

Institution: University of York		
Unit of Assessment: 33 - Music, Drama, Dance, Performing Arts, Film and Screen Studies (B - Theatre, Film, Television and Interactive Media)		
Title of case study: Object-Based Media: generating new tools, industry practices, and public experiences in interactive storytelling		
Period when the underpinning research was undertaken: 2014 - 2020		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Marian Ursu	Professor	Jul 2013 - Present
Jonathan Hook	Senior Lecturer	Sep 2014 - Present
Davy Smith	RA	Nov 2016 - Apr 2019
Shauna Concannon	RA	Feb 2018 - May 2019
Andrew Walter	RA	Dec 2019 - Present
John Gray	Software Developer	Jun 2017 - Present
Alvaro Cacerez-Munoz	Interface Designer	Jul 2020 - Dec 2020
Period when the claimed impact occurred: 2015 - 2020		
Is this case study continued from a case study submitted in 2014? N		
<p>1. Summary of the impact (indicative maximum 100 words)</p> <p>Object-Based Media (OBM) redefines the way that stories are told through moving pictures and sound. In OBM, stories are interactive: each member of the audience can receive, at each viewing, a personalised narration which responds to their direct choices as well as to their known preferences. Research at the University of York led by Professor Marian Ursu has generated significant advances in OBM. It has culminated in the development of a pioneering OBM authoring toolkit, Cutting Room, which facilitated the industry's wider and deeper engagement with the emergent form of interactive storytelling and supported the creation of new experiences for the general public. First, Cutting Room has informed the integration of OBM technical capability into BBC production and delivery systems. Thus, it shaped BBC production workflows and enhanced the ways BBC production teams engage with interactive storytelling technology. Second, Ursu's research has provided industry storytellers with more effective means to imagine and produce interactive narratives. Cutting Room has helped them engage directly with the craft of interactive storytelling and develop new ways of thinking about the nature of storytelling and the opportunities provided by interactive media to tell stories. Third, Cutting Room has changed the experience of those benefiting from these new forms of storytelling, the viewing public, by offering them radically new ways of interacting with stories carried through moving pictures and sound.</p>		
<p>2. Underpinning research (indicative maximum 500 words)</p> <p>There is increasingly stronger evidence from audiences, particularly younger ones, that they desire new forms of mediated storytelling which are interactive. However, interactive narration is a concept that requires fundamentally new ways of thinking. Producers have to conceive multidimensional 'narrative worlds' that automatically resolve, in each viewing experience, into meaningful and attractive linear stories. The concept is still in its infancy, but Ursu and his team's practice-as-research has now provided a new foundation for thinking about and developing it. This research has two core components which are detailed below.</p> <p>The Development of Generic Technology and Tools</p> <p>Ursu's team's major achievement is that it developed a solution to authoring interactive narratives that responds to two key requirements, which had previously been accepted as being mutually exclusive. First, it allows creatives to engage with <i>complex</i> narrative spaces, otherwise hugely difficult or impossible to do in previous iterations. Second, it gives them the power to craft these interactive narratives <i>directly</i>, without requiring the involvement of software developers. To achieve these ends, the team devised a set of basic interactive narrative structures and implemented them in an authoring tool – Cutting Room – allowing creative thought to be immediately realised through the software [3.1, 3.2]. The key innovation resides in providing the ability of these narrative structures to be combined and indeed re-combined, thus offering a powerful and effective means for developing complex interactive narrative worlds [3.1]. The basic narrative structures, thus, afford great expressive power. They are also easily accessible to</p>		

creatives, as they are rooted in familiar film-editing concepts [3.1]. This radically new paradigm, the first of its kind in non-linear storytelling, has pioneered a new approach to authoring, and facilitated a deeper engagement with the form, leaving the creative process entirely in the hands of the creatives.

The Development of the Interactive Narrative Form and Creative Practice

The team have researched OBM storytelling form in three genres: fiction, documentary and collaborative film-making for mental health, as described below.

