

# Authoring Object-Based Video Narratives

Davy Smith, Jonathan Hook, Marian F Ursu

Digital Creativity Labs, Department of Theatre, Film and Television, University of York, UK  
{davy.smith, jonthan.hook, marian.ursu}@york.ac.uk

## ABSTRACT

This demonstration presents a new approach for the authoring and delivery of online Object-based video narratives. We introduce a cross-platform desktop application which provides a graphical environment for the authoring of video narratives that can be dynamically sequenced and composited at viewing time, based upon the interactions, or context, of the audience. In addition, we present the *Object-Based Storytelling Engine*, a client-side JavaScript library which allows the delivery of object-based narratives in any HTML5 compliant browser.

## Author Keywords

Object-based media; HTML5; Online Video Production; Interactive Video; Data-Driven Video;

## ACM Classification Keywords

H.5.1 Multimedia Information Systems

## INTRODUCTION

Object-based Media (OBM) is a term growing in popularity within research to describe media productions, made with recorded audio-visual content, that have the ability to respond or adapt to the contexts in which they are experienced. In OBM, media objects are dynamically – therefore automatically – assembled during delivery, as opposed to being locked within a linear sequence at authoring time, as is the case with the traditional approach to media production. The delivery of media as objects allows for the construction of highly non-linear, interactive, responsive, personalized, context specific, narratives.

Previous approaches to authoring OBM narratives have demonstrated the feasibility of the concept. The most recent and mature example of this was *ShapeShifting Media Technology* [1], which significantly addressed the challenges to the production and delivery of OBM. However the available technology at the time produced barriers to its adoption; a dedicated proprietary player was required to be installed within set-top boxes for its

Paste the appropriate copyright/license statement here. ACM now supports three different publication options:

- ACM copyright: ACM holds the copyright on the work. This is the historical approach.
- License: The author(s) retain copyright, but ACM receives an exclusive publication license.
- Open Access: The author(s) wish to pay for the work to be open access. The additional fee must be paid to ACM.

This text field is large enough to hold the appropriate release statement assuming it is single-spaced in Times New Roman 8-point font. Please do not change or modify the size of this text box.

Each submission will be assigned a DOI string to be included here.

distribution.

Today, significant advancements in web technologies, primarily through the inclusion of flexible video libraries and WebGL in HTML5, have removed many of these technological barriers to delivery. However, current web-based editors for authoring non-linear video narratives are significantly limited, when compared to truly OBM approaches. Current interactive video software generally restricts authoring to branching narrative structures which are based upon explicit interaction from viewers and directly link specific sequences of clips together. The semantic selection of media based upon the context of the viewer is currently impossible, or significantly limited, in current authoring environments. In addition, the dynamic compositing of video media is not possible within current web-based authoring tools, e.g. applying chromakeys, colour grades or transitions etc.

To the authors' knowledge our presented demonstration software is the first truly web compatible OBM authoring tool, allowing the creation of HTML5 compliant non-linear video narratives that can be dynamically sequenced and composited at viewing time, without the requirement for additional plugins or proprietary players to be installed.

## OUR APPROACH

The production tool we present is a fully functional Minimal Viable Prototype (MVP) for the authoring of non-linear, interactive or data-driven, OBM narratives. Productions can be exported as a static, client-side webpage, which can be viewed in any HTML5 compliant browser. Exported projects include the Object-Based Storytelling Engine (OBSEngine), which dynamically sequences the video narrative at viewing time.

## PRODUCTION TOOL

The MVP production tool provides a graphical user interface for authoring OBM narratives. It is created as a cross platform application using Electron<sup>1</sup>. The main window consists of nine panels which can be arranged by the user in any combination of stacks, columns and rows. The main panels' functionality are described in the following sections.

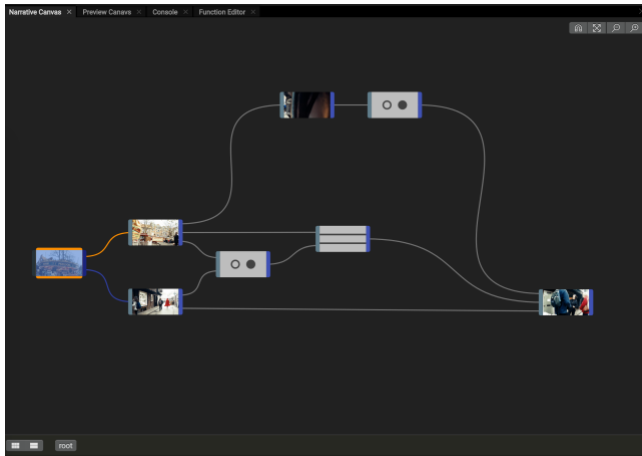


Figure 1. The Narrative Canvas

### Narrative Canvas

The *Narrative Canvas* (Figure 1.) allows media objects to be added and linked together. This is where the main structure of the narrative is constructed. In the presented MVP tool, three types of media object are supported; the *Atom*, *Group* and *Layer*. These constructs take inspiration from *ShapeShifting Media*, which has previously shown their sufficiency for the creation of highly non-linear and personalised narratives, whilst employing authorial metaphors which are familiar to film-makers [1].

