

# LEGO Batman: Graphical Breakdown Editing - Optimising Assembly Workflow

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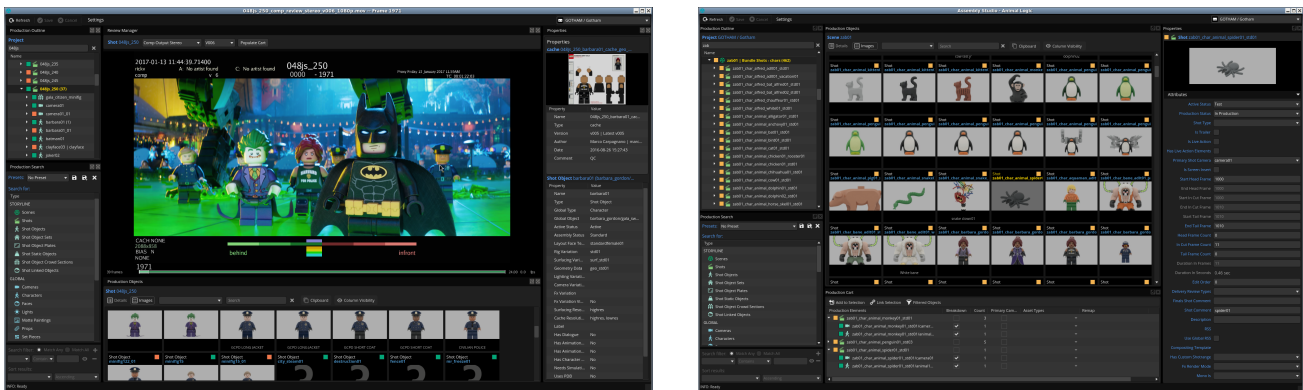


Figure 1: The Assembly Studio - RV Integration ©Warner Bros Inc., The LEGO Corporation. All rights reserved.

## ABSTRACT

The ever increasing complexity of the LEGO movies demanded a new way of managing project breakdowns. Animal Logic's fine-grained, modular representation for assets [Sarsfield and Murphy 2011] meant that hundreds and thousands of shots, and shot objects, needed to be managed. It was clear from our experience on the *The LEGO Movie* that our existing text-based spreadsheet approach would not scale to demands of *The LEGO Batman Movie*.

## CCS CONCEPTS

•Computing methodologies → Animation;

## KEYWORDS

Assembly, Animation, Breakdown

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## 1 EVALUATING CURRENT AND ALTERNATIVE SYSTEMS

Animal Logic had two existing and separate systems for managing and reviewing breakdown and assets for a project. The breakdown

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was managed via a spreadsheet style UI presenting text-based data. Graphical data including clips and image thumbnails were via reviewed through a rich web-based interface. When considering the design for this new system it was clear that a combination of these two systems was required, providing the strong data editing capabilities of the spreadsheet system while presenting it in an easy to use, graphically rich interface. Third-party systems such as Shotgun were considered during the design process. They offered solutions for some of the requirements for this project, but none covered all necessary features. Additionally as Animal Logic already had significant infrastructure already in place, it was more desirable to extend these systems than to integrate a new system.

## 2 GRAPHICAL BULK BREAKDOWN EDITING

For *The LEGO Batman Movie* a new application, *Assembly Studio* was developed to manipulate shot breakdowns using a feature-rich, highly visual interface. All objects in the breakdown from characters and props, to the shots themselves are presented with thumbnails and movie playback within the application.

*Assembly Studio* uses the popular web metaphor of shopping, allowing users to drag and drop various objects (Characters, Props, Setpieces etc) into a cart. Items in the cart can then be assigned to one or many shots very quickly. Critical assets, such as animation curves ("motion") and set layout configurations can also be copied during this process. This scope and graphical detail provided for breakdown manipulation vastly sped up the assembly process, and significantly reduced continuity issues.

## 3 SEARCHING MASSIVE BREAKDOWNS

The scale of *The LEGO Batman Movie*, also motivated a new method for searching breakdowns. With the inclusion of various test shots

and previsualizations, there were over 20,000 shots containing upwards of 200,000 shot-objects. This resulted in around five million attributes to be searched and maintained during production. A significant increase from previous productions, our existing systems struggled to present the data to many simultaneous users. A server-side searchable index was developed to facilitate access to the data without incurring heavy database load. Complex search terms can be used to quickly limit the visible data and enable more focused manipulation of the production database.

#### 4 DIGITAL LINE-UP

Due to the nature of LEGO, there are thousands of potential combinations for individual character configurations. Everything from the colour of their arms, to their accessories, to specific facial features, can all be configured per-character, per-shot. The art department defined hundreds of named combinations of these, and recorded them in a vast 'digital line-up'. *Assembly Studio* presented each combination as a thumbnail that could be easily dragged onto shots for assignment. When combined with optimised search capabilities, specific character combinations could be easily found, visually confirmed, and applied to a shot with a few clicks.

#### 5 RV INTEGRATION

All automated review assets for *The LEGO Batman Movie* were injected with new metadata, giving a unique ID to each 3D object within every frame. With this addition, tools were developed that allow users to access production database information on any object visible in the render. With Tweak Software RV embedded in *Assembly Studio*, users manage the breakdown and adjust the content of shots directly from reviews.

#### 6 BEYOND LEGO

While the complexity of our LEGO movies makes these tools essential, they can significantly increase the efficiency of any large scale production pipeline. The concept of graphical breakdown authoring is now the baseline for all new projects at Animal Logic.

#### REFERENCES

Aidan Sarsfield and Eoin Murphy. 2011. The Power of Atomic Assets: An Automated Approach to Pipeline on "Legend of the Guardians: The Owls of Ga'Hoole". In *ACM SIGGRAPH 2011 Talks (SIGGRAPH '11)*. ACM, New York, NY, USA.