Interactive Narrative in Digital Broadcasting

A L FREW
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Interactive Narrative in Digital Broadcasting

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Dedication

I dedicate this work to the friends and family

who sadly passed away in the course of writing this thesis.

Nathan Wynn Harrison, who was just four years old in August 2016.

Robert Wynn Harrison, my Grandfather, who passed away not long after Nathan.

Charlotte Holt, a dear friend who passed away in September 2019.

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Abstract

This thesis is focussed on an application of audience data in developing media form Implicitly Interactive Pervasive Narrative (IIPN). IIPN is a digital broadcast that uses data about the audience and/or their environment collected pervasively, in real-time, to tailor the narrative it is delivering. The audience has a sit back experience whilst an algorithm personalises their story. IIPN is currently produced by research and development departments. This thesis asks two research questions: To what extent is current narrative theory useful in examining IIPN? And, what are the key production benefits and drawbacks to working with IIPN? To answer these questions, it examines two prototypes made by the British Broadcasting Corporation's Research and Development (BBC R&D) department.

The project makes contributions to knowledge in three areas. One is in ascertaining to what extent current narrative theory is useful in examining IIPN. The next is a theoretical model proposal for studying IIPN based upon these findings. Finally, the project identifies key production benefits and drawbacks to working with IIPN. The theory-based contributions of the project are achieved through a literature review which revealed there is not a narrative theory dealing with IIPN specifically. The literature review goes on to inform a model proposal that is tested in the two case studies. The proposal is composed of three parts. The first is to consider the 'pre-narrative' elements of the IIPN, the second is to compare several outputs from the IIPN. Both these steps include the third element which is how audience data is affecting them. The production-based findings were gained through applying the model proposal in the case studies, aided with interviews with staff from BBC R&D. The findings are pulled together into a matrix which details the benefits and drawbacks to IIPN and includes a range of ways to mitigate the drawbacks. As IIPN is in its infancy as a technology, both the model proposal and the production findings help to define the field and act as a first step towards creating a toolkit for working with IIPN.

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Abbreviations

BBC R&D - British Broadcasting Corporation Research and Development Department

EDL - Edit Decision List

EU - European Union

GDPR - General Data Protection Regulation

HCI - Human-computer Interaction

IIPN - Implicitly Interactive Pervasive Narrative

OBB - Object-Based Broadcasting

TCP/IP Transmission Control Protocol/Internet Protocol

Introduction

This thesis is focussed upon Implicitly Interactive Pervasive Narratives (IIPN). IIPN is a digital broadcast that uses data about the audience and/or their environment collected pervasively, in real-time, to tailor the narrative it is delivering. The audience has a sit back experience whilst an algorithm personalises their story. At the time of writing IIPN is typically made by research communities in the public and private sector. This thesis examines the work of the British Broadcasting Corporation's Research and Development department (BBC R&D) in this narrative form.

Research questions and objectives

The project is centred upon the emerging form of IIPN and asks the research questions:

- To what extent is current narrative theory useful in examining IIPN?
- What are the key production benefits and drawbacks to working with IIPN?

The objectives that were planned to meet these aims:

- Define 'implicitly interactive pervasive narrative.'
- Locate IIPN within the wider social, cultural, and historical context of the field by placing it within a timeline of developments related to IIPN.
- Identify existing theoretical narrative frameworks relevant to IIPN through literature review.
- Propose a narrative theory model through analysing two IIPN prototypes made by BBC R&D in two case studies.
- Use the case studies to uncover the production benefits and drawbacks to working with IIPN.
- Distil a matrix of benefits and drawbacks to IIPN from the findings in the case studies and get feedback from industry professionals on this.

The project's research questions are answered by taking a multidisciplinary approach. This reflects my own background which is both practice-based as a graphic designer and creative producer as well as an academic. As a graphic designer, I specialise in digital publications, including explicitly interactive books and apps that function across platforms. As a creative producer, I have worked in the digital arts sector exploring storytelling with drones, virtual reality, augmented reality and organising hacks. Through working on this thesis, I have developed a professional relationship with the BBC R&D department with whom I have co-authored a paper exploring user testing of the prototype in Case Study Two and produced events that showcase the prototypes for the BBC.

As a creative producer, I have a great deal of experience planning and risk assessing projects that involve state of the art technologies. I control budgets, project-manage, employ technologists and sometimes work directly with members of the BBC R&D team from which the subject of this thesis originates. This gives me access to information otherwise unavailable to some researchers. My professional knowledge has lent itself to identifying the risks and benefits of working with IIPN and creating one of my contributions to knowledge, a matrix of these risks and benefits. The matrix is aimed primarily at people working with IIPN both in broadcasting and research communities. The additional contribution to knowledge from this thesis is an assessment of the theory that is applicable to IIPN. According to my research, as an emerging type of narrative, there is not yet a theory that deals explicitly with IIPN. Consequently, a key contribution to knowledge of this thesis is a theoretical model proposal to begin examining IIPN. It is aimed at those researching narrative forms in both academia and corporate research departments.

The basic principles of IIPN

IIPN is a kind of digital broadcast that uses data about the audience and/or their environment in real-time to tailor the narrative it is delivering. For example, imagine a children's programme about caring for pet cats. Within the programme, the creators wish to elicit affection towards cats by using an image of a cat familiar to that child. To do this they insert an image of a cat from a social media account used by the child, or one of their family members. This means that each audience that watches the programme will see a slightly

different variation of the broadcast. The content of the narrative the audience sees has been informed by data about them at that moment.

Figure 0-1 Example of a cat image from social media placed in a programme. (Frew, 2020)

To make this kind of personalised broadcasting possible, IIPN requires a way of sending programmes unlike regular broadcasting. At BBC R&D they developed a new approach. Typical internet broadcasts send the audience a complete file where all of the video, images and sound would have been compressed into one file and then sent to the audience's media player. This type of delivery does not allow for any changes to be made in real-time to the content as the file is fixed. To create a way to give audiences variety, the BBC designed an approach that means the content is not fixed into one file until the last possible moment. Instead, the audience receives the video, images and audio still as separate files which are not assembled until they press play. The BBC refers to these separate elements as 'objects'. Keeping them separate means the programme can be changed and added to up until the last moment. Exactly how the objects are put together and any data that is found and added is all decided by software known as an Edit Decision List (EDL). The EDL is a set of instructions that tells the media player how to put together the narrative. The BBC named this process 'object-based broadcasting' (OBB) to reflect the way in which it works.

The following diagrams help to explain OBB in more detail. Figure 0-2 shows the computational process that takes place between an audience member pressing play and the start of playout in traditional broadcast. There is no action required by the software to find any data to insert into the narrative.

Figure 0-2 Diagram of the computational process of a traditional broadcast between pressing play and playout. (Frew, 2020)

The diagram in Figure 0-3 shows the computational process of selecting data in an IIPN. The diagram uses the example of a children's show with an image of a cat. Here, between pressing start and the narrative beginning to play, data has been looked for and acquired. Then it has been put into the narrative to be included when it is played out.
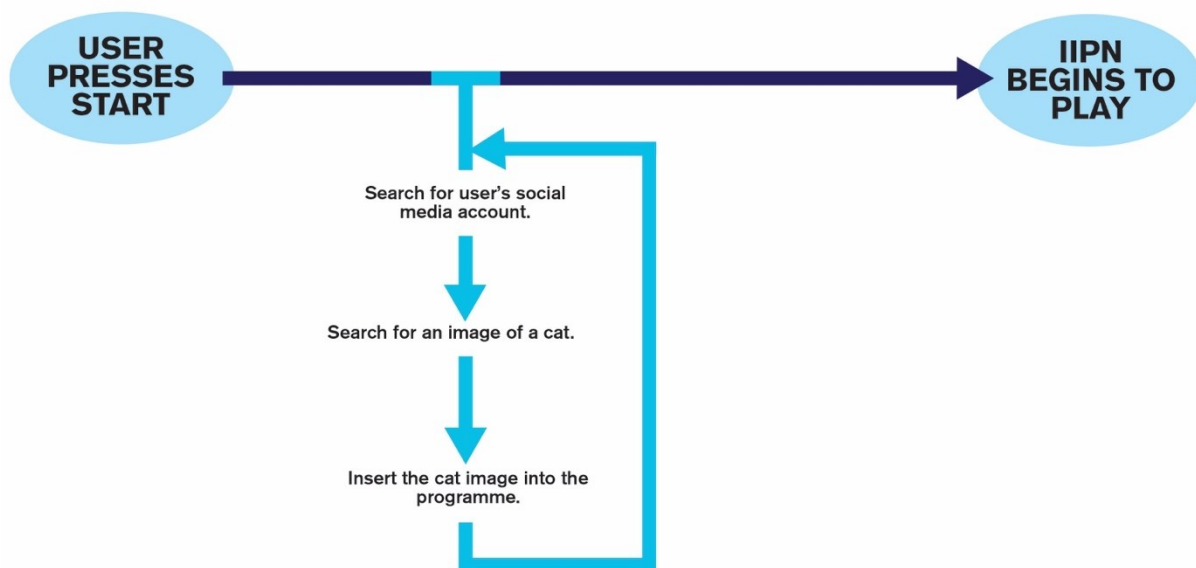
Figure 0-3 Diagram of the computational process of an IIPN broadcast between pressing play and playout. (Frew, 2020)

As IIPN is assembled in real-time from objects it is still possible to alter its content as it plays, not only at the moment it is first assembled. This is another factor that makes it distinct from traditional broadcasts. The IIPN can alter according to new data it receives as it

is playing and respond to changes to the environment in real-time. For example, an IIPN that uses data from a microphone could sense whether the ambient noise in a room has changed. If a noisy machine like a dishwasher started as the IIPN plays it could adjust the sound balance accordingly. As the parts of the narrative are kept distinct, the volume of the dialogue in the IIPN could be increased.

This object-based method is currently the most efficient way to deliver IIPN (2020). The ideal network to send an IIPN over is Transmission Control Protocol/Internet Protocol (TCP/IP) because it allows the possibility to send only the content needed by that user. In contrast, a typical 'broadcast', using the term in the technical sense, involves sending the same information (a programme) from a single point (the BBC) to multiple other points (members of the audience). Broadcasting every possible variation of the narrative to every audience member is a wasteful use of resources. However, this does not have to be a binary choice as IIPN can work over a combination of broadcast transmission and TCP/IP. This could be done effectively by sending larger objects common to more narratives over broadcast, and the smaller unique items over TCP/IP. This would help mitigate the potential burden of high data requirements on the audience end. In a report on broadcast trends from UK broadcasting regulator Ofcom (Yardley, Jones and Montakhab, 2014) this hybrid model was predicted "to be the most economical means to meet the requirements for content consumption in the UK" over the next few years. More recently, Ofcom's 2019 report on media usage notes that "viewer behaviour continues to shift towards alternatives to broadcast TV, in particular, online video services" (*Ofcom 2019b*, p. 5). This earlier prediction and trend towards IP based viewing points towards the development of IIPNs ideal network scenario becoming common.

The difference between implicit and explicitly interactive narrative

There are two basic ways an audience may interact with a narrative, explicitly and implicitly. In an explicitly interactive narrative, the audience actively participates in forming the narrative text. For example, choosing between branches in narrative events, by clicking their preferred next stage. Whereas, in an implicitly interactive narrative, the choice is made by the computer algorithm powering it, without the audience needing to make a selection. The

implicitly interactive audience will still press play and give permission to use their data, but once the narrative begins their active interaction is over. Both of these kinds of narratives are interactive as they are influenced by the audience and/or their context. But, the method of interaction is different.

To better illustrate the difference between IIPN and explicitly interactive narrative I will make a brief comparison between the implicitly interactive *Take This Lollipop* (Zada, 2011) produced by Tool of North America and Little Monster and the explicitly interactive *Our World War* (Rawsthorne and Shaikh, 2014) produced by the BBC.

The IIPN *Take This Lollipop* uses data from the social media profile of the audience member during the narrative. It is a film short published on Facebook about a stalker obsessing over their victim. The short quite deliberately uses the creepiness of implicitly using data by making the audience member's social media profile the same as that of the stalker's victim. It places the personal data of the audience member at the centre of the short using it to heighten the horror. The only interaction the audience needs to make is pressing start (Figure 0-4) which is simultaneously permission for the narrative to access your social media profile.
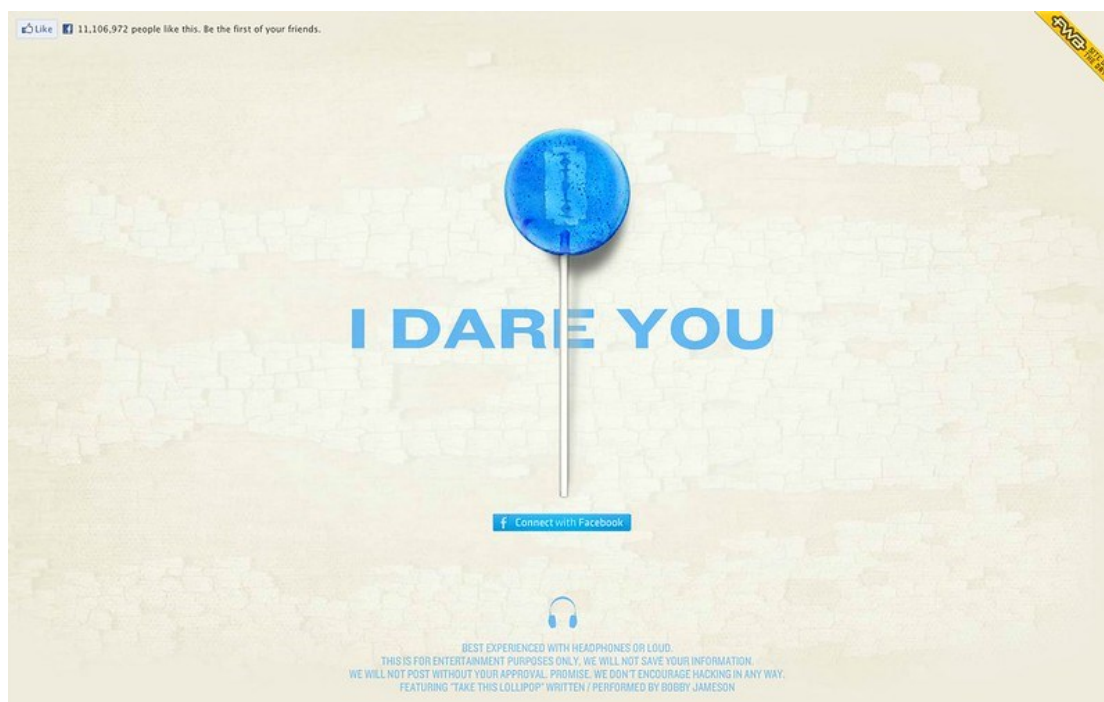
Figure 0-4 The start screen of *Take This Lollipop* (Zada, 2011)

The explicitly interactive *Our World War* is a drama set in the First World War. It is told through a combination of live-action film and animation. The drama follows a series of events within the First World War through the perspective of one character. This character, Arthur Foulkes, is a young soldier who is pushed into command of a few survivors after most of his troop, including the leader, are killed whilst trying to secure a forested area. The drama focuses on the possible actions he can take to try to keep the survivors alive, whilst following his orders to hold the forest. The role of the viewer is to choose which actions Arthur should take from a series of multiple-choice questions throughout the programme.

The difference between explicit and implicit interaction is felt both in audience experience and the computational structure of the narratives. The audience experience of each hinges on the style of interaction. *Our World War* leans into the active decision-making of the audience as a key part of it. In an interview, with a producer on the programme Dan Tucker (2015), he explained that the choices were there to help the audience empathise with soldiers in the First World War and the hard decisions they were forced to make. The choices the audience are given were carefully selected to reflect the real-life decisions made by soldiers at the time. Tucker emphasised that the options were deliberately unclear as to whether it would be the best thing to do or not. He wanted the audience to experience the challenge of being given sudden authority over life and death situations without preparation or certainty. For example, at the end of the drama, the audience must make a choice as to whether to attempt to rescue a member of their team. The result of their choice leads to their team member living or dying. In *Our World War,* the audience is encouraged to take an active role as it forms a central part to the narrative experience.

This contrasts with *Take This Lollipop,* where the only explicit interaction takes place when the audience member presses start. At no point does *Take This Lollipop* use the audience's active influence on the narrative to emphasise the tension. As a text that draws on the traditions of the horror genre, it reveals more and more personal information from the audience's social media profile to unnerve the viewer.

The design of *Our World War* uses pauses in the main action of the drama to highlight when decisions have to be made. As shown in Figure 0-5, an overlay with multiple choice answers are put on screen whilst the scene freezes in the background. Designed to create pressure

on the audience, a timer conspicuously counts down in the style of a gun scope. Pauses in the action are again used for emphasis through an intermittent scoring screen which appears three times in the drama. The screen reviews the audience's choices, gives them a score and contextualises their decision in terms of how real soldiers would have reacted in that situation. In the interview, Tucker (2015) explained that it was added in to motivate the audience and increase the stakes by creating more consequence to their actions. In contrast, in *Take This Lollipop,* there are no gaming elements. There is no score or sense of having 'won' the drama through your interaction. *Take This Lollipop,* like all IIPN is designed to be a sit back experience with no effort required from the audience once it has begun.

Figure 0-5 The first question screen shown in explicitly interactive drama *Our World War* (BBC, 2014)

The computational structure of the two dramas also demonstrates the differences in their styles of interaction. *Our World War* follows a branching style of interactive narrative as shown in Figure 0-6 below. The audience is presented with a choice of already determined outcomes. They then see the predefined consequences of their choice before returning to the main spine of the plot which is always the same. Similarly, *Take This Lollipop* has a core story spine which is common to all of the variations. The difference lies in that the content within it is not defined before it is played out. Each data insertion is chosen at that moment for the audience and is different in each iteration. There is an unlimited number of variations that *Take This Lollipop* can have whereas, the *Our World War* viewer will always see the same few predetermined options.
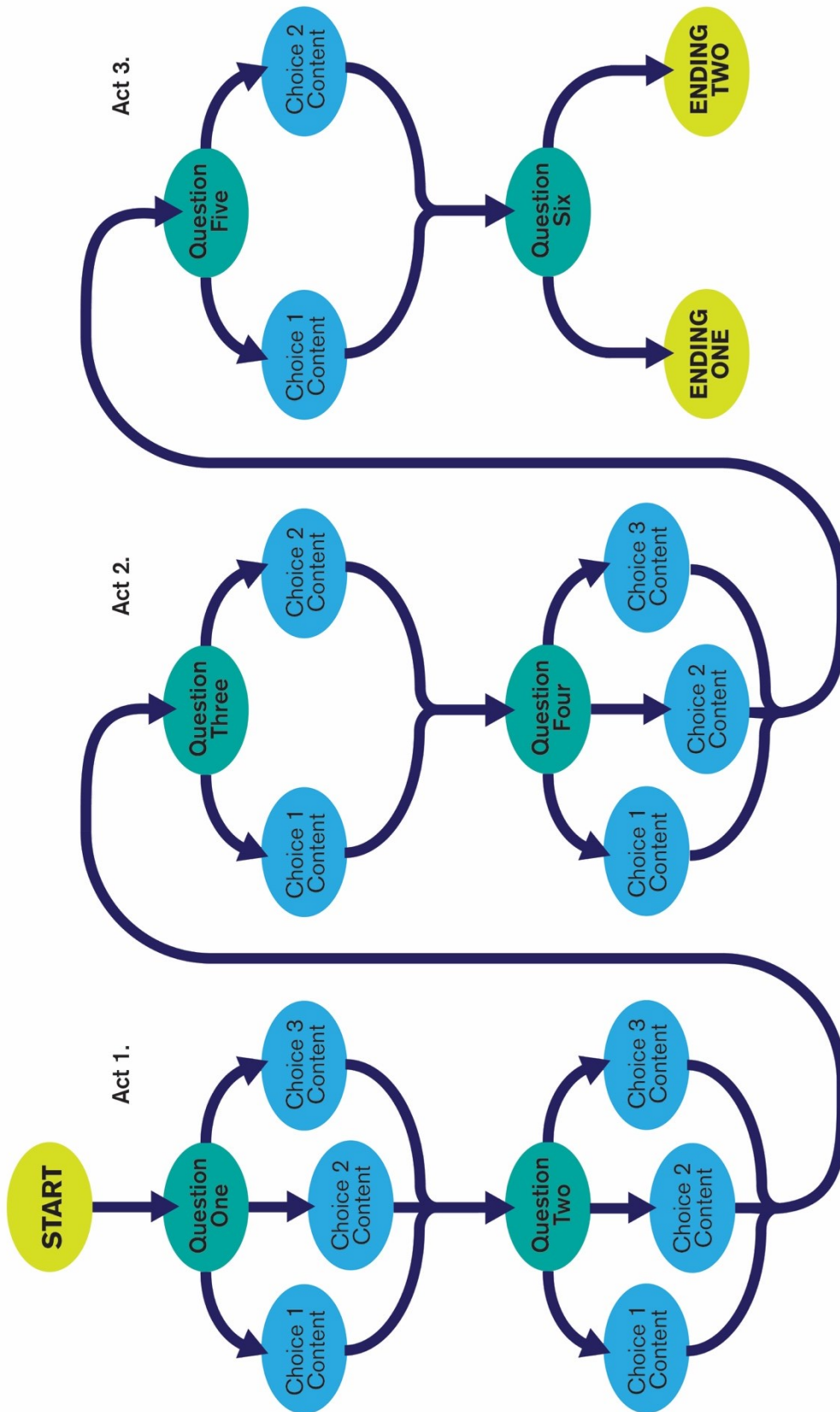
Figure 0-6 Diagram of the computational structure of explicitly interactive drama *Our World War* (BBC, 2014)

Types of data and objects in an IIPN

IIPN is responsive to the environment through the incorporation of data about the audience and/or their context. This is a form of pervasive computing, where sensors in the everyday environment communicate across networks to deliver information. For example, devices that allow pervasive computing include; laptops, tablets, smart TVs, smartphones, smartwatches, ticket barriers, lighting systems, and internet-capable household appliances. In contrast to desktop computing, pervasive computing uses sensors in any place, at any time and can move from one device to another. For example, a smartwatch that informs the wearer that they are receiving a phone call on their mobile phone and allows them to reroute the call to the watch.

Pervasive computing provides a large range of possible data sources for IIPN. Current examples could be, data from sensors in the audience's environment such as light level, ambient temperature, microphone, camera, motion sensors and the orientation of the device. Data could also indicate the wider context, such as location, time of day, transport, the stock market or the weather. Alternatively, it could be data that is more individual, such as pictures, audio or video owned by the audience member, social (contact list, social media profile), messaging, music, media preferences, economic, health (health tracking apps) and calendar. The range of data available will change as technology, legislation, and audience attitudes develop.

The objects used in object-based broadcasting that make up an IIPN can be varied as shown in Figure 0-7. As the objects are designated by the originators, they are not limited to only being types of media such as audio, video or images. The different objects can also be chosen at a conceptual level. A conceptual object may be defined by character attributes, storyline, mood, and pace. For example, the same children's cat programme can be divided up conceptually. The programme could have objects labelled according to which person or animal is being shown. In this case, any footage and audio containing a vet, the presenter, children or cats could be labelled as their own object. Both kinds of objects can be used in the same programme. This approach is used in the IIPN in Case Study Two as objects have

been apportioned both according to media type and which character is being shown on screen.

Figure 0-7 Diagram of different types of objects that an IIPN can be divided into. (Frew, 2020)

Structure of the thesis

The thesis begins with defining the terms associated with IIPN and its recent technological context. The literature review considers narrative theory in relation to IIPN. The theories that lend themselves to creating a model proposal or are useful in determining production benefits and drawbacks are then applied in the two case studies. The discussion and findings chapter gather the work in the two case studies into a theoretical model for examining IIPN and a matrix of the benefits and risks in production. Finally, the thesis concludes bringing together the research findings, limitations, and ideas for future research.

Continuing from the groundwork laid in the Introduction, in Chapter One, the first area defined is the use of the term narrative. As this thesis aims to propose a narrative theory to help examine IIPN, this is discussed in depth in the later literature review chapters. In this early stage of the thesis, only a simple explanation is posed as an initial groundwork. This is that a narrative is anything that presents a story.

Central to the research is the type of interaction utilised in an IIPN. As such, this chapter goes on to describe the difference between implicit and explicit interaction. It is the intentions of the audience experiencing the narrative that determines this. If the audience is intentionally interacting with the narrative, it is explicitly interactive. If the audience is passively consuming the narrative, it is implicit interaction. Both of these narrative forms are interactive as they are influenced by the audience and/or their context, however the method of interaction is different. This definition was created using the already established description of 'implicit interaction' from computer science (Serim and Jacucci, 2019, p. 2). Using a term already recognised will help avoid confusion and adding to the array of terms already available.

After defining the types of interaction, I move on to show how the term 'interactive digital narrative' is often used only in relation to explicitly interactive narrative. This is significant, as it helps build the case for this thesis' contribution to knowledge. For example, at the BBC, the term interactive narrative is used to describe narratives with active participation. The BBC coined another term, 'perceptive media,' to describe narratives with implicit interaction. Later in this chapter, I discuss how the term 'perceptive media' was developed at the BBC and the other language they use in relation to it.

The other key part of the narrative form's name 'pervasive' is also outlined. As with implicit interaction, this word has been chosen as it is already established in computer science (Rouse *et al.*, 2019). In computer science, the term is synonymous with 'ubiquitous computing,' a technology that uses implicit interaction to transmit data about an audience and their context across networks. It is something that can be used in all aspects of everyday life, like a travel card that tops up automatically, for example. Some other terms related to pervasive media, 'personalised media,' 'location-based media' and 'mixed reality storytelling' are also briefly examined.

Finally, the chapter concludes with a roundup of IIPN's key characteristics: as a narrative assembled at the time of playout, using pervasive computing to gather data about the audience and/or their context. The way the narrative is experienced, and the data gathered, is through implicit interaction as it has no intentional interaction from the audience.

The second chapter, 'Historical Context', locates IIPN within the technological developments since the 1960s through to 2020. It covers the broader significant changes in technology over this time period before homing in on how IIPN became established at BBC R&D as 'perceptive media.' It explores narrative structures developed recently such as generative narrative that uses machine learning and transmedia storytelling. Generative narratives are a clear precursor to IIPN. They are examples of how authors have already been creating frameworks that produce multiple narratives rather than one fixed outcome. An example of this is *Hundred Thousand Billion Poems* (Queneau, 2019) which is a sonnet, divided into lines, that can be assembled to create 100,000,000,000,000 possible sonnets (Figure 0-8). Other, more recent examples that use machine learning to generate narratives, such as *Sunspring* (Sharp, 2016) and *PoemPortraits* (Devlin, 2019) are also explored. Transmedia storytelling, where narratives are told across multiple media formats, is also highlighted as a media form related to IIPN that uses digital technologies and challenges traditional narrative structures.

Figure 0-8 Image of *Hundred Thousand Billion Poems* written by Raymond Queneau (1961)

There are several other technological advances important to IIPN outlined in the chapter. One is the development of smart devices. Smart devices, such as smartphones and smart televisions provide the media needed for IIPN to be delivered to audiences. They are both digital and connected to a large range of data sources that IIPNs can utilise. Another is the growing trend of the quantified self, where people track their health, such as their heart

rate also provides a rich dataset for IIPN. Examples of this are narratives such as *Nevermind* (Reynolds, 2014) and *Scanners* (Ramchurn, 2014) that were using brain waves to inform their delivery.

The rise of social media has had a large impact on broadcasting and society as a whole. This is covered in three sections in the chapter with social media in relation to news broadcasting, entertainment broadcasting and as a platform for narratives. Within news broadcasting, social media's influence changed the course of politics in the United States of America in the Cambridge Analytica scandal (Lewis and Hilder, 2018). For entertainment broadcasting, social media helps engage audiences in traditional television services when their content is not on air. Finally, as a digital platform, social media channels are creating a place for IIPN narratives to be hosted, such as the already mentioned *Take This Lollipop* (Zada, 2011).

The latter part of the chapter explores how the BBC fulfils its legal requirement to be at the forefront of technology. The origins of perceptive media are traced from the initial recognition of it as a possibility in hacker culture through to the first prototype which is the subject of Case Study One. The chapter concludes with BBC R&D's vision for the future of broadcasting, which eight years on from its inception still includes developing IIPN style broadcasts.

Following this chapter, the 'Literature Review' chapter aims to locate narrative theories that relate to IIPN. The chapter is gathered into areas that reflect the structure of the IIPN narrative model proposal I go on to develop. The theories explored were limited to the most relevant theorists and only some of their works as it is beyond the scale of a thesis to include every narrative theory. All of the works selected are there to provide concepts, models and/or the language that underpin the later IIPN model proposal or are directly applicable to the case studies.

The chapter deals with theory focussed on narrative in digital formats. There is a wide spread of digital narrative theory to cover, so theories that dealt with specific areas of concern for IIPN are explored. Firstly, as IIPN could be in any digital medium theories that account for multiple media forms were prioritised. The chapter includes how to determine

to what extent a text is a narrative (Ryan, 2007). Then, the key differences between IIPN and explicitly interactive or traditional narratives are shown through Epsen Aarseth's (Aarseth, 1997) work on explicitly interactive narrative. Through this, I highlight how explicit interaction is incorporated into the definition of interactive digital narrative (Koenitz, 2015). This shows how narrative theory, does not frequently address implicit interaction and is where this research fills a gap in knowledge.

The chapter also deals with several other areas relevant to IIPN. One is the computational structure that makes up part of its form. This is explored through models that account for an IIPN as a computational structure that creates multiple outputs rather the singular one of traditional literary narrative (Miller, 2008; Koenitz, 2015; R. Aylett and S. Louchart 2003). This is a key idea carried through to the model proposal. A further area of exploration is the way in which data from the real world is brought in to influence the narrative metaleptically. Metalepsis is the movement between worlds in a narrative illustrated by the work of Alice Bell (2016) in digital media.

There is a wider lack of narrative theory that, as Bell et al put it "can be used to analyse digital fiction as a form of *digital* narrative as opposed to a form of digital *narrative*" (2014, p. 7 emphases authors' own). Bell argues for the creation of more example analyses of digital narratives. She suggests that analysis of digital narratives should be made transparently with a "bottom-up approach… in which conclusions are based on examples, and critical assertions are substantiated with evidence" (2014, p. 11). This thesis aims to do precisely this by developing a model transparently through case studies. Additionally, as highlighted by Bell, this work may also assist in expanding the field of literary study analysis as IIPN is a form of digital fiction.

Figure 0-9 A still from the film short prototype examined in Case Study Two *The Break Up* (Amedume, 2016)

The two case studies in chapters 4 and 5, take elements of narrative theory and apply them to two IIPN prototypes from BBC R&D to help develop a model proposal. The prototypes are both from BBC R&D as they were the only company available to work with whilst the research was carried out. The other IIPN made during this time period was *Take This Lollipop.* Unfortunately, it's creators Tool of North America and Little Monster, did not respond to my enquiries. Consequently, it is only the BBC R&D department and their two prototypes that are the subject of this research.

The two case studies are used to develop a theoretical model for examining IIPN. The model is in three parts. The pre-narrative, the product and data. The model is expected to be used as an initial framework for analysing IIPN. First, the researcher should examine the pre-narrative element of an IIPN. This is all the things that make up the IIPN as a system that can create products, it is the media assets, computational software, the hardware needed to make it and the story itself. The second stage, the product, should be an analysis of more than one product made by the same pre-narrative. Alongside both of these stages the role of data should also be considered. At the pre-narrative stage this is the potential data. It is how the system has been designed to fetch data and then integrate it into the narrative's

delivery. In the product stage, this is the study of the influence of the actual data. By studying more than one product it is possible to see where they vary between versions. Examining these differences potentially reveals the impact of the data on the narrative.

The theoretical model developed in the case studies is leveraged to uncover the benefits and drawbacks to producing IIPN. Both case studies include insight into the production methods employed in their development through interviews with staff at the BBC who were involved in creating them. Issues around production explored were, for example, the difficulty of working with IIPN internationally, how to communicate a new form of technology to colleagues and audiences, making IIPN accessible to varied audiences, and providing informed consent.

An area explored in depth in the case studies is the ethical dimension of working with IIPN. As this narrative form uses data about the audience and/or their context how the data is obtained, communicated, used in the narrative, and then stored were all explored as areas of concern. The use of data intersected with areas such as the notion of privacy in western societies, legislation that stipulates how data should be handled, and how this changes depending on the type of data being worked with. All of these issues have a bearing not only on the content of the narratives themselves but also the reputational risk to originators in working with IIPN.

Chapter 6, 'Findings and Discussion,' lays out a model proposal for examining IIPN theoretically and a matrix of drawbacks and benefits to IIPN production based upon the two case studies. The model proposal is briefly summarised as made up of three areas for an IIPN analysis. The first is to ascertain the 'pre-narrative,' this is all the objects and the way in which the narrative can be assembled into a product. The second is to compare and contrast more than one product produced by the IIPN's pre-narrative. By comparing more than one output the researcher is better placed to examine how the narrative can change between variations. The third is to identify the data source that informs the narrative's content and how this is embedded into both the pre-narrative and its effect on the narrative products as they playout.

Production benefits and drawbacks were explored through using a grounded theory analysis on the two case studies. Once the findings were developed into a matrix, I presented them back to staff at BBC R&D. The subsequent conversations I had with the BBC staff informed the discussion and helped to shape the final draft which is presented as Appendix 1. Benefits and drawbacks are presented as a list at a generalised level, then in two tables with drawbacks and possible ways to mitigate them at a practical level. Finally, the overall project is brought together in the 'Conclusion' where the key findings, limitations of the project and suggestions for future work are made. This includes a synopsis of the production findings and the extent to which current narrative theory relates to IIPN.

1 Definition of Pervasive Media, Implicit Interaction, and Related Terms

Introduction

As is often found with fields of research concerned with new technology, there is a range of terms associated with IIPN. This is a challenge common across new technology fields. New media narrative scholar, Carlos Alberto Scolari (2009, p. 587) found this issue with the term 'transmedia storytelling' as did Barış Serim and Giulio Jacucci (2019) in relation to 'implicit interaction' in computer science. What unites these scholars is the method they use to clarify their terms. They reveal how the terms are already used, the differences between them, and outline other closely related terms to assist them in forming their own definition. This chapter uses the same technique to define the important terms that relate to IIPN.

Narrative

The first term to define is the one at the heart of this research, narrative. The basic definition of the word narrative used throughout the thesis is that it is anything that presents a story. The narratologist Manfred Jahn, (2005, p. N1.2), states that this could be through performance, image, or text. Likewise, narrative can be found in film, television series, radio plays, theatrical plays, comic strips, graphic novels, novels and digital media.

The term narrative is used in preference to story. In narratology, the term story has a specific meaning that varies between theorists. Whilst the precise interpretation of it can differ, in narratology, story is a particular aspect of a narrative rather than a term for the whole entity. This nuance, along with what aspects make up a narrative, is discussed in detail in the later Literature Review.

Implicit and explicit interactive digital narrative

As outlined in the Introduction, at its simplest there are two types of interactive narrative, the explicitly interactive and the implicitly interactive narrative. In an explicitly interactive narrative, the audience is expected to be engaged in forming the narrative as it plays. For example, choosing what a character should do next in the story as events occur. The action that happens is affected by conscious decision-making from the audience. In contrast, the implicitly interactive audience member is not actively involved in the narrative once it has begun. After pressing play and/or giving permission for their data to be used they have a lean-back experience. All choices and edits are made by the narrative's system, not by the audience once it has begun. Both narratives are altered by the audience's presence, but the way they interact is different.

I am using the term 'implicit interaction' because implicit interaction is already an established term in the field of Human-computer Interaction (HCI). In HCI, the term is understood to mean when an audience interacts with a computer interface passively. It is defined in a paper devoted to clarifying the term in HCI, by Barış Serim and Giulio Jacucci, as an "audience's attitude towards an input–effect relationship in which the appropriateness of a system response to the audience input (i.e., an effect) does not rely on the audience having conducted the input to intentionally achieve it" (2019, p. 2). The paper highlights that it is the intention of the audience that is important in implicit interaction. This is what this research is centred upon. IIPNs are altered to the audience without their having to actively interact throughout the narrative.

It is essential to define this difference in interaction as it is what makes this research distinct from other kinds of work on interactive digital narrative. Typically, narrative theory is focussed upon explicit interaction when it is describing an interactive digital narrative. For example, Hartmut Koenitz defines interactive digital narrative as "an expressive narrative form in the digital medium implemented as a computational system containing potential narratives and *experienced through a participatory process* that results in products representing instantiated narratives [emphasis my own]" (2015, p. 98). The element of participation is seconded by Ulrike Martina Spierling. In her definition of interactive digital

narrative, she explains that "members of the audience become participants in a storyworld that enables the resulting story*" (2010 p.12). This participation is explicit interaction.*

That interaction is typically explicit when narratologists refer to interactive digital narrative, is also made clear by Koenitz *et al* where the authors state that interactive digital narratives: "dissolve the division between active creator and passive audience and herald the advent of a new triadic relationship between creator, dynamic narrative artefact and audience turned participant" (Koenitz *et al.*, 2015, p. 1). The audience is no longer passive. The effort required is described by Epsen Aarseth (1997) as ergodic. Aarseth states that "in ergodic literature, nontrivial effort is required to allow the reader to traverse the text" (Aarseth, 1997, p. 1). Therefore, when a narrative theorist refers to an interactive digital narrative it is reasonable to assume that they are focussing on a digital narrative with explicit interaction.

As demonstrated in this section, the precise type of interaction used in a narrative is important to define. Therefore, throughout this project, any interactive narratives discussed are described as implicitly or explicitly interactive where appropriate.

Pervasive media

Pervasive technologies use information from sensors to get data about the audience and/or their context to deliver content. These sensors are embedded in buildings and objects around us. For example, some on a smartphone include; microphone, camera, gyroscope, accelerometer, magnetometer (compass), global positioning system, proximity sensor, ambient light sensor, touch screen, fingerprint sensor, pedometer, barcode/QR code scanner, barometer, thermometer, and heart rate sensor. An application of data from the sensors on a smartphone would be a journey planner. The app can use the global positioning system, gyroscope, magnetometer and accelerometer to pinpoint your location. Combining this location data with local travel information via the internet, the journey planner can provide a route, based on where you are, to another destination.