In collaboration with the production company Symbolism Studios, Ursu as executive producer and Smith as consultant on interactive narrative structures, have produced a short fictional film, *What is Love?* [3.3], which used the Cutting Room authoring tool [3.2]. Here, viewers become members of the main character's network of followers, and their decisions have a direct impact on her actions. The key practice-based research challenge was to reconcile an audience's emotional connection to the narrative with the interventions necessary to the film's interactive form (the users' input). Interventions could disrupt the narrative flow, and so the research question was whether it was possible to devise modes of interaction that were natural and enticing, and which preserved the continuity of the narration. The research facilitated through *What is Love?* demonstrated that narrative continuity and emotional engagement were not disrupted through viewer interaction, setting up *What is Love?* as a successful exemplar for the interactive narrative form. These results were validated through a user study involving 94 participants, using a questionnaire comprising nine questions with the responses being rated using a 5-point Likert scale [3.1].

Complementary to this, Ursu and his team also applied OBM to data-driven documentary storytelling in the *Brooke Leave Home* production [3.4], made in collaboration with Limina Immersive, and to non-linear participatory film-making as a therapeutic tool in mental wellbeing, through research engaging with the *Stepping Through* production [3.5], a linear film made to support research into non-linear form, with the support of the 'Converge: education for recovery' programme. In the former, in which stories respond to the data profiles of the viewer rather than to explicit interaction from them [3.4], the team found that the impact of a story can be enhanced when it references, explicitly or implicitly, viewers' own data [3.4]. The latter demonstrated that this form of storytelling has the potential to be more effective in capturing the many perspectives and voices of participants with mental health problems [3.5].

3. References to the research (indicative maximum of six references)

3.1 Marian F. Ursu, Davy Smith, Jonathan Hook, Shauna Concannon, John Gray. 2020. Authoring Interactive Fictional Stories in Object-Based Media (OBM). In *Proceedings of IMX '20: ACM International Conference on Interactive Media Experiences*, June 17-19, 2020, Barcelona, Spain. ACM Inc., pp. 127-137. DOI *+^

3.2 Marian F. Ursu, Jonathan Hook, Davy Smith, John Gray, Andrew Walter, Alvaro Caceres Munoz, Shauna Concannon. *Cutting Room*, OBM Authoring Toolkit. [First release on 29.01.2018]. Last version publicly available at <https://digitalcreativity.ac.uk/cuttingroom> ^

3.3 *What is Love?*, 2018. [Interactive Film]. Ben Reid, Dir. Marian F. Ursu, Exec. Producer. Davy Smith, Interactive Narrative Structures: Symbolism Studios, University of York and BBC, UK. [Exhibited at York Mediale, 30.09.2018 – 6.10.2018]. ^

3.4 Shauna Concannon, Natasha Rajan, Patif Sha, Davy Smith, Marian F. Ursu, Jonathan Hook. 2020. Brooke Leave Home: Designing a Personalized Film to Support Public Engagement with Open Data. In *CHI '20: Proceedings of the 2020 ACM CHI Conference on Human Factors in Computing Systems*. April 25-30, 2020. Honolulu, Hawai'i, USA. ACM Inc., pp. 1-14. DOI *+^

3.5 Simona Manni, Marian F. Ursu, Jonathan Hook. 2019. Stepping Through Remixed: Exploring the Limits of Linear Video in a Participatory Mental Health Film. In *TVX '19: Proceedings of the 2019 ACM International Conference on Interactive Experiences for TV and Online Video*, June 2019, pp. 83–94. DOI *^

(* = peer reviewed, + = returned to REF2021, ^ = produced with peer-reviewed funding)

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4. Details of the impact (indicative maximum 750 words)

The team's research **A** has fundamentally informed and driven the BBC's development of new tools and technologies, **B** has initiated and enabled the development of new creative practices in

industry, and C) has exposed millions of audience members to new concepts and technologies for storytelling, as detailed below.