### Function Editor

In this panel, functions that will be called during playback are defined. Default functions can be edited, or new functions created, using a text-based code editor. Functions are written in standard JavaScript.

### Ontology

The *Ontology* panel (Figure 2.) allows for semantic Classes to be defined and instances to be assigned within these Classes. Objects can be annotated from the ontology. Decisions based upon the viewers' data or interactions can be used to determine selections at viewing time (e.g. return the object where the *Subject* equals the Subject chosen by the viewer).

### Property Inspector

The *Property Inspector* panel (Figure 2.) enables the metadata within objects to be edited. Specific data attributes which can be directly edited include the *Position* and *Scale* of the media object within the frame, adding *Annotations* from the Ontology, adding *Interaction* regions, assigning *Selection Functions* and editing the *Inputs* and *Outputs*. In addition, custom metadata can be added to objects from within this panel.

### ONLINE DELIVERY

Projects are exported as a static web-page utilising two client-side JavaScript libraries; The OBSEngine, developed by the authors, and *VideoContext*, developed by BBC R&D.

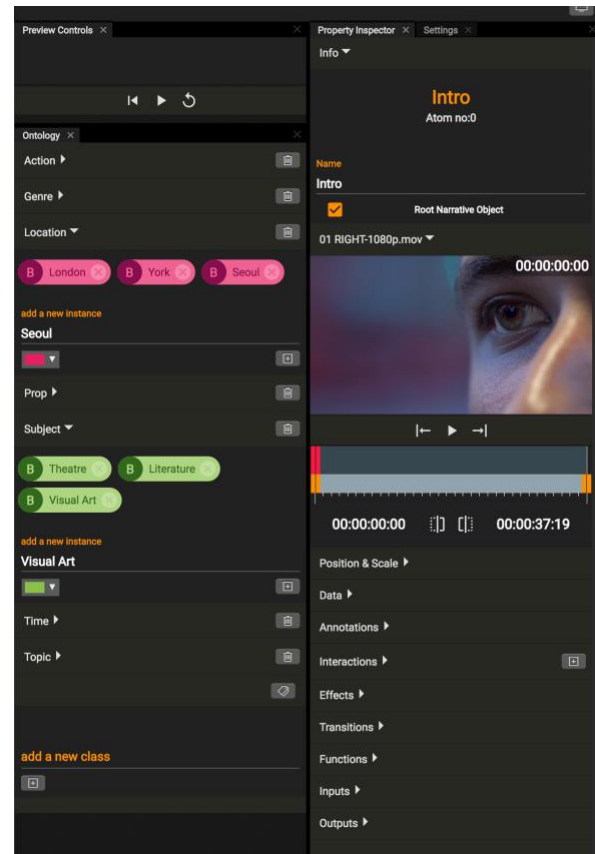


Figure 2. The Ontology and Property Inspector Panels

### Object-Based Storytelling Engine

The OBSEngine is a client-side HTML5 cross-browser compatible JavaScript library to dynamically sequence media objects. At viewing time, objects are sequenced based upon the resolution of selection functions, to allow for the delivery of non-linear, interactive, and/or data-driven video narratives. The OBSEngine sequences media objects directly to the *VideoContext*<sup>ii</sup> library, an open source client-side JavaScript library developed by BBC R&D for the rendering and compositing of video media. VideoContext uses a HTML WebGL canvas to render video frames as textures.

### REFERENCES

1. Marian F. Ursu, Maureen Thomas, Ian Kegel, Doug Williams, Mika Tuomola, Inger Lindstedt, Terence Wright, Andra Leurdijk, Vilmos Zsombori, Julia Sussner, and others. 2008. Interactive TV narratives: Opportunities, progress, and challenges. *ACM Transactions on Multimedia Computing, Communications, and Applications (TOMM)* 4, 4: 25.

<sup>i</sup> <https://electronjs.org/>

<sup>ii</sup> <https://github.com/bbc/VideoContext>