In computer science the term 'pervasive' in relation to technology is common. The term 'pervasive computing' is used interchangeably with 'ubiquitous computing' and refers to data about the audience or their context, without explicit interaction, that communicates

across a network. Pervasive computing senses data from our everyday environment to inform technology in many aspects of our lives. It is not intrinsically linked to narrative as it delivers any kind of content to an audience. For example, a website advertisement that uses location data and browser history. The advert may mention the local branch of a shop and an item that the user has recently searched for online. The user has not had to manually tell the advertiser where they are or what they are interested in purchasing to create this advert. The data has been communicated across networks.

In the arts, the term pervasive media is also used. For example, the publication *Ubiquity: Journal of Pervasive Media* (Phillips and Speed, 2018) explores the impact of pervasive media on society through art, design and scientific research. Another example from the arts where the term pervasive media is used is the 'Pervasive Media Studio' (Watershed, 2019) which has run since 2008. This is a physical studio hosting around 100 artists in Bristol, who make work connected with new technologies. One of the earlier projects housed in the studios was the *Theatre Sandbox Project* (Watershed, 2010) which set out to use pervasive media in theatre. The project's early timing for the space "ensures many residents [of the studios] are still drawn from a theatre or performance background" (Watershed, 2010).

 The *Theatre Sandbox Project* sets out a definition for pervasive media:

> "Pervasive media is digital media delivered into the fabric of real-life and based on the situational context at the moment of delivery. The two defining features of Pervasive Media are:
>
> 1. Uses technology to understand something about the situation and respond based on that information;
> 2. Uses digital media to augment (bridge) the physical environment, and vice versa." (Watershed, 2010)

This partly conforms to the definition in computer science, as it responds to the audience or their context in real-time. However, the term pervasive in computer science does not only refer to bridging between physical environments but is able to embrace data from more abstract contexts. For example, an audience's taste in music.

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Other terms related to pervasive media

Personalised media

At this point, it is worth highlighting several other terms. The first of these is personalised media, which is an additional term used to describe IIPN. However, when used in relation to broadcast, this term typically refers to recommendation algorithms and advertising. The use of 'personalised media' in the broadcast industry is highlighted in a call for workshops at the TVX conference (ACM International Conference on Interactive Experiences for Television and Online Video). The call states, "personalisation is usually interpreted as the generation of personalised playlist, programme guide, product placement and advertising for viewers," (Ulisses *et al.*, 2016) rather than narrative. Therefore, whilst personalised media does refer to tailoring to an audience, it does not carry a specific association with narrative. Something can be personalised media but not an IIPN.

Location-based narrative

A term that may be included in a description of an IIPN is 'locative narrative.' Twan Eikelenboom (2007) uses it to describe a narrative that takes place in a physical location. Here, the movement of the audience member in a space may trigger the story, a technique used in the interactive narrative installation *Coming Out* (Roundhouse, 2016), for example. Experienced in a conference, the audience listened through headphones on individual mobile phones to audio triggered by location beacons placed in the building. As well as the audio played in the headsets, audience members were asked to interact with actors and rooms set up as part of the narrative.

Whilst this may require similar technology and methods to IIPN, locative narrative would be an additional description rather than an alternative: not all IIPN pieces include locative elements. Further to this, a narrative may be only locative and not IIPN. It may not require pervasive media technologies or demand explicit interaction from the audience. Locative media is not interchangeable with IIPN.

<u>Mixed reality storytelling</u>

Mixed reality storytelling takes place in both the digital and physical world (Alexander Kan et al (2014). The term is not new; in the 1990s work began on a taxonomy of terms to describe them (Milgram and Kishino, 1994). Here technologies that allow virtual reality and augmented reality are highlighted as the conduits for 'mixed reality storytelling'. Much like location-based narratives, an IIPN could also be mixed reality, but not all mixed reality narratives are IIPN. This is because a mixed reality narrative may ask for data explicitly and require interaction throughout.

Perceptive media and the BBC Research and Development department

The BBC R&D team work with IIPN. Two of their prototypes are the focus of the case studies making the organisational context of the BBC a key part of this project. Within the BBC R&D team, IIPN is known as 'perceptive media.' The term was first introduced (Forrester, 2012a) to describe where data has been used to tailor something specific to that audience. This tailoring is the 'perceptive' part of the term, as the narrative 'perceives' something about the audience or their environment. That the BBC R&D team felt the need to create a new term to describe this form of interaction, shows that they see it as different from the already established term interactive digital narrative. The 'media' part of the term was chosen so as not to imply a particular medium. This is highlighted in Forrester's first blog post where he says "perceptive Audio would be a very interesting concept (hence perceptive media not perceptive tv)" (Forrester, 2012a).

The term solidified over the next four years as it moved from concept to a BBC project (Forrester, 2016d) (BBC, 2012). Several points were clarified since the earlier definition by the BBC team. The first is that perceptive media is explicitly connected to narrative. Whilst perception involves acquiring data and then using it, it is not as simple as sensor acting on input, like a clothes dryer stopping when it senses clothes are dry. It is only perceptive media if the data is used to create a dynamically adjusted narrative.

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The second point is that the data used is collected implicitly from the audience. Perceptive media is described as "for the enjoyment of the unknowingly participating audience" (Forrester, 2016c). From the audience's perspective, a perceptive media narrative is a sit-back experience. Audiences are passive recipients of the narrative, rather than protagonists within it (Forrester, 2012b). There is no direct input such as you would expect within a choose your own adventure novel or branching narrative, for example. This also extends to how the data is accessed, a perceptive media narrative either uses data that requires no interaction from the audience, or it asks for permission to use data already uploaded. In other words, the audience has not uploaded data specifically for that story. The BBC emphasises that it is not intended to be a covert gathering of information but is tailoring with minimal effort from the audience (Forrester, 2016c).

The BBC R&D team on occasion merge the term perceptive media with others depending on the medium that their project is using. This occurs in relation to the two case studies in this thesis. *Breaking Out* (2012a) is sometimes referred to as "perceptive radio" (Forrester, 2013) and *The Break Up* (Forrester, 2015) is referred to as "visual perceptive media" (Forrester, 2015). Both of these are combining perceptive as a term with the media the narrative is being presented in. This shows that the BBC continued to view perceptive media projects as not being medium-specific.

The term 'perceptive media,' could be used interchangeably with IIPN. It covers media that is both implicitly interactive and uses pervasive computing. It is not widely used beyond the BBC R&D team, whereas, the terms 'implicit interaction' and 'pervasive media' are. As such, within this thesis, I will refer to what the BBC would call 'perceptive media narrative' as Implicitly Interactive and Pervasive Narrative (IIPN). This encapsulates the key qualities of the narrative form that the research is concerned with; the use of implicit interaction to deliver narratives through pervasive computing.

Use of the term perceptive media in a marketing context

Outside of the BBC, the term perceptive media has been used by a minority of marketing companies. Marketeers Ed White and John Ridpath describe perceptive media as a way to

see their audiences through "cameras, sensors and software" (2012). They are using the term perhaps interchangeably with 'pervasive computing' to describe the technical method used to personalise media. White uses perceptive media to describe the marketing campaign *Elf Yourself* (Oddcast, 2017). *Elf Yourself* is an online video where the audience uploads an image of themselves that is then used on top of the face of a dancing elf (Figure 1-1). This is inconsistent with the way the BBC R&D team uses the term perceptive media, as it requires uploading imagery explicitly for the video. For the R&D team, a perceptive media film would not require a direct upload of content from the audience.

Figure 1-1 Still from the *Elf Yourself* (*Elf Yourself*, 2017) online video

Another example where White uses perceptive media interchangeably with pervasive computing can be found in *Brewery Journal* (2015 p.32) where he describes the marketing campaign *Link, Like, Love* (2011). The campaign connects American Express cardholders' social media profiles to their cards. The data from their social media profiles allows marketers to then send their customers personalised deals. This use of sensors to gather data and connect it together into something for a particular audience is an example of pervasive computing. It is inconsistent with how the BBC defines perceptive media, as it does not tell a fictional narrative.

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From this brief analysis, it is possible to argue that marketers are using the term to describe any personalisation of digital media. They are using it both for instances of pervasive computing in *Link, Like, Love* and in explicitly interactive narrative *Elf Yourself.*

Other terms related to perceptive media at the BBC

Object-based

As well as 'perceptive media' there are other terms used internally at the BBC in relation to their research into perceptive media. One of these is the technical process used to power their IIPN prototypes, 'object-based broadcasting.' It is another term devised by BBC R&D which refers to a way of structuring computer programming that allows narratives to be assembled in real time as they play out. OBB, in its simplest form, has been summarised as "media plus metadata" (Forrester, 2016d) as a way of keeping all the parts of a broadcast as separate 'objects' right up until they are played out. For example, keeping each shot or everything one character does in a film short, separate. This means the narrative can be put together in any order at any time. Unlike a traditional broadcast, where the film short would be played out from one file, or 'object.'

Object-based is a term also used in computer science. As many members of the BBC R&D team are computer scientists, I believed it was likely that OBB is derived from this. I checked this with staff at BBC R&D who confirmed that having a background in software was the strongest influence on choosing 'object-based.' Brandon Butterworth, who introduced the use of the term at the BBC, stated that for him object-based was a "natural choice" (personal communication, Sept 18 2020) as it was already established in computer science. The term "object-based language" is used in computer science to describe a type of programming language involving 'encapsulation': encapsulation is when a specific set of code is defined as a discrete entity from the rest of the code. This renders it a private object. Other parts of the code cannot directly change what happens to it, only the code within the object itself determines how it responds to other parts of the programme. For example, in a video game, there is the avatar on the screen that the audience plays through. This avatar is an object within the code. When the avatar interacts with space and performs an action, for

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example eating an apple, the thing it is eating is separate. The apple is its own object, its effect on the avatar, say filling their 'hunger' status bar, is determined by the code in the avatar. A programming language that uses this technique of grouping areas of code into objects is known as an object-based language. From this, the similarities to OBB are clear. In OBB there are discrete objects that make up the narrative that is then assembled by a set of rules. This is the same principle.

Interestingly, the term OBB is not used consistently even within the BBC R&D team itself. As multiple teams within the BBC work on projects using object-based methods, there is some disparity in the associated terms. The word 'atom' is being used in the place of 'object' by a minority, specifically in the *Atomised News Project* (Zambrini, 2016). On the project's website (*Atomised News - with BBC R&D*, 2017) the difference in terminology is acknowledged and the author explains that object-based is more about "on-demand, IP-delivered content items." However, on the same page, the author goes on to describe the project as using the same technical process as OBB. This shows how even at a micro level, establishing consistent language around new technologies is challenging.

Within BBC R&D the term object-based is used as a prefix to more than just broadcasting. The following less frequently used terms are adopted in different projects documented on the BBC R&D blog. 'Object-based production' is used in a project (*Object-based Production Tools in the Cloud*, 2016) (Cox and Hett, 2016) and was listed as a key theme for the largest broadcast tradeshow in the world, by BBC R&D, (Wagdin, 2016). Others terms include, 'object-based film making' (Forrester, 2016b) 'object-based video experiences' (Shotton, 2015) and 'object-based audio' (Mann *et al.*, 2013).

Responsive

Responsive Radio: Derek Tangye - The Cornish Gardener

Choose desired programme length, then press Play

12 Mins   24 Mins

Figure 1-2 The interface to *Responsive Radio* (BBC, 2015), where the audience selects the programme length before playout.

The term 'responsive' is used by BBC R&D in a project similar to their IIPN prototypes. Named *Responsive Radio* (Churnside, 2014), it is an online radio show, available through a web browser and has a scalable duration. The audience is invited to select what length of programme they would prefer before pressing play. Once the duration has been selected, the programme content is then scaled to that length for the audience. Where this differs from their IIPN projects is that it involves explicit interaction from the audience.

Introducing *Responsive Radio* (2014), BBC R&D staff member Tony Churnside highlighted the similarity of the project to responsive web design. He explained that the project explored what would happen if the principles of responsive web design were applied to radio. Responsive web design is an approach that reacts to an audience's behaviour and/or environment through flexible layouts that change appropriately for the orientation, screen size, and platform the audience is viewing. For example, an image may appear smaller, or a text size bigger in order to fit appropriately when displayed. Responsive web design uses a similar technical process to OBB. It uses pieces of data and their associated metadata to assemble content based on the context of the audience. Here, the key difference between OBB and responsive media, as understood from the BBC's definitions, is that responsive media assembles assets such as an image, video, or piece of text for primarily information

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display purposes. It is chiefly concerned with adapting to a type of device or screen size. Whereas, OBB includes 'objects' such as characters, a storyline or a theme as well as media 'objects' and so allows for a wider range of assemblies with more artistic aims.

Conclusion: Definition of an implicitly interactive pervasive narrative

This chapter outlined the key terms in the thesis, defined precisely how they will be used, and their technical context. The terms 'pervasive' and 'implicit interaction' will likely develop over time and take on different nuances in the years after this research. Therefore, defining how they are used here will aid future, as well as current scholars and producers in understanding this work. The implicitly interactive and pervasive narratives that this research is concerned with may also not develop beyond its infancy. The broader areas the terms represent, in everyday networked computing, audience data applications and low effort interaction, will probably remain. This ensures that even if this precise style of narrative does not flourish, the findings of the work will still be useful.

In summary, the implicitly interactive pervasive narrative form studied in this thesis has the following characteristics:

- It is a narrative with a discernible beginning and an end, a protagonist within a world with other characters and events.
- It uses technology such as object-based broadcasting, as defined by the BBC, where conceptual or medium-based aspects of the narrative (such as text, image or character) are assembled, according to rules set out by the originator, at the time it is shown to the audience.
- The narrative is delivered through a digital platform.
- It has multiple variations in final form that are informed by data about the audience and/or their context.
- The audience data is collected using pervasive media, such as GPS, social media profile, time of day, heart rate etc.

- The narrative is implicitly interactive as it requires no intentional action by the audience beyond agreeing to their data being used and/or pressing play.

2 Historical Context of IIPN

Introduction

The purpose of this chapter is to demonstrate how Implicitly Interactive and Pervasive Narrative (IIPN) differs from other related forms of narrative and its place within the wider media ecology. The chapter aims to outline the origins of IIPN within recent (from the 1960s) technological history and its specific emergence at the British Broadcasting Corporation's Research and Development (BBC R&D) as perceptive media. In general, the work of BBC R&D on IIPN and the trends found in this timeline, such as generative narrative, ubiquitous computing, smart devices and the rise of social media, falls into what Jens Schröter (2014), would describe as the 'general ecology' of media. This is the view that media technologies will become "smaller, more mobile, ubiquitous, and at the same time smarter and capable of perception and feeling" (Schröter, 2014). As we have seen, the term the BBC uses for their IIPN style narratives encapsulates this as 'perceptive media.' The chapter explores the wider context of IIPN through technological themes and examples of narratives and ends with a diagram of where these fit in relation to IIPN.

Generative narrative and machine learning

Generative narrative is a clear relation to IIPN. Generative narratives are stories that have been created using some kind of automation. They use a base structure and a certain way of interaction to create many possible variations of a text. An example from the 1960s is Raymond Queneau. Queneau was a founding member of writers group *Ouvroir de littérature potentielle* or Oulipo, which is roughly translated as the 'workshop of potential literature.' The members of Oulipo sought to find new structures and patterns to use in their writing. In 1961 Queneau published *Hundred Thousand Billion Poems* in an analogue format. The book is a collection of ten sonnets, divided into lines as shown in Figure 2-1. These can be assembled with any of the others to create one hundred thousand billion possible sonnets. *The Hundred Thousand Billion Poems* subsequently have been made into multiple digital forms. For example, on one website you can view all ten base sonnets and

then generate random selections (Queneau, 2019). As with IIPN makers, the writers made narrative structures with a huge range of possible iterations. They are not creating a final form but space within which a final form can emerge. Much like IIPN makers, they also will not have been able to experience every possible variation of their work.

Figure 2-1 Image of *Hundred Thousand Billion Poems* written by Raymond Queneau (1961)

Creative Technologist at Google, Ross Goodwin, bridges some of the gap between these earlier forms of interactive narratives with his work. Goodwin has been involved in a wide variety of projects involving AI to generate narratives. Just like *Hundred Thousand Billion Poems,* Goodwin's work also does not follow a typical story structure as the texts he has produced are all nonsensical or poetic. This is not accidental, as AI-generated narrative, Goodwin explains, is currently not able to create more than one paragraph of what a human would consider a coherent text (Fulleylow, no date). Within this limitation, Goodwin has created several projects to produce surprisingly poignant writing.

Figure 2-2 A photograph of the Lyra star constellation

Goodwin has made two poetry projects in collaboration with artist Es Devlin, who had the initial idea for the projects. These are *PoemPortraits* (2019) and *Please Feed The Lions* (2018)*.* Both use a single word from an audience member to then generate two lines of poetry. In *PoemPortraits* the user submits a single word in their internet browser (See: https://artsexperiments.withgoogle.com/poemportraits). From this word, two lines of poetry are formed around it using a technique similar to predictive text. Goodwin created the algorithm that makes these predictions by training it with hundreds of examples of 19th century poetry. To create the image below, I submitted the word 'Lyra' which is a star constellation (Figure 2-2) to the project. This was quite fitting with the poetry it generated which is about light in the darkness. The two lines of poetry are then moulded to the shape of the user's face with an in-browser selfie filter. Similar to IIPN, this is in real-time and is unique to that user at that moment. In the *Please Feed the Lions* variation of the project, a large lion sculpture shows the poem in its mouth via LEDs during the day and was projected onto Nelson's Column in London's Trafalgar Square at night. These projects are similar to IIPN as they use real-time data to generate a narrative from the user but differ in that they

require explicit interaction. The project shows how as machine learning matures it has the potential to greatly influence IIPN's development.

The lyra in the darkness still begins. The light
Flawless deep and shadowy and dim, was the region.

POEMPORTRAITS by Es Devlin   Google Arts & Culture

Figure 2-3 Image generated by *PoemPortraits* using the word 'Lyra' and Anna Frew as the subject (Frew, 2020)

Goodwin has also worked on another project that has elements in common with IIPN. One of these is the sci-fi film short *Sunspring* (Sharp, 2016). The screenplay was generated by an algorithm trained with films from the same genre. When compared to a traditional screenplay, the result is a completely incoherent film short that has some surprising

moments, such as when the lead character coughs up an eyeball. It has similarities to IIPN in that it uses algorithms to help generate a narrative, the acting, stage direction, production and postproduction were all done in response to the screenplay. It is akin to IIPN in that it uses data and an algorithm to create a narrative. However, it does not use real-time data linked to the audience themselves or implicit interaction to do so.

Another contemporary example of a generative narrative that is a step closer to IIPN is the music video *Midnight Oil* by Shaking Chains (Hardiker, 2017). A new film is generated at the moment for each user when they press play. The scenes in the music video are made from other online videos. These videos are compiled by an algorithm based on the results of searches inspired by the song's lyrics at the time the viewer presses play (Khawaja, 2017). The resulting video clips play alongside predetermined points in the song. In repeated viewings, it is possible to see where different sections may begin and end. The timings for the clips were carefully selected to ensure the music video, whilst random still felt like a whole. In this example, the data is less personal than in the BBC's prototypes as it is not as connected to the user or placed within the narrative itself.

Hypertext

One type of narrative that is a predecessor to IIPN is hypertext fiction: a kind of digital narrative where the user navigates between different, usually text-based, elements. Hypertext like IIPN relies on user interaction and has variations that the originator cannot have foreseen. Importantly, at the time of writing, it is also the subject of a great deal of the narrative theory most closely related to IIPN. One seminal hypertext fiction referenced in narrative theory is *afternoon, a story* (Joyce, 1993) where the user navigates between different text-based fragments to form a storyline starting and ending when they choose. The text explores memory and knowledge in the intersections between its characters. The online archive in which it can still be viewed describes it as "the story of Peter, a technical writer who (in one reading) begins his afternoon with a terrible suspicion that the wrecked car he saw hours earlier might have belonged to his former wife" (V2_ 2019). Like IIPN, each experience of a*fternoon, a story* will be different. Both *afternoon a story* and hypertext in general, contrast to IIPN because they require explicit interaction from the audience.

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Transmedia storytelling

In 2007, 'transmedia storytelling' came to the fore. The term can refer to a narrative told across platforms to create one cohesive whole as described by Looney (2012) or it can also be used to describe narratives in discrete story arcs across different media platforms. For example, the first version is told via printed books and another is via a television program. This kind of narrative is not only described as transmedia storytelling, terms such as 'cross-media,' 'multimodality,' 'interactive,' or 'enhanced storytelling' are also used. This multiplicity of terminology described as "semiotic chaos" (2009, p.587) by media theorist Carlos Alberto Scolari is something he argues is common amongst new technologies and emerging models as seen in the previous chapter.

Whilst not usually pervasive or implicitly interactive in terms of delivery, transmedia narratives push at the edges of storytelling in new technology and challenge traditional narrative structures. Readers normally expect the pleasure of the closure of narratives found in classical fiction. Outside of experimental and avant-garde cinema, for example, when we watch a film, we expect to finish it knowing all we need to make sense of it. Transmedia narratives are often not based upon a single plot or collection of characters but on complex fictional worlds. These worlds can encompass multiple characters and plotlines, encouraging what media researcher Henry Jenkins refers to as "an encyclopaedic impulse in both readers and writers" (2007).

The genres most commonly found as transmedia narratives are children's stories, mystery and suspense as well as sci-fi and fantasy. Writing for digital publishing software company Pubsoft, Kemeri Howell argues that they are popular because they are "open and accessible to cross-platform entertainment outlets" (2013). The fantastical elements of these genres can lend themselves to rich world-building that can expand into many media and storylines. The most famous example of successful transmedia storytelling can be found in the *Harry Potter* world created by J. K Rowling. Ground-breaking in many ways, the series has set precedents for how transmedia storytelling can work. The world of *Harry Potter* has been commercially realised as books, merchandise, games, films, clothing, theme parks, cookbooks, and into its flagship website *Pottermore.com* (2009). Significantly, the website

Pottermore was the first site that Amazon has ever allowed its customers to buy e-books directly from, indicating the franchise's monetary power.

In 1991, Mark Weiser opened his widely quoted article titled *The Computer for the 21st Century,* with "the most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it" (1991). Working at the Computer Science laboratory in Xerox PARC, Weiser was setting out a vision for the future of truly ubiquitous computers. He focussed upon creating a network of interconnected devices instead of one personal computer. He wanted to move away from the desktop and distribute computational tasks across the environment (Dourish and Bell, 2011, p. 11). Weiser predicted and went on to make interconnected handheld tabs, tablets and giant interactive boards, versions of which his lab produced and used from 1988. Weiser also, correctly, predicted cloud computing, digital office assistants, affordable video calling, cheap digital storage and computers that could handle multiple windows, tasks and users in one machine. All of which, provided the technological foundations that IIPN relies upon.

In the year following Weiser's article, 1992, IBM released the first smartphone complete with a touchscreen, email, fax, calendar and apps. This was followed in 2002 by Blackberry, targeted at business professionals. Then, in 2007 Apple exploded onto the market with iPhone and Amazon launched the first dedicated e-reader. In another industry-shaking move, Apple announced the iPad in 2010, the first commercially profitable tablet computer (Ritchie, 2013). The iPad sold over 15 Million units, outselling the original iPhone and all of every other kind of tablet in the market that year combined (Ritchie, 2013). By 2019 79% of adults in the UK own a smartphone (Boyle, 2020) and 60% a tablet computer (O'Dea, 2019). The progress of these devices was essential to IIPN's development as they provide the necessary sensors such as GPS, camera, internet browser, and a microphone to create the narratives as well as somewhere to display them.

Figure 2-4 Image of the *Bridging Book* (2013)

The following two examples are of children's eBooks that utilise the capabilities of devices that know about us and our surroundings similarly to an IIPN. Developed by staff at the Engage Lab in Portugal, pictured above (Figure 2-4) is the *Bridging Book* (Pinto *et al.*, 2013). The picture above shows a children's narrative told through an iPad and physical book placed alongside each other. The physical part of the book is designed to lie against the side of the iPad to provide additional content and interactive elements matching each of the book's double-page spreads. As the reader turns the physical page, magnets in their corners activate a page turn on the iPad, removing the need for batteries in the book. On the screen, the reader can trigger short animations within the imagery (demo: https://vimeo.com/64249658). This offers an example of where print and screen can create an interesting reading experience through context-aware sensors.

Published in France by Nathan, *Comprendre Comment ça Marche* (Lebeaume and Joël, 2014) is another book where a physical element is combined with screen technology, this time via cameras using augmented reality. In this French-language children's encyclopaedia, the same pages as in the book appear on a computer screen with the reader's hands. On the screen, as the user moves their hands interactive film elements take place around them. For example, in one section, a film of a helicopter is positioned on the screen so that it appears to be landing on the palm of the reader's hand. The inclusion of the reader's body on screen

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makes the interaction between the physical and digital book more than a way to turn the pages as with the *Bridging Book*. As it involves the user in the world directly, according to BBC R&D's future aims document (BBC, 2017b), it could be described as an immersive narrative.

Kate Pullinger's *Breathe* (2018) is an example of an IIPN that took the affordances of smartphone technologies and applied them in a written narrative. *Breathe* (see http://www.katepullinger.com/breathe/) is a ghost story about a young woman called Flo who can speak to ghosts. In the story, Flo is trying to contact her dead mother's ghost. Designed for smartphones, each page is made up of a short piece of text which the reader swipes with their finger to move to the next page. As the reader turns the pages spooky interruptions occur. The swiping mechanism reveals written messages from a ghost that knows where you are and what time of day it is. At times the ghost takes over the whole screen or uses the reader's finger swipe as the start of rubbing away the page to reveal another text. Occasional marks appear on the screen as you read, almost as if someone is tapping the screen from reading over your shoulder. Similarly, to *Take This Lollipop* (Zada, 2011)*,* the narrative leans into the creepy potential of IIPN as the ghost uses references to your time of day, weather and local landmarks such as train stations and cafes to prove it is watching you. This ghost story is a good example of how IIPN can utilise smartphone technologies such as location and time of day.

In 2019, there were developments in television technology via smart TVs which means it is now possible to deliver an IIPN to television directly. Before, this would need to have been done via an internet-enabled device such as a laptop. This technology has facilitated further growth of online video streaming and the rise of TV and film content provider Netflix. Online streaming as a market is expected to grow with several new online television streaming providers having launched or are about to launch in 2020 such as Apple TV+, Disney+, HBO Max and NBC Universal/Peacock. Interestingly, IIPN's originators, the BBC, also plan to launch a yet to be named service with Discovery to host their natural history content. This expansion of the market will provide increased opportunities for IIPN content.

Streaming service Netflix launched an interactive program to adult audiences for the first time in December 2018, *Bandersnatch* (Slade, 2018). The feature-length episode

Bandersnatch is part of the Black Mirror television series which explores the unintended consequences of new technology. The episode follows a branching narrative structure where the audience is posed questions which affect the subsequent narrative content. The questions range from the banal such as what the protagonist should eat for breakfast through to an extreme of whether he should kill his father. *Bandersnatch* went on to be nominated for two Emmy awards. Netflix had already produced several interactive programs for children. Speaking to *Wired* magazine, Netflix's Carla Engelbrecht (Hitchens, 2019) explains that they saw children as the first audience to work with as "we knew if we couldn't make this work for kids, it would never work for adults," as there is "a more inherent willingness to interact in kids." The creation of this interactive content points to a clear interest in personalised narrative beyond the BBC.

Bandersnatch is an episode of note because it represents the realisation of a wider plan at Netflix around the future of content. Engelbrecht suggests interactive television as a key way for Netflix to maintain its relevance and audience share. This is because Engelbrecht sees gaming platforms as Netflix's main competitors rather than satellite television channels. She views bridging some of the elements between gaming and television, in particular, user agency, as key to their future success. Engelbrecht sees developing interactivity as similar to "the development of seemingly subtle, yet aesthetically and experientially crucial, cinematic techniques" (Hitchens, 2019). She offers the example of introducing ceilings to film sets, which offered low angle shots to heighten the sense of realism in the film. When asked about the possibility of implicit interactivity being used to create a perfect narrative for the audience, a very IIPN like idea, Engelbrecht expresses concern: "the video perfectly constructed for you? It sounds like a Black Mirror episode" (Hitchens, 2019). Whilst very similar to BBC R&D's goals to create more tailored narrative content, this suggests that at the time of this interview, Engelbrecht does not intend to create implicitly interactive, and therefore, IIPN narratives for Netflix.

Social media and news broadcasting

The huge political and sociological consequences of social media mean that whilst it is a rich source for data and an ideal platform for IIPN there is heightened sensitivity around it due

to its potential for abuse. Mainstream social media platforms began to gain prominence in the mid-2000s. In 2003 Myspace, a social networking site centred around music, was founded. Then, in 2004, Facebook launched, which as of June 2019 had 1.59 billion users (*Company Info: Facebook Newsroom*, 2019). Adding to this social media world are Flickr, an image- sharing site, and YouTube, a video-sharing site. in 2006 Twitter launched and in 2010 Instagram also made an initial appearance.

As well as social interaction and blogging, social media sites soon became a source for breaking news and information outside of the mainstream media. Among other things, it led to the rise of 'citizen journalism.' Citizen journalism is the collection, dissemination and analysis of news and information by the general public by means of the Internet. Within the BBC, they responded to its growing popularity by establishing a user-generated content team. The team took the content sent in by the public, of imagery and text, often through social networks, and wove it into its broadcast journalism. The inclusion of content created by or about the audience in broadcast mirrors IIPN's ability to take into account the audience and/or their context.

The impact of citizen journalism can be seen across the world and has spawned a huge amount of academic literature around social media, citizen journalism and civil liberties. For those wishing to explore the topic in more depth, two key texts are Shoshanna Zuboff's, *The Age of Surveillance Capitalism* (2018) and Evgeny Morozov's, *The Net Delusion* (2012)*.* In this thesis, citizen journalism is relevant to the context of how IIPN is perceived as it affects both governmental attitudes to data privacy and the profile of sharing media on the web.

Social media has had a large impact in western society. For example, in a large scale debacle, the Cambridge Analytica scandal (Lewis and Hilder, 2018) changed the course of politics in the United States of America. Here data was collected from Facebook users completing a personality quiz as well as illegally from their Facebook friends to create a data set of tens of millions. This was then used to target political advertising which helped Donald Trump win the 2016 USA presidential campaign. It was also used in the 2016 European Union referendum in the United Kingdom by the Vote Leave campaign.

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In another scandal involving the misuse of data with social media, Facebook themselves used their users' data to manipulate them. Adam Kramer et al experimented with the content of users' newsfeeds to discover if they could create the same mood in the user as was displayed on their feed (Kramer, Guillory and Hancock, 2014). Conducting their experiment on a massive scale, they deliberately showed sad content to some users, successfully manipulating them into also feeling sad. This deliberate filtering of content to affect their users' mood negatively raises grounds for serious concerns over the terms and conditions of social media. Consequently, whilst it is a huge potential source for audience data for IIPN, there is potential for misuse and pre-existing negative audience attitudes as a result of old scandals.

Social media and entertainment broadcasting

Changes in traditional television usage have contributed to the novel context for IIPN. Traditional television viewing declined for a few years before 2009 (Damratoski *et al.*, 2011). However, the viewership of live television broadcasts of sporting events such as the *Winter Olympics* and entertainment like the *Grammys* was observed to increase. The better viewing numbers for live events is thought to be due to people interacting via social media whilst they are aired (Damratoski *et al.*, 2011). This view is shared by MIT staff member William Bulkeley (2010) who also believes that making it easier for content producers, networks and carriers to link viewers with friends will help television broadcasters retain their audiences. This opening up of TV to social networking would, in turn, make it easier for companies to create IIPN.

IIPN may create an additional opportunity for discussion in social media through the variances the audience can compare and contrast. Chief Executive Leslie Moonves of the broadcast network CBS argues that because we "like shared experiences … social networking tools such as Twitter has (sic) encouraged TV viewing as Americans to exchange opinions on what they're watching" (Schechner and Ovide 2010). The opportunity to share opinions via tweets, texts and status updates during a live program creates a sense of community and a stronger connection to the broadcast. It is less passive than traditional TV viewing and makes it easier for a viewer to find something they want to watch. IIPN could

be leveraged to help create this stronger connection through varied and more relevant content.

Social media can create more of an all-encompassing world for the audience, as well as a personally tailored experience like an IIPN. For example, one way television networks use this social media interaction to encourage engagement with their content is to offer 'bridge content' in between episodes. This provides a means for fans to interact with the program whilst it is not on the air, keeping them interested and engaged with the series. One program that has achieved this with particular success is the Fox Network produced series *Glee* (Brennan, Falchuck, & Murphy, 2009). Set in an American high school, it follows the lives of a group of teenagers who are in a choir. Key to its success, *Glee* interacts with its audience continually, both throughout the program's airtime, with cast members tweeting as it airs, but also outside of it. Fox has invested in this area by also developing an iPad app for the show, providing viewers with news and clips to bridge the gaps between airtime. Whilst it is simple to see the marketing value in retaining an audience via other free content, the implications for narrative structure are interesting.

Figure 2-5 Photographic example of someone using a second screen whilst watching television

In a clear example of the technology needed to deliver IIPN, MIT staff member Marie-José Montpetit (Bulkeley, 2010) created a system that integrated live television with an application. Monpetit pitched her application to British Telecoms (BT), who provide a digital television service. At the time of the article, BT did not comment on whether the system was later adopted. Montpetit's system included a central database that aggregated video from online sources, shares data from social networks (unique to the audience) and delivers video to the television. This system also utilises a second screen with an iPhone App. In the app people in the audience's network can comment and rate the content they are viewing. It also has a feature that allows audiences to recommend a program to each other with the option of then setting this program to play out automatically at a later time. All of these features are useful to broadcasters in encouraging engagement with their content as well as providing a means of delivering an IIPN.

Social media as a platform for narratives

The advent of social media platforms created an opportunity for short-form publishing that was uniquely digital in nature, opening the door to IIPN. There are a great deal of social media narratives available to study and scholarship around this. The literature review does not cover narratology in relation to social media as it prioritises work that is not tied to one medium. For those wishing to gain a grounding in narratology in relation to social media, Bronwen Thomas' (2014) work on Twitter and Maria Mäkelä's (2019) work on Facebook provide good places to begin. Examples of narratives from Twitter show that utilising the affordances of each type of social media is important for their success, a lesson relevant to IIPN. For example, when Twitter emerged as a new form of media with social importance, publishing houses actively engaged in it. Commissioned by *The New Yorker*, established print writer Jennifer Egan wrote Black Box, (Egan, 2012) which was originally published one tweet per hour, for ten nights in May 2012. Egan, not a Twitter user herself, wrote a piece which critic Katy Waldman described as "beautifully composed tweets [that] were like foreign travellers who had no idea where they'd turned up" (2012). Waldman's criticism was the result of Egan's misunderstanding of how Twitter functions as a social network. Twitter is focused upon the interaction between accounts and users finding tweets (short, usually

text-based posts) by following trends.[1] By producing a piece of fiction that ignores these interactions and trends, Egan's work jarred and ultimately was lost amongst the tweets that use the mechanics of the site. The lack of use of Twitter's 'secret handshakes' can be seen as Egan's carefully crafted words (2012), whilst fitting neatly into the required character restriction of Twitter's format, they do not use any of the functionality of the site such as usernames and hashtags.

A more successful example of a Twitter narrative is the winner of the Twitter Fiction Festival 2012, Elliott Holt (2012). Holt used the affordances of the site to directly engage the audience, making it more personalised and akin to IIPN than a static text. In contrast to Egan's delivery over a period of days, Holt's murder mystery was told over a few hours. This immediately created a more impactful way to tell the narrative. Holt builds the narrative experience through three different Twitter accounts, each representing a different 'witness' to the crime the narrative is centred upon. The success of the fiction lies in it fully embracing the way that Twitter functions. As highlighted by Waldman, (2012) Holt uses hashtags, as well as errors "Can't bloody type on this thing," shout-outs "I'm wearing @alexanderwangny," and banality "Why is it so hard to get a cab?"(Holt, 2012). Woven together, this created a fiction that used the format effectively, harnessing laughs of recognition and the affordances of Twitter to create an award-winning piece and an engaging short-form fiction for the reader. As the narrative is embedded into the digital social life of the audience member it is a step closer to IIPN. Whilst the audience's information is not directly used to shape the narrative, it is still an important move towards IIPN.

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[1] Trends are created via a hashtag (#) for example #TwitterFiction which when used before a word, makes it searchable in the site. You can search for tweets via the hashtag or browse 'trending' hashtags. These trending hashtags are the most popular hashtagged words/phrases in use at the time of your search.

One example of IIPN that uses social media data to inform its content as well as using it as a platform is film short *Take This Lollipop* (Zada, 2011). The short is published on Facebook and weaves the social media life of the user directly into the narrative. The film's content deliberately plays into the creepy aspect of social media and audience data. The narrative is about a stalker looking at the person they are obsessed with. The user themselves is presented as the subject of this obsession as the short shows images and other information about them from their Facebook profile. For example, their profile itself is displayed with the stalker's reflection overlaid. This is an early example of how IIPN became available outside of the BBC.