A. Influencing OBM tools and technologies at the BBC

The BBC is the most significant broadcaster in the UK and has a large R&D Department that is charged with developing innovative cutting-edge televisual and broadcast technologies. It actively seeks out partners with whom it develops 'next generation systems and standards' (<https://www.bbc.co.uk/rd/about/our-purpose>). In the words of the Head of BBC R&D North, 'From October 2015, BBC R&D worked alongside Marian's research team at the University of York to develop OBM as a versatile and user-friendly form of interactive story-telling across IP-based broadcasting. [...] Marian's research, particularly through their Cutting Room toolkit and the "What is Love?" OBM film production has been a key element in this process, [...] shaping interactive media tools at the BBC' [5.1]. The conceptual model and visual design language of Cutting Room, resulting from York's research, were adopted by BBC's own OBM Toolkit [5.1] which, in turn, 'informed the integration of OBM capability [...] into existing BBC delivery systems, thus shaping BBC production team workflows and enhancing the ways BBC production teams connect with, and utilise, this innovative, new storytelling technology' [5.1]. Ursu's team has thus fundamentally informed future technological developments in the BBC's digital infrastructure.

B. Generating new creative practice in industry

OBM provokes very new ways of crafting stories, because creative practice now rests on the production of discrete narrative elements and associated 'recipes' for their potential user-focused (re-)combinations. The versatility of the Cutting Room toolkit in expressing such 'recipes' allowed various production companies to engage more profoundly with the new form and discover new ways of envisaging, designing and crafting them.

B.1 OBM production at the BBC has directly benefited from Ursu's research. As an example, the 1000th celebratory episode of *Click*, the BBC's flagship technology programme, is a completely interactive episode [5.2a]. Broadcast in 2019, it was created 'following a visit by the BBC Click team to see the premiere of *What is Love?* at York Mediale (2018)' and was '[i]nspired by the narrative form of *What is Love?*' [5.1]. Furthermore, this episode was powered by the BBC's adoption and adaptation of the Cutting Room toolkit, StoryFormer [5.1]. The Click series editor stated: 'Click has been on air for nearly 20 years, and in that time we've pioneered new ways of telling stories... This is Click's most ambitious experiment yet, and it promises to bring television into the interactive, online era' [5.3a]. Other BBC productions made with StoryFormer include *His Dark Materials Interactive: Discover Your Daemon*, *Instagramification*, and *Make Along Origami Jumping Frog* [5.2b-d].

B.2 Symbolism Studios was set up in 2017 'to step into the unexplored world of nonlinear video storytelling [...] and be among the pioneers of this emergent art' [5.4a]. Its founders previously worked with cutting-edge technologies and world-leading brands within Imaginarium Studios, including on *The Ruins Of Empires*, *Star Wars: The Last Jedi*, and *War For The Planet Of The Apes*. In 2018, Symbolism started to work together with Ursu's team on the production of *What is Love?*. Cutting Room allowed Symbolism 'to aim high and take the form far beyond the then industry standard represented by the branching narrative model' and 'construct[ed] more complex structures that provide[d] more flexibility to the interactive story, allowing it to provide more nuanced and comprehensive real-time responses in each particular viewing experience' [5.4a]. They reported that the engagement with Ursu's research 'has been essential for our understanding of the potential of the form' and 'has positioned us in the top echelon of thinkers and producers of the new form of storytelling' [5.4a]. For example, the CEO of Symbolism, during a public debate with the producer of the iconic Netflix interactive film *Bandersnatch*, in which they analysed their experiences of pioneering this new form, praised her positive experience of using Cutting Room in response to some major problems encountered by the *Bandersnatch* team: 'I was able to respond with our positive experience of using Cutting Room, which alleviated to a great extent the drawbacks of authoring through Twine identified by [the *Bandersnatch* producer] and allowed us far more versatility and efficiency in expression' [5.4a].

B.3 Storypunk is a scripted podcast and TV company, and Bellyfeel an interactive media company, both developers of new forms of digital storytelling. They, in partnership with the York research

team, have explored OBM in order to develop an interactive podcast format. This was based on a large collection of interviews with a key collaborator of Bob Marley and his family, relating intricate events with extraordinary connections between them. Storypunk, responsible for the story concept, identified that the main challenge was ‘to dissect this extensive material into smaller objects and to structure them in such a way as to allow the vast number of potential stories to come to life through interactive consumption’ – ‘a huge challenge as there is no prior similar work ever done and the space of possibilities is more or less unlimited’ [5.4b]. They reported that ‘Marian’s research in OBM enabled us to properly engage with the challenge of turning vast source material into workable interactive narratives, and generate ideas and craft prototypes that otherwise would not have been possible’ [5.4b]. Bellyfeel reported through its director that ‘Cutting Room is quite different to anything that I am aware of and it has influenced my thinking about what is possible for interactive storytelling, for example in the way it supports concise and simple expression of complex interactive narrative structures’ [5.4c]. After a first successful step, the production company Storypunk is seeking funding to ‘refine this line of work and plan to continue our collaboration with Marian’s OBM team, [and] use their OBM model and the Cutting Room OBM tool’ [5.4b].

