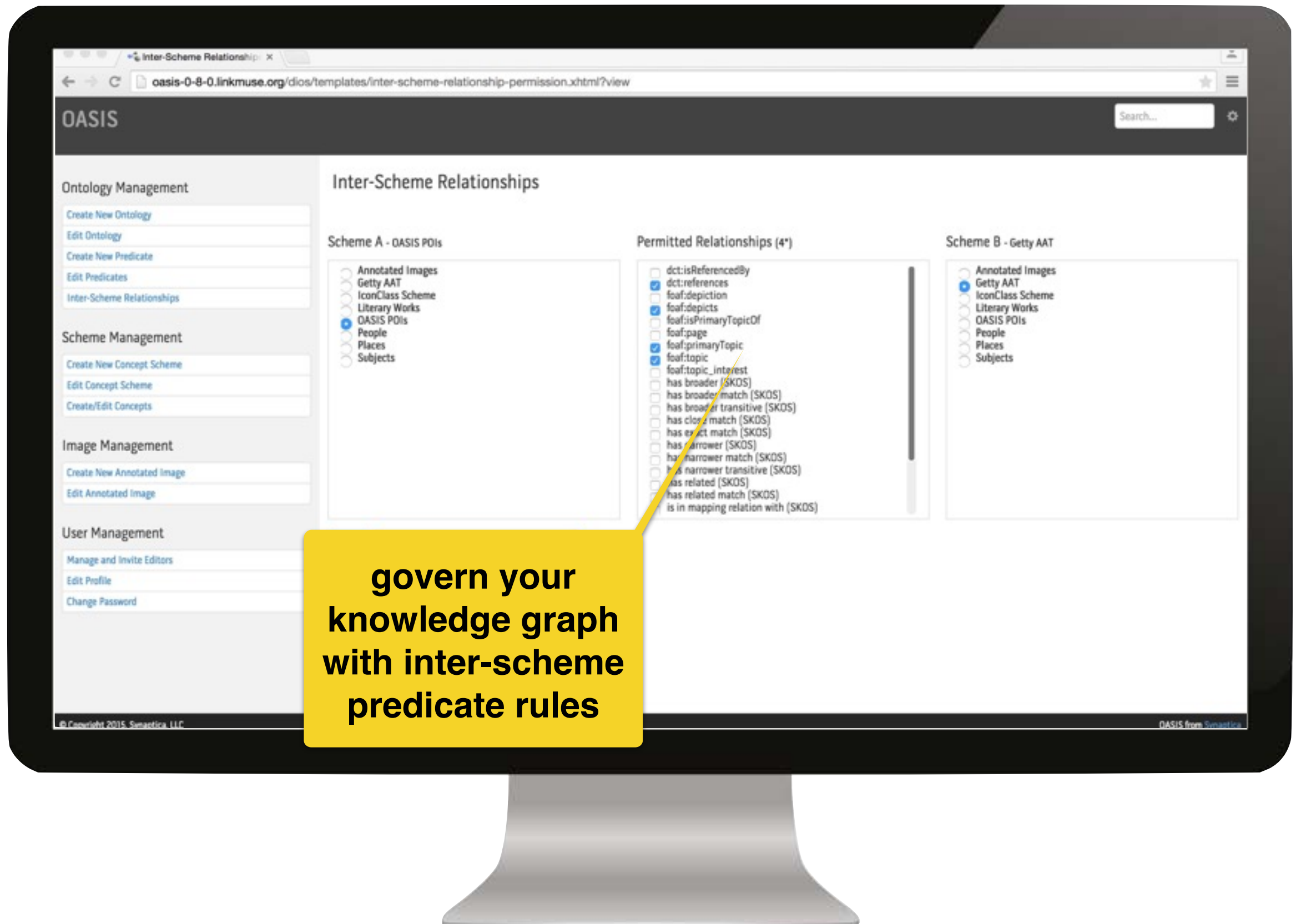
configure ontologies and predicates



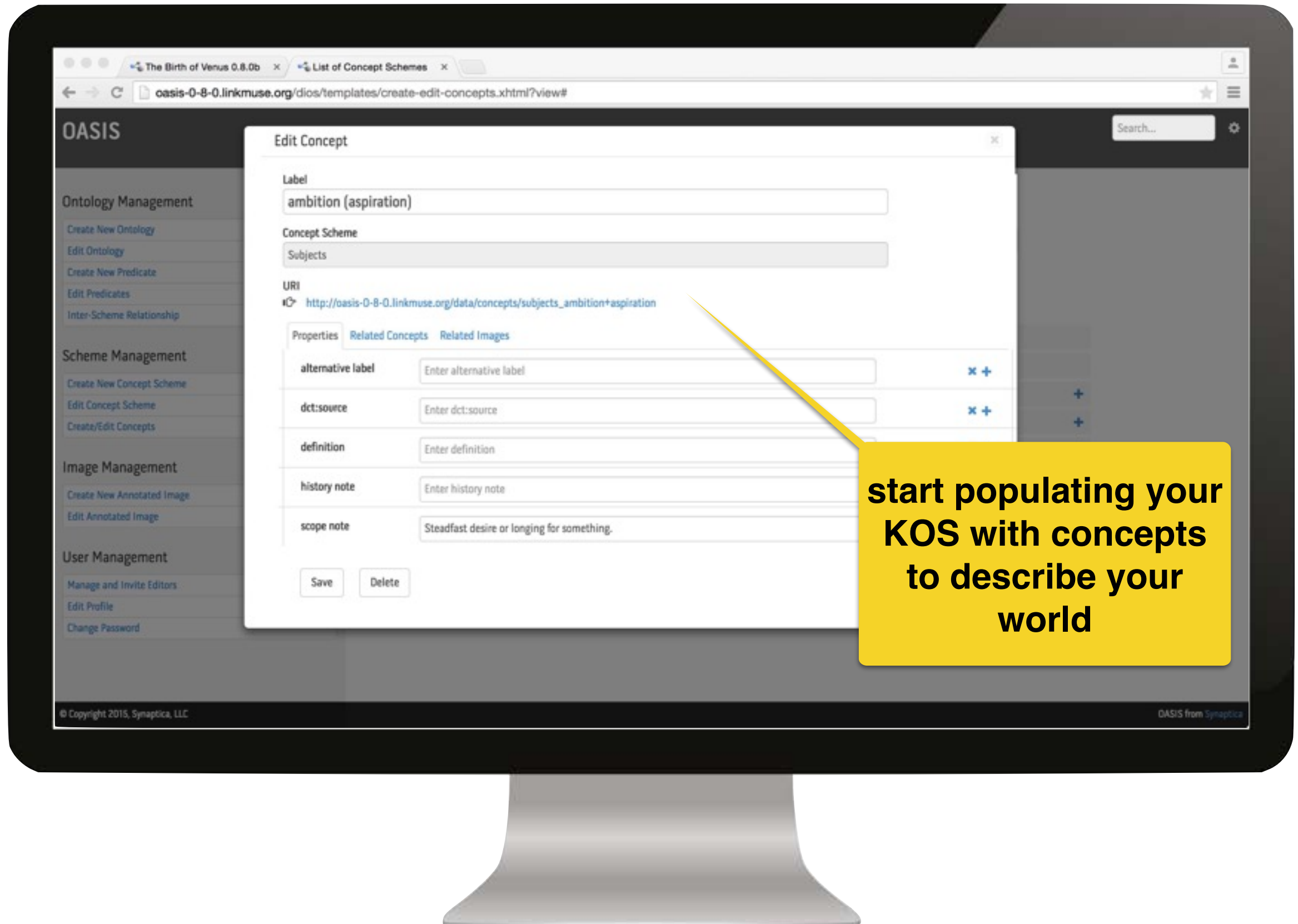
and design KOS schemes



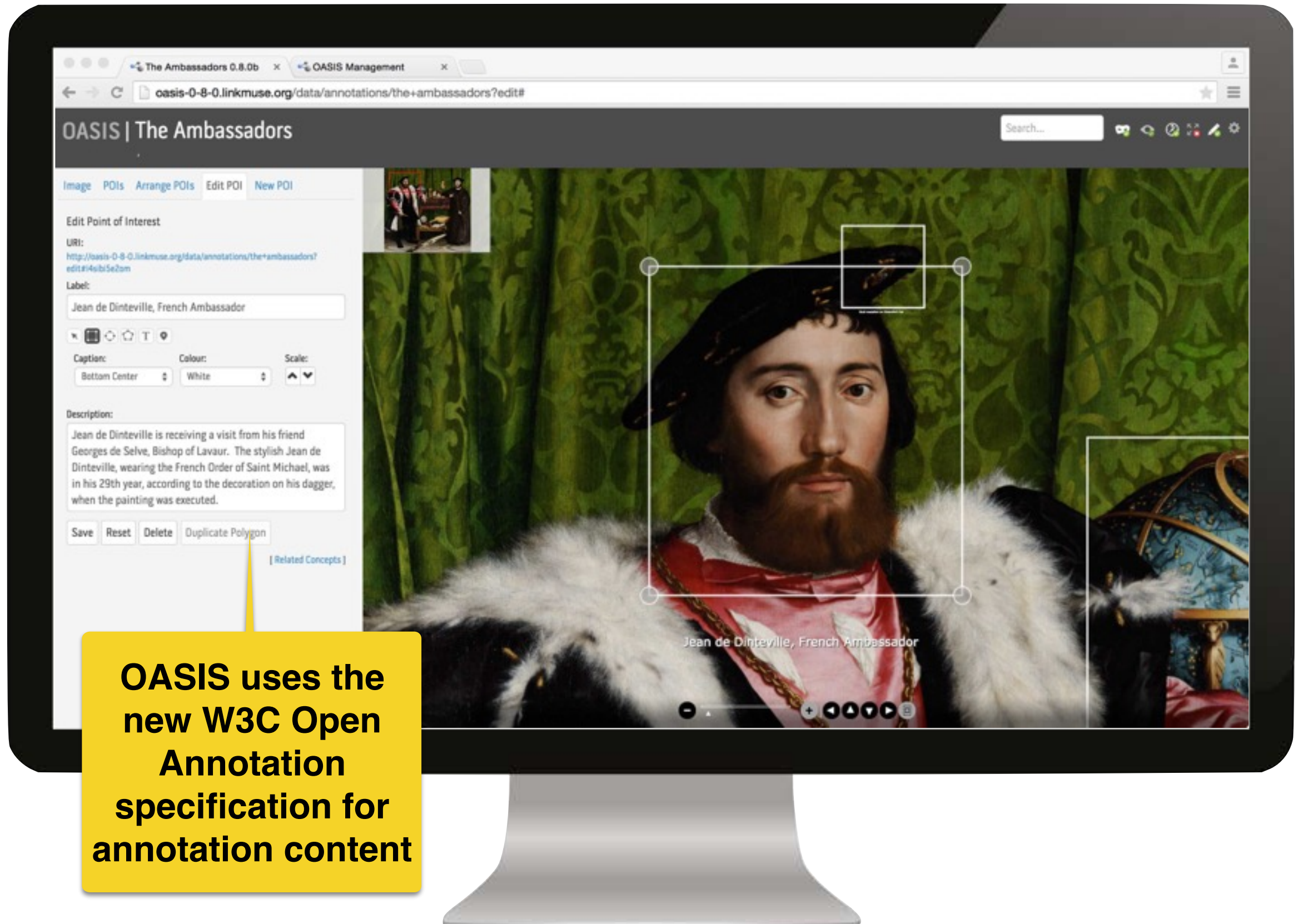
govern inter-scheme relationships



build taxonomies