Fanfiction

As described in an interview with BBC R&D's Forrester (2017a), perceptive media projects media grew directly out of online hacker and remix culture. This means digital fanfiction represents an important precursor for IIPN as a form of personalised narrative. 'Fanfiction' is a term used to describe original, though amateur, works that are inspired by the publications of professional writers. Prior to this fanfiction was self-published via fanzines, disseminated at conventions and usually, sci-fi or fantasy based. In 1998, the website fanfiction.net launched in an important step for the world of self-publishing. Like its print-based predecessors, the site operates on a not for profit basis. It allows users to access a searchable archive of works, it is easily accessible and allows users to rate the stories directly, which led to it becoming popular quickly.
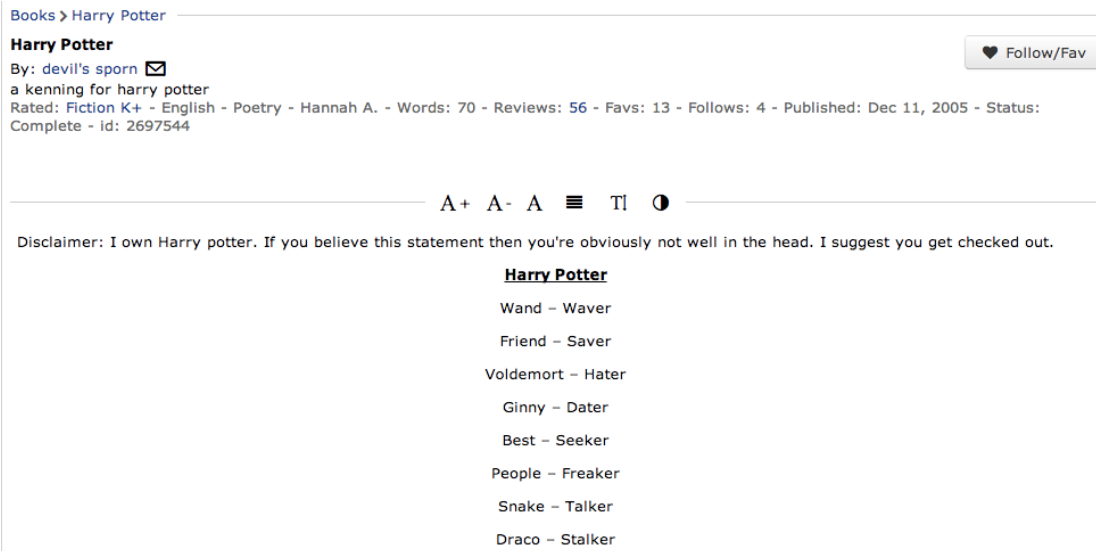
Figure 2-6 Screenshot of fanfiction *Harry Potter* (2005)
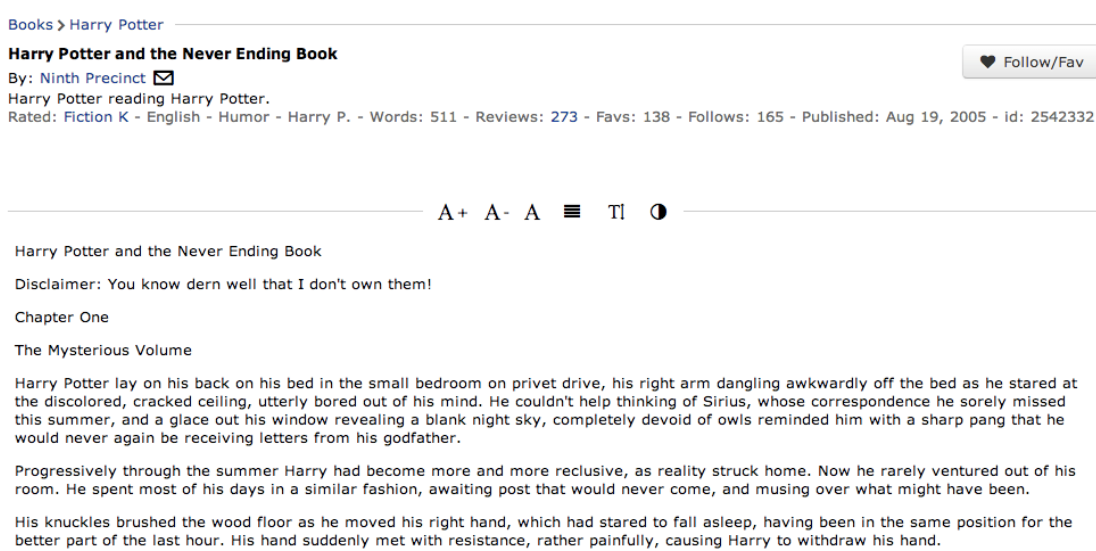
Figure 2-7 Screenshot of fanfiction *Harry Potter and the Never Ending Book* (2005)

There is a potential problem with the style of writing. As fanfiction.net accepts any kind of narrative, the accuracy of the grammar, structure or language varies greatly due to the lack of editorial control. Issues with editorial quality, however, are not necessarily a barrier to success. Some fanfiction has spectacularly broken into the mainstream. Erotic fiction *50 Shades of Grey*, written by Erika Leonard James, (2011) became a record-breaking bestseller. Based upon the young-adult vampire-romance series *Twilight* (2006) by Stephanie Meyer, the book began life as a fanfiction entitled *Master of The Universe*. Whilst derided by the majority of critics for the style of its prose, "James writes like a Brontë devoid

of talent" (Dowd, 2012), the trilogy went on to be one of the most commercially successful series ever.

Fanfiction offers the writer and the reader alternate ways to appreciate their preferred fiction. Some books create a way for the fan to remain connected with the work when they are waiting for another instalment. It may allow them to resolve a storyline in a way more to their liking. For instance, for a fanfiction author, the protagonist should have married another character. The huge amount of choice on fanfiction.net allows the reader almost a multiple-choice style narrative. The way that fanfiction allows the reader to rewrite the narrative around their own life is similar to the notion of an IIPN designed to suit the user.

Quantified self

The 'quantified self' is a movement where people track aspects of their daily life. Often utilising new technologies and wearable devices, they collect data on food consumed, mood, blood oxygen levels, heart rate or their menstrual cycle for example. The collection and analysis of this data are usually used to improve the daily life of that person. For example, Katrina Rodzon, speaking at the 2013 Quantified Self Conference recounted how through self-tracking she was able to diagnose herself with celiac disease. Using a combination of an elimination diet, weight measurements and gathering subjective evidence of bloating and mood swings, she pinpointed her gluten intolerance (Ramirez, 2014).

Self-tracking data collected from large numbers of people have led to significant insights into how we live our lives. One example of this is in city planning for cycling. The fitness tracking app, Strava, allows users to log exercise via bicycle, running or walking. Local governments have used this data to improve their city infrastructure, for example, Brisbane, Australia used it to inform rebuilding a cycle route after it was destroyed in a flood (Sunde, 2017). This shows how user data is having an impact on shaping our physical as well as sociological space.

Project #Scanners by Richard Ramchurn and Jonathan McGrath (2014) is an example of using health data and wearable devices for narrative experiences. This Kickstarter[2] funded film uses the audience's physicality to change what it shows you. The film is designed for one audience member at a time. Wearing a headset, the lone user's brainwaves and blinks are used to inform how the film is edited. With the audience member's describing it as a "dreamlike" and "meditative" experience (Ramchurn, 2018) the film transforms what it displays depending on how relaxed the audience member is. Their calmness is judged by the brainwave and blink data detected by the scanner headset in real-time. The film is edited at that moment by software designed according to the creator's intentions. It is possible to experience this film with either explicit or implicit interaction. The audience member can choose to explicitly interact by deliberately blinking in certain moments and trying to alter their mental state or they can sit back and let the interaction occur implicitly, with no intention.

Another biofeedback narrative is the video game *Nevermind.* Launched for funding on Kickstarter in early 2014 it went on to win gaming awards (*About Nevermind*, 2019). Again, utilising external data to create an immersive experience, this game alters the difficulty level of what you are playing according to your heart rate. Designed in the horror genre, the game puts you in the position of a psychologist in a sci-fi world where you delve into the minds of mentally disturbed patients. Using a heart rate monitor the game can sense the level of anxiety you have as you are playing. This leads to a game-playing experience where deep breathing exercises and meditative techniques instead of expert hand-eye coordination are important. The game's creator Erin Reynolds believes that playing the game and learning to control your stress levels in play can help in real life too (Castillo, 2014).

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[2] Kickstarter is a website that hosts projects that are available for crowdfunding. The project's creator proposes an idea and other users can fund it. Typically, a variety of funding levels are available with a reward of some kind related to the cost of the funding paid. For example, a book project may offer a bookmark for a low donation and a hard-back book for a more expensive funder.

This kind of self-tracking and use of wearable devices are paving the way for it to be used in IIPN experiences. There are significant ethical considerations to be made about using the health data of the audience to tell a narrative, not least because the storing of data about someone's health is confidential and in law must be carefully protected.

The origins of perceptive media, a form of IIPN at BBC R&D

This section maps the origins of perceptive media, which is a form of IIPN, at BBC R&D. As the lead developers of this kind of narrative in 2020, their organisational environment is important to consider alongside the wider technological context of IIPN. This part of the chapter onwards situates the role of R&D in the BBC and outlines the way in which perceptive media was spotted as a trend and some of the projects related to its development.

The R&D department's purpose

The BBC has had an R&D department since it was first formed in 1927. The BBC is funded through a publicly paid licence fee, is subject to a Royal Charter, and an agreement with the British government. Within this agreement, it is required to provide a centre of excellence for the development of broadcasting through an R&D department.

The legal agreement (Secretary of State for Culture, 2016) stipulated that there must be an R&D department at the BBC and has multiple clauses. The key points of these are paraphrased below:

- It must aim to maintain a leading role in broadcast research.
- The work completed must be shared internationally, and the technologies used should have open standards (be made widely available, free of charge, with fair terms).
- Work should be done within the BBC and in co-operation with universities and businesses that are active in the area.

- It must balance the potential for revenue from its intellectual property and the possible gains of the wider UK economy should their work become open source. (Secretary of State for Culture, 2016)

The BBC R&D team have focussed on many projects over the years (BBC, 2017a) that demonstrate how they have been at the centre of innovation in broadcasting technologies. In 1959 they made the first transatlantic television transmission. In 1962 they used satellites to communicate for the first time, and by the end of the 60s, they transitioned to colour TV. In 1974 they launched the text-based service CEEFAX. In the 2000s they helped set up Freeview and launch online video service iPlayer. With iPlayer, the BBC was the first mainstream broadcaster in the UK to launch a user-friendly form of online video. This led to a change in demand for internet hosting and packages, which enabled Netflix to come to the UK (Marshall, 2014).

From around 2005 BBC R&D have focused on how the Internet intersects with the broadcast industry (BBC, 2017b). As stated in their aims, BBC R&D (2017b) aspire for their media content to become more personalised so that it has the potential to be responsive to the user's depth of interest, location, lifestyle, age, and available leisure time. This element of personalisation also extends to devices, so that the user can have the best experience for their device no matter the manufacturer. Other aims, less directly applicable to IIPN include that broadcast should be interactive so users can, in some cases, add their own content. Allowing viewers to add their own content reflects areas highlighted earlier in the chapter in citizen journalism, fanfiction, generative narrative and how transmedia storytelling and social media bridge content responds to the interests of the audience. Finally, the BBC state an aim (2017b) for their media to be 'immersive.' The BBC define 'immersion' as "content presented in environments that give the audience enhanced experience either through Virtual Reality or 360 video" (2017b). It is a saturation of the senses, rather than as being fully engaged with a narrative. Outside of the BBC, these types of narrative experiences were shown earlier in the chapter with *#Scanners* (Ramchurn, 2014) that responds to its user's brainwaves and the augmented reality used in *Dokéo: Comprendre Comment ça Marche* (2013). Of the BBC's aims highlighted in this paragraph, perceptive media is the realisation of their goal to produce content that is responsive to their audience.

Their established track record of innovation in broadcast means that the BBC R&D team is viewed as an authority on the future of technology in the field. This leads to their predictions being more likely to be viewed as inevitable rather than a choice. If the people who brought colour television to the small screen say this will happen and show that they are working on it, it implies that it may come to pass. This has parallels with the rise of ubiquitous computing in general. In *Divining a Digital Future* Paul Dourish and Genevieve Bell show that the people responsible for envisioning pervasive computing, such as the earlier mentioned Mark Weiner, were also some of its creators. Something also observed in *Wi Journal of Mobile Media* where they describe how forecasts about the telephone from "the actual developers of the telephone were more successful in their forecasts than any other group." This suggests that, as Simone Natale who is writing about the technological imaginary describes, "developers play an active role in fulfilling their own prophecies" (2014).

BBC Backstage

Between 2005 – 2011 the R&D team ran an event called BBC Backstage which helped to develop work on the intersection between the Internet and broadcasting. This event gathered together hackers and developers to work with datasets from the BBC. At this point, Google and Amazon had very recently opened datasets to developers for the first time. Seeing this, the BBC saw an opportunity to reinvent themselves as a platform for developers and hackers to help shape them for the Internet (Forrester *et al.*, 2011). In 2005 this was a bold move, as very few companies allowed access to structured data[3]. In an interview, Ian Forrester (2017a), a senior producer in BBC R&D, describes running the events as representing a key cultural shift in how the BBC R&D team worked. For him, it showed a move from working with others as audience segments or suppliers to co-creators (Forrester, 2017a). This parallel development between Google and the BBC can also be seen

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[3] Structured data is easy for computers to search, manipulate and add to, as it is already organised to be understood. For example, the relationship between a first name and the last name of a person may be organised so that the relationship between the two names is clear.

in the generative narrative projects Google has made with similar technology to perceptive media that were outlined at the start of the chapter (Fulleylow, no date; Devlin, 2018, 2019).

In an interview, Forester (2017a) explains how the work at BBC Backstage was essential in paving the way for object-based broadcasting. OBB is a technical process that brings together multiple pieces of information into a coherent whole. Forrester (2017a) outlined that early prototypes from BBC Backstage were made from new combinations of disparate datasets. For example, one combined Google Maps data with BBC travel data. This meant that users could see on their map how long their journey would take with up to date travel information. This is something that Google Maps has now done as part of its service since 2009 (Barth, 2009).

At BBC Backstage, the insight most influential on the development of OBB was how hackers or 'pirates' remixed movies and television (Forrester, 2017a). Forrester saw that a common feature of pirated content is that the commercials or credits are removed (2017a). In early pirated content this would be achieved by rerecording a version where the user has manually moved the play head to skip the unwanted content. Forrester (2017a), explained that later the pirates found a faster way of doing this via the .NFO[4] text file which is typically downloaded alongside the movie file. The pirates put instructions in the .NFO file so that when the video file is played, it automatically moves the play head to skip content for you. Then, faster still, Forrester (2017a) outlined that the pirates began using an Edit Decision List[5] (EDL). This technique splits the original movie file into separate files containing in one the movie and in the other(s) the commercials. This separation was the start of an idea for

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[4] A .NFO, short for Information File is a text-based file. It contains details about the downloaded film, application or game such as the release date, author, media title or license information. With software, this also includes installation information. This information is used to help catalogue and make it searchable in the file's databases.

[5] An edit decision list or EDL is used in post-production to edit film and video. It contains a list, in order, with data that shows where each video clip can be found and in what order to play them in the final cut.

OBB. Forrester saw the potential to do more than simply remove commercials in a static fashion "imagine if the EDL was not a static thing, but a dynamic thing" (2017a). This notion of remixing the content for each user dynamically went on to underpin OBB and in turn perceptive media.

Similar to the community outlined in the fanfiction section, Forrester (2017a) described that the hackers would also remix the content of television and films to create different edits to suit their own artistic vision or fantasy of how the narrative should unfold. Forrester (2017a) explained that the potential for OBB to provide a way of doing this was one of the motivations for its development. For example, at BBC Radio 4's *Character Invasion* event (Amedume et al., 2014), the possible ways to remix how a character could be presented using OBB were unpicked. The ability to change the gender, race or age of the character based on, or in opposition to, the audience's preferences offers the possibility of creating a more diverse range of characters. Panellists suggested that this could go some way to addressing problems with the under-representation of minority, or female characters in the media. This, in turn, raises the question of when it would be appropriate to show less diversity to an audience if more is available?

After seeing the trend of remixing content emerge at BBC Backstage, Forrester (2017a) championed it within the R&D team leading it to gain traction as a project. On February 8th 2012 perceptive media had its first public launch. Creating a big stir, Forrester, gave an initial presentation of perceptive media at Social Media Café, a networking event for digital industry professionals. Attendees, including myself, were at once excited and horrified by the potential of a technology that can personalise narratives with implicit interaction. Shortly following this, Forrester made his first blog post (2012a) outlining what perceptive media is, which was published alongside an article on *The Next Web* (Bryant, 2012) where the immediate concerns about privacy were also captured. In July 2012, the first perceptive media prototype *Breaking Out* (BBC, 2012) was launched to the public at Social Media Café.

The first OBB projects at BBC R&D

At the same time as making *Breaking Out* another project pioneering OBB technology was developed. This project was focussed on the creation of 'audio objects.' Known as the *Pinocchio* project, its lead producer, Tony Churnside (2012) used "audio objects" to create what he hoped would be a more immersive listening experience. By 'audio objects' Churnside is describing a way of mixing recordings differently to a stereo mix where sounds are panned somewhere between left and right speakers. In this instance, the sounds are mixed as audio objects positioned in space rather than simply designated left or right. This creates a final set of audio objects rather than a surround sound file. Each of these audio objects has a set of metadata that describes things like its elevation, distance and source level. Within the *Pinocchio* (Churnside, 2012) experiment, this data was rendered through the speakers' channels before broadcast and was intended to do this in the listeners' home device in the future.

The *Pinocchio* experiment was only available for download in surround sound (Churnside, 2012). This is not the same as the full 3D version which was created for and played in the studio. With 26 loudspeakers, Churnside was able to create a 3D audio experience where sounds were positioned above, below, in front of and behind the listener. Churnside describes one part of the drama he believes to be particularly effective where Pinocchio is swallowed by a shark and underwater sound effects play around the listener from all angles (Churnside, 2012).

The potential for creating varied experiences via audio objects is significant and is an early example of OBB which enables IIPN. As explained by Churnside (2012), the advantage of broadcasting audio scenes in this way is that speakers and listening devices are independent of the mix. This potentially allows the listener to experience the audio in a way that produces the highest quality for their device, be it a set of headphones or as many speakers as they own. Further to device changes, this also allows for the audio to be rendered differently for each listener's preferences. For example, the audience member could change the balance between foreground and background sounds according to their hearing ability.

Building upon the *Pinocchio* experiment in October of 2013 members of BBC R&D used audio objects to create an interactive audio experience of a football match (Churnside and Mann, 2013). The experiment was designed to allow listeners to choose a balance between crowd noise and commentary, and also where in the crowd the sound came from. In user testing, the BBC (Mann, et al 2013, p.13) found that people used the interface to change the balance between the commentary and crowd, and which part of the crowd they heard early on in the broadcast. 65% of listeners did not move their microphone 30 seconds after the beginning. Following an initial adjustment period, no matter what the activity was on the pitch, the listeners were unlikely to move the balance. About twice as many people chose to increase the crowd level noise as those who chose to increase the commentary, but there was no preference for a football team. The lack of interaction once the user had found their preferred settings might make a case for some implicit interaction or a full IIPN. The listeners in this situation may enjoy this being done for them automatically so they can focus on the match.

Participants in the experiment responded positively (Mann, Churnside, Bonney, & Melchior, 2013, p.15). Most people believed it to be a major improvement on traditional radio coverage. The most popular feature was being able to choose which balance they preferred between the crowd and the commentary. Many participants asked if the experiment would be running again next year, but as the project used "the computational equivalent of a cardboard box and a bit of sticky tape," (Churnside and Mann, 2013) it appears that the use of this technology as standard will not be with us in the immediate future. Instead, the team decided to explore interactive audio with implicit interaction in two prototypes. These form the main case studies for this thesis and are described below.

The perceptive media prototypes

The first perceptive media prototype, *Breaking Out* (2012) is an online radio play designed to change its dialogue based on data taken at the time of playout. For example, based on their IP address it mentions landmarks in the dialogue local to the listener. The content of the play is described in detail in Case Study One (p.117). This online radio version is not the only available format for *Breaking Out.* The play can also be listened to via a physical radio

built by BBC R&D. The bespoke radio set was made after initial user testing with the online version. In their experiments, the researchers found that the listeners struggled to separate the radio drama from the screen (Forrester, 2013). They found that the audience was waiting for something to happen on screen rather than listening to the audio. As a result, to help audiences behave naturally around the radio play, a physical radio was developed (Figure 2-8).

Figure 2-8 Photograph of the *Perceptive Radio* 2014 (Frew, 2013)

The use of a physical radio meant that pervasive computing data feeds from analogue sensors could be utilised in addition to the ones already in the online version. The key aim of the functions added was that all of the effects had to be beneficial to the user and be useful in an everyday environment (Forrester, 2013). Unlike the other software-based elements these adaptions do not directly alter the words spoken in the radio play but instead the way it is presented. The radio was developed to be sensitive to the domestic environment of its listeners. Still in the spirit of perceptive media, they designed it to have implicit interaction through passive inputs. As paraphrased from Forrester (2013), the following functions were developed for the radio:

- For a listener moving around a room, as they move away from the radio the volume level adjusts to remain consistent.

- For a large spike in ambient noise, such as a washing machine turning on, the depth of the audio alters, bringing the voice of the actors to the fore.
- In a less active setting, where the listener is sat in low lighting, it removes most of the treble to make a more relaxing experience.
- In a settled scenario, if there is a spike in noise and movement it is assumed to be a phone call and the radio pauses.

Perceptive radio went on to be developed into another version in 2015, a podcast in 2018 and remains an active project in 2020. The BBC believes that the project is valuable because it can be "personal, dynamic and responsive without being creepy or infringing personal liberties" (Forrester and Cox, 2019). They hope that it will help them create more immersive media experiences by giving additional tools to content creators. They also hope that its use of implicit interaction will make it possible to cater to audience members with a range of accessibility requirements.

Another perceptive media prototype, *The Break Up* (Amedume, 2016) was completed in 2016 but not released to the public. *The Break Up* is a romance drama film short. The purpose of the prototype was to build on the success of OBB in audio by creating a piece that also included moving image. The film short is capable of displaying the narrative with different colour grades, edits, endings and backing music. This is described in detail in Case Study Two. In 2020 *The Break Up* remains the most recent perceptive media prototype made by the BBC.

How the BBC presents its perceptive media projects

Figure 2-9 A slide from Forrester's presentation *Objects, Responsive and Perceptive Media for ARD/ZDF* (2017)

Presenting perceptive media can be challenging. From its origins in hacker culture through to its contentious first public presentation audiences can react to it negatively. This reaction to new technology is not uncommon. Martin Lister (2009) describes how new technologies can cause a sense of anxiety about the loss of older forms linked to insecurity related to the new demands they make. For anyone wishing to promote IIPN or new technologies in general, there are some techniques used by the BBC to help alleviate negative responses.

One of these strategies is the careful use of language. The use of the term 'perceptive media' itself, rather than 'pervasive' is a moderating use of language. Pervasive, whilst established in computer science as one of the technologies underpinning perceptive media, carries with it negative connotations as a word in general. Pervasive is defined by Collins Dictionary as being "something, especially something bad, that is pervasive is present or felt throughout a place or thing" (2019). This makes the term unattractive to the BBC when trying to foster a positive reception to working with this kind of technology. The content of the two prototypes (Case Study One and Two) reflects the way the BBC carefully presents perceptive media. On occasion, Forrester links perceptive media to childhood which helps it

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to appear less threatening. In one of Forrester's slides (Figure 2-9), for example, building blocks are used to help explain how perceptive media operates technically. In another, he uses an image of an adult and two children around a campfire (Figure 2-10). This gentler approach is also reflected in the content of the two case study prototypes as they are simple and mostly inoffensive. Whilst they deal with adult themes such as domestic violence and agoraphobia one is a comedy and the other a romance. This softening of language and use of friendly imagery and less offensive content may help reduce anxiety around perceptive media.

Figure 2-10 A slide from Forrester's presentation *Perceptive media, ethics, dreams & hyperreality* (2017)

A key strategy to promote new technologies outlined by Lister (2009, p. 67), is to position it in relation to something that came before it. Lister (2009, p. 67) explains that the more recent technology can be presented to show how it shares good characteristics with the older technology or practice whilst improving on its shortcomings. For example, in one of Forrester's slides, Figure 2-10, he introduces perceptive media, the newer technology, through the analogy of storytelling around a campfire, an older form of storytelling. BBC R&D (Forrester, 2012b; Forrester, 2016a; Forrester 2016c) use the analogy repeatedly to exemplify how oral storytellers make subtle changes such as plot details and voice timbre to

suit their audience, ambience and environment as perceptive media can. Forrester is taking attributes of the old technology to show how they transfer into the new.

Another way the BBC compares perceptive media to old technology is its emphasis on personalisation. In Figure 2-11 BBC R&D make a comparison between OBB and traditional broadcasting. Here, they emphasise the negatives of traditional broadcasting as everyone receiving the same content. The graphic shows how image content is not scaling well onto different sizes of screens. Then, they highlight the benefits of new technology. They are making the 'best' experience for the viewer and the images all fit. There is no mention of audience data, a more contentious part of OBB, where the 'preference' of the viewer may have been stored for example. This is typical of the strategy that Lister (2009, p. 67) described, as it positions the new technology as solving the negatives of an older one. In fact, Lister (2009, p. 68) demonstrates his argument with the example of how interactive television is positive because it makes the user an individual rather than part of a mass audience, precisely the argument the BBC is making here. A strategy future IIPN creators may wish to use when promoting their own work.
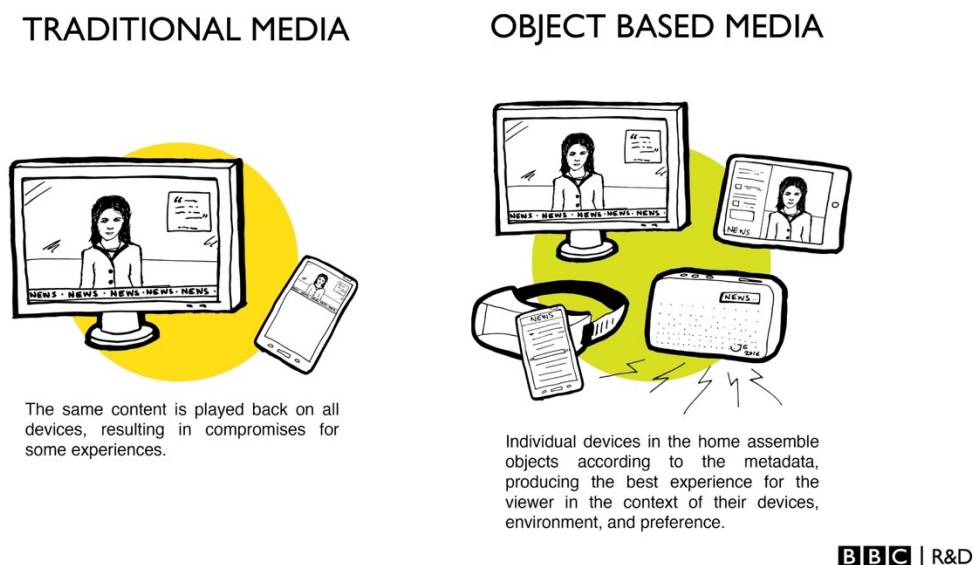
Figure 2-11 Diagram of OBB by BBC R&D in 2019 that has been edited to only show the last two sections from 'traditional media' and 'object-based media' side by side (BBC, 2017b)

The BBC's vision of the future for perceptive media and OBB

Eight years on from the launch of the first perceptive media prototype in 2012, in 2020 the BBC still see OBB and personalised content as the future of broadcasting. Describing the prototypes that followed *Breaking Out* as "maturing productions" (Brooks *et al.*, 2019) the BBC R&D team believe that they have now demonstrated that it is possible to create this kind of responsive narrative. Alongside producing prototypes to demonstrate the possibilities of OBB the R&D team have also created a toolkit to help people create their own content.
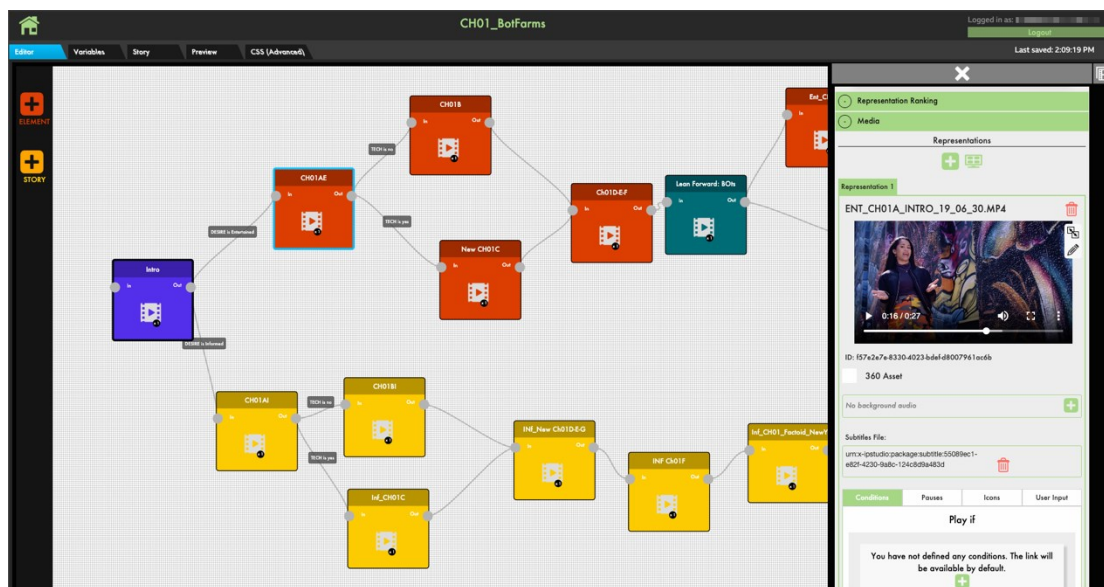
Figure 2-12 Screenshot from StoryKit the BBC's production toolkit for creating interactive broadcasts. (Brooks *et al.*, 2019)

Known as 'StoryKit' the toolkit is a "suite of robust and integrated web software tools for authoring and delivering object-based programmes" (Brooks *et al.*, 2019). The creation of this toolkit to help others author their own interactive content is a key step in getting IIPN to a wider audience. This is in contrast to the two prototypes discussed in this thesis which were made with the R&D team as the lead producers. This means they can offer Storykit to any in house production team who want to create interactive content, who can then begin working with it in minutes.

The two prototypes *Breaking Out* and *The Break Up* are still forming the basis of projects in 2020. Following on from the physical radio format of *Breaking Out,* the BBC are now

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experimenting with moving it onto mobile devices through podcasts. *The Break Up* is being used as part of the *Living Room of the Future* (Drury, 2018*;* Forrester and Kerlin, 2019) project. In partnership with the University of Lancaster, the BBC is testing smart devices in the living room as data sources for the drama. The project explores the challenge of delivering a group experience of perceptive media as well as trialling a system for keeping personal data stored within a device in the home, rather than on the cloud.

As well as these two perceptive media projects, Forrester, is now focussed upon developing a 'community of practice' around OBB (2016b). Forrester explained that he uses 'community of practice' as a deliberate reference (2017a) to the theory of situated learning (Lave and Wenger, 1991) where participants work together to problem-solve. A model where people are actively immersed in problem-solving in a social, shared space. Events such as BBC Backstage aimed to create a communal place for this kind of learning and innovation. This community building is a way for the BBC to make their vision for the future a reality, by including and recruiting others who may, in turn, help them to do so.

The BBC hopes that as more exemplars of object-based media are created independently of the R&D team that the development of it will be accelerated. This would open the creative potential of this media to exploration within varied kinds of narratives and to test it where it "offers audience value beyond traditional linear content" (Brooks *et al.*, 2019). This is a sentiment echoed by Netflix who, as outlined earlier in the chapter, see interactive broadcasting as key to staying dominant in the market. As the BBC and broadcasting giant Netflix are pursuing IIPN and similar content, this points towards the possibility of IIPN maturing and becoming an established media form.

Chapter conclusion

This chapter highlights the key trends in technology and society that surround and can be thought of as leading to the inception of IIPN narratives. This is illustrated in a diagram of the narratives referenced in this chapter in relation to IIPN on the following page. The chapter makes the case for where IIPN fits into technological advances in narrative media as part of a wider trend in media to personalise content. Two major broadcasters, the BBC and

Netflix, both intend to continue developing this kind of interactive content. There will very likely be more and more narratives created using IIPN and similar forms of delivery. There is, therefore, the need for the creation of a theoretical narrative framework to help understand the nature of these narratives. The next chapter, the literature review, is the next step in creating this theoretical framework as it examines to what extent current narrative theory is applicable to IIPN.

Figure 2-13 Diagram of the narratives in the Historical Context chapter to show close they are to IIPN in format. (Frew, 2020)

Narrative in New Technology Without Interaction

Sunspring
Ross Goodwin
AI generated screenplay

Harry Potter and the Never ending Book
Ninth Precinct
Online Fanfiction

Black Box
Kate Egan
Twitter based fiction

afternoon, a story
Michael Joyce
Branching narrative hypertext.

Perceptive Radio
BBC R&D
Plays IIPN with additional sensors that adjust to the environment.

The Break Up
BBC R&D
Film short with varied colour grade, endings, edits and music.

The Pinocchio Experiment
BBC R&D
Optimised audio for the audience's device.

Take This Lollipop
Zada
Film short with social media data

Breaking Out
BBC R&D
Radio play with location, social media, cinema, news, weather and date data.

Pervasive Narrative

A Hundred Thousand Billion Poems
Raymond Queneau
Online book-based poem.

Bandersnatch
David Slade
Branching narrative on television

Explicitly Interactive Narrative

Explicitly Interactive, Pervasive Narrative

#Scanners
Richard Ramchurn and Jonathan McGrath
Film that uses eye blink and brainwave data.

Bridging Book
Engage Lab
Physical book paired with an iPad app using magnetic fields.

Nevermind
Erin Reynolds
Game that uses heart rate data.

Poem Portraits
Es Devlin
Uses audience input to generate poetry in real-time.

Comprendre Comment ça Marche
Clément Lebeaume and Joël, Lebeaume
Book paired with screen that uses augmented reality.

Implicitly Interactive, Pervasive Narrative

Midnight Oil
Shaking Chains
Music video made up of online clips based on a real-time web search.

Breathe
Kate Pullinger
Smartphone fiction uses movement, location and weather data.

#TwitterFiction
Elliot Holt
Twitter-based fiction

5 Live Football Experiment
BBC R&D
Uses audio objects for dynamic sound in a football match.

The world of Harry Potter
J.K Rowling
Transmedia narrative

Explicitly Interactive Narrative

3 Literature Review

Introduction

The literature review is focussed upon the intersection between narrative theory and Implicitly Interactive Pervasive Narratives (IIPN). The purpose of this was to aid the development of my IIPN theoretical model proposal. The chapter gathers the literature into sections according to which area of the model they inform. To begin, I discuss theory that helps ascertain to what extent a text may be an IIPN. I then move on to the importance of considering an IIPN as a space for potential narratives, not only a finished product. Central to this is outlining the computational structure of an IIPN through diagrams or analogies. The next section deals with theoretical methods for examining a corpus of texts. This is important to the model proposal as IIPNs produce more than one output, it is not a fixed text. The final section is focussed on how implicitly gathered data affects both potential and actual IIPN products. The impact of implicitly gathered data on a narrative is not yet, to my knowledge, represented in narrative theory. Consequently, a related notion, metalepsis, was included to help explore this and develop my model proposal.

Defining an IIPN

Definition of narrative

As IIPN is a new narrative form it can be challenging to pin down which texts are examples of it. This means that before an analysis is made it may be useful to determine to what extent a text is a narrative. Marie-Laure Ryan (2007) lays out a narrative theory to help define an object as a narrative. It is a theory that accommodates digital texts in any medium, this makes it useful for those working with IIPN, as an IIPN can be in any digital format. Ryan's theory is a list of criteria of characteristics a narrative may hold. The criteria, and whether a given object meets them is a way for a researcher to find to what degree their object holds "membership" (2007, p. 28) to the form of narrative. The criteria are not intended to be absolutes, an object may not meet every aspect on the list. As Ryan

describes, the criteria allows "narratologists to delimit the object of their discipline [and] to isolate the features relevant to their inquiry" (2007, p. 33). This makes the criteria a useful tool for those studying IIPN to determine more precisely what they are working with.

To demonstrate Ryan's criteria in action, this is how the IIPN film short *Take This Lollipop* (Zada, 2011) fits them. Ryan identifies that a "narrative must be about a world populated by individuated existents" (2007, p. 29). The short is set mostly in the shabby looking home office of the lead character. There are two existents: the stalker and the stalker's victim who is the viewer as shown via their social media profile in the film. Ryan emphasises that "this world must be situated in time and undergo significant transformations" (2007, p. 29). The stalker is seen working themselves up into a frenzy before looking up where the viewer lives and leaving to find them. Ryan observes that "some of the participants in the events must be intelligent agents who have a mental life and react emotionally to the state of the world. Some of the events must be purposeful actions by these agents" (2007, p. 29). The stalker clearly reacts with emotion to the images of the viewer's social media profile and takes a decision to see them in person. The characters have agency as the stalker deliberately leaves to find the viewer. *Take This Lollipop* meets Ryan's next criteria that "the sequence of events must form a unified causal chain and lead to closure" (2007, p. 30). Finally, Ryan's analysis suggests that a narrative "must communicate something meaningful to the audience" (2007, p. 30). This is achieved in *Take This Lollipop* as the viewer is unnerved by the inclusion of themselves as the victim of the stalker. It is clear that *Take This Lollipop* has a full 'membership' to the narrative form by Ryan's criteria.

The criteria can be used to show how other broadcasts are not as strong candidates for the narrative form. For example, a weather broadcast may use implicit interaction and pervasive technologies via location data and other sensors to update itself in real-time. Despite the fact that it meets some of Ryan's criteria such as a setting, existents with intelligence, some limited emotional responses and is in a logical order, it does not convey a story of amplitude or show a transformation in the characters. This shows that the weather report is not fully a 'member' of the narrative form and so not as strong an example of IIPN as the dramas that are the subjects of the two case studies. In this way, the criteria can be used to help untangle what is and is not an implicitly interactive pervasive *narrative.* This is

a useful first step to take before embarking on an analysis using the IIPN theoretical model this thesis develops.

Defining interaction

Describing how interaction takes place in an IIPN is a necessary stage of an IIPN theoretical model. Existing theory on interactive digital narrative is mostly focussed upon explicit interaction. This is still of relevance to an IIPN model as it can be used to demonstrate how it differs from both linear and explicitly interactive narrative. Epsen Aarseth coined the term 'ergodic' (1997) to describe an interactive narrative where "nontrivial effort is required to allow the reader to traverse the text" (Aarseth, 1997, p. 1). Aarseth developed the term ergodic from the Greek 'ergon' and 'hodos' meaning 'work' and 'path.' This reflects a key feature of an explicitly interactive text, as the reader must work to create a path through it. This contrasts to IIPN, which is not explicitly interactive, as the reader must only make a trivial effort to read it. All of the interaction and decision making from the audience is before the narrative begins to play. IIPN is deliberately a sit back experience, it is not intended to be work for the audience member. An IIPN, once begun, fits Janet Murray's description of non-interactive narratives that do not "require us to do anything except to pay attention as they are told" (1997, p. 174).