B.4 Cutting Room has also facilitated the engagement with OBM of over 600 innovative storytellers, which are part of a diverse and inclusive community working on the cutting edge of media production, Storytellers United (<https://storytellers.link>). BBC R&D used Cutting Room to enable this group to engage with OBM [5.1], in events such as the February 2019 Manchester Hack Jam (<https://storytellers.link>). For the BBC, this resulted in the provision of ‘an engaged and enthusiastic group of advocates for OBM-based projects’ and ‘increased access to fellow developers providing valuable feedback on OBM developments’ [5.1].

C. Enabling public experiences of OBM

York research has also enabled the general public to engage with OBM interactive narratives through its own productions as well as through those driven by Cutting Room’s technology.

C.1 *What is Love?* was one of the major exhibits at York Mediale, Nov 2018, a festival attended by over 19,000 people [5.5, p. 16]. In the Festival’s audience evaluation, *What is Love?* was reported as having been the 3rd most popular event from the total of 60, with 20% of the 346 respondents having visited the installation [5.5, p. 13]. The research team estimated that over 900 visitors experienced the interactive production [3.1, p. 133]. A survey of 94 participants carried out by the York team showed that viewers found the production to be interesting and engaging [3.1 p. 134]: 79% rated overall interest as good or very good; 69% rated overall engagement as good or very good. The Mediale team requested a formal peer artistic evaluation of the festival using the Arts Council England Quality Metrics principles [5.5, p. 19]. This led to impressively positive feedback for *What is Love?*. 8 out of 12 categories received the highest score of 10 out of 10, for example: excellence (‘one of the best examples of its type that I have seen’), originality (‘it was ground-breaking’), captivation (‘it was absorbing and held my attention’), and enthusiasm (‘I would come to something like this again’), whilst the other four received scores of 8 and 9 [5.5, p. 35]. This placed *What is Love?* 2nd within 13 surveyed artworks, only one point away from the piece evaluated most highly [5.5, pp. 19-36]. The evaluator’s full scores for the categories of distinctiveness (‘it was different from things I’ve experienced before’) and challenge (‘it was thought provoking’) [5.5, p. 35], suggest that the film provided audiences with new experiences that challenged their thinking.

C.2 York OBM research gained extensive audience reach through *Click* and other BBC OBM productions. *Click* viewers had the opportunity to see and hear about examples of interactive storytelling when *What is Love?* and Cutting Room featured on its episodes on TV (Oct 2018) and radio (Jan 2019) [5.6]. The selection of the York OBM research to feature on these programmes reflected its importance and worldwide relevance, and introduced the York-developed technology to huge audiences worldwide. *Click* is distributed online and on both TV and radio across five BBC Channels [5.3b], including the BBC News Channel in the UK and worldwide via World News and the World Service, reaching hundreds of million viewers around the world [5.7].

Furthermore, audiences have been able to have hands-on experience of the interactive narrative form through BBC OBM productions which have made use of the technology developed

with York. The OBM BBC productions described in Section B1, above - *Click 1000*, *His Dark Materials Interactive*, *Instagramification*, and *Make Along Origami Jumping Frog* [5.2] - have enabled over 700,000 people to have first-hand experiences of the OBM interactive narrative form. For example, according to the BBC's figures, the 1000th episode of *Click* reached 323,905 audience members and *His Dark Materials Interactive: Discover Your Daemon*, 378,424 [5.8].

