Integrating Semantic Web Technologies in the Architecture of BBC Knowledge & Learning Beta Online Pages

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1 Abstract

The BBC has understood the value of online learning from the early stages of the web, and has provided rich educational material to those wanting to learn. An example of this is the BBC Bitesize website[1], which started back in 1998 and is a popular formal education resource.

In the formal learning space the BBC has a number of sites: the already mentioned Bitesize, Skillswise[2] and Class Clips[3] amongst others. There are tens of thousands of content items across these sites, with each site having different mechanisms for publishing, discovering and describing the content it serves.

To provide a coherent learning experience to users, a model for describing content in the context of the UK national curricula was developed. This model provided the foundation for building the new Knowledge & Learning beta website, presenting learning resources in the context of the UK national curricula in a consistent way. In addition, it allows for consistent reflection of changes in the national curricula throughout the product.

Designing the architecture of such a system is a challenging task. Each of the existing sites have similar yet different ways of describing and navigating through their content. In addition, the existing learning sites do not have a single content description model that could be reused in the beta site. Having a flexible structure in the back-end that can reflect the national curriculum and that can be used for consistently describing and organising learning resources is a key feature of the architecture.

We are going to present the architecture behind the Knowledge & Learning Beta site and we focus on the curriculum ontology, which is central to the architecture. We show how it is used to describe and organise learning resources, how it supports navigation and how it is aligned with semantic markup vocabularies for better precision in search. We will also present some of the challenges we faced and discuss future work.

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[1] `http://www.bbc.co.uk/bitesize/`

[2] `http://www.bbc.co.uk/skillswise`

[3] `http://www.bbc.co.uk/learningzone/clips/`

The overview of the architecture of the architecture is shown in Figure 1. The curriculum ontology plays a key role in the description of the learning resources, which are video clips and revision guides.
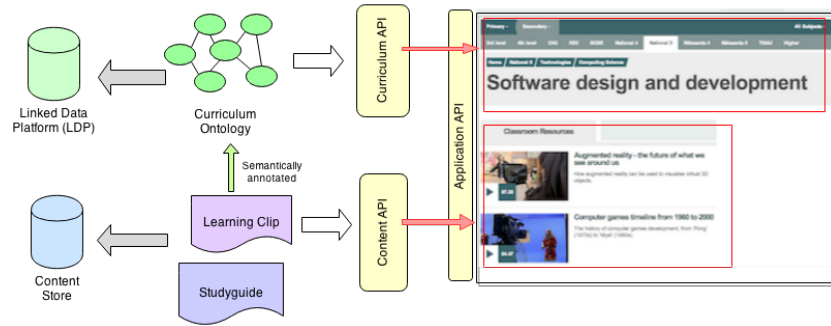

Fig. 1: The BBC Knowledge & Learning Architecture.

Following a Dynamic Semantic Publishing (DSP) model, the BBC Knowledge & Learning system incorporates semantic web models and linked data in its architecture. In the Knowledge & Learning Online Pages, different components of the front end are served by different systems in the back-end.

In a nutshell, the ontology and its instance data are served by the Linked Data Platform, which amongst other services it provides the BBC internal triple store. Learning content such as video clips and revision guides are saved in a different system named as Content Store. The coupling between Learning resources and curriculum ontology is done through semantic annotation. In particular, the content items are semantically annotated with curriculum instances so that the Application Layer can retrieve related content for curriculum ontology instances.

The Curriculum Ontology aims (1) to provide a model of the national curricula across the UK, (2) to organise learning resources, e.g. video clips and revision guides and (3) to allow users to discover content via the national curricula. These are achieved by providing broad units of learning (e.g. a Topic) and more finely grained units (e.g. a Topic of Study).

The Curriculum Ontology is the glue that holds the content together and the basis of the website navigation. One of the benefits of this is that it can offer dynamic aggregations of content achieved by querying the linked curriculum data. It can also help to easily discover content. For example, the recommendations on other relevant topics to a video clip is done via the ontology data. Building additional recommendation services using the curriculum ontology and other BBC and external ontologies is a promising direction.

Finally we will show how, mapping the Curriculum Ontology concepts with learning markup vocabularies, such as the Learning Resource Metadata Initiative (LRMI), allowed for better precision in search using the metadata of the learning content.