IIPN sits somewhere inbetween the explicitly interactive and the non-interactive narrative. The audience does not work to influence a text, but their influence is affecting the substance of what they experience. Aarseth provides some metaphors to describe the difference between explicitly interactive and non-interactive texts that can help explain this. One metaphor is that the audience of a non-interactive text is like a spectator at a sporting event "he may speculate, conjecture, extrapolate, even shout abuse, but he is not a player" (Aarseth, 1997, p. 4). In contrast, in an explicitly interactive narrative, Aarseth argues that the audience "*is* the player" (1997, p. 4, emphasis author's own). IIPN lies in between this, they are not the player or spectating at an event that would happen regardless of their presence. The IIPN audience member is a spectator of a match made only for them, according to their data and or context.

In another example metaphor, that helps show the difference between explicit, implicit, and non-interactive texts, the audience is on a train. In a non-interactive text, the audience can look at the changing landscape, view whichever part of the scene interests them, get off the train, but they are not free to move the tracks in another direction. In an explicitly interactive text, the audience can move these tracks, or possibly drive the train themselves. Again, for IIPN the difference lies in between. The audience member cannot drive the train, but the journey they are taken on is only for them, designed at that moment. It is not a journey that takes place in the same way indifferent to the audience's presence. These metaphors help show how IIPN is not an explicitly interactive or a linear text. The audience does not interact directly with the structure of the text, but the text is still altered for them.

Another way the difference between explicit and implicit interaction can be explained is through the notion of agency. Murray describes that the audience of an explicitly interactive narrative experiences a feeling of agency as their actions can meaningfully change what is happening in a narrative (2017, p. 161). It is not just being able to see your interaction on the screen. It is beyond simple participation. She describes it as the ability to be "both the dancer and the caller of the dance. This is the feeling of agency" (2017, p. 161). As IIPN does not use this kind of explicit interaction, its audience does not experience a feeling of agency. An IIPN audience member's data may help inform what happens in Murray's dance, however, they would not be actively participating as either a dancer or the caller of the dance.

Aarseth disputes claims that interactive digital narrative and literary texts are the same. He outlines that he is often challenged with the same issues; "1. All literature is to some extent indeterminate, nonlinear, and different for every reading, 2. The reader has to make choices in order to understand the text, and finally, 3. A text cannot really be non-linear because the reader can only read it one sequence at a time" (Aarseth, 1997, p. 2). Aarseth replies that there is a clear distinction between the literary and interactive narrative. In an explicitly interactive narrative, the reader's choice will render some of the other choices inaccessible. Similarly, in an IIPN text, the reader will only be able to see their version. The reader and creator for IIPN may never know what the other choices are, or exactly what they missed.

This differs from the ambiguity of a linear text, as it is an absence of possibility, not of potential interpretation for the reader and creator.

The key principle from Aarseth's work to taken into the IIPN theoretical model proposal is help in defining what implicit interaction is. When a researcher is examining the type of interaction that is taking place, they can consider whether it represents 'work' for the audience member. If the audience is required to interact beyond the simple turning of a page or scrolling of a mouse, then the text may be explicitly interactive rather than an IIPN. As with Ryan's work, this is an early step in the IIPN theoretical model that takes place when determining precisely what the object for analysis is.

IIPN as a space for potential narratives

A system of narrative

Narratives delivered through digital technologies require substantiation through a computational process. They do not exist in a 'complete' form as a paperback novel does but must be assembled for the reader at that moment. Whilst this can be as straightforward as displaying pixels on a screen, an explicitly interactive narrative and/or IIPN is more complex. The process of substantiation can affect narrative structure. This is a stance supported by Katharine Hayles who maintains that "print is flat and code is deep" (2004, p. 74). She is highlighting that there is substantially more happening to render a narrative in something like a hypertext compared to a paperback novel. Consequently, narrative theory that accounts for a narrative as a system and a space for multiple potential outputs is essential to a model for examining it.

As an IIPN is a system of narrative, rather than a fixed text, there is not an 'author' in the traditional sense. For IIPN there is no single author that has dictated the meaning of every iteration. Murray and Hartmut Koenitz et al propose an authorial concept that encompasses the writer and computer partnership used to make an IIPN. Koenitz et al propose the idea of a 'procedural author,' a practitioner who creates "complex sequences of conditional instructions" (Koenitz *et al.*, 2015, p. 73). The procedural author concept takes into account

that the author is the source of a framework for meaning, rather than the provider of a fixed text. Murray, similarly, describes that "the procedural author creates not just a set of scenes but a world of narrative possibilities" (2017, p. 188). This is an accurate way of describing the authoring of IIPNs, as it recognises that they are creating a system that produces a possibly infinite range of narratives rather than only one.
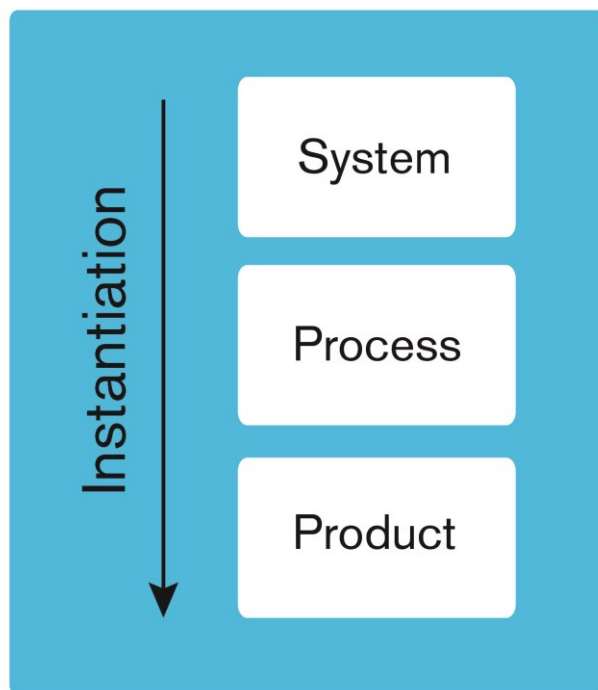
Figure 3-1 Diagram of system, process and product, Koenitz (2015), redrawn (Frew, 2020)

Koenitz (2015) provides a useful model that includes the procedural nature of an explicitly interactive digital narrative. Koenitz sees a "need to move away from the output centred legacy of previous theoretical frameworks" (2015, p. 97). This is important for IIPN as it produces multiple products, not a single one to examine. In order to move away from focussing only on the output, he thinks it is essential to show the computational framework of a narrative. The key idea underpinning this proposal is the 'system, process and product' model shown in Figure 3-1 that includes the potential narrative, how it comes into being and the final narrative product in an analysis.

For Koenitz (2015), the system is what forms the digital narrative. It is a combination of hardware and software. He explains that the system accounts for feedback loops, where computers go to look for data to inform the artistic nature of the narrative it is delivering. In IIPN the system is the hardware required to play the narrative, the software running it, the objects, and the instructions on how to assemble it. From here Koenitz describes how the interaction of an audience with the system creates a process. This process is defined by the parameters of the system but also the audience's actions. For IIPN this emphasis on interaction is less relevant because it takes place outside of the audience's view and is completed by the system. For example, in Case Study One the system finds the day's weather and mentions it as part of the dialogue. This requires no interaction from the audience themselves. Consequently, for IIPN the differentiation between system and process is not essential. Whilst there is a process in IIPN to form the narrative, taking into account a general pre-narrative element is sufficient for my own model proposal.

One drawback to including the system is that it substantially overlaps with the audience's own processing or understanding of the narrative as described in reader-response theory. Koenitz argues that this model takes into consideration the meaning in the mind of the audience as an active process. This is important, as there is an additional layer that makes all interactive digital narrative distinct from other non-interactive narratives. The audience is not responding to a fixed text, as is typically described in reader-response theories, but a changing one. In an IIPN, the text is different each time and the audience know that it is. They will be experiencing something they know may only be happening once, which brings with it a sense of loss. Additionally, they may be able to see their influence on the text very directly, with an image of themselves included on screen, for example. In Koenitz's model, which is for explicitly interactive narrative, he highlights that it is different to a non-interactive text as the audience will speculate about the consequence of their actions within the narrative as part of creating the text's meaning in their mind. For IIPN, there may be no speculation on the consequences of their actions for the audience, but there is a knowledge

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that theirs is not the only version. The audience member knows that another circumstance would create a difference in the content of the text, not only their perception of it.
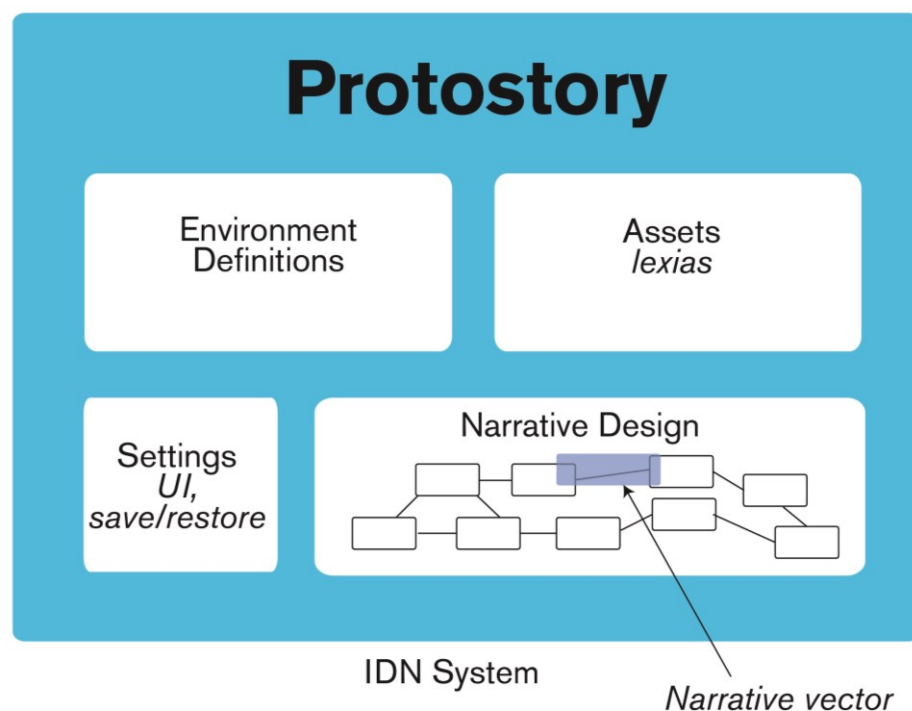
Figure 3-2 Diagram from Koenitz (2015) showing an application of the protostory model. IDN refers to Interactive Digital Narrative, redrawn (Frew, 2020)

The pre-narrative stage of an IIPN analysis (which includes the system and process of forming it in Koenitz's model) is important to consider as part of my theoretical model proposal. Koenitz provides a more detailed way of examining this with the idea of the 'protostory.' The "protostory denotes the concrete content of an interactive digital narrative system as a space of potential narratives" (2015, p. 99). It is at its essence the pre-narrative, the ingredients needed for the narrative to take place. Koenitz (2015) expands on his idea of the pre-narrative protostory by developing it into a more detailed model as shown in Figure 3-2. The model is made up of different elements the 'environment definitions, assets, settings, narrative vectors and narrative design.'

The 'assets' are pieces that make up the narrative, such as audio, moving image or text. The settings are the parameters of the program running the narrative. For example, the user interface, a pause function or save progress button. Analysing the initial interface of an IIPN can be a productive area to consider and so is included as a part of my IIPN model proposal.

In Case Study One, for example, how consent can be gathered from an audience member in the interface is considered in detail.

The 'environment definitions' for Koenitz involves both the physical hardware and the digital presentation of the explicitly interactive narrative. Koenitz intends this area to include the environment that the audience operates within. For example, an explicitly interactive narrative could be staged in a house that the audience can explore through a VR set as they wish. IIPN also uses both hardware and digital presentation techniques to display the narrative. The difference lies in that the IIPN audience member is not expected to roam autonomously. They are served a linear experience once the narrative has begun. Although designed for explicit interaction, this aspect of the model can still be valuable to an IIPN theoretical model. For example, in an IIPN similar to *Scanners* (Ramchurn, 2014) that uses the audience's brainwaves captured with a headset, the environment and hardware is likely key to an analysis of it.

The 'narrative design' is the way the narrative can be flexibly presented. It is the outline of how the narrative can be put together. This narrative design may be shown through diagrams such as those by Koenitz in his model (Figure 3-2). Here, when analysing an explicitly interactive narrative, Koenitz does not detail the narrative design in its entirety but shows the principle of how it is formed. There are many approaches that could be used for illustrating the narrative design, some of which are explored later in this chapter. This idea is useful to an IIPN theoretical model. Whilst an IIPN analysis does not need to show explicit interaction decision points, an illustration can still be made to show where and how changes to the narrative structure can occur. For example, in Case Study One a pseudo-code flow chart illustrates how data is used and the narrative is assembled.
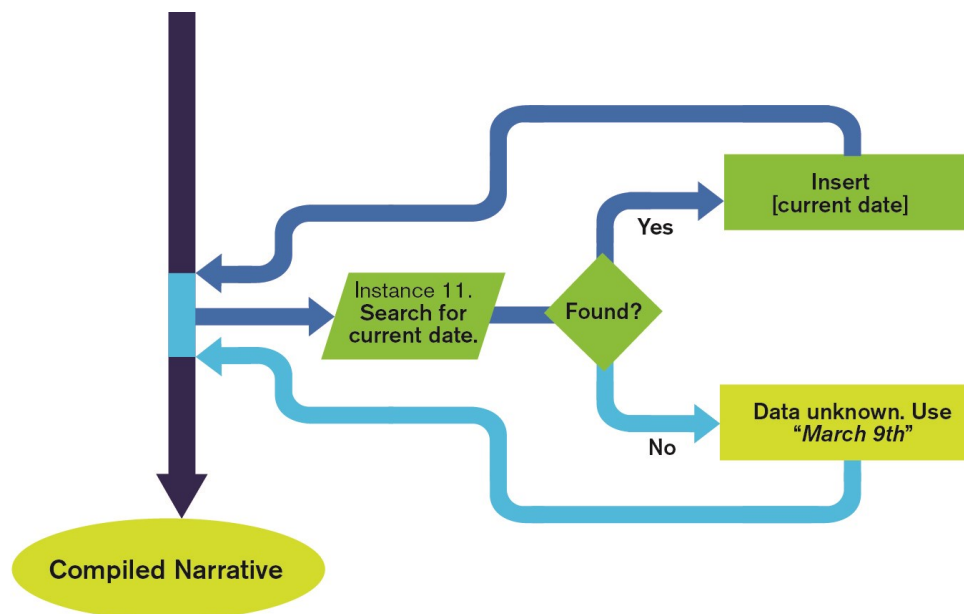
Figure 3-3 Example of a diagram of the computational structure of an IIPN from Case Study One (Frew, 2020)

The remaining term 'narrative vectors' is key to an explicitly interactive digital narrative. They are substructures within the narrative design that convey important information to the audience. Narrative vectors allow for more authorial control and keep the narrative on track. For example, in a murder mystery, a narrative vector may instigate key events such as another murder, or create a situation to stall the audience until they have all the information they need for the remaining plot to make sense. Digital narratologists Ruth Aylett and Sandy Louchart (2003) also have a term for this role, the 'drama manager.' Less plot focussed than Koenitz's narrative vectors, Aylett and Louchart argue that "the role of the drama manager should be only to intervene in order to regulate the dramatic interest of the narrative" (2003, p. 7). The drama manager's focus is on maintaining a high level of audience engagement with the narrative. Whilst IIPN responds to data rather than active user input, the notion of including the system that ensures the narrative responds appropriately to data input is useful to an IIPN theoretical model.

One key area for IIPN that is not included in Koenitz's model is data. IIPN is assembled based upon data about the audience and/or their context. An IIPN is assembled automatically, with the originator's design using this data. The data content that is taken in can be inserted as part of the story content itself, such as a word in some dialogue or an image. It can also

be used to determine which parts of the narrative to show and in what order. Unlike the explicitly interactive narrative Koenitz made his model for, there is no audience member inputting what the narrative should do next. The IIPN is all automated according to the data it receives. This makes the data source an essential part of understanding the narrative design of an IIPN and so a necessary part of a model for analysing it.

Describing the computational system

Describing the computational structure of an IIPN is a useful part of its analysis. Games studies theorist Carolyn Handler Miller (2008) uses diagrams and analogies effectively to demonstrate the varied structures of narratives in games. These techniques are also of use to an IIPN model. Miller explains that drama is made out of 'building blocks,' "small units of material [that] are assembled into a greater, interconnected whole" (2008, p. 121). Applying this analogy to explicitly interactive narrative, Miller states that you must first "work out both your smallest and your largest building blocks" and then "your decision or action points—the places where the user can make a choice or perform an action" (2008, p. 123). Miller's analogy maps well onto IIPN; the decision points could be understood as the set of rules put in the Edit Decision List and the possible objects available for assembly, the building blocks. IIPN then stops short of offering the audience choice in this assembly, as the computational rules that govern which data or objects can be found, also decide what is put into the narrative.

Another idea Miller uses to describe narratives in games is that of the interconnected root system. In an IIPN there can be an almost never-ending set of possible iterations of the final product. For example, in *Breaking Out* (BBC, 2012) the algorithm generating it looks for data on local bars, restaurants, and cultural sites according to the audience's location. The narrative is connected to a very expansive range of locations via the internet. Miller proposes a structure to describe this complexity as like an interconnected root system. In this system each piece can be connected to every other piece, there is no endpoint and no way out. The IIPN is like this root system through its pervasive nature. It is connected to a web of devices and data sources that help inform its eventual outputs.

The way Miller uses diagrams is useful to an IIPN theoretical model. Miller's branching narrative diagram Figure 3-4, for example, reflects the form of the IIPN examined in Case Study Two. The case study narrative is a film short with multiple possible beginnings, endings, and overall edits. Each circle is a node or action point within the story. The diagram uses different lengths of arrows and varying positions to show that each node may take a different amount of time or action to complete. The numbering within them shows how the structure quickly "escalates out of control" (Miller, 2008, p. 124). The numbers are not easy to follow, and it is hard to see how they might relate to an overall narrative. From the game player's perspective, their route through will only ever contain three steps with one possible ending. For the game maker, they have had to make nine possible endpoints, eight of which will not be seen by the game player. This makes the branching narrative structure resource-heavy for the creator as they need to provide more content for every branch they wish to add. As Miller highlights, a " branching structure like this squanders valuable resources" (Miller, 2008, p. 124).
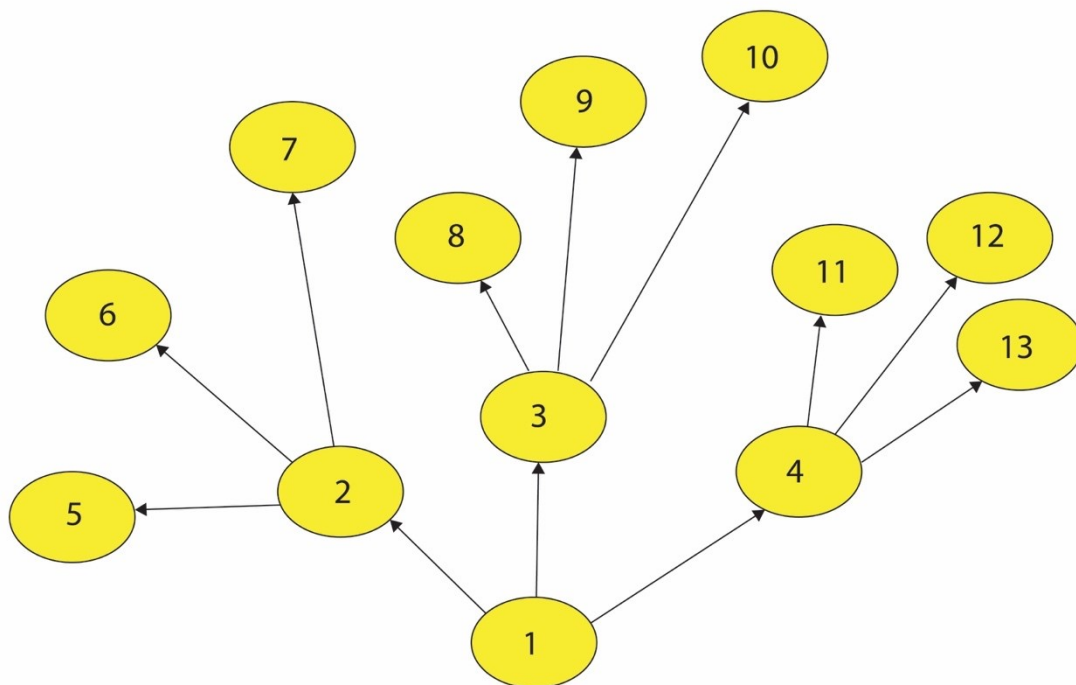
Figure 3-4 Branching narrative diagram, Miller (2008), redrawn (Frew, 2020)
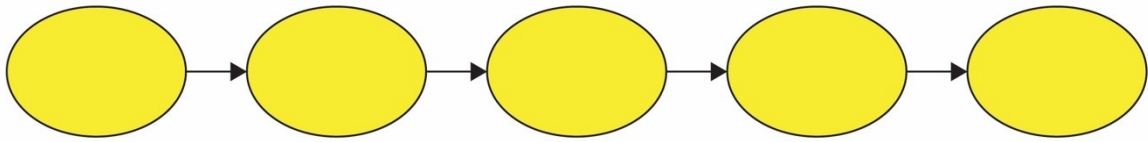
Figure 3-5 String of pearls diagram, Miller (2008), redrawn (Frew, 2020)

An IIPN has key plot points and sequences that are common to every experience of it. This makes the approach of the 'string of pearls' model (see Figure 3-5) a simpler one than the branching narrative. It is a node structure that allows scope for exploration if the narrative is a game. The 'string of pearls' describes a critical story path. In an explicitly interactive narrative, the audience can move around within the worlds, or pearl on the string, but must then return to progress into the next world. In a game, they may need to complete a certain task for example, or they can move on but not access all the parts wanted in the next pearl until they return to complete the previous one. The string of pearls does not fit neatly with an IIPN as it requires explicit interaction from the audience to decide how much to explore and move between worlds. It could, however, be used to describe the need for core elements to be displayed for an IIPN to make sense.
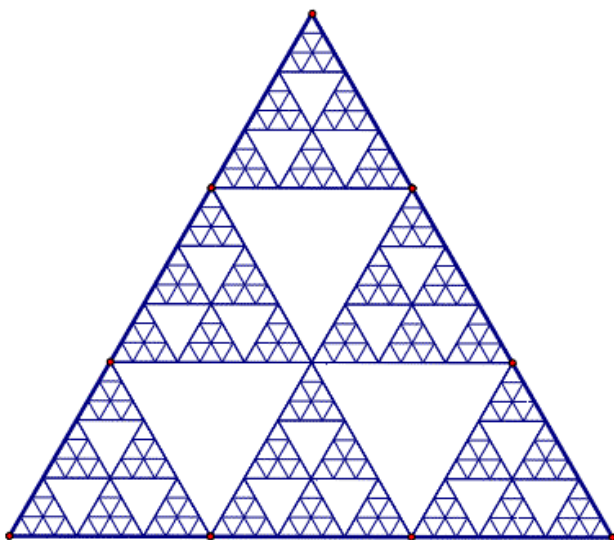
Figure 3-6 Waclaw Sierpinski triangle diagram of a fractal.

Miller's description of the fractal structure can be used to help explore another style of narrative. Fractal is meant in the mathematic sense as a pattern that repeats itself endlessly

in smaller and larger forms. For example, the Waclaw Sierpinski triangle in Figure 3-6 is a structure that remains the same no matter how far you zoom in or out on it. Miller explains that this fractal structure is a story that does not advance, instead, it expands. For Miller, this fractal model is a middle ground between the string of pearls to one that is ever moving as the narrative remains the same but grows with the audience. An existing interactive digital narrative, the *Responsive Radio Project* (BBC, 2015) is an example of this outside of gaming. Before pressing play, the audience is asked what length of the show they would prefer. All audience members receive the same core story, but the longer versions have additional non-essential content to supplement this.

The preceding examples of diagrams and analogies shows how the computational structure of an IIPN may be described. These are useful tools for an IIPN model as they enable the researcher to explore the narrative as a source of potential outputs. This is a more comprehensive approach than only considering the artefacts the system produces.

Approaches to analysing IIPN outputs

Dividing a text to discover similarities and differences between outputs

An IIPN will always produce multiple outputs that are different from one another. A key stage in a theoretical model for examining IIPN is discovering which elements are common across IIPN outputs and which are the variables. Existing narrative theory provides some strategies to do this. An important principle from all these ideas is dividing the texts into different layers to then analyse, compare and contrast. This creates an assumption that it is possible to truly separate a text into elements. Theorist Mieke Bal explores this concern and states that creating disjointed layers "does not mean that these layers *exist* independently of one another " (2009, p. 6, emphasis author's own). She explains that the layers "serve as instrumental and provisional tools to account for particular effects the text has on its readers" (2009, p. 6). They are layers made for a theoretical analysis. Therefore, whilst dividing the texts into layers is useful, retaining an awareness of how they intertwine and affect each other is important.

Bal separates narratives into three parts, the 'text', 'story' and 'fabula.'[6] Bal's first and most straightforward element is the 'text.' The narrative 'text' is a "finite structured whole composed of signs" (2009, p. 5). The text can be produced from any medium that can relay a sign, for example, "these can be linguistic units, such as words and sentences, but they can also be different signs, such as cinematic shots and sequences, or painted dots, lines and blots" (Bal, 2009, p. 5). The 'story' is the "content of that text and produces a particular manifestation, inflection, and 'colouring' of a fabula" (Bal, 2009, p. 5). The fabula is "a series of logically connected events and chronologically related events that are caused or experienced by actors" (Bal, 2009, p. 5).

Separating a text into the fabula and story is a useful technique for examining an IIPN. It can be used to show where differences in an IIPN's outputs are. This is important for analysing an IIPN as whilst the content is broadly similar, both the story and fabula may change between outputs of the same IIPN system. For example, by describing the fabula it was possible to show that the events did not differ at all in Case Study One. In contrast, mapping the fabula in Case Study Two showed that significant narrative events in the fabula changed between variations. In one variation the narrative climaxes with the protagonists' relationship ending and in the other, they stay together. Considering the story helped to show where smaller differences in the texts were, for example, the different intro and outro music in Case Study Two, could change the connotations of that moment in the fabula as more or less unhappy.

Vladimir Propp (1968) also provides a strategy that is useful to an IIPN theoretical model. He compares a limited number of variations of the same Russian fairy tales in order to draw out an overall narrative form common to them all. He uses a combination of tables, to aid comparison and longer discussion to help evidence his findings from these. This strategy can be applied to IIPN by comparing outputs from the same narrative system, rather than from different authors and regions as Propp did. Making these comparisons across outputs from

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[6] There is a large range of terms for the division of a narrative in narratology. Seymour Chatman (1978, p. 19), for example, divides a narrative into two components, the 'discourse' and 'story.' His 'discourse' has the same meaning as Bal's 'story' and Chatman's 'story' has the same meaning as Bal's 'fabula.

an IIPN can be used to uncover its underlying computational structure as well as similarities and differences in the story and fabula.

Whilst the method Propp uses is useful for IIPN, some of the detail of his work is not, as it is very specific to Russian tales. Propp built a set of 31 narrative functions to represent the content of Russian fairy tales. He determined that these functions always appeared in the folk tales in the same order to create a whole. For example, Function 16 *Struggle* where the Villain and the Hero go into direct conflict is always followed by Function 17 *Branding* where the hero is marked in some way by the conflict either by a scar or artefact. This list of 31 functions in a set order is too precise to be relevant for IIPN and many other forms of narrative. For example, Marc Cavaza and David Pizzi highlight (2006) that Propp's approach does not work well with interactive digital narratives. The fixed sequence prevents a branching narrative style and the potential of multiple storylines. Case Study Two, for example, has two different endings and so could not fit a Proppian structure. Further to this, Cavazza and Pizzi argue that the theory has a "lack of character perspective, [and] the lack of a psychological level of representation (for emotions, feelings or self-appraisal)." Therefore, this theory does not offer enough of an insight to justify the work needed to directly apply it in an analysis of IIPN narratives.

Despite the specifics not being relevant to IIPN, Propp's way of thinking about narrative as a series of functions is helpful. In an IIPN the content is adjusted in real-time according to the audience and/or their context. These adjustments are made according to 'algorithmic functions' that behave similarly to Propp's narrative functions. In both IIPN and Propp's corpus of Russian fairy tales, the core functions remain the same but the presentation changes according to the audience and time it is made. In *Oedipus: A Folklore Casebook* Propp shows how aspects of the *Oedipus* story change over the centuries (Propp, 2000, pp. 58–62). For example, in some versions of *Oedipus* at the end he becomes the king in others he is simply dead. By comparing variations of *Oedipus* Propp's aim is to show how sociological changes through history such as marriage and technology may alter the story. Propp argues that changing technology can produce hybrids between the old and new such as the mythological animal the winged horse. He suggests that the winged horse takes the cult role of the bird and transfers it to the horse as they became domesticated. Here Propp

is demonstrating that whilst the same narrative structure remains, parts of it change to better resonate with the society of the time. In IIPN these small changes happen in a much more immediate way. Rather than over centuries, IIPN changes at that moment according to the audience. For example, Case Study One alters the location it is set in based upon where the audience is. This points to Propp's strategy of dividing a narrative to find common elements and then discussing where the differences are as useful to the IIPN theoretical model.

In 'The Narrative Structure in Fleming,' narratologist Umberto Eco (1982) also provides a strategy for dividing up a narrative in analysis. Eco creates an argument for an overall narrative structure in Ian Fleming's James Bond novels. He does this with an exhaustive analysis of the events in the plot, the characters and then comparing them across books. Eco's approach is more flexible than Propp's and so more relevant to an IIPN theoretical model. Eco proposes a descriptive table of the narrative structure "while seeking to evaluate for each structural element the probable incidence upon the reader's sensitivity" (1982, p. 244). Eco determines that Fleming's plots are made up of pairings, such as characters Bond and M, Bond and Villain and Bond and Woman. Propp's method did not allow for this focus on character. Central to Eco's analysis is that whoever the villain or woman might be they are essentially the same character in each novel. He provides evidence for this by using long paragraphs describing villains and their relation to his determined characteristics of the Bond villain. Eco observes that all of these elements "are always present in every novel" but that it is not "imperative that the moves always be in the same sequence" (1982, p. 255). This is more flexible than Propp's approach that does not allow for elements to be in any order.

As IIPN's are partly computational, it is possible that applying Eco's technique to the products made by one system could determine a common structure. In contrast, Eco's structure is not comprehensive within a corpus of James Bond novels. As he notes himself, Eco deliberately does not use examples that do not fit his structure from Fleming's body of work. He rejects *The Spy Who Loved Me* (1962) "which seems quite untypical" (1982, p. 244) as it does not adhere to his model. This limitation, even within works by the same author shows that it is very difficult to find an 'absolute' narrative form in literary works. In

contrast, as an IIPN is made from the same computational structure, it is possible to derive a common framework between variations.

Barthes provides an even finer grained approach to dividing up a narrative that is of relevance to the IIPN model proposal. Rather than being focussed on finding a common structure as Propp and Eco were, Barthes is trying to uncover the possible meanings a text holds for the reader. In 'Textual Analysis: Poe's Valdemar,' the first step in his proposed method for narrative analysis is to divide it up (Barthes, 2000, pp. 131–132). He suggests that "we shall cut up the text… for study into contiguous, and in general very short, segments" (2000, p. 131). He names these short segments lexia. "A lexia is an arbitrary product, it is simply a segment within which the distribution of meanings is observed; it is what surgeons would call an operating field: the useful lexia is one where only one, two or three meanings take place" (2000, p. 131). After this, Barthes suggests the analysist should "observe the meanings to which that lexia gives rise" (2000, p. 131). He sees the lexia as "the finest possible sieves, thanks to which we shall 'cream off' meanings, connotations." (2000, p. 131).

This process can be applied to IIPN as a strategy to uncover in what ways the final texts produced by the same IIPN can differ. By using lexia Barthes is not intending to show the order of occurrence of events. Neither is it an attempt to find every possible meaning in the text. Instead, Barthes sees it as a way to locate "avenues of meaning" (2000, p. 130). For IIPN, this lexia strategy can help to show if and when variations differ. For example, in *Breaking Out* (BBC, 2012) there are points at which the dialogue changes according to weather data gathered at the time of playout. By dividing the case study text into lexia at the points where these data insertions happen, it is possible to then look at what their connotations are. Such as, if the weather is sunny in one variation, this has different connotations to it being rainy in another.

In an IIPN there may be infinite variations of the text itself as well as their connotations. Barthes does not see a multiplicity of meanings as a disadvantage, he argues "undecidability is not a weakness, but a structural condition of narration: there is no unequivocal determination of the enunciation: in an utterance several codes and several voices are there without priority" (2000, p. 137). Considering every possible connotation of each lexia in a

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text is too larger task to ever be complete, even more so in an ever-changing IIPN. Barthes finds that "a narrative is not a tabular space, a flat structure, it is a volume, a stereophony" (2000, p. 137). The multiplicity of meanings, he describes as the beginning of intertextuality, where the meaning of one text is influenced by another. "What founds the text is not an internal, closed, accountable structure, but the outlet of the text onto other texts, other signs: what makes the text is the intertextual (2000, p. 132). For the IIPN researcher, considering this intertextual influence of one lexia on another is important, as at times IIPN literally includes a text external to the narrative. How the connotations vary between IIPN narrative products is an aspect of what makes it different from other narrative forms and so is a key part of its analysis.

In an IIPN analysis, the lexia may maintain the order reflected in one playout but there is a potential for "partial reversibility" as Barthes describes in another work, *S/Z* (2002, p. 20). Barthes argues that some parts of a text can be reordered, and others must remain in the same sequence. This is most applicable to IIPN where there are multiple beginnings, endings or internal narrative threads as there is in *The Break Up* (Amedume, 2016). This type of narrative requires a list of lexia that takes into account divergences in the story events. In *S/Z* Barthes highlights that defining the lexia allows him to then consider the "shifting and repetition of the signified" (2002, p. 14). This consideration of shifting and repetition is doubly important in relation to IIPN texts to better examine how they differ from version to version.

Barthes' concept and term lexia has been used and expanded on by digital theorists in different ways that are helpful to IIPN. George Landow (1992, p. 4) develops the term for digital media in a way that maps onto IIPN. Firstly, Landow does not limit the lexia content to lines of text but states that "lexia may include graphics, sound, or even full motion video" (1992, p. 4). This is relevant to IIPN as it can appear in any media format. Additionally, Landow, working with hypertext, describes lexia as "connected by electronic links and may be read in a variety of orders" (1992, p. 4). Therefore, a reading experience that involves following the links and the potential readings of the texts is limited only by the possible permutations of these links. He argues that the concept works well in line with Barthes' stance in *S/Z* (2002) where a text can be partially reversible and have no true beginning. It is

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straightforward to use this understanding in relation to IIPN as it clearly maps on to the concept of object-based broadcasting. Here the objects can be understood as lexia that are then arranged by an algorithm according to a specified data source. Like Landow's hypertext, the IIPN is only limited by its internal rules. It can bring in any number of other data sources, for example, Case Study One brings in the titles of films.

In the latter case studies I use the term lexia to describe the division of the prototypes into smaller chunks. In a way similar to how Barthes describes lexias, the ones I created are "arbitrary in the extreme" and their contents "a matter of convenience" in order to create the "best possible space in which we can observe meanings" (2002, p. 13). In the analyses, the lexia are created at key plot points in order to study where the narratives vary in the story rather than throughout the entire texts. This is to focus on what makes the IIPN different to narratives with only one iteration and to keep the scope manageable.

The relationship between real world data and the story world

One of the things that makes IIPN different to other kinds of narrative is the way in which it uses data from the real world as part of the story world. This makes the use of data, both as potential data in the pre-narrative and its appearance within outputs a key part of its analysis. Narrative theory offers some ways of thinking about and examining the movement of data from the real world into the story world that can be used within an IIPN theoretical model. One of these is the concept of metalepsis, originally defined by Gérard Genette (1980) as "any intrusion by the extradiegetic narrator or narratee into the diegetic universe (or by diegetic characters into a meta-diegetic universe, etc.), or the inverse" (Genette, 1980, pp. 234–35). In other words, when one world moves into another. This can be between different fictional worlds and between the actual world we live in and the narrative. There is a hierarchy of worlds, with the upmost world being our own, the next is the story world, then followed by an imaginary world within the story. This movement between worlds is a part of IIPN. Data about the audience or their context informs the shape or content of the story world it is presenting making an IIPN text metaleptic. It is an

additional level of metalepsis not generally available to digital narrative as it directly includes real-world elements in the story world context.

As a narrative form, IIPN inherently contains metalepsis of a descending kind. This is where something from one world moves down the hierarchy into another. In IIPN, this is the data from the real world moving down into the story world. For example, in IIPN *Take This Lollipop* (Zada, 2011) images from the audience's social media account appear in the story world. The reverse is also possible as an ascending metalepsis, where elements of one world move up into the next. An ascending metalepsis, for example, could be the characters in a movie reading a comic book only for the comic book characters to come to life in their story world. An IIPN text may contain either kind of metalepsis or none at all as part of its story. But, as a narrative form, as it uses data about the audience or their surroundings to alter the story world it will typically have a descending metalepsis.

In addition to ascending and descending metalepsis, there are a range of digital media specific ideas provided by Alice Bell (2014, pp. 21–38) that relate to IIPN. One of these is 'transworld identity.' Bell explains that "an individual is said to possess 'transworld identity' when she moves from one ontological domain to another" (2014, p. 24). It is when the reader is asked to believe that a character has completely moved from one domain into another. The character now has a transworld identity. Someone can also have a partial transworld identity, where only part of them has moved into the other world, Bell terms this "synechdochical metalepsis" (2014, p. 32).

Synechdochical metalepsis is something that appears within Case Study One for some of the audience members. The narrative involves inserting place names and local bars, pubs and restaurants into the dialogue. This places the audience partially in the same ontological domain as the narrative. When an audience member is surprised by this it can be uncanny. In an interview with a producer on the project Ian Forester (2017b), he explained that the insertion of someone's local pub into *Breaking Out* was unnerving for one person in his user testing. Despite this, Bell highlights that the metalepsis in a digital narrative can be positive; "rather than causing alienation, metalepsis can be used to increase the reader's immersive experience of the text." (2016, p. 301). Bell is discussing the explicitly interactive

text *Clearance* (Campbell, Alston and Johnson, 2007) where the reader is very aware of their influence or presence in the text, an IIPN audience is more likely to be surprised.