C.3 York OBM research also enabled BBC R&D to demonstrate their collaborative research into personalised media experiences and data privacy in an accessible format by using the power of interactive storytelling. As the Head of R&D noted: '[W]e used [Cutting Room] to create a project demonstrator for Databox, BBC R&D's collaboration with the University of Nottingham on a platform to manage trusted access to personal data' [5.1]. The demonstrator, called *The Living Room of the Future*, allowed audiences to explore the relationship between people's minutely surveyed daily behaviour through ubiquitous digital devices (Internet of Things) and the potential use of this data in providing more relevant, meaningful and immersive televisual experiences, while ensuring their privacy and security. The interactive film used in this demonstrator was produced with Cutting Room, with guidance from the York team. *The Living Room of the Future* has been experienced by over 2000 members of the general public at FACT, Liverpool, 4-22 May, 2018 [5.9, p. 98]; the installation has since been experienced by audiences at the V&A, London, 22-23 Sept 2018; Youth Cultural Centre, Skopje, Macedonia, 29 Oct–4 Nov 2018; and Tate Modern, London, 8-9 Feb 2019. As the Head of BBC R&D observed: 'As a result of the Cutting Room-powered content of "The Living Room of the Future", public audiences were better able to engage with data ethics issues through personal-data-driven storytelling' [5.1].

C.4 Ursu's OBM research helped to enable the city of York to define its status as a UNESCO Creative City of Media Arts. In December 2017, York was invited to participate in the Gwangju International Media Arts festival through one representative project from its network [5.10]. The nominated project was Cutting Room which, as York Mediale noted, 'was at the forefront of the field - informing the development of algorithmic art practice, and the development of mainstream media tools by the likes of the BBC, Mozilla and others' [5.10]. In the context of an extremely high profile exhibition, 'the project's presence helped to secure York's reputation as a dynamic and innovative city [...] working at the cutting edge of interactive technology' [5.10].

5. Sources to corroborate the impact (indicative maximum of 10 references)

5.1 Testimonial, Head of BBC R&D North Lab & Future Experience Technologies Section

5.2 BBC OBM Productions [all accessed on 22.01.2021]: **a)** *Click 1000*

<https://www.bbc.co.uk/taster/pilots/click1000>; **b)** *His Dark Materials Interactive*

<https://www.bbc.co.uk/taster/pilots/hdmadventure>; **c)** *Instagramification*

<https://www.bbc.co.uk/taster/pilots/instagramification>; **d)** *Make Along Origami Jumping Frog*

<https://www.bbc.co.uk/taster/pilots/origamimakealong>

5.3 **a)** BBC '*Click 1000*, The Inside Story' <https://www.bbc.co.uk/taster/pilots/click1000> **b)** About *Click* <https://www.bbc.co.uk/programmes/articles/5JdJLjT8I2PZQybvNKYCSX6/about-click>

5.4 Testimonials from media companies: **a)** Co-owner and CEO, Symbolism Studios; **b)** Co-Managing Director, Story Punk; **c)** Managing Director, Belly Feel

5.5 York Mediale 2018, Festival Evaluation Report, February 2019 <https://yorkmediale.com/wp-content/uploads/YM2018-Festival-Evaluation-FULL.pdf>

5.6 BBC Click <https://www.bbc.co.uk/programmes/b0bmq83> (TV piece: 11 Oct 2018 - 31 Dec 2020), now available at <https://www.youtube.com/watch?v=TM4op2VruY> (from 15:00 to 19:40) and <https://www.bbc.co.uk/programmes/w3cswfhl> (Radio piece: from 19:53 to 26:25)

5.7 BBC Media Centre, 'BBC International Audience Soars to record high of 426m', 18 June 2019 <https://www.bbc.co.uk/mediacentre/latestnews/2019/bbc-international-audience-record-high>

5.8 StoryKit: An Object-Based Media Toolkit <https://www.bbc.co.uk/rd/projects/object-based-media-toolkit> [figures from 16.01.2021]

5.9 N. Sailaja, A Crabtree, J.A. Colley, A Gradinar, P. Coulton, I. Forrester, L. Kerlin, P. Stenton. 2019. *The Living Room of the Future*. In *Proceedings of IMX '19: ACM International Conference on Interactive Media Experiences*, June 5-7, 2019, Salford, UK. [DOI](#)

5.10 Testimonial, Creative Director, York Mediale