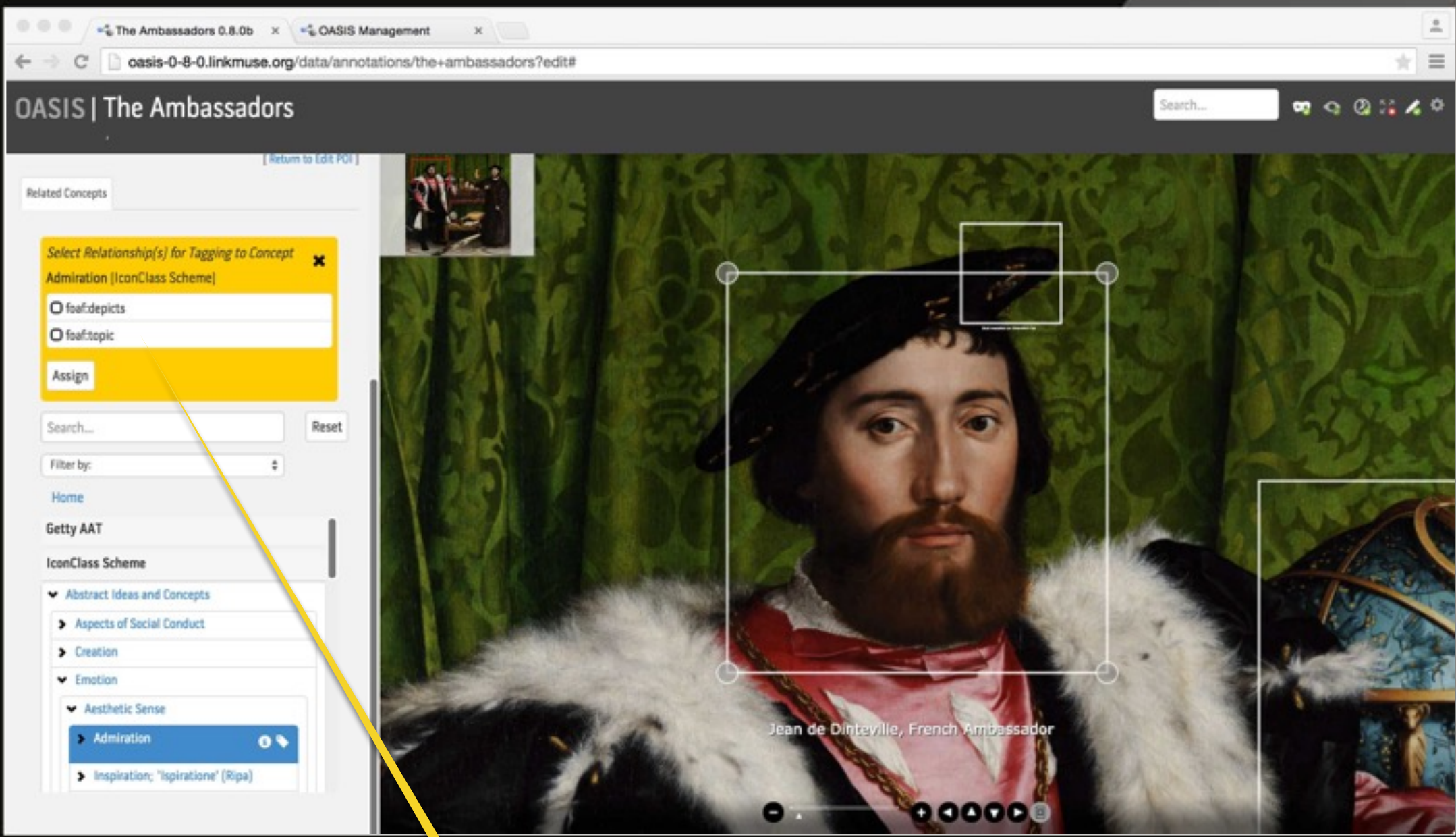


create annotations



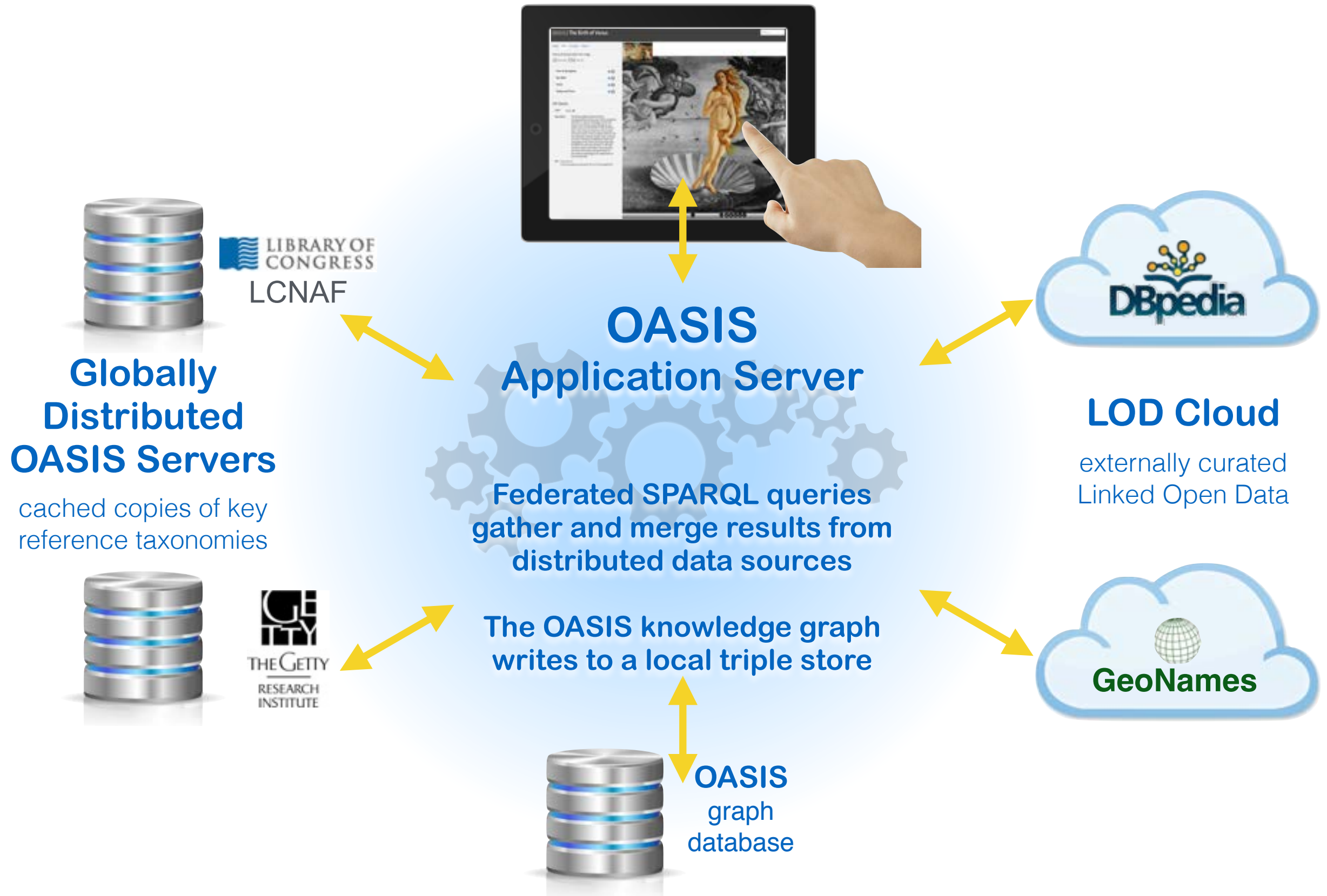
**OASIS uses the
new W3C Open
Annotation
specification for
annotation content**

and index content



The screenshot shows a web browser window with the URL `oasis-0-8-0.linkmuse.org/data/annotations/the+ambassadors?edit#`. The page title is "OASIS | The Ambassadors". On the left, a sidebar titled "Related Concepts" contains a section "Select Relationship(s) for Tagging to Concept" with radio buttons for `foaf:depicts` and `foaf:topic`, and an "Assign" button. Below this is a search bar and a "Filter by:" dropdown. The main area displays a portrait of Jean de Dinteville, French Ambassador, with a large white bounding box around the face and a smaller one around the hat. A yellow callout box points to the sidebar with the text "content is indexed using predicates from the adopted ontologies".

content is indexed using predicates from the adopted ontologies





thank you