Breaking Out also contains references to real-world cinema referred to by a character. As with the location data's potential to be uncanny, the feeling of a synechdochical metalepsis for the audience member in *Breaking Out* depends on whether they have realised it is there. It could be argued that if the audience is unaware of the encroachment of the real world in the narrative world it is not metalepsis. Bell states "references to nonfictional entities in fiction, such as the Mall of America, are not metaleptic in themselves because they form part of the story world" (2016, p. 306). Therefore, the experience of metalepsis for the audience may be reliant on their awareness of how IIPN is being used in the narrative they are experiencing.

There is another form of metalepsis possible to find within IIPN, 'counterparthood.' This is when someone appears simultaneously in two worlds, rather than as wholly moved into another. Bell (2016, p. 24) offers the example of Martin Amis, an author, in his book *Money* (2005). In this book, Martin Amis plays a game of chess with John Self. Here, the reader knows that "Martin Amis exists in the actual world as the author of *Money*, and Martin Amis also exists in the fictional world as John Self's opponent" (2016, p. 24,25). The two Martin Amis' are counterparts of each other, as they exist in tandem as separate individuals.

Bell also modifies counterparthood to better suit a digital text. In a section likely to be relevant to many digital narratives she considers the "metaleptic cursor" (2014, p. 28). She argues the cursor on the computer screen represents the audience. This representation suggests they have a version or copy within the narrative and therefore a counterpart. Whilst the audience interacts with their body by moving the cursor they are 'reembodied' on the screen as it mimics their movements. It is a representation of them in the digital realm that symbolises their choice as they click to make a decision in an explicitly interactive digital narrative. This allows the audience to be in both worlds at the same time despite the audience not being on the same ontological level as characters within the story. Bell describes the story world that the cursor is sat within as a "mediating space" similar to that of an omniscient narrator. They are not on the same level as the characters but one world above this where one might observe and comment, for example. This means that the

audience is simultaneously in two different worlds, and so as having a counterpart in the story world. Bell emphasises that this does not reflect an exact use of counterparthood as the cursor is purely a visual representation of the audience, not an exact copy. Therefore, when applying this theory it is important to identify *how* they are counterparts. There are two suggestions for doing so. The first is through the use of shared proper names for the counterparts, in this case, irrelevant as the cursor is a visual icon. The second is if the two things can be considered to share essential properties. For the cursor their shared properties are a spatiotemporal position and function, the mouse and cursor move in time and complete actions as the audience wishes (2014, p. 30). The cursor is a counterpart of the audience.

As IIPN uses data generated in real-time this offers it an opportunity beyond the metaleptic cursor to locate the audience in the same spaciotemporal position as the story. Following Bell's arguments, the audience gains counterparthood when listening to *Breaking Out* because it contains data insertions that relate specifically to that audience member. They are located in the same spatial world of the narrative, through the inclusion of local landmarks and in the same temporal world with the day's date and weather. As a result, the audience is simultaneously in two different worlds and so has counterparthood. This is a level beyond a typical explicitly interactive digital narrative where the audience uses a mouse to make a choice. It is an inclusion of direct references to elements of the real world, not only the audience's decisions.

Exploring the spaciotemporal relationship between the audience and the IIPN created by its use of data may be a rich area of exploration in an analysis. There are some concepts from narratology that can be brought in to help deal with this. Paul Ricoeur (1980) provides the notion of 'public' and 'internal' time. The external public time is the now of the audience experiencing the narrative. In its recitation a story is open to the public, be that through written text or otherwise. In addition to the external public time, Ricoeur outlines that a narrative has its own internal time; the characters can refer to others in the 'now' of the narrative. The narrative has its own within-time-ness. Narratologist Seymour Chatman also draws this distinction in the plot time and reading time "discourse time – the time it takes to peruse the discourse – and story time, the duration of the purported events in the

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narrative" (1978, p. 62). For IIPN, a reflection of how the internal time and public time are communicated, particularly in relation to where variations or data insertions occur may be useful to an analysis. For example, in Case Study One the public time of day is quite literally placed into the narrative itself. This fixed the internal narrative into the public now, which on further analysis was inconsistent with other parts of the internal narrative time, as the story referred to locations that do not exist in the public now. In the case study, this became a fruitful area for consideration, where at each point a variance occurred.

In terms of the IIPN theoretical model, the key idea taken forward from this section is to examine how data from the real world is influencing the narrative. The concepts of metalepsis and narrative time outlined in this section are possible ways of doing this. However, whilst useful, they are not a core part of the model as their relevance depends on the aims of the researcher.

Conclusion

In this chapter I have located narrative theories that relate to IIPN. These theories are a starting point for the IIPN model proposal tested in the next two case studies. The first section in this chapter is centred on identifying an IIPN text to study. Ryan (2007) provides a framework to help define a digital *narrative* and Aarseth's (1994) work on explicit interaction has helped to inform my own definition of IIPN.

The next section focussed on the principle of analysing IIPN as a space for potential narratives. This is raised by Koentiz (2015) as the 'protostory.' In the case studies, this notion is taken forward as the 'pre-narrative' part of examining an IIPN. This is a consideration of all the elements that potentially help to make an IIPN output, not just an examination of the outputs themselves. An idea taken into this 'pre-narrative' section is the importance of examining the computational structure as part of an IIPN. Miller (2008) provided a diagrammatic example of how to visualise the computational structure of interactive digital narrative.

Another principle taken into the model proposal is that of comparison to find similarities and differences between texts. Barthes (2002), Eco (1982), and Propp (1968) demonstrated

a way of comparing the structure of the fabula and story-based elements of narratives through tables, pairs, and separating the narrative into lexia. For IIPN, essential to this Koenitz's (2015) idea that it is important to examine more than one output from a digital narrative system. In the case studies this is taken through as the 'product' section. Here, different outputs produced by the IIPN's are compared and contrasted.

The final part of my model proposal is the influence of data, via implicit interaction, on the narrative. This is a key part of IIPN texts but is not covered in current theory directly. Some theory that deals with external influences on a text is metalepsis. Bell (2016) provides a series of ideas around digital metalepsis that may prove useful to researchers depending on the text they are examining. The principle from Bell's work taken into the model is to be specific in an analysis on how the influence of one world on another is taking place. As this is relevant to both the pre-narrative as a potential story space of an IIPN, as well as its output, I include examining the influence of data throughout all areas in both case studies.

4 Case Study One – *Breaking Out*

Introduction

The goal of the case study is to examine the British Broadcasting Corporation's Research and Development Department's (BBC R&D) prototype *Breaking Out* (BBC, 2012)*,* to determine areas of success and failure to inform future Implicitly Interactive Pervasive Narrative (IIPN) makers in their own productions. This is through testing a model proposal based upon the theory explored in the previous literature review chapter. The model is broadly a structure that splits the case study into two sections; Pre-narrative and then Product. As argued by Koenitz (2015), the result of this is that the whole shape of the narrative can be considered. The first section addresses the pre-narrative and is concerned with identifying all of the potential components that make up a narrative product. This included the identification of data sources and how they are put together to form a narrative. The remainder of the chapter aims to draw out insights into production whilst applying relevant theory from the literature review.

Pre-narrative

Introduction to the narrative

Breaking Out was piloted with the public online in a web browser at www.futurebroadcasts.com for a period of four months in summer 2012. It is the first example of IIPN launched by the BBC and remains online in 2020 but had stopped being maintained. The play is set in a lift, inside an apartment building where Harriet, an agoraphobic, lives. During *Breaking Out* Harriet decides to leave her flat for the first time since she moved in. When she gets into the lift, it gets stuck and her journey takes a strange turn as the lift, the second main character, begins to speak to her. With encouragement from the lift, Harriet is slowly lowered to the ground floor where the narrative ends as she makes her way into the outside world. Within *Breaking Out* the adjustable part of its

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delivery is found in small changes made to the dialogue. These differences are informed by data in real-time delivered by the robotic voice of the lift character.

The computational structure

To identify where and what kind of data is being used in the pre-narrative, only the lift's dialogue needs to be considered. To do this, I compared what the lift character said in four variations of the narrative product. This provided a likely indication of which lines used data to alter the dialogue. These notes are compiled into Table 1 below. The variations are the original script, one recorded in Stockholm July 2016, Manchester May 2017 and one recorded in Edinburgh May 2017. This range was chosen as it offers a comparison between locations in and outside of the UK, the date and time, and the baseline of the original script. The same variations are used for analysis throughout this case study.

This table shows that there are 11 instances in *Breaking Out* where the dialogue spoken by the lift has been changed according to the data accessed. I have defined an instance as a single line where words can be changed. One of these lines contains two words that can change but is counted as a single instance. The table also shows that there are six kinds of data used. These are location (5 instances) weather (1) social media (1) cinema listing (2) news (1) and date (1).

	Manchester May 2017	Edinburgh May 2017	Stockholm July 2016	Original Script
1	Missing out on all of **Manchester**	Missing out on all of **Edinburgh**	Missing out on all of **your city**	Missing out on all of **Manchester**

2	You could go to the **Printworks**	You could go to the **Scottish National Gallery of Modern Art**	You could go to the **Imperial War Museum**	You could go to the **Imperial War Museum**
3	You could make it to the **Chorlton Water park**	You could make it to the **Edinburgh Castle**	You could make it to the **Urbis**	You could make it to the **Urbis**
4	Well it's **raining**, I guess it depends how much you like the **rain**	Well it's **sunny**, I guess it depends how much you like the **sun**	Well it's **raining**, I guess it depends how much you like the **rain**	Well, it is **raining**. I guess it depends how much you like the **rain**
5	Oh, erm, maybe if you got off **Twitter** and **Digg** and went outside	Oh, erm, maybe if you got off **Twitter** and **Digg** and went outside	Oh, erm, maybe if you got off **Twitter** and **Digg** and went outside	Oh, erm, maybe if you got off **Twitter** and **Digg** and went outside
6	You could go to the cinema. The **"A Fantastic Fear of Everything"** is on, it'll be funny	You could go to the cinema. The **"A Fantastic Fear of Everything"** is on, it'll be funny	You could go to the cinema. The **"A Fantastic Fear of Everything"** is on, it'll be funny	You could go to the cinema. **The Muppets** is on, it will be funny
7	See a horror **"The Harsh Light of Day"** is on, it	See a horror **"The Harsh Light of Day"** is on, it	See a horror **"The Harsh Light of Day"** is on, it	See a horror**? The Raven** is on. It will not matter if you scream

	won't matter if you scream	won't matter if you scream	won't matter if you scream	
8	Just to go for drink in **Rain bar** or a meal in **Harvey Nichols**	Just to go for drink in **The Dome** or a meal in **The Winter**	Just to go for drink in **Kro Bar** or a meal at **Stock**	Just to go for drink in **Kro Bar** or a meal at **Stock**
9	**"the economy may continue to shrink, as a man in Cornwall is jailed for life for blinding his girlfriend we talk to her about how she's coped"**	**"the economy may continue to shrink, as a man in Cornwall is jailed for life for blinding his girlfriend we talk to her about how she's coped"**	**"the economy may continue to shrink, as a man in Cornwall is jailed for life for blinding his girlfriend we talk to her about how she's coped"**	Script states **"SOUND: NEWS PLAYS"**
10	**Cathedral?**	**St Giles Cathedral?**	**Palace Theatre?**	**Palace Theatre?**
11	**May 9th**	**May 9th**	**July 23rd**	**March 9th**

Table 1 Table of script sections where data is used to change the dialogue in different variations, the changeable elements are in bold.

As it was straightforward to identify the places where data was inserted through comparing variations, *Breaking Out* can be drawn as a diagram to show this. The diagram attached in the Appendix 2 shows all the potential pathways the computational structure may take in order to generate the narrative. The computational structure has been mapped with an evenly spaced flow chart as data is retrieved at the moment of playout, rather than as

needed throughout. The flow chart was made using pseudo-code. Pseudo-code is appropriate as it is a standard way to make a high-level demonstration of how a program works for humans, rather than computers. It is useful for communicating with non-technical audiences. In the computer program itself, each stage in the flow chart would be made up of several lines of code. This is a level of detail not needed in narrative analysis. In Figure 4-1 below the same section of the narrative is presented both with and without pseudocode conventions to show how they make the process clearer. This is because it demonstrates at a glance with different shapes that the stages in the flow chart are different functions (Figure 4-2). Using " " around terms to be inserted and in [ ] around changeable content also helps keep the diagram easy to follow.
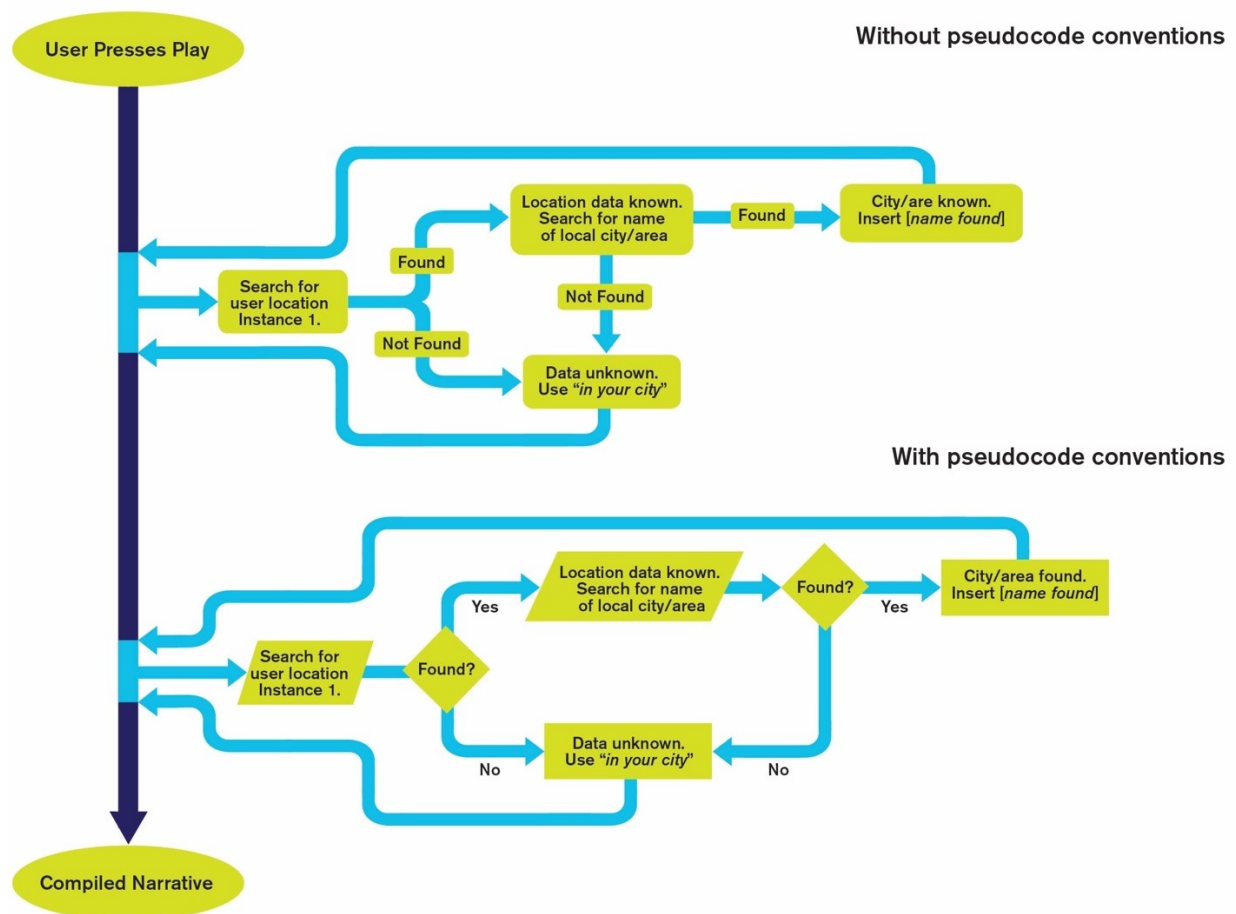
Figure 4-1 Diagram showing the use of pseudocode and non-pseudocode in Case Study One (Frew, 2020)

Figure 4-2 Key of pseudocode flow chart shapes (Frew, 2020)

To test the accuracy of the flow chart, I used it to show the path taken by the entire Edinburgh variation (see Appendix 3). Figure 4-3 shows the simplest example of a pathway in the play, where the date is found and inserted. The pathway taken through the flow chart to create the Edinburgh narrative is represented through the use of darker colours. Here, we can see the algorithm would first search for the day's date and a decision point on whether it finds the date or not follows. After this, we see that it is successful, and so returns to the narrative (represented by the thick navy line to the left) with the day's date to be inserted on playout. As it is the last instance of data to be added to the play, the next step the computational process does is to compile the narrative. This decision point was successful for all of the variations used in this analysis.
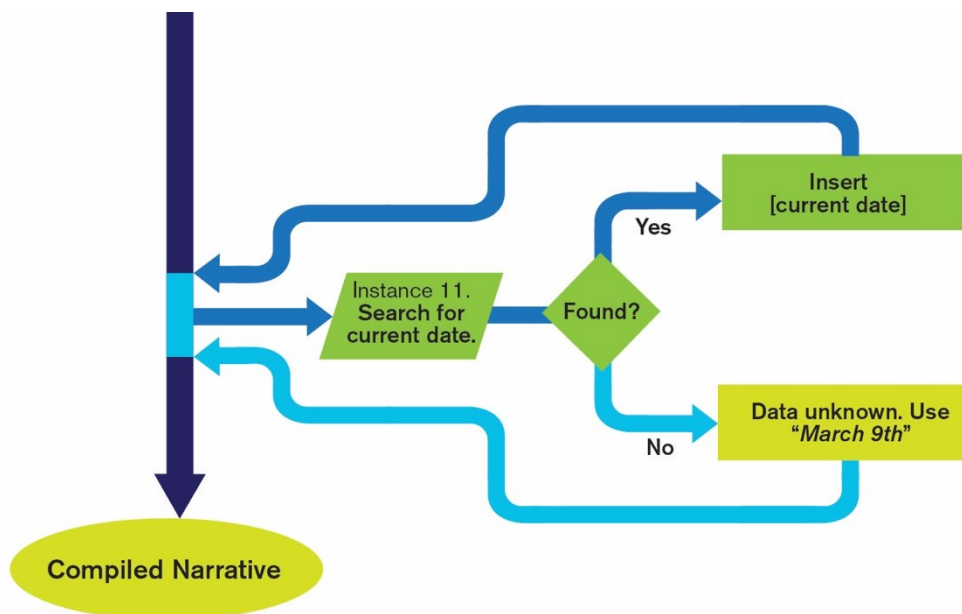
Figure 4-3 Path taken in a pseudocode diagram of finding the day's date within the Edinburgh variation of Case Study One.

Testing the flow chart by applying it to a variation had two benefits. It ensured that the flow chart was not missing any steps with errors corrected if any were found. It also meant that a

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clear demonstration could be made as to how the play worked. It showed that for every data variation there was a set of pathways not used. This means that unlike a traditional linear narrative, as *Breaking Out* uses data to inform which words to use, in the event that no data is found, a placeholder is required instead.

Challenges of working with IIPN as the state of the art

Development stage

The available technology dictated the media form of the narrative even in the initial stages. The audio play format was chosen by Forrester (2017b) based on the capabilities of web browsers at the time (2012). Forrester judged that there would be limitations, but that SMIL (Synchronised Multimedia Integration Language, a programming language) was likely to be capable of audio playback for an object-based delivery.

From an accessibility perspective *Breaking Out* is limited as it requires audiences to have access to the latest 'state of the art' technology. In this instance, as the prototype's purpose is to utilise the newest technology this issue is inevitable. Work from BBC R&D is required to use new technology and so cannot avoid the, often expensive, hardware and/or software needed to run it. This makes it inaccessible to some people. Future IIPN works from other broadcasters and non-research parts of the BBC will be able to improve this as the technology develops beyond the test-bed. The web browser that was cutting edge at the time of its launch is now standard in 2020, for example.

One of the challenges of working with IIPN is introducing it as a narrative form to others. There is a lack of existing examples available to help explain what it is. Creating a proof of concept to help with this, explains Forrester, was the key aim of making *Breaking Out.* The struggle to communicate what this media form is was felt in the earliest stages of the project's development. Forrester went to the BBC Writers Room to commission a writer. The BBC Writers Room is a space organised by the BBC to develop both new and experienced writers who are interested in working with them. Forrester presented the concept of IIPN and the possibilities of assembling a radio play in real-time. Forrester

(2017b) commented that the writers met the project with scepticism. There were remarks that it would ruin storytelling, that there was no foreseeable benefit, that it's so like a branching narrative that it is pointless and that it removed the writers' control. Despite this initial scepticism, and with support from Henry Swindel, the head of the BBC Writers Room at the time, the writers returned treatments based on a brief.

The parameters of the brief were that the play could include location and weather data, it must have a small number of characters, be in a limited space, and that one of the voices must be robotic. The available technology restricted the brief to only audio and that the data used must be delivered through a robotic voice. The short length, limited space and few characters were determined by the tight budget as it is cheaper to have few aspects. As technology advances the constraints will lessen. For example, in 2020 it is now possible to have more realistic voice simulation. This means a brief written in 2020 would not be constrained by the need for a robotic voice.

Working to create a narrative in new technology has a reputational risk as it is not possible to be confident in the quality of the final outcome. This means it is not always feasible to work with some media partners both internal and external to the BBC. Forrester (2017b) described how he received treatments from several writers. One of the treatments, not written by the successful writer, he felt had potential. This treatment had to be rejected because it was too similar to a BBC Radio 4 programme. Going ahead with a story so close to another would have been a reputational risk due to its potential breach of copyright. Forrester felt that they were unable to work with BBC Radio 4 directly as the technology was not sufficiently developed. This shows how using riskier new technologies can hinder potential partnerships.

Production stage

At times new production methods were deployed during the scriptwriting phase. Forrester described how Sarah Glenister, the writer, initially worked up her treatment into a script to share with Forrester as a conventional PDF. Forrester wanted to run the writing process differently and so put the script into an online document that allowed multiple people to

edit the same version at the same time. The software developer Happy Worm Studio was then hired to complete the technological side of the project as they had the experience of working with JavaScript (a programming language) and audio on the web. As a team, they all contributed to the development of the script in the online document. The technologists would input at points to suggest where data could be applied.

Both the trialled co-editing production process and use of state-of-the-art technologies had an impact on the final play. When the play was at a point where it could be viewed online the scriptwriter could not access it. In 2012 Google Chrome, a state-of-the-art web browser was needed to play the narrative. Unfortunately, the writer's computer was unable to support Google Chrome, limiting her ability to give feedback. Combined with Glenister's inexperience, Forrester felt she was unable to always assert her own creative vision for the project, realising a fear raised in the Writers Room that the technology could cause a loss of control. This reduced influence of the creative member of the team on the project will have contributed to the overall quality of the play with the artistic intentions of the scriptwriter not being the same as the technologically focussed programmers. As shown later in the case study, the technologists added in some of the placeholder words used in the play when the data insertions fail. As well as changing the tone by adding placeholders, there is some evidence that the technologists' involvement in editing affected the grammatical accuracy of the script itself at point 8 in Table 1. Here the technologists' placeholders contain the error of missing the word 'a' in the line "Just to go for (a) drink in Rain bar or a meal in Harvey Nichols." This mistake is not made in the original script.

Interface Design

As the prototype uses experimental processes it poses a reputational risk to the BBC if it does not work. Consequently, a final production challenge for *Breaking Out* was finding the best place to host it. The play was deemed not to be a good fit for BBC Taster, the home of experimental work produced by the BBC. Its typical setup involves the audience either actively answering questions about the piece they view or the expression of some kind of explicit interaction throughout. As Forrester was aiming for an audience experience with no interaction or questionnaire this was not a suitable home for the play. The other platform

available internally is BBC iPlayer (Figure 4-5) which is for professional quality work. As a result, *Breaking Out* was hosted on a bespoke website. This shows how within a large organisation such as the BBC, even with areas designed for experimental work such as BBC Taster, not all the work it produces can fit what is already established.
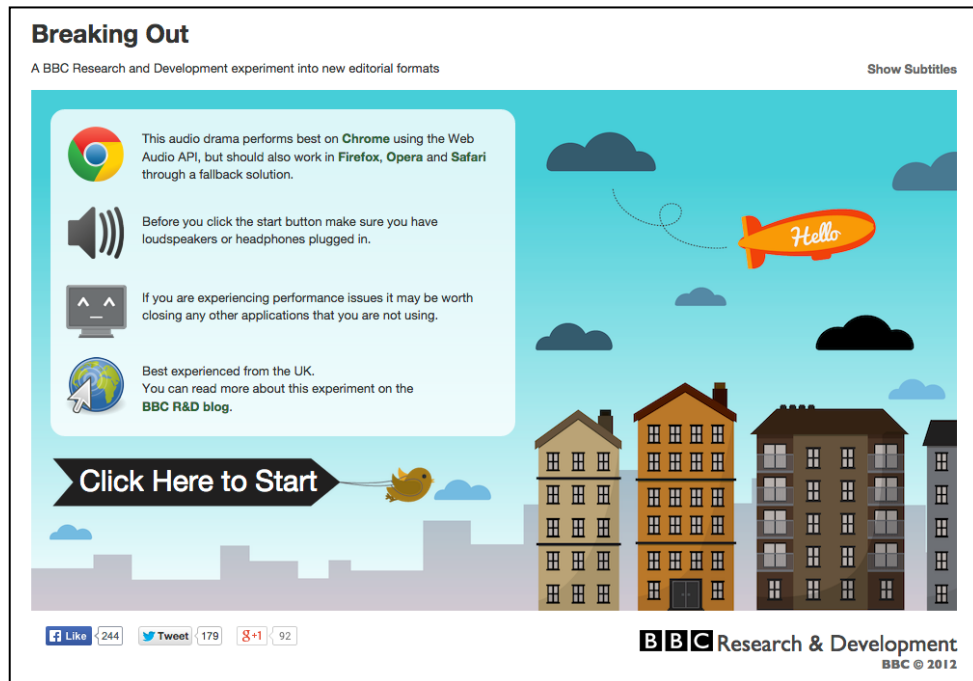
Figure 4-4 The landing page for *Breaking Out* (BBC, 2012)

Figure 4-5 BBC Radio 4 website where a radio programme can be accessed online (BBC Radio 4, 2017)

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Using state of the art technologies can require the development of different interface design and graphic language compared to traditional broadcasting platforms. In *Breaking Out* the design of the graphics interface and illustrations help to communicate that it is a prototype and set up expectations for the audience. By bearing in mind semiotic theory around graphic design from David Crow (2010, p. 55) on the importance of symbols and their meaning in context, it is possible to show what the interface design communicates. On the landing page, Figure 4-4, the design does not immediately communicate to the audience an expectation that this website houses a narrative. Whilst we have the same text hierarchy convention of a programme title in a large point size, it is at the top of the web page where the media company's name and logo would be expected.

Despite the unconventional graphic design for a radio play, it is still clear to the audience how to access it. The most prominent part of the page is the 'Click Here to Start' shown in Figure 4-6. This part of the page uses analogue symbolic language to help the audience navigate. This can be understood through Jay David Bolter and Richard Grusin's idea of 'hypermediacy' (see literature review) as *Breaking Out* is using the language of another media form. Much like its analogue counterpart, the way in which the radio play begins to playout is through the pressing of a 'button.' In the homepage, this button is symbolised through a long banner which ends in a point to the right echoing the analogue triangular play symbol. The use of the word 'start' as opposed to play and the less conventional banner rather than a triangle symbol helps prepare the audience for an experimental setting. This is useful to the BBC as this is primarily a prototype and creates their desired impression. For future works, this may differ.
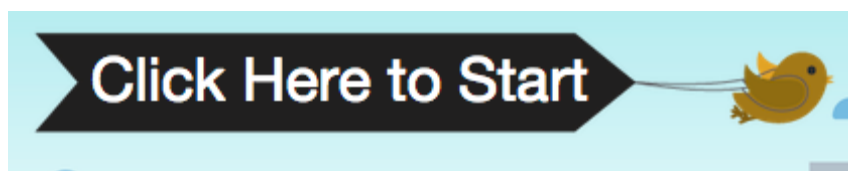
Figure 4-6 Close up of start button banner on *Breaking Out*'s (BBC, 2012) home page

Including a progress bar for IIPN's that are slow to load is crucial. This is important as a typical audience will abandon an online video if it fails to load after 2 seconds (Krishnan and Sitaraman, 2012). This makes the loading screen in Figure 4-7 a key part of the interface

design. The graphic of the lift shows the arrow moving which gives the audience a sense of progress as the play is generated.
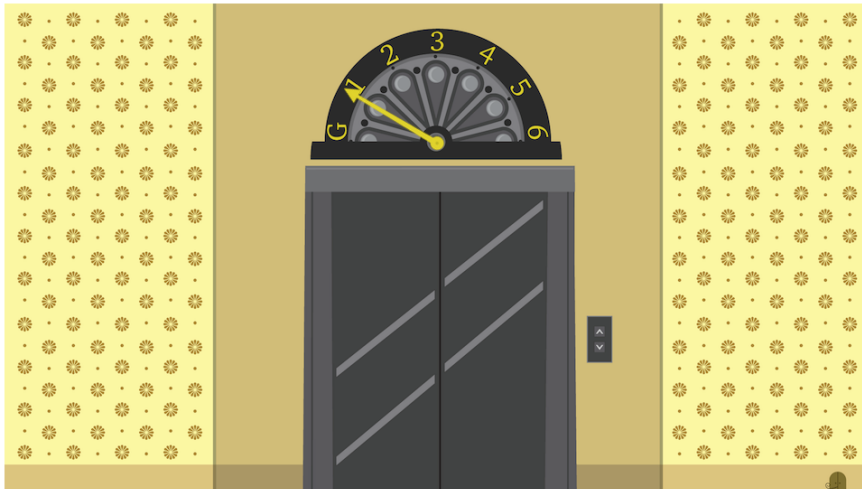
Figure 4-7 *Breaking Out* loading page (BBC, 2012)
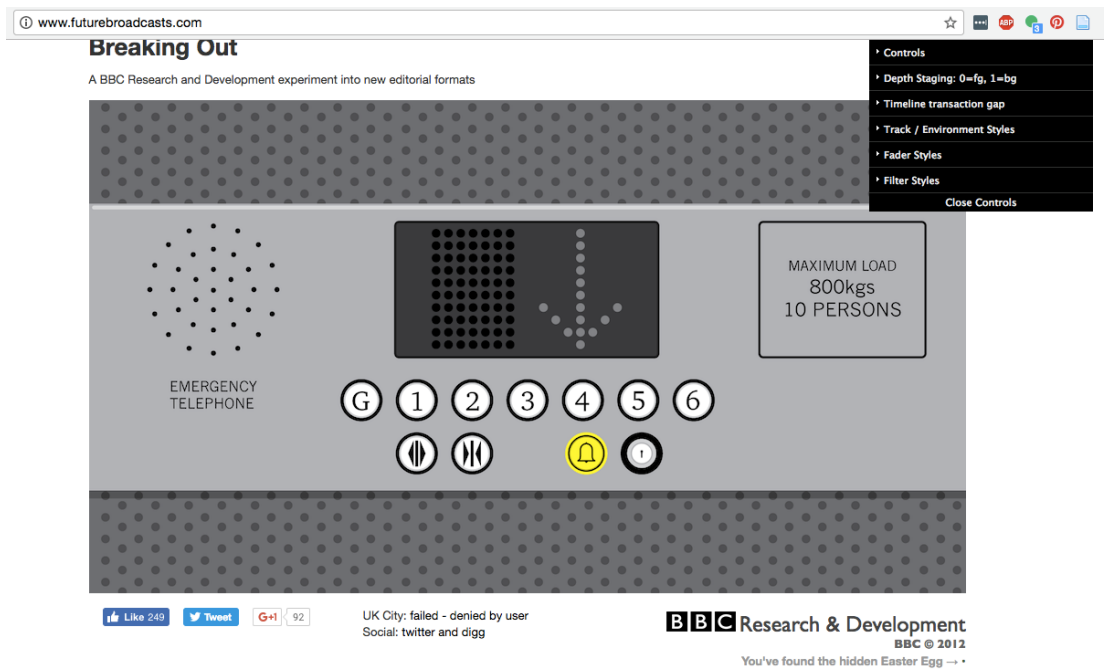
Figure 4-8 Image still of lift animation in *Breaking Out* (BBC, 2012)

Figure 4-9 Final image in *Breaking Out* (BBC, 2012)

Working with the state of the art can lead to a less user-friendly experience when the interface design departs from the typical understood format. In *Breaking Out* the interface lacks the ability for the audience to pause, rewind or fast-forward the drama. These features are typical of most online audio or analogue formats. This makes a less audience-friendly interface as it is an inflexible experience. Secondly, there is an 'Easter egg' function that can be revealed by clicking a button designed to blend in with the background. Clicking the button opens a series of options that are visible at the top right of Figure 4-9 and Figure 4-8. This type of Easter egg design feature is more common in projects for technologists and large world building settings such as online games than a typical radio play. The information is so hidden that it is not user-friendly for the average radio drama listener.

Departing too far from the typical design of the medium an IIPN occupies, can also be distracting for the audience. *Breaking Out* differs from the usual online radio drama interface as it uses illustration and animation (Figure 4-8 and Figure 4-9 are displayed throughout). When doing audience testing the BBC research team found audiences were distracted from the audio content as they waited for something to happen visually. This shows how moving too far from the conventions of the base media form, in this case, a radio play, can be disorientating for the audience and detract from their experience. In this instance, the quality of the illustration is also inferior to the audio content. This means removing the images would create a more professional and less distracting audience experience. These design issues are not inherent to IIPN productions.

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Internationally producing IIPN

For IIPN creators making narratives that work internationally across spoken languages is a challenge and would add significantly to the workload. The field of computer science recognises the difficulty of working with different languages in the same product (Scott, 2014). Language translation technologies are very complex and not good enough in 2020 to automatically render an IIPN in another language. In *Breaking Out* each instance of data would need new instructions depending on the language it is accessing, as whilst the language used within coding is typically international English in every country, verifying whether the data you have is relevant and/or correct is a complicated cultural challenge. In the next few paragraphs, I explore this further using Swedish, as Stockholm was the location of the international variation used in the case study and is my second language.

In Swedish, the use of English words in everyday language is not unusual so having a bilingual narrative would not be considered strange. However, there are still conventions within mixing the languages that mean it is not as simple as taking the names of locations or cinema titles and putting them in with the English. For example, in Swedish the word 'the' is not separate to the noun, it is added as a suffix. Rather than 'The Old Town,' it is 'Gamla Staden.' Therefore, when speaking a mixture of English and Swedish the convention is to only use 'the' once in the sentence. So, a location data word insert in *Breaking Out* would need to read "You could go to Gamla Staden' as opposed to 'You could go to the Gamla Staden' which essentially says 'You could go to the the Old Town' to a Swedish speaker. This means a new rule for a Swedish version of *Breaking Out* would be needed just to cover using 'the' in relation to a noun. Another issue is that in the Swedish variation the local cinema listings and place names, whilst often including English titles at the cinema and in bars and restaurants, are most often in Swedish. The Swedish language has an additional three letters, å ö ä, compared to English. Letters from another language can break software written in English (Scott, 2014).

Even the simple data insertion of the day's date also has problems when it is taken internationally. In Sweden, the day's date is YY/MM/DD as opposed to the English DD/MM/YY. This issue is not necessarily resolved between countries that share a language.

Fellow English-speaking country America also has another date format of MM/DD/YY. Finally, all elements, including the page design of a website would need to be adaptable. For example, a one-word concept such as 'lagom' in Swedish, would require a full sentence in English of 'exactly the right amount of something.' From a design perspective, this would mean that more space is needed for the longer explanation in the English design and the poetics created by the language would be very different in the narrative.

A narrative that functions well across languages is a design problem that stretches far beyond the quick examples mentioned here. Should an IIPN creator wish to take on the challenge of a narrative that works in different languages they would not only need a translator, but also a user experience designer and software developer to work on the project. It may be beneficial at this early stage of IIPN development to only offer narratives in one language. The creators can assess whether they want to offer it internationally and put in default placeholders when needed if an international location is detected.

Placeholders and the problems they both solve and create

Breaking Out's format involves changing the dialogue with words selected from data gathered at that moment. As it is assembled in real-time there is a risk that the algorithm is unable to find the information it needs. This means that a series of 'placeholders,' in this case snippets of dialogue, are stored ready to be deployed if the required data cannot be found.

I determined the placeholders in *Breaking Out* by returning to Table 1 from earlier in the case study, which shows the dialogue in four variations. Unexpectedly, they were not all provided in the original script. The news clip and movie title data insertions contain words consistently different from the original script that had not been newly gathered for that playout. This was confirmed by making a comparison with the Manchester 2017 variation on a computer that had never played the narrative. This ensured the results were not skewed by cached data (data kept within the computer from previous playouts). The news clip and movie names were consistent across the Manchester May 2017 variations on both

computers. This suggested that new placeholders had been put in as they have not been newly gathered for that playout. To check this was correct, I asked Forrester (personal communication 17 Sept 2020) who confirmed that these placeholders were generated by an algorithm and not directly by the writer. Forrester (personal communication 17 Sept 2020) explained that that the computer-generated placeholders are stuck in 2012 as subsequent to *Breaking Out's* release, another part of the BBC turned off the access needed to draw in new data preventing it from generating new content. This means that for every data point in the pre-narrative, there is a possibility for new data, a writer's placeholder or a technologist's placeholder to be heard.

Table 2 Whether new data, writer's placeholder or technologist's placeholder was used for each data type in each variation.

	Stockholm 2016	Manchester 2017	Edinburgh 2017
Location	Writer placeholder	New Data	New Data
Weather	Writer placeholder	New Data	New Data
Social Media	Technologist placeholder	Technologist placeholder	Technologist placeholder
Cinema	Writer placeholder	Writer placeholder	Writer placeholder
News	Technologist placeholder	Technologist placeholder	Technologist placeholder
Date	New Data	New Data	New Data

The way in which the computational system is designed can create a higher chance of the data insertions failing. The more stages to be successfully completed, the more risk there is

that one of them will fail. This risk in the computational design is most evident in the Stockholm based variation of *Breaking Out*. Table 2 below shows new data or a type of placeholder was used in each variation. The Stockholm version was the most heavily reliant on placeholders. Nearly all of the data played was not new, with only the day's date included as new data. This is not surprising as the audience was warned that the audio play would not work as expected outside of the UK. It can be extrapolated that all of the data insertions, bar the date, may have relied upon location data in some way. For example, the weather data would require location data to know which forecast to look at. This demonstrates that relying on more than one stage in the data collection can cause a higher likelihood of failure.

Table 3 A graph showing the number of instances of new data, technologist placeholders and the writer's placeholders in each variation

Number of instances of new data, writer placeholders, and technologist placeholders in each variation.

Variation	Type	Value
Edinbrugh 2017	Original Script	2
	Technologist Placeholder	2
	Writer Placeholder	7
Manchester 2017	Original Script	2
	Technologist Placeholder	2
	Writer Placeholder	7
Stockholm 2016	Original Script	8
	Technologist Placeholder	2
	Writer Placeholder	1

The pseudo-code diagrams better illustrate how multiple stages carry with them more risk. Figure 4-10 shows the route in the Edinburgh variation where the program searches for the name of the city or area the audience is based in. By breaking down the decisions we can see that first, the program must find the location. Then, if successful, it must also search for the name of the city or area. This shows that there are two decision points where the algorithm may return with no data making it slightly riskier than a one-stage data retrieval.
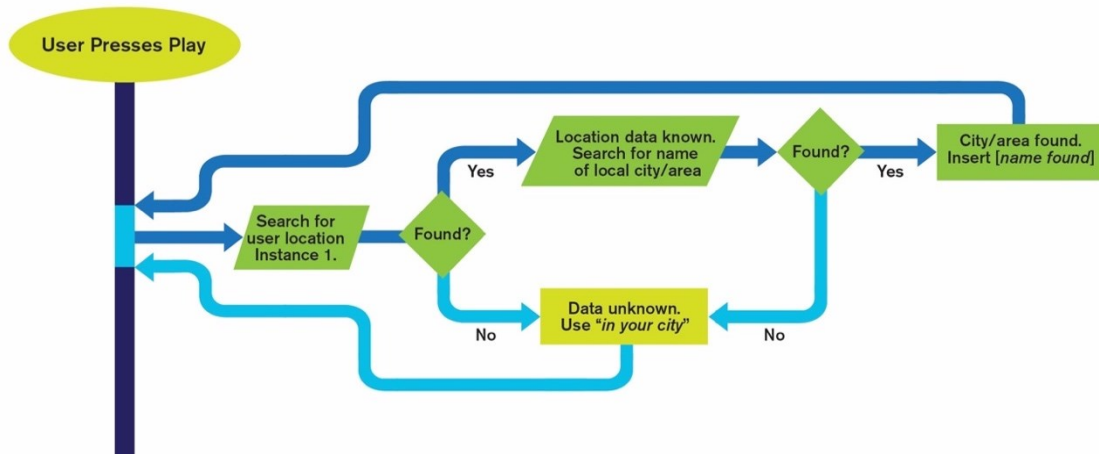
Figure 4-10 Diagram in pseudocode showing finding location data in the Edinburgh variation of Case Study One (Frew, 2020)

The risk of having stages reliant upon data from a previous playout can be seen below in Figure 4-11. The figure shows the seventh use of data in the play where it requires a horror film name. The program has the audience's location and date, and so moves on to search for the local cinema listings. However, from the variation comparison stage, we know that the film mentioned was a placeholder (which was checked against the release date of the film, which was 2012 rather than 2017 when it was listened to). To reduce the risk of failure, process could be simplified, perhaps going straight to a cinema listing search, rather than a local cinema listing.
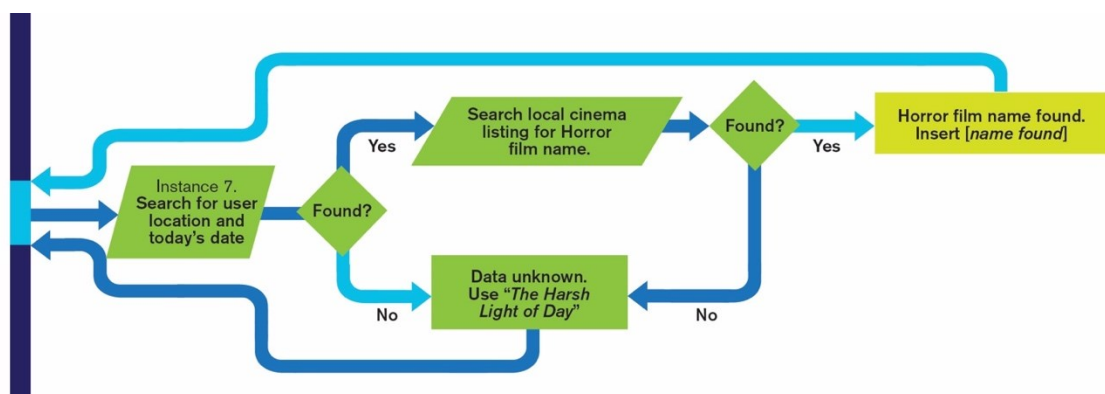
Figure 4-11 Diagram of failure to find a cinema listing in the Edinburgh variation (Frew, 2020)

For reducing the risk of failure in the narrative overall there is a balance to be made by the production team. Spreading the risk by avoiding overreliance on one data source type would reduce the likelihood of a complete failure. The downside to this is that multiple sources

create a larger and more expensive workload. It also means that a situation with a patchwork of working and not working parts is more likely. This patchwork could cause more problems, in having data that doesn't match, than it solves. Therefore, having a dominant data source which is more cost-effective, but vulnerable to larger-scale failure, is a risk the producers of IIPN narrative will have to balance.

How successful data insertions and placeholders relate to each other changes the way in which an IIPN tells the story. Problems can occur when the placeholders and successful data insertions don't match up. In *Breaking Out* the day's date and the weather data are interrelated. As the weather and date are intended to match the public time of the audience when both work this is in harmony. However, if one of these fails there is a risk of creating a contradiction. For example, if the day's date is stuck on the placeholder of July 20th and the weather is then reported as snow this creates a very different impression of the lift's knowledge.

In *Breaking Out* an issue with a mixture of successful data insertions and placeholders is that it may create an inconsistent internal narrative time. None of the variations studied in this chapter contained wholly successful insertions for every type of data. This creates a risk of inconsistency in internal narrative time. For example, at the time of playout, the bars and restaurant names pulled in may belong to places that did not exist when the canned news snippet and films from 2012 were aired. This creates a mismatch between locations and news and cinema listings that did not exist within the same timeframe. This could become jarring for the audience.

It is possible that the data pulled into the narrative is incorrect. Originators will need to judge the level of risk an unreliable source represents and its impact on the narrative per data source. In *Breaking Out* it was not raining, as stated, whilst the Manchester and Stockholm variations were recorded. In this case, a mismatched weather type to the audience poses a low risk, as it does not affect any major plot points. By being so low risk there is a question around whether the weather data adds anything to the impact of the play other than as a proof of concept. However, it is important to recognise it is one part of a whole set of data designed to make an impression of being in the real world now.

When the placeholders have been chosen by a technologist, rather than the writer, it undermines the writer's ability to control their creative intentions. For example, in the Stockholm variation, "your city" is inserted rather than the writer's Manchester as a placeholder. Referencing 'your city', in this case, Stockholm, does not correspond to the placeholders used later on. As either all the location data points will succeed or fail as a group the writer's placeholder 'Manchester' is more consistent.

There is a risk in *Breaking Out* that it could pull in data insertions that are not known to the audience. This will hinder the text's aim of making it feel more familiar to them and may be confusing. In this instance, it is possible to mitigate this by ensuring there is enough context in the rest of the dialogue. For example, the lift recommends that Harriet goes to see a comedy and then inserts the name of the film, *A Fantastic Fear of Everything.* Without knowing the film, the audience still knows that it is a comedy. In another example, the lift suggests she go "for [sic] drink in Kro Bar or a meal at Stock." Again, the audience is orientated by the rest of the dialogue. This principle also applies to the placeholders. Care should be taken to ensure that they are selected to be non-ambiguous and in line with the artistic aims of the text as far as possible. For example, the placeholder of the cultural centre Urbis is a poor choice in *Breaking Out*. Few people outside of Manchester will know of it and it closed down two years before *Breaking Out* was launched. This makes it a weak choice for a venue the audience is expected to recognise.

Another danger in relying on the location data to provide a sense of familiarity is that the audience may not be at home or in their local area. The local feeling is dependent on the audience recognising the landmarks added. For an audience member visiting an area, it may hold no relevance at all. This means a creator determined to set their narrative in their audience's usual locale would need a different mechanism for choosing it, such as the most frequently used IP address.

For a longer running IIPN, there is a risk that the placeholders and technology powering it can become out of date. This creates a strong possibility of an IIPN losing its changeable elements bit-by-bit that are then replaced with placeholders that are also out of date. This can be mitigated by having a 'shelf-life' for the narrative combined with a periodic review for functionality. It may be useful to consider the narrative more like a performance, in that

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it is only available for a limited time when the technology is actively maintained. For *Breaking Out,* moving it somewhere where it can be routinely checked, like BBC Taster, may also help. In addition to this, it is important that the original placeholders are chosen to be relevant over a longer period of time. For example, in *Breaking Out* two of the placeholders have closed down, the restaurant Stock and the cultural institution Urbis were closed before the play's launch.

Data ethics in IIPN

Privacy and the individual

For IIPN creators, the cultural context they are working in will affect the ethical issues that apply to their use of data and the audience's privacy. This is because, as highlighted by Paul Dourish and Genevieve Bell (2011), privacy is a social and legal construct. In the west, privacy is linked to the individual. You have a right to know your data, and health data is deemed particularly sensitive (Dourish and Bell, 2011, p. 141). These notions have been enshrined in law in Europe through the General Data Protection Regulation (Regulation (EU) 2016/679) which gives the individual the right to delete and access personal data. Any IIPN creator, including the BBC, must comply with these laws when operating within the European Union.

For IIPN producers it is essential for them to comply with local privacy law and to protect their reputation through maintaining the necessary data privacy standards. In *Breaking Out*, the majority of the data falls into the lower risk categories as defined by European law. These lower risk areas are things such as content preferences, basic information such as age, gender and location, the next, more risky level, is recent purchase and recent browser history. Most of the data in *Breaking Out* is obtained from the audience's IP address and is not specific enough to pinpoint an audience's exact location. This use of location data within the narrative also meets UK media regulator's guidelines (Ofcom, 2017, p. 44) as it does not reveal the address of the audience. Therefore, from a privacy perspective, the use of location data in the play is low risk. In the same way, the other data sources, movie names, news snippet, the weather and the date are low risk as they are all widely available.

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Breaking Out's use of social media data brushes up against the most private area of all in western society outlined by Dourish and Bell, information about friends and family. Maintaining privacy standards through legal and ethical frameworks in the west is linked to protecting others and keeping them safe. Revealing information about others could damage personal reputation and image. In this instance, it is only the name of the social media platform the audience member is logged into that is used in the narrative and so is relatively low risk.

Safeguarding in IIPN

There are also ethical considerations around safeguarding the audience from harm and offence in IIPN content. First of all, in this case, the way the audience accesses the play lacks information about its content. The audience is primed for an experiment, however there is no plot synopsis or indication of the length of the programme. It is not until the audience reads the instructions that it becomes clear that this is an audio drama. There is no indication of likely content and what age group it is aimed at. The audience must take it at face value that the content is appropriate for all age groups. They must also assume that the themes explored are not of an upsetting nature as most broadcasts have these warnings as a matter of course. The BBC's guidelines ask for the degree of harm or offence likely to be caused by the content to be considered. The overall narrative considers the mental health issue of agoraphobia. It is treated sympathetically without misrepresentation. It is a small risk that audiences would be offended by the content. It does not contain strong language, sex or violence and so does not require an age limit.

Guidance advice standards are typically laid out at an institutional level. The BBC, for example, have their own guidance document that details this (The BBC, 2020). For meeting these requirements in *Breaking Out*, this would include adding in information about its content before playout so that the audience can gauge the appropriateness, or their interest in it, before viewing. In this case, the play's interface could be improved from a safeguarding perspective by including a clear age rating and an indication of what the plot of the play is. There could also be an inclusion of resources in how to deal with agoraphobia at the end.

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Another safeguarding issue that arises from the information on the landing page is informed consent. For a non-technical audience, the presentation of the play is unlikely to be sufficiently explanatory to help them make an informed decision before playing. The copy on the page is quite technical. A usual radio listener would not be aware of what an API is or have an understanding of what a "fallback" solution may mean in terms of their audience experience. Additionally, the full information for what the play is doing with data is on another web page. As this is a blog for technologists and researchers, it is unlikely a typical audience member would visit this beforehand. As it stands, there could be some improvement in communicating the project in less technological language on the landing page to make it more accessible to a non-technical audience. Further technical detail can still be provided but focussed on another webpage as it already is in part. This would help improve how informed the audience was before viewing this experiment.

A safeguarding risk with IIPN is accidentally shocking people through uncanny or surprising data insertions. In audience testing for *Breaking Out*, Forrester (2017b) found that a "woman in Glasgow jumped out of her skin when it mentioned the pub that she goes to regularly." As the artistic intention of the play was not to shock and surprise the audience this was not an ideal reaction. This could be mitigated by only using references to local landmarks that are larger in scale. They are less likely to have as much personal significance as the local pub or café would to an audience. This chance of shocking with more specific detail could occur in any type of data inserted into an IIPN.

The use of the news snippet carries with it some safeguarding risks because it is generated at playout. As the play's originators do not know what the upcoming news content will be it may accidentally include distressing material. In this case, the originators can reasonably assume that content broadcast on the BBC news will have adhered to ethical standards that their department would also be happy with. Ideally, if there is a major incident, such as a terrorist attack, it is important to suspend this part of an IIPN. This is because using national tragedies as they happen in a comedy is insensitive at best and very upsetting at worst. This kind of 'off' switch for data sources may need to be built in for some IIPN productions.

As the play is available to all ages there are safeguarding issues for children that need to be considered. If the data selected was a strip club or a pornographic film, this immediately

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raises safeguarding issues for younger and vulnerable audiences. This type of problem is occurring in other uses of technology. For example, the voice-activated computer Amazon Echo Dot was filmed responding to a toddler's request to play "digger digger" with "you want to hear a station for porn detected" (User: TheKablim28, 2017) before descending into a list of very inappropriate terms for a child. Vulnerabilities to accidentally sourcing adult material, or similarly potentially offensive content should be controlled.

Privacy and large organisations

As IIPN and other new technologies continue to change the ethical frameworks that relate them are too. Consequently, a continual evaluation of any live IIPNs in reference to updated frameworks will be needed. At this stage, with a large organisation such as the BBC leading the development of IIPN, privacy concerns about large organisations and data are important to consider. Jeff Smith el at (1996) provides a useful overview of privacy literature in relation to large organisations and draws out the key issues. Smith et al looked at the concerns raised by participants in different studies whose data was being stored by large organisations. The key problems raised by participants in the studies are paraphrased below (Smith et al 1996):

- Too much personally identifiable data is being stored about the user.

- Data is being collected for one purpose but used for another without permission both within and externally to that organisation.

- Unauthorized people can access the data.

- Protections against deliberate and accidental errors are insufficient.

- Automation and decision-making processes are excessive.

- Databases may be combined into larger databases, making users easier to identify.

In *Breaking Out,* exactly which data is used and how it is used interplays with different concerns from this list. Firstly, as with any use of data in IIPN, there is the ethical consideration of whether any of the data is then stored and if so, how it this is done. In an

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interview, Forrester (2017b) explained that the data used in *Breaking Out* is not stored anywhere afterwards or visible to the BBC at any point. This is to ensure the anonymity of the audience and avoids the issue of storing too much data about an individual. As the BBC is operating within the UK this is important in the wider societal context. At the time that *Breaking Out* was published the UK government was pushing for access to personal data through the *Draft Communications Data Bill* (2012), nicknamed the 'Snooper's Charter.' Although not passed into law until 2016, the later titled the 2016 The Investigatory Powers Act means that any data stored by the BBC or any other broadcaster may be requested for use by the government. Thereby, by storing data, the BBC and any other broadcaster can be cast into a different role as an extension of government agencies. This undermines the trust of the audience; is providing data possibly subject to government surveillance worth it for an IIPN?

Breaking Out makes use of social media data and this is a sensitive issue because of the political climate in the UK in 2020 after the Cambridge Analytica scandal (Lewis and Hilder, 2018). This is particularly true for large media organisations, which had a role in manipulating audiences for political gain in the scandal. This makes using social media data, even only the names of websites, potentially controversial. In an interview, Forrester (2017b) describes that including this data was an addition during the production stages when a vulnerability in JavaScript in 2012 meant that it was possible to do so. There may be an ethical question here, just because the data is available should it have been utilised? The way in which Forrester described it as a 'vulnerability' suggests there may be some cause for concern over its use. Leveraging data that sits in a grey area of accessibility opens up the BBC and any other future originator to accusations of misusing private information.

Following on from this is the issue of automation in the decision-making process. Any IIPN creator must be careful to ensure as far as reasonably possible that any automation is not likely to cause problems. In *Breaking Out*, as with all IIPN, a computer program is used to pull together all of the different objects and data into a narrative. The result is that the creator cannot see, and, therefore, ensure that every possible iteration conforms to the ethical standards or artistic intentions they wish to communicate. Software-based on algorithms are not always correct and carry the social and cultural biases of its creators. In

an example of ongoing controversy, in 2015 Google Image, an image recognition algorithm, automatically mislabelled photographs of black people as gorillas. In 2018, this issue was still not resolved when researchers for technology magazine *Wired* attempted to find images of black people or gorillas with Google Image (Simonite, 2018). Google's interim solution has been to simply censor the terms 'gorilla,' 'monkey,' and 'baboon' from its software. Additionally, search results for 'black person' 'black man' or 'black woman' were found to return black and white photography rather than ethnically black people. This is a form of erasure of this group of people from the database as it is not possible to find images when directly searching for them. It is an example of how automated systems can be incorrect to a very offensive degree and cause huge harm. For those wishing to study racism in algorithmic bias further, an excellent starting point is Safiya Umoja Noble's (2018) book *Algorithms of Oppression: How Search Engines Reinforce Racism.* Noble considers the inherent racism in Google's algorithms, including the image search issue cited earlier in this paragraph. Other places to begin researching the large area of algorithmic bias are Caroline Criado-Perez's (2019) work on gender bias in data and Cathy O'Neil's (2016) work on how big data can increase inequality and undermine democracy.

The risk of imprecise and biased algorithms is not only an ethical concern. Unintended or irrelevant use of data could create a very different narrative experience for the audience. Therefore, the creators of IIPN may need to consider what level of risk they are happy to accept as part of the design. For example, none of the different data types used in *Breaking Out* is essential to understanding the rest of the narrative. Whilst they change the flavour or colouring, they do not fundamentally change what happens. Therefore, using data they are not 100% certain of might be judged low risk. In contrast, in the next case study, there may be a different ending to the whole narrative based on the data used. As a result, the creative team may want to be more confident in their data source than they would be here.

It is important that data obtained for IIPNs created by large organisations are kept only for that instance. One of the concerns about large organisations was that data could be collected for one purpose but then used for another either within or externally to the organisation. The use of the news snippet from another part of the BBC may, depending on what is pulled in, be a potential example of this. In May 2017 the play is no longer able to

update the news pulled in and uses a news snippet that is about domestic abuse. It is about a specific case whose information may be a matter of public record. However, as highlighted by Michael Zimmer in his own case studies on privacy (2010), just because the data is publicly available and not used to harm anyone, does not mean it is ethical to use it. There is a possibility of ignoring a broader dignity-based theory of privacy. By taking data from its original context and putting it into a narrative, the BBC has removed the ability to control their information from the person who the story is about.

There are existing ethical frameworks that IIPN creators may draw upon. Researchers Leanne Townsend et al (2016) provide an ethical framework that addresses the issue of using publicly available social media data in a new context. Here, the authors highlight that the context of the data should be taken into consideration when deciding how to use it. For example, a social media post from a public figure, who is deliberately trying to spread a message as far as possible, is an ethically acceptable situation where their message can be reused as it is. In contrast, for an individual who is not a public figure, anonymising their social media post, including paraphrasing it so it is not searchable, is the ethically sound course of action. The authors highlight that this is of particular importance for sensitive subject matters. In *Breaking Out*, the interviewee in the news snippet placeholder who was a victim of crime gave their consent originally for a radio broadcast made at that moment. They did not knowingly consent to be part of a narrative for years to come. In this case, following this ethical framework, permission should be sought from the interviewee to be included as a placeholder in the narrative, as they are easily identifiable, not a public figure, and it is about a sensitive subject matter.

As the BBC is part of the research community, they must adhere to the highest ethical standards possible. For this IIPN this means to mitigate the ethical concerns of using a news snippet, or other information about an individual as a placeholder, a policy of reviewing them should be in place. This may be done in line with the guidelines for a live broadcast (BBC, no date b). For example, originators can check that consent is still in place for anyone interviewed, or if a traumatic event is inserted this could be evaluated or changed in line with ethical standards. This would ensure that the broadcaster is aligned with Ofcom's statement that "the re-use of material… then used in a programme for another purpose…

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does not create an unwarranted infringement of privacy" (2017, p. 44). Additionally, if a piece of data with sensitive issues in it is placed, such as domestic abuse, this could then be accompanied by resources to help with this issue.

It is critical to assess whether a user becomes easily identifiable when datasets are combined. In *Breaking Out* taken individually, the day's date, local weather, cinema listings, social media channels and local bars and restaurants to the audience member are all low-risk data sources. They are not overly personal but still represent a range of data points that is useful for a technical prototype. As the majority of the data is not sensitive to that audience member even when taken all together the six types of data do not create an identifiable set of information about an individual.

Ethics of informed consent

For an ethical broadcaster, a clear, understandable, and accurate form of consent should be used before an IIPN is consumed. This is an issue key for IIPN because it deliberately uses an audience's data in a concealed way. If not told beforehand, the audience may never know their data was used. Unless the audience visits the linked BBC R&D blog they are only aware that it is an "experimental editorial format" (BBC, 2012). They do not know that their IP address will be used to ascertain their location, the local weather, news, cinema listings and the day's date and be placed in the narrative. Future experiments with the prototype were intended to see if audiences would notice that data had been used (Forrester, 2017b). Revealing this beforehand would undermine the research. The fact that it is an experiment is made clear, so the audience may accept that there is an omission of some information. It is, however, a deliberate deception.

The BBC's editorial guidelines (BBC, no date a) state that when deception is used certain members of staff must sign this off. The BBC may have considered the prototype low risk due to a number of factors. Firstly, as it is not part of their main online platform it is unlikely to attract a large audience. The presentation of the prototype suggests it is designed primarily for a technological audience and for demonstration purposes. The landing page includes an Easter Egg and practical requirements for listening which is not typical for a

standard radio play. The play needed a cutting-edge browser at the time, which narrows its audience to those who prioritise technology. The drama was promoted mostly at tech events, and in press aimed at technologists such as *The Next Web* (Bryant, 2012). This suggests that likely audiences are over eighteen, and not large in number. Taken together these factors mean that the omission of what data is used before playout must have been considered low risk.

IIPN producers will need to make a careful decision as to how and when to give their audiences the ability to have informed consent. This issue is a broader problem in digital media. Frequently, people are presented with overly long terms and conditions before being able to watch a program or use an online service. These terms and conditions are not only an impractical length but also, as highlighted in a report by the UK House of Commons (2014), they are designed for courtrooms rather than users. In fact, the long terms and conditions on websites are so unreadable that only 1% of people appear to be reading them at all (Select committee on the European Union: Internal market sub-committee, 2015). This means that the majority of people are unaware of the consequences of what they have agreed to. For example, by using a social media platform you may be giving permission for them to use your images in marketing. Therefore, an ethically presented IIPN requires a clear, short and understandable method of consent.

Narrative effect of informed consent

From an artistic perspective whether or not the audience knows what data is being used beforehand is important. For example, if the artistic intention is to surprise the audience with some data unique to them this will not work if they have been told earlier. If surprise is the intention, it may be important that the audience is unaware that any data is being used at all. This is because of the 'Forer effect' (Forer, 1949) when people believe vague personality statements that are mostly positive to be accurate about only themselves. If the audience is told that an IIPN is designed for them, they may then interpret the narrative as being relevant to them in unexpected ways. In an experiment I conducted with the BBC using the prototype in Case Study 2 this was found to be true (Frew and Forrester, 2017). When asked which elements they thought had been altered for them, some of the

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participants believed things that had not been altered had been. For example, one participant felt that the story content involving an angry male protagonist reflected their personality. Consequently, it is possible to accidentally mislead an audience member as to what has been changed for them.

If the originators intend for the audience to not know beforehand that there is data being used, then considering the interface the play is heard in is important. The type of browser or the browser settings of the audience can undermine the integrity of the experiment or surprise element. This is because some browsers will ask you for permission when a program wants to access location data. In *Breaking Out's* home page instructions, you are asked to use Google Chrome, whose standard settings do not ask for permission. Providing the audience uses this recommended browser the experimental conditions are maintained. If the audience was to use another browser, such as Firefox, however, a pop up appears when you click through asking if you give the program permission to access your location before generating the play. This removes the experimental or surprise conditions of not revealing the use of data. This highlights a challenge for designers in creating a consistent setting. The browsers will each behave differently, as will every individual's browser privacy settings.

The narrative effect of IIPN delivery on *Breaking Out*

Beyond acting as a prototype, *Breaking Out* appears to be aiming to create a feeling of 'nowness' and familiarity with the real world of the audience. The purpose of this from the BBC's perspective is that it provides a way for them to be seen as less London centric, a problem they have been tasked with solving (Ofcom, 2019a). Emphasising this point was one of the results that Forrester described in user testing *Breaking Out* (2017b). In the testing, the BBC found that audiences in London did not pick up on the play being located there. Londoners expect dramas to be set in their local area. As such they do not react to local references as strongly as someone in a less represented area. For the London audience, the feeling of familiarity is already there with many dramas.

The different data types aim to make it feel local by using a technique described as 'counterparthood' (2016, p. 24). The audience is being asked to imagine that they are part of the same ontological domain as the fictional world. Through the data insertions that relate specifically to that audience, they are located in the same spatial and temporal world of the narrative. They are in the same location, through the use of local landmarks and at the same time through the day's date and weather. They are not exactly in the same world but in a place near it. As a result, the audience, hopefully, finds the narrative more related to their everyday life.

The more specific the data is, the more effective it is in creating a sense of familiarity or connection. For example, the location data works best when it references local independent spaces, such as the bars Kro Bar and Stock. The social media data, similarly, is more effective if it picks up a less likely site such as Digg, which is included in the placeholders, rather than the common site Facebook. An element that would enhance localisation greatly is using synthesised accents. In *Breaking Out* both the lift and Harriet always have the same accent. In their audience testing, the BBC found that one person felt that the accent should be consistent with the area the play is set (Forrester, 2017b). This person wondered if the drama was set in Glasgow, why none of the characters had a Glasgow accent. This kind of nuance with accents, whether to match a location with an accent or to disrupt it, is now possible with technology developed for use in 2019 (*Online Tone Generator*, 2019). For public broadcasters like the BBC, this kind of IIPN delivery could help them with their requirement to ensure they serve underrepresented communities in their programmes.

IIPN style storytelling can provide the opportunity to make a character appear magical. The data insertions in *Breaking Out* imbue the lift with a magical characteristic. As the lift has access to the real world of the audience it gains a supernatural quality within the story world as it knows things a regular character would not. Its movement between worlds gives it a partial transworld identity and is a form of synechdochical metalepsis (Bell, Ensslin and Rustad, 2014, p. 32). In future works, this could be made more of, to create an 'all-knowing' type of character or one that is quite explicitly magical. Conversely, it may not be possible to give characters this knowledge of the audiences' world without an accidental implication that they have magical abilities. For some storylines, it may be inappropriate to give

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characters any kind of supernatural feeling. As such, careful consideration of exactly what data a character could deliver before they take on a magical quality may be needed.

The IIPN elements can be used to emphasise different artistic intentions such as character traits. For example, the lift character delivers the time she has been out of the flat to Harriet to the second, creating the impression of machine-like accuracy. This data-heavy response suits the flat delivery of the lift's voice. The lift acts as a comic deadpan foil to Harriet's emotive and lively delivery, highlighting her anxiety. Its robotic nature could be further emphasised by putting in even more data when it uses IIPN delivery. For example, in the line about the weather, it could say 'it is sunny, 21 degrees with a UV index of 60%' rather than simply 'well it's sunny.' As the possibilities afforded by IIPN become more apparent, using opportunities like this to enhance character traits will likely become more common.

Different data insertions can be used to change how a character is perceived from variation to variation. In one line that changes between the variations, Harriet can be seen as appropriately sarcastic or dismissive of culture. Harriet's line "wow inspiring. At least you didn't say I could reach for the stars," changes meaning depending on what tourist attraction the lift mentions beforehand. In one variation the lift suggests she attends the Printworks, a venue primarily associated with nightlife. The audience may find Harriet's response appropriate as her voice suggests she is an older woman and they know she is agoraphobic. In contrast, when the lift mentions the Imperial War Museum in another variation, she sounds dismissive of culture. As museums are thought of as places where one would go to seek inspiration, this remark becomes flippant and possibly mean spirited. It suggests a preference for more lowbrow entertainment that may be inconsistent with an otherwise middle-class sounding character named Harriet. In this way, even small changes in the dialogue can alter how an audience perceives a character.

The robotic delivery is an advantage as it allows the audience to infer the tone, comedic or otherwise to the lift, removing the need for different delivery styles for each data type. When the lift delivers the line "and then you will have a lovely time, well it's [raining], I guess it depends how much you like the [rain]." in the Manchester variation, it could be seen as humorous, with the understanding that no one is expected to like the rain. Conversely, in the Edinburgh variation, the lift says "and then you will have a lovely time,

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well it's [sunny], I guess it depends how much you like the [sun]." This can still be read as a joke, with the lift poking fun at Harriet not going outside even when there is good weather to enjoy. The robotic delivery means a joke can be inferred with both positive and negative weather types. The downside of the robotic voice is that some jokes, especially the ones based on sarcasm, may not always be noticed by the listener. As a result, how tone may need to be changed in voice acting, based on possible data insertions, is a factor IIPN makers may need to consider.

Some data types in an IIPN are more likely to create an emotional response than others. In *Breaking Out* it is the news item that has the potential for the most varied and emotive connotations. The lift is suggesting that bad things can happen no matter where you are, so you may as well leave the building anyway. As the majority of news stories are negative, it was likely that anything pulled in would represent a threat, immediate or otherwise. In this case, the news snippet is about a man that is jailed after blinding his girlfriend. For audiences familiar with the news story, which as it was on the national news they may be, it will remind them of domestic violence. This case involves a woman being held captive in her flat for hours, repeatedly beaten, and eventually blinded by her partner. The woman had a history of returning to her abusive partner, but this violent incident was the end of the relationship. As this involves a woman being kept against her will in her flat, it is parallel to Harriet's own feeling of being trapped and panicked. Here the lift has highlighted that the home is not always a safe place in a very dramatic way. Another news snippet, perhaps about the economy, would have been less dramatic and emotive. This shows how some data insertions can create more emotional moments than others.

An unreliable character trait in a protagonist can be used to help explain instances where an IIPN has inconsistent, odd or incorrect data insertions. In *Breaking Out* Harriet's anxiety is shown throughout the play as she panics and is possibly unreliable as a source of 'reality.' She is concerned that she is "hearing voices" (BBC, 2012) when the lift begins to talk and the play ends with revealing her earlier conversation with a repairman to be part of her imagination. A character that uses inconsistent details, time frames and locations are plausible when they are imagining a lift can talk. In the play, there are several instances where the data insertions created odd or inconsistent connotations. For example, in the

Manchester variation, the lift tells Harriet that it is a beautiful day and so she should leave the flat. Then, later on in the same variation, the lift informs her that it is raining and that going outside would only be enjoyable if she likes the rain. This changes the first part of the dialogue about it being a beautiful day to feeling a little odd, or perhaps a joke. Harriet's unreliability can be used to explain this oddness away, someone who does not go outside will not be well informed of the weather.

Taken individually, the data insertions are not powerful in their effect on the story. However, when they are heard altogether they all help to contribute to the feeling of 'nowness.' The greater the number of them that function and the more specific they are to that audience the more likely it is *Breaking Out* will feel familiar to them. As an artistic aim this is straightforward, which is appropriate for a prototype. At this stage, the prototype acts as a good proof of concept to inspire more ambitious work.

Reflection on the application of the theories and models used in this case study

The chapter is framed within the 'pre-narrative' and 'product' elements of IIPN. This is derived from the 'system, process and product' model outlined by Koentiz (2015). The first part of the chapter is focussed on the pre-narrative which is an exploration of the elements that make up the IIPN as a space for potential outputs. This involved discovering what type of data could be used, where and how as well as the core elements of the story. After this, I moved on to examining different products made by the pre-narrative system. This model allows the narrative's many possible variations to be considered rather than being limited to just one output with no acknowledgement of the system. As a framework, it provided a basic structure for the whole chapter and so is used in the next case study in the same way.

The case study relied heavily on an interview with a producer on the project, Ian Forrester. One of the aims of the case study was to find insights useful to future IIPN creators, so this was of particular importance. It provided a different perspective beyond a purely textual analysis. For example, it was possible to show how production values affected the final play:

the small budget meant that it had to be short, with a limited setting, and only two main characters.

When considering the landing page of *Breaking Out* I focussed on a range of the graphic elements. I did not examine every design component in detail as it was unlikely to be useful in achieving the chapter's aims. This is because the thesis is focussed on a model proposal for IIPN in a *general* sense rather than for IIPNs with a graphic interface. It is also unlikely more production insights would be gained this way. To study the play button, I employed Jay David Bolter and Richard Grusin's idea of 'hypermediacy' where an older media is echoed in the form of the new. In addition to this, I used semiotic theory concerned with graphic design from David Crow (2010). This media-specific theory allowed for a more detailed understanding of the interface than using the literary ideas of Barthes explored in the literature review. This exercise showed the value and possibility of including further media-specific theory in the model proposal. In the next case study, a similar shallow level of media-specific theory is brought in.

The data identification stage of the 'Pre-narrative' section is crucial to all of the further analysis. In this case study, it is where the information needed to complete the subsequent work is found. It makes it possible to select a range of variations of the text that suit the researchers' aims. There were a range of techniques applied and exactly which ones will prove useful in future work will be dependent on which medium an IIPN employs. These strategies were relevant to *Breaking Out* as the content is language-based audio. Creating written tables comparing variations and then a pseudo-code flow chart was an effective way to demonstrate the pre-narrative structure. This may not always be relevant in each IIPN analysis because if the content is not all language-based, as it is in the next case study, some areas of the narrative's content would be lost.

The ethical implications for *Breaking Out* and IIPN were explored using the ethical frameworks most relevant to the originator and the medium of the case study. This allowed consideration of its different aspects to be made fairly and can be used as a strategy by researchers with similar aims. In this case, the ethics of the BBC and UK media regulator Ofcom were used as well as work from scholars in ubiquitous computing and social media. By doing this, it drew out insights that may help future production teams with issues such as

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whether data insertions remain ethical over time and how much an audience should know about the data being used in the narrative. As the following case study considers a narrative also from the BBC the same guidelines are referred to.

Several of the theories and ideas from the literature review are applied in the chapter to discover the meanings in the outputs. This is a more elementary approach as narrative theory is mostly focussed on set texts. Ideas on lexia (Barthes, 2000), character (Chatman, 1978; Bal, 2009), metalepsis (Bell, Ensslin and Rustad, 2014) and time (Chatman, 1978; Ricoeur, 1980), were relatively easy to apply. The result was an effective way of showing how the different data insertions affected the internal narrative time creating potential inconsistencies. For example, in all the playouts tested there is a mixture of placeholders from the past and successful data insertions from now. Additionally, demonstrating that Harriet was an unreliable actor showed that this type of character could be used to explain away inconsistencies made by glitching IIPN technical elements. Overall, it was clear that as a deliberately simple narrative there was not a wealth of connotations and metaphors to explore. As IIPN matures this will likely not remain the case and so these ideas may become more useful to researchers in the future.

5 Case Study Two – *The Break Up*

Introduction

This chapter continues to test narrative theory in relation to Implicitly Interactive Pervasive Narrative (IIPN) to develop a narrative model proposal for IIPN. The chapter is focussed on another 'perceptive media' prototype from the British Broadcasting Corporation's Research and Development (BBC R&D) team. This time, it is a film short titled *The Break Up* (Amedume, 2016). I begin with everything that makes up the pre-narrative elements of *The Break Up* before moving on to examining products constructed by it. The purpose of examining the short is to find out where production worked well and where challenges occurred. To aid this I interviewed the lead producer about the project, Ian Forrester (2017b) and in this instance, also the director and writer Julius Amedume (2015). Amedume is not a BBC R&D member of staff and was hired on a freelance basis, which is typical in the BBC, to complete this project. The case study shows how many of the project's initial ambitions were not realised due to various production issues. Documenting the problems helps meet the overall aim of the chapter: to determine areas of success, failure and concern to help future IIPN makers in their own productions.

Pre-narrative

Introduction to the narrative

Similar to *Breaking Out* (BBC, 2012), the subject of case study one, *The Break Up* was commissioned and made by the BBC R&D team as a proof of concept prototype. Its main purpose is to demonstrate an IIPN delivery where a narrative can change based on implicit interaction. The initial ambition for the project was for one narrative to be available in three genres, horror, sci-fi, and romance. Due to production challenges (outlined later in the chapter), only the romance was completed. Despite these setbacks, the finished short can be used to demo IIPN variations if it is installed locally on a computer by the BBC. There are four sets of possible variations in the short designed to be chosen on the implicit interaction

of the audience. These are nine different colour grades, fourteen music genres, a positive or negative ending and four overall edits. Taken together, this means there are 448 possible final combinations of *The Break Up.*

The data source intended to inform which genre the audience received was originally expected to be information on the audience's personality type. This idea was later abandoned (outlined later in the chapter) and at the point of conducting this case study, no data source to inform the implicit interaction has been chosen. As which options should be implicitly selected for each audience has not yet been defined by BBC R&D, the short is not released to the general public. It has been shown at various events such as one I assisted in the production of at the *This Way Up* conference at HOME, Manchester, UK, in 2015.

The Break Up is a romance drama set in a bar in Manchester (see Appendix 7, for a summary of the narrative events). The short begins with a man and a woman preparing to meet one another. This is shown in several ways depending on the variation watched. In some openings, it begins with the woman, Sarah, gesturing to her stomach to imply she is pregnant. In others, this moment is not included, and she is only shown walking towards the bar. The other main character, Ian, nervously awaits her arrival. The couple appears to be meeting after having split up. The reason for this is implied by a bruise on Sarah's face and the likely cause of the bruising, Ian proceeds to attempt to win her back. The couple begins their interaction tensely with Ian bullying Sarah into drinking some water. After she takes a sip, Ian drinks a glass of wine very quickly. Watching with disapproval, Sarah's judgemental gaze eventually causes Ian to stop drinking the wine as he remembers he is there to win her back.

After this rocky start, Ian then asks Sarah to marry him by offering her a ring. She turns him down and delivers a further emotional blow by telling him she is no longer pregnant. Depending on the start sequence, the audience may or may not know she is in fact still pregnant. Ian reflects on the news sadly and still insists on the proposal. Sarah sticks to her decision at this point, and after a short conversation stands and walks away from Ian. Upset by her leaving, Ian cries 'Wait!' After this, the short ends happily or sadly for the two characters. In the positive ending, Sarah finishes the relationship and is seen standing outside the bar. She indicates she is still pregnant (and so lied about not being pregnant to

Ian) and strides away confidently looking optimistic about her future. In the negative ending, Sarah returns to the abusive relationship and stands by Ian appearing unhappy whilst he looks satisfied.

Outline of the changeable elements

Unlike the previous case study, as the changeable elements in this prototype are defined within its interface there is no need for a lengthy data identification stage. Therefore, this section was designed to determine the two elements likely to be the most contrasting in each set of variables. Hopefully, this provided a better than random selection for the analysis in the product section. As there are four sets of variables, and so four pairs to later contrast, this still represents a substantial amount of material for the later discourse analysis. These pairs are summarised into Table 9 as a quick reference guide at the end of this section.

Colour Grade

The eight colour grades that can be applied to the short are titled in the interface as; Dark, Bronze (which is the default), Sci-Fi, Vivid, Weak, Rosey (sic), Strong and Grey. These are shown in Figure 5-1. From this, it is clear that the variations create a significant difference in the appearance of the short. For example, Grey removes all colour and Rosey acts more like a lens filter tinting everything pink. The other colour grades are less extreme and create a range of warmer or colder tones. The best colour grade to be used as a constant in the comparison section is Bronze. This is because Forrester explained in an interview that it was designed for this short, unlike, for example, Sci-Fi which was created for the sci-fi genre originally intended to be available. To provide contrast to Bronze, the other colour grade used in the product section is Grey as one of the more dissimilar available.

Roesy
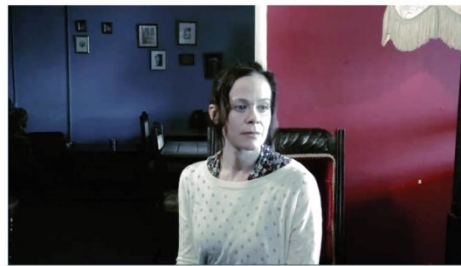
Sci fi
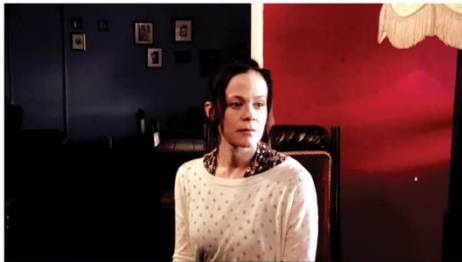
Bronze
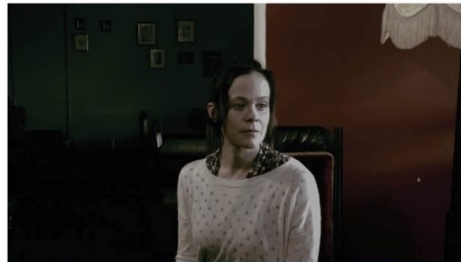
Weak

Strong
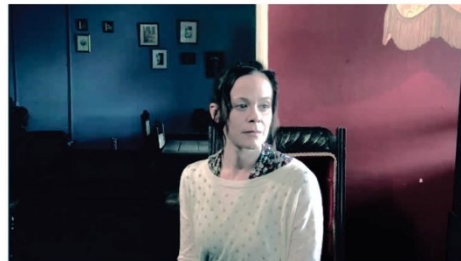
Vivid
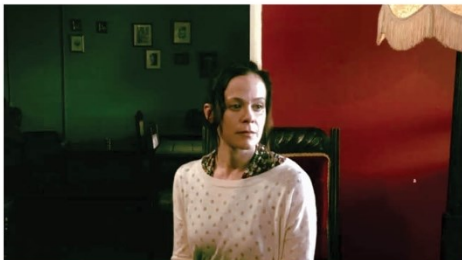
Dark

Grey

Figure 5-1 Stills showing all of the available colour grades in *The Break Up* (Amedume, 2016)

Music Genre

There are 14 different alternative music genres. Each genre has two tracks, one to go with the positive ending and one to go with the negative ending. These are labelled in the interface as Alternative, Blues, Christian/Gospel, Classical, Country, Dance, Easy Listening, Electronic, Folk, Hip-Hop/Rap, Indie, Jazz, Metal, Pop, R&B/Soul and Rock. There is no film score and the music is played only at the start and end. To select contrasting music genres, I

listened to each of them in turn eventually selecting Classical and Hip-Hop/Rap. This decision was based on the mood they created. In this case study, the moods in each genre were for the most part melancholic, with Classical being an example of this. In contrast, the Hip-Hop/Rap was more upbeat and so makes a good selection for the later analysis on narrative effect. Classical, whilst providing contrast in mood, also comes from a very different origin to Hip-Hop/Rap. Therefore, together they were chosen to be a good pair to juxtapose.

Edits
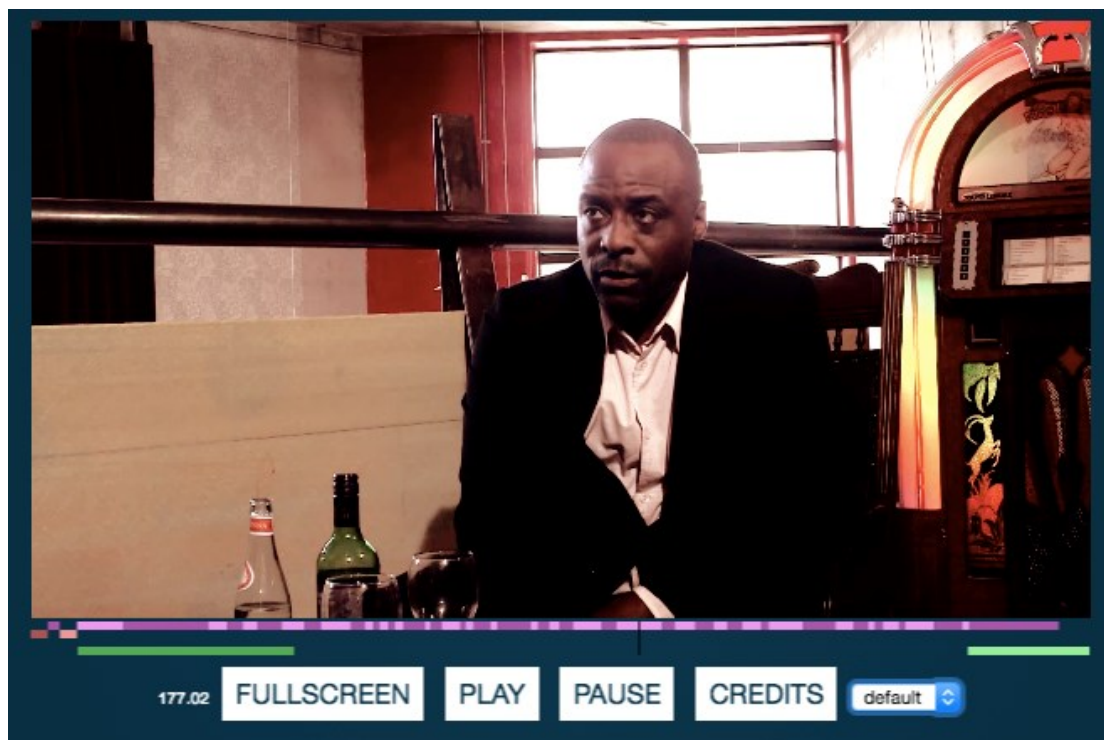
Figure 5-2 Screenshot of the during playout interface in *The Break Up* (Amedume, 2016)

Within *The Break Up* there are four different edits, titled the Diplomat, Analyst, Sentinel and Explorer. These titles reflect the later abandoned idea, to tailor the delivery according to the personality type of the audience. Describing the detail of the different edits was challenging as it is not possible to examine every nuance of difference within the scope of this case study. Instead, a more pragmatic approach was needed to demonstrate the differences in the edits and find two that were likely to be useful for later comparison. This more pragmatic approach was to quantify information about the edits by mapping the relationship between the music and shot lengths using the graphic visible during playout,

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Figure 5-2. The pink rectangles show the moving image content and the green the music in relation to time. Then, I documented this graphic in every edit and ending when the Alternative music genre was playing and compiled it into Figure 5-3. This showed that the shot and music lengths in every variation are interdependent.
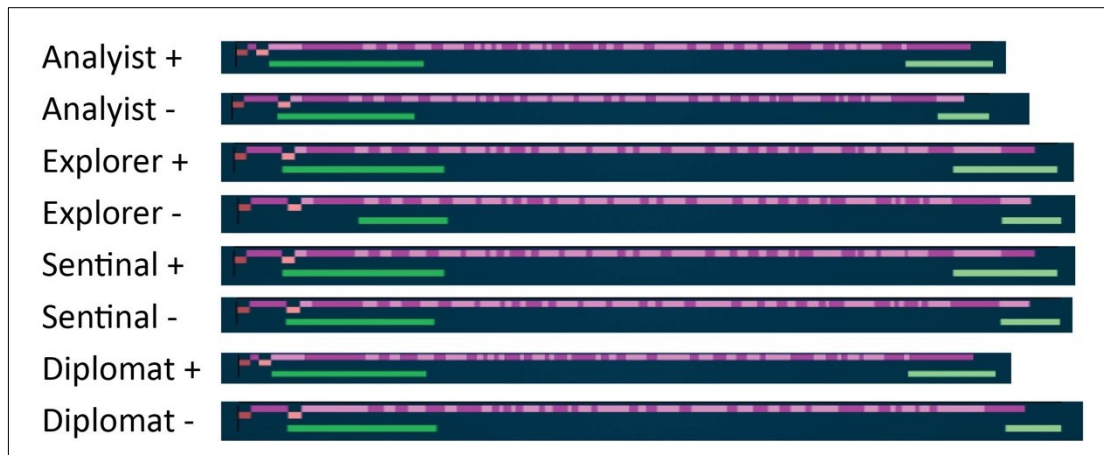
Figure 5-3 Diagram comparing music duration within the same genre in different edits and endings. The positive endings are labelled with + and the negative – (Frew, 2020)

From Figure 5-3 I could see that the overall duration of the short changed in each edit and ending within the Alternative music genre as the length of the graphic differed. This hinted that the edit and ending content may be a bigger cause for change in duration in the short than a music genre. However, the length of the graphic is an imprecise metric, so further data was needed. To test whether the ending and edit was the larger influence on the short duration I then measured the short's length in seconds in every edit, in every ending, with every music genre.

Table 4 shows the mean and median duration of the short for each music genre when its playtime from every edit and ending is averaged. If the music genre greatly affected the overall length of the different edits the table would have shown varying mean and median playout times. However, the table shows the mean and median length of the short is quite consistent across all of the music genres. This suggests that it is the edit and endings that have the most significant impact on the short's overall duration. It is, therefore, likely that there are significant differences in the story between the edits and endings.

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Table 4 The mean and median duration in seconds of the short averaged across all edits and endings

Music Genre	Mean	Median
Alternative	309	306
Blues	309	305
Gospel	309	306
Classical	309	307
Country	309	307
Dance	309	306
Easy Listening	309	307
Electronic	309	307
Folk	309	306
Hip-Hop/Rap	309	307
Indie	309	307
Jazz	309	307
Metal	309	307
Pop	309	307
R&B / Soul	309	307
Rock	309	307

Once it was established that the music genre is not the largest influence on the duration of the overall short, Table 5 was made to determine the differences in playout duration based on edit. The table shows the duration of every edit and ending in the Alternative music genre, Appendix 4 shows a finer-grained diagram of this. The table demonstrates that there are some contrasting overall durations between the edits. The longest edits are the sentinel and Explorer with the positive endings and the shortest is the Analyst with a negative ending. The table shows that the Diplomat and Analyst edits have a smaller difference in

overall durations when their positive and negative endings are compared. In both edits, the different endings create only a 5-second difference in the overall time. Whereas, the sentinel and Explorer edits have a larger difference in overall duration depending on which end is played. Their positive endings are 15 (sentinel) and 17 (Explorer) seconds longer than the negative ones.

Table 5 Overall duration of short in all edits and endings with alternative music
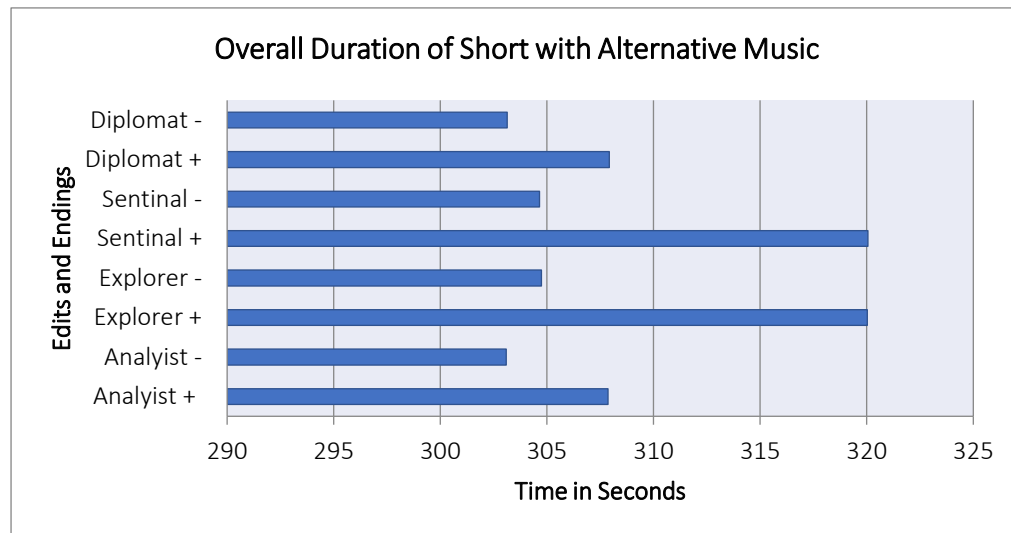
From this description of the pre-narrative, it was possible to then make a better-informed choice on which edits to analyse in the product section. As the table showed that there are two types of edit lengths, those with little difference between the endings and those with a large difference, a selection needed to be made from each. To do this I revisited the original playouts to see whether the shot content also varied more greatly in each edit. From this, I found that the shots shown in the Explorer edit are the most different. Consequently, the Explorer is the selection made from the pair with a big difference between the overall durations. The Diplomat is the selection from the pair with a small difference in overall duration. In this instance, the Diplomat and Analyst edits contained fewer changes in terms of shot content and so the final choice of the Diplomat edit is less significant.

Negative and Positive Endings

It is clear that a comparison should be made between the positive and negative endings in the product section. However, whether the end of the Diplomat or Explorer edit was likely

to provide more contrast needed to be ascertained. Similarly, to the edit section, a pragmatic approach was needed as the small changes that make up the differences throughout the edits are so numerous. Therefore, as the shot length and music duration are interdependent, I used the duration of the music as an indicator to decide which endings to compare. I took data and made Table 6 to show the duration of the music at the start, Table 7 to show the duration of the music at the end and Table 8 to show which time the start music begins to play. The tables in this section include data from only the Alternative music genre as the full datasets are large graphs (full dataset in Appendix Two p.266). There is, however, one notable exception to be seen in the wider data set. The Diplomat edit with a negative ending has much shorter music at the start in the Christian and Gospel genre than in the others.

Table 6 Duration of start music in Alternative genre across all edits and endings
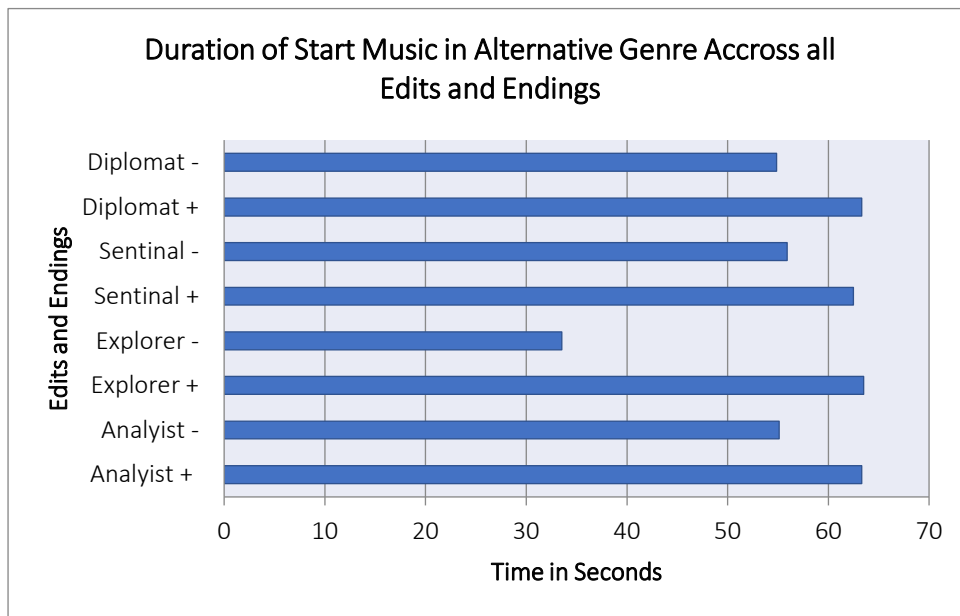
Table 7 Duration of end music in Alternative music across all edits and endings
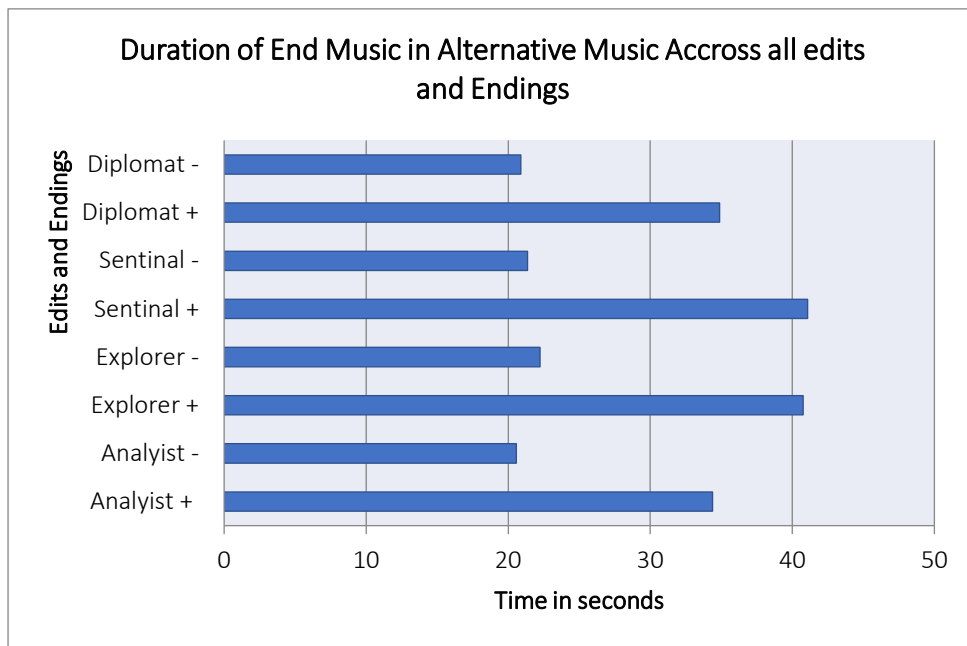
Table 8 The time that the start music begins to play during the short in Alternative music

Edit and Ending	Start
Analyst +	12.88
Analyst -	17.66
Explorer +	18.75
Explorer -	43.81
Sentinel +	19.02
Sentinel -	17.28
Diplomat +	12.83
Diplomat -	17.76

The three tables reveal enough about the shape of *The Break Up*'s pre-narrative to make a selection of which edit's endings to compare. As far as it is possible to determine by looking at music duration, the Explorer edit holds the greatest contrast for comparison in the

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discourse analysis. This is due to the Explorer edit with the negative ending having consistently shorter start music than any other as shown in Table 6. Additionally, as shown in Table 8, the point this start music is played is also very different from all the other edits. It begins twenty-five seconds later than the next latest start time. As well as being editorially different in terms of when the start music begins, the Explorer edit is also longer overall than the Diplomat indicating there is more content in this version. This provided sufficient evidence to select the Explorer edit over the Diplomat edit for the product section.

Table of Constants and Variables for Comparison

The previous section described the pre-narrative elements that make up *The Break Up*. Through doing this it was possible to identify which elements were likely to provide suitable source material for later analysis. The selections from each of the variations are summarised into Table 9 below. Studying these possible variations shows to what extent the content of an IIPN can differ and the possible benefits and drawbacks to using these types of changes for producers.

Table 9 Constants and variables used in the case study analysis

	Constant	Variable
Colour Grade	Bronze	Grey
Music Genre	Classical	Hip-Hop/Rap
Edit	Explorer	Diplomat
Ending	Positive	Negative

IIPN elements in *The Break Up* may enhance, obscure and change the story

IIPN elements in *The Break Up* that support the action

The most powerful IIPN element in *The Break Up* is the pair of endings. Which ending you view determines whether the couple stay together or break up. To make these divergent endings work, the short uses the other changeable IIPN elements, mostly successfully, to support this. It is the clearest way IIPN has been used to affect the story in both case studies.

The changeable colours and shots shown in *The Break Up* have been chosen, somewhat uncritically in my view, by the makers to enhance what is happening in the plot. The Bronze colour grade is the default for this short and was always intended to work with the romance genre. Forrester (2017b), described that the Bronze colour grade was designed to be similar to the film *Amelie* (Jeunet, 2002). *Amelie* is heavily colour graded to be bright and saturated throughout. It has a greenish colour with red, green and blue designed to pop on screen. In addition to this visual styling in colour, *Amelie* uses very close-cropped framing, often cutting part of the actor's heads or bodies from the frame. *The Break Up*'s Bronze colour grade and framing are not quite the same as in *Amelie* but it does apply the same contrast of warm and cold tones to create vibrancy in the colour palette. Overall, as expected with a colour grade designed for the romance genre, it heightens the artistic intentions of the creators rather than obscuring them.

Figure 5-4 Still from *The Break Up* (Amedume, 2016) of Sarah's opening shot, Explorer edit, positive ending, Bronze colour grade
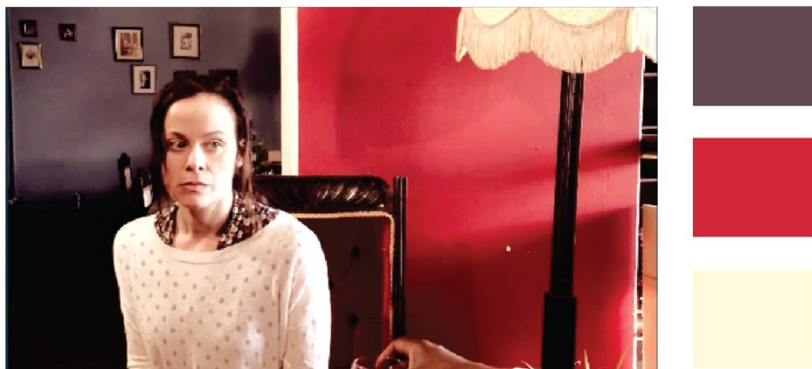
Figure 5-5 Still of Sarah, mid-close-up shot, the Explorer edit, Bronze colour grade, positive ending. *The Break Up* (Amedume, 2016)

To aid in analysing the use of colour in the short I have applied film theorist Patti Bellantoni's (2005) theory on colour in film. Colours change as the mood and action in the story shifts. Studying the shots with a Bronze colour grade shows how it has been deliberately designed to enhance the action in each variation. When the short ends positively, bright red predominates to show defiance, love and danger as film theorist Patti Bellantoni argues (2005, p. 96). Sarah is introduced to us in this variation, for example, with a bright defiant red behind her (

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Figure 5-4) to foreshadow what is to come. Later on, Sarah is set against a bright red as she is putting herself in danger by defying Ian (Figure 5-5). In contrast, moments in this positive variation where Sarah is doing what Ian wants, such as Figure 5-6, the red tone is muted, which matches her subdued behaviour.

Figure 5-6 Still of Sarah and Ian sat in the bar, Ian has just insisted Sarah drink, Explorer Edit, Bronze colour grade, positive ending. *The Break Up* (Amedume, 2016)

In a negatively ended playout, the Bronze colour grade's tones reflect the subdued content throughout (Figure 5-7). The dominant hue is green. The skin tones of both characters are less healthy-looking: Ian looks a little unwell, which befits an alcoholic. In combination with the negative story content and sorrowful music, the green colouring takes on a sickness connotation rather than that of life. The green dampens the colour purple, which is apparent throughout the positive variation (Figure 5-4, Figure 5-5**Error! Reference source not found.**, and Figure 5-6). The colour purple, as argued by Bellantoni (2005) is often used in cinema to show when something is about to end. This could be a character's life, relationship or their hopes dying for example. As their relationship does not end in the negative variation, the colour purple is absent (Figure 5-7). Whereas in the positive ending, Sarah is framed by a purple ceiling as she ends the relationship. This helps communicate how their relationship is unhealthy and demonstrates how the changing colour grades serve to underline the action on the screen. From this analysis, we can see that the colour grade helps to create the mood in each variation.

Explorer positive ending   Explorer negative ending
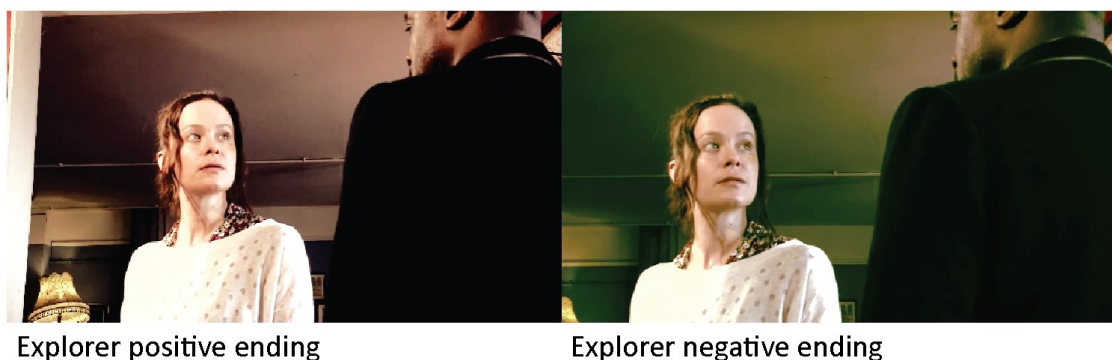
Figure 5-7 Comparison of colour grade in positively and negatively ended Explorer edits. *The Break Up* (Amedume, 2016)

Similarly, music supports the action on the screen. To my ear, when the short ends positively the Classical music used, has a modern sound that is easy to listen to. In contrast, I

found the negative variation's Classical music to be string-based, more traditional sounding and melancholic. In combination with a greenish cast to the Bronze colour grade, the dramatic music and story content create a bleaker impression than using positive music, colour and shots.

Shots also change to support the endings, even within the same personality edit. They have a larger impact on the story content than the music and colour grades. Figure 5-8 shows the differences between the beginnings of the negative and positive variations in the Explorer edit. The positive variation starts with Sarah walking towards the bar in between the title screens. The negative variation opens with her stood beside a playground, touching her stomach suggesting that she is pregnant. This setting mirrors her pregnancy and situates her in an identity related to motherhood absent from the other beginning. This is a significant difference, as in the positive variation the audience does not know that Sarah is pregnant from the start, whereas in the negative one they do.
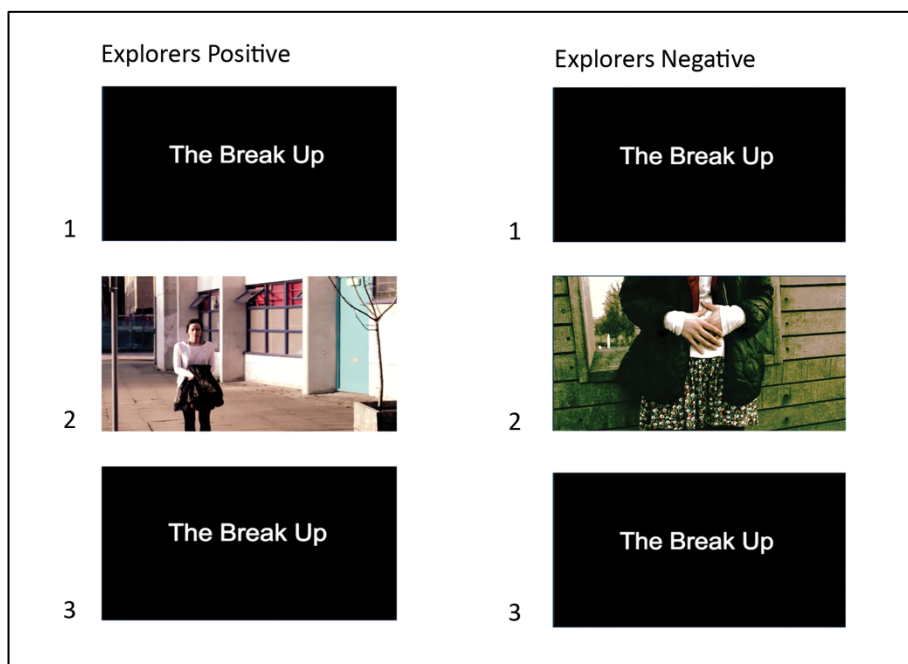
Figure 5-8 Arrival scenes comparison in Explorers edit with negative and positive endings. *The Break Up* (Amedume, 2016)

The way the shots are framed is also altered to match the positive or negative ending. For example, in both endings, Ian shouts at Sarah but the positioning of the characters in the frames is different. Here, the director has employed what David Bordwell and Kristin

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Thompson refer to as "spatial relations" (2008, p. 227) between the shots to emphasise the fabula. In the positive ending, the shot shows Ian's head and shoulders straight ahead (shot 3 in positive variation Figure 5-9). Which is the same as Sarah's framing, giving them equal status as the short cuts from one to the other. This contrasts to the negative ending where Ian is shown shouting at Sarah with a shot from below (shot 4 in positive variation Figure 5-9). Ian is positioned to the far right of the shot which then cuts to Sarah looking physically cowed at the far left. As the actors have been shown mostly in the centre of the frame beforehand it also serves to highlight this as an important part of the fabula. This positioning and cut between the shots in the negative version emphasise Ian's power emotionally and physically over Sarah. It shows the subtle potential of using an IIPN to enhance the narrative content.
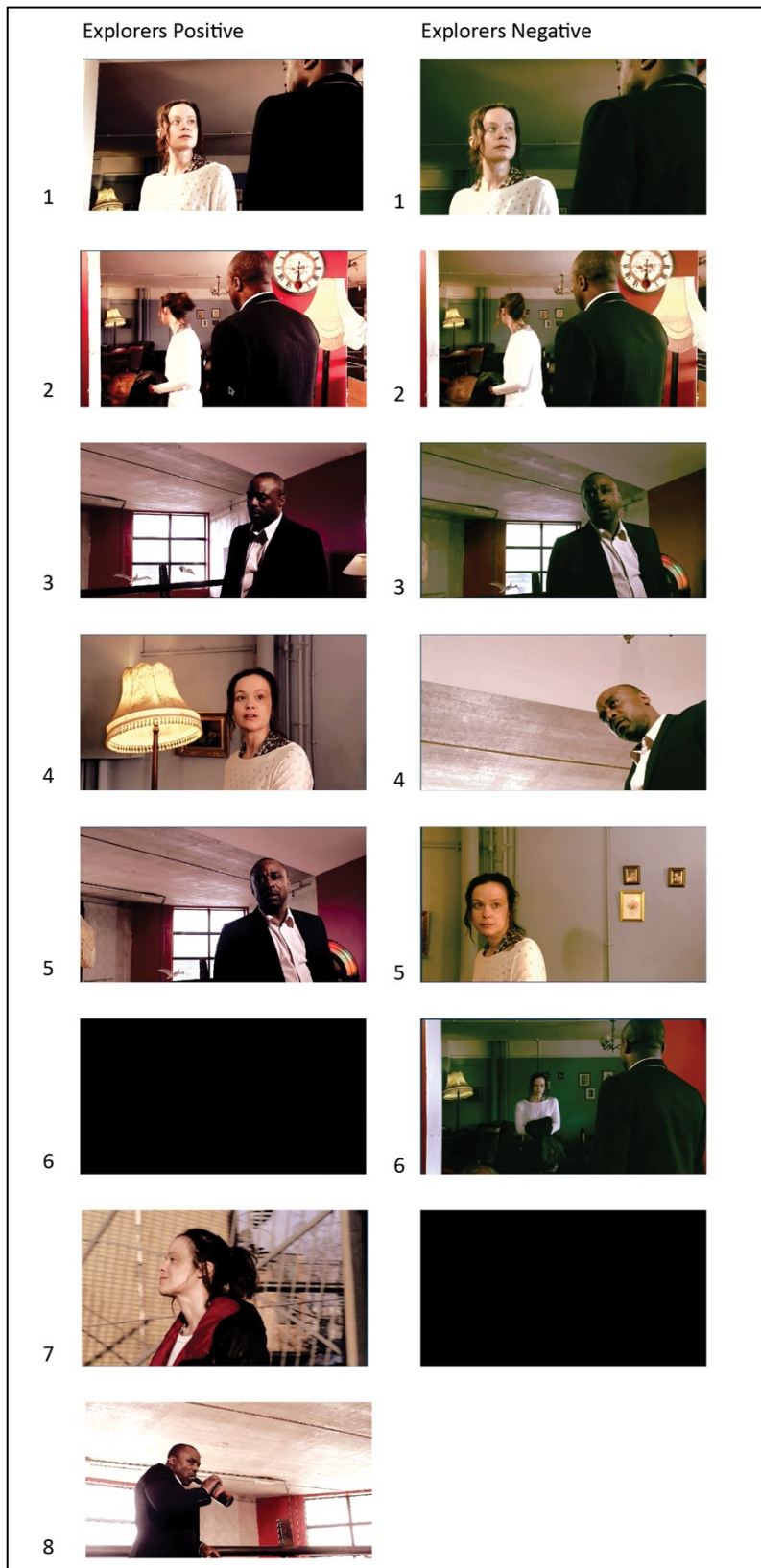
Figure 5-9 Comparison of shots used in the positive and negative endings of the Explorers edit. *The Break Up* (Amedume, 2016)

There are two additional effects that the IIPN elements in the short demonstrate that could be used in future productions. Firstly, including IIPN early in a broadcast can be used to effect later, unchanged parts of the narrative. This is done in *The Break Up* by changing which shots the audience see in the opening. The Explorer edit's negatively ended variation shows that Sarah is pregnant in the opening, whereas in the positive ending the audience doesn't know until the end. This changes the audience's experience of the middle content even though what is shown is mostly the same. The most significant change is that the viewer knows Sarah is lying when she tells Ian she has had a miscarriage in the negative variation. This raises the stakes of the conversation. Another, more subtle difference is in how we perceive Ian. In both variations, Ian is clearly shown as drinking during the day, as Sarah arrives in daylight and the rest of the bar is empty. In the negative variation, this takes on a greater contrast as Sarah has come from a children's playground. This indicates that it is so early in the day children are still playing outside and his behaviour is more extreme. This shows how a change in the earlier scenes can affect the perception of the story.

The other technique that the short demonstrates is using the IIPN elements to change the way a character is perceived by the audience. In the short, the Explorer edit shows Ian more than in the Diplomat edit and uses this extra time to make him a little more sympathetic. Most of the changes are at the beginning and end of the short. Figure 5-10 shows a series of stills from both edits at the beginning. In the Diplomat edit, there is more focus on Sarah, making her unambiguously the most sympathetic character. The Explorer edit sets up Ian more sympathetically in comparison. It shows how Ian prepares and waits for Sarah's arrival nervously. He is shown pacing, selecting music and setting up drinks, highlighting his emotional distress. Importantly, the audience is not shown that Sarah is pregnant and less of her apprehension before the meeting. Without the lingering shot on Sarah at the start, the audience may not notice the bruising, a sign the relationship is abusive, until after her arrival when a closer shot of her is included. These changes culminate to create a different impression of the characters depending on the edit you see.

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Figure 5-10 Comparison of Explorer and Diplomat edit arrival shots, positive ending, Classical Music, Bronze colour grade. *The Break Up* (Amedume, 2016)

IIPN elements undermining the story

Analysing the short has shown that IIPN has the potential to undermine the storyteller's original intentions. One of the ways that IIPN can be detrimental is by making an unintended artistic impression. When comparing the music genres Classical and Hip-Hop/Rap there is a clear difference in the moods created, one of which appears to be accidentally comical. The

Classical music is very sad. The mood is gentle, creating an appropriate delicate melancholy atmosphere for the short. In contrast, the hip-hop music is quite whimsical, much more light-hearted in tone and could plausibly be used in a 90's hip-hop video. In combination with the urban setting of a bar, this builds to a potentially comic ending. As Ian drinks straight from a bottle, hip-hop music has only shortly begun playing again. This reflects a hip-hop music video trope of drinking from the bottle and feels incongruous. Whilst the music was selected by the team, as none of the other combinations aims to create comedic moments, I argue that this is not intended. This shows how having many variables in an IIPN can lead to unplanned artistic connotations.
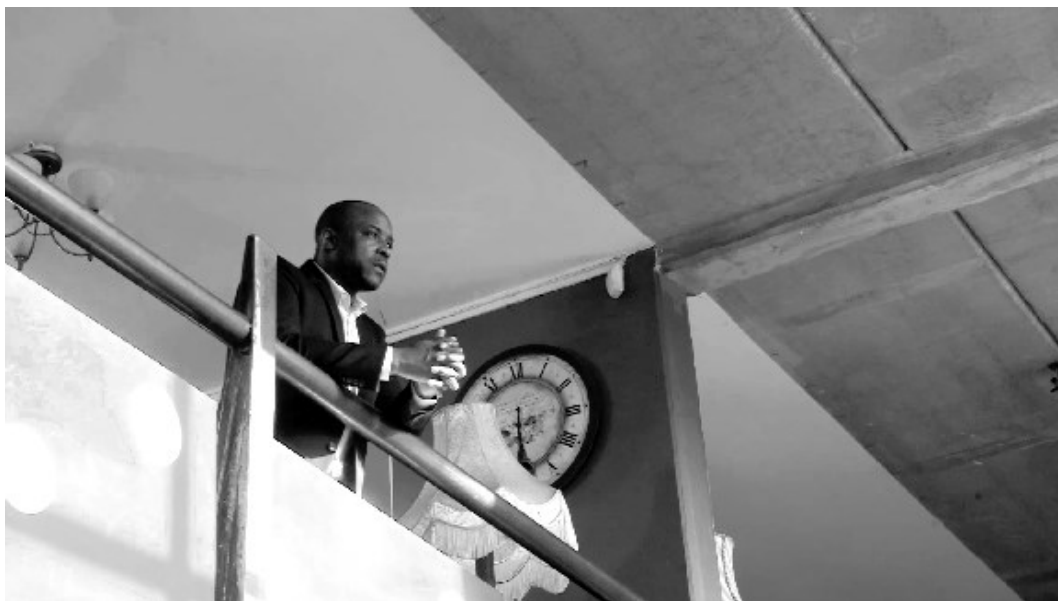
Figure 5-11 Ian stands waiting for Sarah in the Grey colour grade. *The Break Up* (Amedume, 2016)

In addition to unintended connotations, there is a danger that IIPN variables can obscure parts of the action. The Grey colour grade makes *The Break Up* harder to follow in places. The grade works best when it is being used in a shot with more mid-tones such as Figure 5-11 but some of the high contrast or darker shots conceal information important to the narrative. The scene where Ian proposes by pushing a ring towards Sarah is difficult to make out (Figure 5-12 below). This is significant in terms of narrative effect as Sarah's refusal to accept his proposal is a key moment in the plot. Without seeing the ring, the meaning of the conversation is quite different and how serious Ian's feelings are about the relationship less clear. Parts of the narrative are also obscured as high contrast scenes make it difficult to

make out the nuance of Ian's expression, Figure 5-13, on his darker skin tone. Not being able to see one of the lead actor's expressions is a real loss for the narrative effect.

Figure 5-12 Still of Ian pushing the ring towards Sarah in the Grey colour grade. *The Break Up* (Amedume, 2016)

Figure 5-13 Still of Ian standing to speak to Sarah in the Grey colour grade. *The Break Up* (Amedume, 2016)

The way that the grey colour grade obscures some details, highlights the need for producers to ensure that IIPN elements do not work to the detriment of the cast or others' work on the production. Whilst darkness can be a deliberate artistic choice, when it is not for artistic effect, it is important to light all of a short well from an ethical standpoint. By obscuring the set or costume design with poor lighting or colour grading, someone's work on this is being omitted. As Forrester (2017b) explained in an interview, for the cast, the way they are lit is

so important it can form a part of their contract. Bad lighting means the quality of their performance can be compromised and possibly their reputation as a result. Many changeable elements could also have an obscuring impact on an IIPN (e.g. sound muffling dialogue, editing characters out) and should be controlled for where possible in production.

Production challenges

The Break Up was not fully realised, it does not have all of the genre variations originally planned for and is not released to the public as *Breaking Out* was. In 2020, the prototype still does not have a confirmed data input type to inform which variations an audience member sees. At this point, without more example IIPNs, it is not possible to judge whether this is due to problems inherent to the IIPN format or an issue with a particular production method. The following sub-sections explore the production challenges that contributed to the project not meeting the ambition of its creators. They offer insight into pitfalls that future makers may wish to consider in their own productions.

Software development and post-production costs

All productions are limited by budget. For IIPN there are restrictions imposed by its resource-heavy format and the need for developing new technologies. As a prototype, there were several times in producing the short where more work was needed to create bespoke solutions. One of these, as explained by Forrester (2017b) is that there was no ready-made system available to deliver an IIPN short. This led to another member of the BBC R&D team, Matthew Shotton, putting in significant work to build the *HTML5 Video Compositor* (2015). The *HTML5 Video Compositor* (2015) was subsequently released as open source. Releasing the *HTML5 Video Compositor* reflects the BBC's intention (Brooks *et al.*, 2019) to encourage a community of practitioners to create more IIPN content and is part of fulfilling their requirements as a publicly funded broadcaster to share their knowledge. The additional work needed to complete *The Break Up* was used to further the BBC's goals beyond this project, making the investment better value. As IIPN becomes more established, this type of challenge will reduce, bringing down production costs allowing more focus on other, less

technical areas of IIPN. However, at this stage, it is still unclear to what extent future IIPN dramas may need their own software development for each project.

Another area, where new technologies had to be developed, was in post-production. The finished edit needed turning into something that could be used in the *HTML5 Video Compositor* (2015) that the R&D team had made to play IIPN. This was a large task well beyond the project's budget to pay someone to do. Consequently, an external developer who could then use the work in other projects afterwards was found. As with the previous example, the work needed to be usable in other future scenarios to justify its development. This points to a possibility for private companies. As well as reusing work in other projects as this developer did, the software they have built could be sold as a product. Ultimately, for the short, this high level of software development required a great deal of time and resources, which was a contributing factor to the short not being fully realised as an IIPN.

As well as consuming more of the budget to build bespoke solutions, employing staff to work with new systems is expensive. For example, Forrester explained in the interview, that in the post-production process an editor was employed only for initial rough cuts and not for the duration of the project. This was because it took trial and error to create a way of combining the media elements to play in a browser. It would have been too expensive to pay an editor to work throughout this experimental process. A new process was avoided altogether in the final editing stage, as Forrester (producer) and Julius Ademume (writer/director) used Final Cut Pro, the standard software for film editing. A bespoke editor was considered[7] but Forrester felt that whilst Final Cut Pro encourages a linear narrative style, it would hinder the project if the director needed to learn how to use new software. As with the need for bespoke solutions, the need to trial processes and upskill staff will lessen as more examples are made.

Using the same visual language of already established technology helped streamline the production of the interface. In the short, the graphic visible below the moving image (Figure

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[7] Since this project was completed, the BBC have created their own OBB editing and production tools see (BBC, 2017b).

5-14) is borrowing from the graphic conventions of the software Final Cut Pro used to make it (Figure 5-15). The graphic is a form of hypermediacy (Bolter and Grusin, 1996). Both display the moving image and audio aspects separately in relation to time with a thin line to show the progress of the playout. Perhaps not coincidentally, audio is represented by the colour green in both. As the prototype is designed to demonstrate a proof of concept for industry professionals, hypermediation is appropriate. It links the new technology with an older, established technology communicating how it works and making it accessible.

Figure 5-14 Screenshot of the interface in *The Break Up* (Amedume, 2016) during playout

Figure 5-15 Image of Final Cut Pro film editing software (Bullon94, 2014)

Even when the technology is already developed, IIPN formats such as the one in *The Break Up* will always be more expensive than a typical production. Anything with more than one variation, such as *The Break Up's* different edits, storylines, colour grades, and music simply needs more resources. For example, the different colour grades represent an area where more money was needed than in a regular broadcast. Eight, rather than the typical one, colour grades were made. As colour grades are proprietary, this is not as simple as just selecting a few more. A colour grader was hired to make bespoke colour grades for the short. Then, in another layer of work not present in a typical production, a member of the R&D team created an open-source library so that colour grades could be added in real-time at the audience end.

IIPN can create new roles for staff

IIPN can offer possibilities for new roles to emerge in broadcast production. The short needed an adaptable writer who was willing to work more collaboratively than a typical writer and commissioning model. The writer was required to be more flexible and accommodating because of new technologies. To find this team member Forrester

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approached Amedume directly rather than commissioning through BBC Writers Room[8] as he had for the previous project. As Amedume had experience in writing, directing, editing, and distribution he could fulfil more than one role and so was a good fit for the project. For example, being the writer, director and editor streamlined the editing process as Amedume did not need to consult other people to make decisions over the narrative content. The need for flexible team members is likely to continue to remain an important factor in IIPN productions whilst it matures.

IIPN can provide new types of roles for on-screen talent too. It is a potential opportunity for actors and actresses to play more diverse roles and break out of typecasting. As this project was intended to include three genres, it was a chance for actors and actresses to demonstrate their skills in a wide range within one character. During the production process, I sat in on the initial meeting between the casting agent and director before interviewing the writer and director Amedume (2015). Amedume highlighted the potential of the project to realise some of his own aspirations, to give less advantaged people an opportunity. Therefore, Amedume was keen to audition older women and people from ethnic minorities in order to give them the chance to showcase their talent. Here, Amedume was actively leveraging his role as director to use the IIPN format to help actors and actresses avoid typecasting.

Including more variations increases production complexity

For every variance and layer added to an IIPN, the more work and risk there is that something can go wrong. This was felt in many different ways in the production process. Firstly, the brief given to the writer contrasted to a typical broadcasting brief as it required both technical accommodations as well as multiple story variations. Amedume was asked to create something that could utilise personality data to change the sound, colour grade, and edits the audience sees, whilst maintaining a coherent storyline that created a similar

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[8] The BBC Writers Room is a space organised by the BBC to develop both new and experienced writers who are interested in working with the BBC

overall audience experience. These are all elements that would not be included in a typical brief for a writer and made the writing process more complicated. Any IIPN brief will include the need to utilise data in some way at a minimum and so will always differ from a typical broadcast.

To mitigate against the already complicated brief, Forrester and Amedume tried to simplify the script wherever they thought it was possible. The final proposal was three scripts, each with the same dialogue and set in different genres, sci-fi, horror and romance. Using the same dialogue kept it consistent across variations, but the genre change allowed for the different colour grades, music, and edits. Despite their attempts to keep things simple, as is clear from the introduction, only the romance variation was fully realised. This demonstrates the challenge of assessing how many variations can be made in a project at the outset. Making an assessment of the risk of failing to complete each variance will become easier as staff gain experience and more examples are available.

Another factor to consider when planning the content of an IIPN is that unlike an explicitly interactive narrative, the audience member does not see the other options as they view it. Even the most complex IIPNs will always be a seamless experience for the audience. This means the audience will not credit the production with the work of all the other variations. Additionally, without active choices between variations, the creators must decide where the value is for different audience members on their behalf. This is another level of decision making in production for every type of variance. Compared to a traditional or explicitly interactive narrative, this need for decisions on the audience's behalf makes IIPN production more complex.

IIPN shoots are still subject to the same issues that happen in a typical production. During shooting, Forrester describes that some props did not arrive on time and that work began late on some days. All issues that Forrester describes as typical to a non-IIPN shoot too. Overall, Forrester and the other R&D team members found through observation, (by watching the shooting of the film as it happened) that production planning and the shoot went as would be typically expected on a film short production. Forrester sees it running similar to a typical production as a positive sign towards introducing more teams to creating

IIPN in the future. Ultimately, the issues on set meant that only science fiction and romance footage was captured, and the horror genre was abandoned at this stage.

In contrast to shooting, the post-production of this IIPN short was much more complicated than a typical broadcast. This is because instead of creating one final product from the footage, the editor and director produced four different edits of the short. Initially, these were the two sci-fi genre variations either with a happy or sad ending and two romance variations also either with a happy or sad ending. The sci-fi variation was intended to have special effects with more IIPN elements such as the day's date included as an overlay. This required a separate special effects editor to create them. Unfortunately, the person hired to complete the special effects did not deliver them fast enough to meet the project deadlines and the sci-fi variation of the short was not progressed beyond this point. As with any project with multiple stages and team members, each step represents a vulnerability in the project. Currently, an IIPN project inherently carries more stages in post-production than traditional broadcast and so more risk.

The multiple possible outputs of an IIPN make agreeing contracts more complicated than in a typical broadcast. For example, multiple final outputs represent a risk from the perspective of actors and actresses. Usually, an agent will approve a short before it is distributed, to ensure that the actor or actress is shot in a way that is appropriate (for example, they are well lit) and that it is good quality. If it is not, then the actor's contract may stipulate that they are paid a fee for reputational damage. As the short has so many possible variations this kind of process was not possible. The actor and actress who worked on *The Break Up* agreed to do so based on the reliable reputation of Amedume. Other IIPN may be limited in who it can hire as not all agents and their clients will be willing to take this reputational risk.

As IIPNs have multiple variations, obtaining licenses for music used within them is much more complex than in a regular broadcast. For the romance edits of *The Break Up,* Music Technology students from Salford University were tasked with selecting music from 14 music genres, that were appropriate to a happy or sad variation of the short (28 tracks total). To obtain the copyrights for the music the BBC lawyers asked for a rough cut of every possible variation the music may be used in. As *The Break Up* has 448 variations this was not

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possible. To compound this issue, a ban on using music with American copyright within the BBC further constrained the music choices. Consequently, the music selected was from the BBC library. This will be an obstacle to any broadcaster working with music in IIPN, as music copyright will always need to be obtained. This combined with the restrictions on cast means that the possible elements of IIPN broadcast are currently limited. A change in legislation will need to take place before these constraints are released.

Choosing and communicating a data source

One of the challenges of working with IIPN is finding a suitable data source to inform the narrative. The data can either be collected by the broadcaster themselves or from a third-party. If a suitable source is found, the BBC would only have to state how they were using the information so the audience member could give permission to begin viewing. This would be an audience experience that could be done in the interface with only one click. The downside to this is that using data from a third-party requires the broadcaster to put trust in an external agency as to the validity and ethical rigour of their data. For the short, the data source initially chosen to inform the implicit element of the narrative was abandoned after the third-party data source did not stand up to scrutiny.

At the beginning of the project, the producer had an idea of what he wanted the narrative to do technically and, in the story, but not of the data source. The data type was not driving the artistic choices for the narrative. During the commissioning and early production stages, a possible source was considered. Forrester became aware of software development company Momentus, later rebranded as Perceptiv. They had developed an app, *Music and Personality* (2015) that claimed to indicate an audience's personality type based on their music collection. In need of a way to collect data implicitly about the audience, Forrester felt this had potential as a mechanism to determine which audience saw which version of the short. As such, during the commissioning stage, and the first part of the production, the short was intended to be adaptable based on the personality type of the audience as determined by this app. However, as the project progressed it became clear that Perceptiv's app *Music and Personality* (2015) wasn't totally suitable leading it to later be dropped. Forrester explained that whilst the app was good at separating the audience into music

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preferences, the personality profiles aspect of it was not yet robust enough as a data source. This highlights the difficulty in finding a reliable data source that works well with the narrative content for IIPN.

When using data from third parties It is important to check that their data is being sourced ethically. In this case study, the app originally intended to be used applied the categories from the Myers Briggs personality test (Cook Briggs and Myers, 1962). This test has clear ethical guidelines provided by The Myers and Briggs Foundation on its use (*The Myers & Briggs Foundation - Ethical Guidelines*, 2019). The guidelines advise that an appropriate interpretation of the results for every application of the test should be provided. In this interpretation, the types should be referred to in non-judgmental terms at all times. They should be presented as tendencies or inclinations, not absolutes as people can and do behave outside of their types. Additionally, they suggest that the test results should not be used to create stereotypes. For a broadcaster, using this kind of data requires ensuring that these standards have been met before using the information. Each type of data used needs specific ethical consideration before a broadcaster can be confident in including it as part of an IIPN.

Beyond the specific problem of the validity of this app, there are significant ethical issues around using personality trait data for IIPN at all, as it is individual and very personal to the audience. As outlined in the previous case study, data that is particular to an individual is considered important to keep private in western societies. If this data had been used in a public variation of the short, there is a much higher risk of causing offence or concern. The comments on an article (MacDonald, 2015) about the short's development demonstrate some of this potential for worry. For example, one person is concerned about their data being used "No thanks, I don't want to be profiled" and another about the filter bubble "What happened to free choice? I want to watch eclectic programs" (MacDonald, 2015). This type of data source carries with it the potential for controversy.

The decision to have a positive or negative ending may have contributed to the challenge of finding a suitable data source to inform this short. The two endings are reminiscent of the explicitly interactive branching narrative (See literature review p.103). The use of a typical choice-driven structure that includes a negative outcome with implicit interaction is

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problematic. It means that when the audience receives the negative ending, this is not based on an error of judgement or deliberate action on their part. Instead, their data has in some way influenced the text to show them a woman returning to an abusive relationship. In this case, the intention was originally to link it to a personality profile which would have connected it to a very personal aspect of the audience. This may leave the audience member wondering why they received it and the negative ending a reflection on them as a person. An unfortunate outcome for any audience member and more so if they are in an abusive relationship themselves as either party. In this way, the 'win or lose' structure at the end of the short makes finding a data source difficult. Linking any kind of audience data to an abusive relationship may result in poor and upsetting audience experience.

IIPN and the filter bubble

One of the challenges of working with IIPN is that it can contribute to a filter bubble for the audience. Eli Pariser (2011) refers to the 'filter bubble' as when the personalisation of media creates a lonely world that increasingly shrinks to only the audience's interests. This may remove the opportunity for collective experiences, but also shield them from other worldviews, and therefore the ability to access more than one opinion. Pariser locates this within the political climate of the United Kingdom and the United States of America, where social media channels that are filtered to show a limited range of views influence election results (El-Bermawy, 2016). For IIPN creators, appearing to or actively contributing to a filter bubble could dissuade audience members from engaging with IIPN content.

This concern about the filter bubble has been studied by others and contested in different ways that are applicable to IIPN. Andreas Buja et al (2014) argue that the 'volume effect' and 'product mix' effects offset the filter bubble's influence on recommendations. The volume effect describes that personalisation encourages more media consumption and therefore a higher likelihood of audiences having recommendations in common. The product mix effect is that after receiving recommendations users still buy a similar mix of products (conditional on volume). Overall, Buja et al find that concerns about a fragmented audience due to the filter bubble may be overstated. However, the study does not cover all possible instances of the filter bubble, such as in the news or in book recommendations, for

example. For IIPN, if Buja et al are correct, effective IIPN broadcasts will encourage users to view more of them, increasing the likelihood of them seeing the same thing as others.

Fear of the filter bubble may prompt some audience members into taking action that would change the content they receive. In other areas where the filter bubble effect can be found action is being taken. Disruptive technology can be used to change how content is filtered to you. This type of technology is already in use for political filter bubbles. But unfortunately, they carry with them their own set of problems. Engin Bozdag and Jeroen Van den Hoven (2015) analysed different programs designed to disrupt political filter bubbles on the Internet. Key to their findings was that the disruption programs are in turn relying upon narrow models of democracy, such as a binary between liberalism and conservatism. They disregard other democratic models in their design and so continue to act as a filter bubble themselves. Consequently, the audience's using disruptive technology may be contributing unknowingly to their own filter bubble.

Another way that audiences can confound an IIPN creators' intentions is when the audience simply lies about themselves. This is a common practice used to fool online filtering systems. In online dating, a study found that 81% of participants lied on their online dating profiles (Hancock, Toma and Ellison, 2007). They found that men lie about their height, making themselves taller and women their weight, making themselves smaller. This meant that when potential partners filtered their searches, for a particular height, for example, they would still be found, despite the reality not being the same. As highlighted by, Paul Dourish and Genevieve Bell when speaking about ubiquitous computing "lying and truth telling are social practices, not easily understood or distinguished through sensor networks" (2011, p. 149). Therefore, it may be quite possible to fool a computer system to create the effect you wish from its filter and combat the filter bubble. This makes it important for IIPN creators to effectively communicate why providing accurate data is beneficial to the audience.

Whilst the filter bubble and its danger of making the world smaller to the user is real, in the case of IIPNs this may not always be the case. There can be a separation between the effect of a filter bubble and the technology creating it. An IIPN does not have to be tailored to suit the user, much like Bozdag and Van den Hoven's models of filter bubble disruption, it could

be used to challenge views as well as reinforce them. Outside of R&D, another department at the BBC have recognised this ability and applied it to their recommendation algorithm in their app 'BBC Sounds.' The app plays podcasts and is explicitly trying to "'pop your bubble' with unexpected and challenging content" (Savage, 2019). To do so, this BBC team created an algorithm designed to break echo chambers rather than form them. This shows how personalisation algorithms similar to IIPNs can be leveraged to not always suit the audience.

Reflection on how narrative theory was applied in the case study

The model proposal tested in this case study was arranging the analysis into the 'pre-narrative' and 'product' structure inspired by Koenitz's (2015) 'system, process and product' model. As with Case Study One, completing the pre-narrative section first was useful. Determining the range of potential possible outputs in the pre-narrative meant I could choose the most relevant products to study. In this instance, I selected the largest possible variance between products. In contrast to case study one, in case study two, outlining the possible pre-narrative elements was more straightforward. The IIPN elements were clearly defined in the interface so I did not need to use a pseudocode and table-based method to map the structure of the prototype. Instead, I needed to identify which parts of the short to analyse. This was because the short has 448 possible variations. Watching every possible variation with adequate enough notation to then choose which to compare would be an extremely time-consuming task. Therefore, breaking down the narrative into quantitative data (a data set of the length of time the music played within it, in every variation) was a practical solution. This enabled a reasonable choice to be made based on the results of the empirical evidence. However, this was still a very labour-intensive method. Potentially, a smaller sample size of the data could have been used to then generalise from. In this case study, this would have worked but recording every instance allowed more certainty. Future IIPN analysts, who may be dealing with pieces with an even larger range of variables would benefit from automating this process using computer software where possible. For example, using a computer programme to automatically ascertain the duration of every possible variation rather than manually viewing each in turn.

The method of using interviews with staff working on the prototype again provided insight into its production. This included information such as, that the original ambition was to include multiple cinematic genres. As one of the aims of the case studies is to provide suggestions that would help with future IIPN productions these interviews were very valuable. For the model proposal, depending on the aims of the researcher this may not be needed.

The section that used the findings of the pre-narrative made a comparison of the earlier identified pairs. The aim of this was to see what changed in the narrative effect between them. Overall, this utilised the strategy highlighted in the literature review from Barthes (2002, p. 13) to examine lexia for possible meanings. It seems likely that future IIPN researchers would also be interested in the effect of the variances the IIPN produces. Therefore, a broad outline for the model proposal should include examining lexia for their connotations.

As with the previous case study, the relevant theory was incorporated throughout, including theory specific to film. This is because the literature review favoured texts that covered multiple media forms such as Seymour Chatman (1978) and Mieke Bal (2009) as this is most useful to the overall model proposal for IIPN. Whilst both these texts cover film, they are not in the level of detail needed for this case study. Consequently, in this case study I employed the work of several film theorists. Theory from Bordwell and Thompson (2008) helped with examining shot framing and the use of setting to convey meaning. Bellantoni's (2005) work on colour in cinema was simple to apply and was effective when examining the short. The use of stills and highlighting colours within them aided this. The analysis of the edits and endings also utilised stills to good effect and is a method that could be applied in any future work. The most challenging area of the comparisons was the music genre. Here the work of film theorist Michel Chion (1990) provided a surprisingly similar approach to the one naturally lent by the variances. This was the approach of comparing different music laid over the same moving image and then observing how the connotations change. In a larger case study, or one where the variations are only in film audio, revisiting Chion's work and exercises could be an excellent first step. For those researchers working with film-based IIPN this case study demonstrates an application of the model proposal combined with film

theory. Future researchers can take advantage of the large wealth of other film theory available according to their aims. The case study also shows that even a well-funded and well-staffed IIPN production may end in failure. The production issues I have identified indicates areas future makers should be wary of.

6 Findings and Discussion

Introduction

The findings from the case studies are a theoretical narrative model proposal for examining Implicitly Interactive Pervasive Narrative (IIPN) and a matrix of factors to consider in production when creating an IIPN. The model proposal is aimed mostly at theorists who are examining IIPN which includes those working within Research and Development (R&D) departments such as the one at the British Broadcasting Corporation (BBC) as well as academics. The matrix of factors to consider when producing an IIPN is aimed at practitioners and again those in R&D departments or at universities. The chapter is structured so that it sets out the theoretical model proposal and the key theory and models that underpinned it. Then, the chapter focusses on the production findings. This includes the method of constructing the matrix, the matrix itself and a discussion of these findings. The discussion situates the findings in relation to feedback from the BBC, the historical context chapter and expands some of these ideas.

The theoretical narrative model proposal for IIPN

This narrative model proposal has resulted from the case studies. It is intended to be for IIPN in any media format, from radio and television through to augmented reality. The proposal is designed to be used as a way to help researchers and practitioners achieve their aims in examining an IIPN.
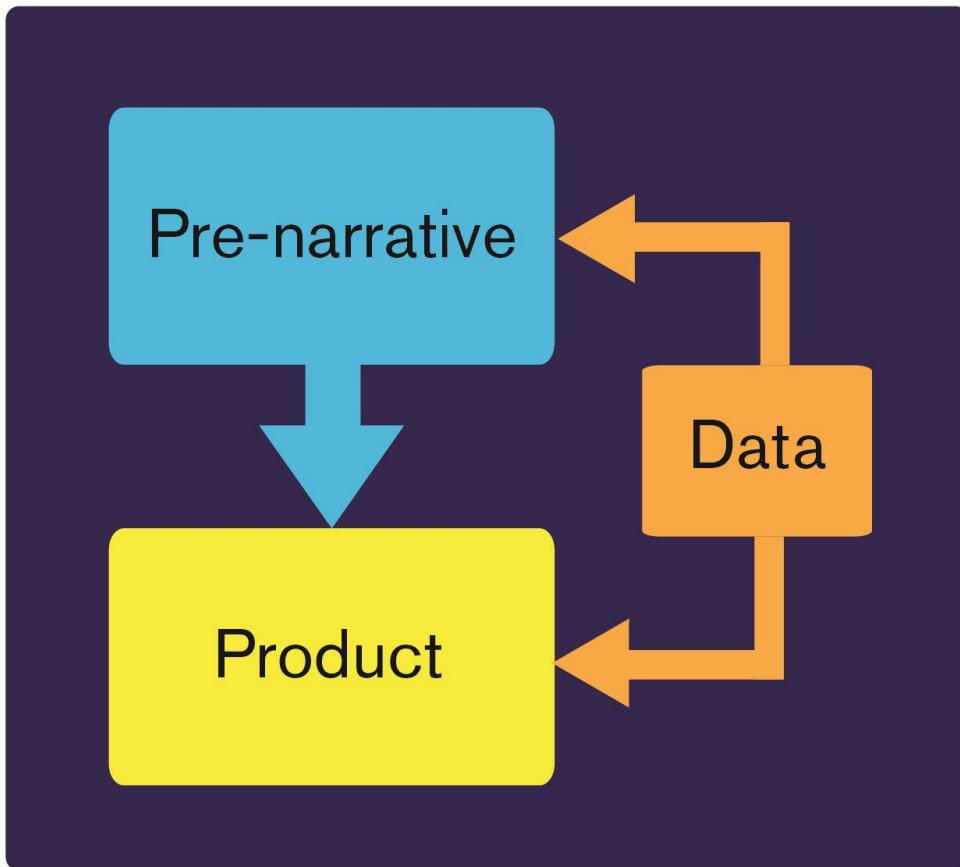
Figure 6-1 IIPN model proposal of pre-narrative and product (Frew, 2020)

The initial model proposal can be summarised in three parts (Figure 6-1): pre-narrative, data and product. The pre-narrative section is expected to be completed first, followed by the product. 'Data' is intended to be explored alongside the pre-narrative and the product as it affects both.

The pre-narrative stage of the IIPN model takes into account the system that creates narrative outputs. This allows for the computational structure beneath a product to be examined. This 'pre-narrative' section of the model deals with everything the IIPN needs to create a playout. It is the media objects (i.e. audio or images), production processes, software and algorithms, audience interface, data sources and the data itself. For example, *Breaking Out* (BBC, 2012) is a radio play. Some of the things that make up its pre-narrative are media objects made of audio, data about the day's weather and a landing page on a web browser.

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When conducting an analysis, the pre-narrative section should be executed first so that a researcher can identify more precisely the system that powers the IIPN. This is important as IIPN's can have an infinite number of possible outputs. There is no 'final playout' as there is with a paperback novel, which has a text set down on consecutive pages and continuous print. Defining the pre-narrative is a way to discover avenues of enquiry. The case studies offer an example of how defining the pre-narrative can be done in a radio play and film short.

During the pre-narrative analysis, the 'data' element of this three-part model should be included as needed. The data is an important part of the pre-narrative. It is a key element of its structure, how the system gathers data, and what it gathers, impacts the later narrative and audience experience. For example, in Case Study One I aimed to draw out production insights to help future makers. Looking at how data was gathered showed that having a primary data source meant that if it fails, most of the data insertions in that IIPN then fail.

The 'potential' data that may be used by an IIPN can also be considered in this section. Once the researcher knows what type of data may be input and how, this can be included as part of the analysis. For example, in Case Study One the issue of safeguarding was explored. As this IIPN draws in stories from BBC News, it is possible that potentially distressing content could be pulled in. As the text examined in Case Study One is a comedy with no age rating, airing breaking news content such as a terrorist attack could be an issue. This was a useful insight for the later production findings matrix. Consequently, the pre-narrative element in combination with the data element offers a rich area of potential for the researcher.

The second stage of the model proposal, 'product' is focussed on examining outputs made by the IIPN. Ideally, this should be done with more than one product created by the system. By analysing more than one product the researcher can explore the different nuances of the variations made by the IIPN. This ensures it is possible to capture the changeable feature of IIPN absent from static texts.

The knowledge gained from completing the pre-narrative section can aid with determining which products to analyse. For example, at the pre-narrative stage in Case Study Two I identified in detail all the possible variations (changes in colour grade, music genre, two

endings, and overall edits). This meant I was better informed of where large variations between playouts would occur. I then selected a limited number of playouts based upon this, making it more likely I would find contrast in the outputs I later examined. As IIPNs have a large number of variations, using the earlier pre-narrative analysis helps narrow down which outputs to consider.

As examining an IIPN involves working with more than one output, even when narrowed down to a few playouts there is likely to be a large amount of material for the researcher to work with. Therefore, selecting a limited amount of relevant material from each text may be practical solution. In both of the case studies this was done at points where there were differences between the products. There are many techniques that can be used to then interrogate these sections depending on the researcher's aims. It is expected that future analysts will need to employ strategies that best suit their field (e.g., feminism in literature, production in film making) in order to do this. For example, in Case Study Two I utilised theory from film theorists to extract lessons on how to produce IIPN.

In the product stage of an IIPN analysis the 'data' element of the model is still important. At this point, this is concerned with actual data, rather than the potential data that could be used. The data used impacts the narrative, sometimes to a large extent. For example, in Case Study Two depending on the data received, the audience would get a happy or sad ending. In Case Study One, the data informing the narrative was literally inserted into the text. For each IIPN, exactly how the data affects the narrative and the impact it has will be different and potentially exciting area to research.

Taken together, the model proposal of pre-narrative, product and data can form the basis of an IIPN analysis. It is expected that additional theory will need to be brought in to aid the researcher's specific aims. For example, in the two case studies, the theory that was relevant to the media form (radio play and film short) was brought in alongside work from digital narratologists and the structuralists. Future researchers may use other theoretical references to help analyse IIPN in another media form or in a narrative with an experimental structure, for example. In this way, the theoretical model proposal for IIPN is the first stop to, hopefully, accommodate many media formats and narrative structures.

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Key theoretical influences on the model proposal from the literature review

The process of conducting the two case studies developed the theoretical narrative model proposal. One of the challenges in applying the narratological theories to IIPN was the lack of precedent to follow. There is not, to my knowledge, an existing theory or model that deals precisely with IIPN. Work completed on analysing digital narratives, when done at all, is mostly focussed upon explicitly interactive narratives. Compounding this, as highlighted by Alice Bell et al the mapping of theory and textuality in this field has been typically at an abstract level (Bell, Ensslin and Rustad, 2014, p. 5). Whilst earlier literary narratologists such as Roland Barthes (Barthes, 2002), Umberto Eco (1982), and Seymour Chatman (1978) provide examples of analysis these are all on static literary texts. The interactive theorists such as Hartmut Koenitz (2015), Yellowless Douglas and Andrew Hargadon (2000), and David Bolter and Richard Grusin (1996) have made limited concrete applications of their theories. This is combined with the problem, that as an IIPN text is different each time, analysing its structure is inherently difficult. An issue also highlighted in relation to explicitly interactive narratives (Bell, Ensslin and Rustad, 2014, p. 5). Consequently, in the case studies, parts of the theories and models were applied, discarded or adapted as they were found to be more or less useful. The detail of this is outlined at the end of each case study in a reflection.

The most influential idea developed from the literature review was the importance of including the computational structure and process as part of an analysis. Theorists such as N. Katherine Hayles go so far as to say that "rigorously speaking, an electronic text is a *process* rather than an object" (2004, p. 78, emphasis author's own). One of the things that make IIPN different from a traditional narrative is that it is made in real-time especially for that audience. This makes including the process of how it does this in an analysis essential.
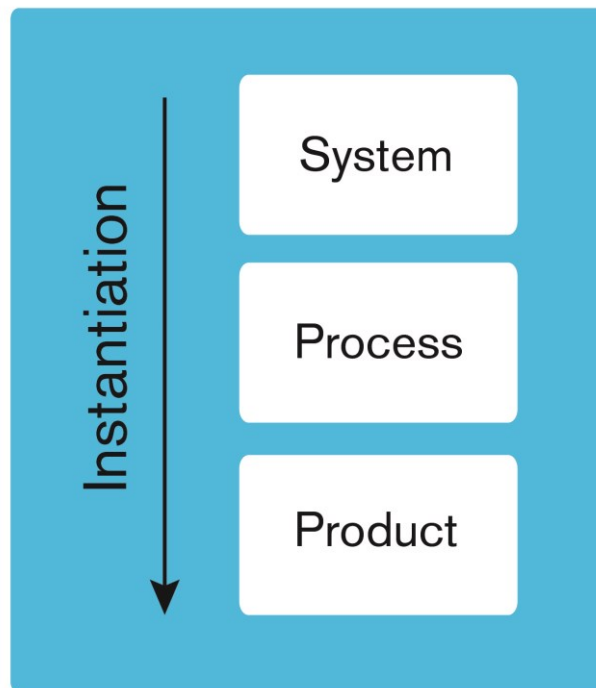
Figure 6-2 Koenitz's (2015) 'System, Process and Product' model for interactive digital narrative. Redrawn (Frew, 2020)

A more specific idea on the computational process underpinning interactive digital narrative also influenced the development of the model proposal. One of these is Hartmut Koentiz's model (Figure 6-2) for explicitly interactive digital narrative. The model looks in detail at computational processes and user interaction as well as its final form. His model summarises a way of analysing explicitly interactive digital narrative through the 'system, process and product'. The model includes the potential narrative in the 'system', how it comes into being with explicit interaction in the 'process' and the final narrative output as a 'product' in an analysis. The model provided a starting point for the case studies. My own proposal follows the broad idea of beginning with the computational space before moving to the narrative.

Koenitz's model was designed for explicitly interactive digital narratives and is not a perfect fit for IIPN. The process stage of the model is focussed upon how the audience deliberately interacts with a text. This is entirely absent in IIPN as the algorithm makes choices on the audience's behalf. Instead, the algorithm and data source interacting both before and during playout creates the text with no direct input from the audience. For example, in Case Study One the system finds the day's weather and mentions it as part of the dialogue. This

requires no interaction from the audience themselves. Consequently, for my model proposal, the differentiation between system and process is not essential. Whilst there is a process in IIPN to form the narrative, without explicit interaction, the term 'pre-narrative' is sufficient to deal with the part of an IIPN that is not fixed in a playout.

Figure 6-3 Still from Case Study Two's *The Break Up* (Amedume, 2016) comparing the colours in two scenes.

A principle from earlier narrative theory was also pulled through. This was separating a narrative into lexia, defined as parts of the narrative isolated from the whole in a size manageable for analysis by Roland Barthes. Updated for digital narratives by George Landow (1992, p.103), this may be a sentence, film clip, event in the fabula or section of audio. For example, Case Study Two included a breakdown of thumbnail images of some scenes (Figure 6-3). After pulling out lexia from the text, Barthes suggests then exploring the connotations of each lexia in turn (2000, p. 130). Where the IIPN model differs, is that this should be done at points of variance between narrative products where possible, instead of at any point in the same static text. The aim of considering the connotations from points of variance is to show how they may change from product to product. For example, in Case Study Two, when the relationship ends in one variation, this has different connotations to the couple staying together in another. This captures how an IIPN is different from a linear narrative that has no variations in how it is delivered.

Production findings and discussion

One of the goals of the case studies was to uncover important concepts and practicalities to think about before, during, and after the creation of an IIPN narrative. From this, I have aimed to produce a document that can be used by IIPN creators as a reference guide on key areas to consider in production.

To make this document, I used the core concepts of grounded theory (Timonen, Foley and Conlon, 2018) with the following stages. I first opened up the data by working through the case studies and assigning codes where there were areas of interest. The codes were a short word or phrase that captured what was interesting about that content in relation to production. Then, I made a list of these codes and grouped them into loose themes. For example, 'IIPN is expensive to make.' In an iterative process, I then moved back and forth from the case studies to the codes and compiled them into key themes. From here I summarised the findings and edited them into a format suitable to share with other researchers and producers.

When an initial draft was complete I presented these findings to Ian Forrester (2020), a senior producer at BBC R&D who I have interviewed throughout the project. I also presented the findings to Oliver Spall (2020), who worked at BBC R&D when the prototypes were developed and has since gone on to work for Spotify. At Spotify, a music streaming service, Spall works with data as a Product Manager. The feedback from Forrester and Spall helped to confirm the areas I had identified were relevant to people working with IIPN. I gave them an opportunity to suggest additions to the matrix, some of which are included in the final form. Their feedback also resulted in a format change to the matrix. The draft they saw (see Appendix p.271) grouped the information predominantly into lists rather than tables. I changed this to tables to ensure that all of the drawbacks I had found were presented with some practical recommendations where possible. This filled in any gaps and strengthened the practical aspects of the matrix.

It is important to highlight and acknowledge that Forrester and Spall both have a close involvement with IIPN. Forrester is professionally responsible for promoting it as 'perceptive media' internally at the BBC and to external agencies. He is invested in its future and

demonstrating the positive impact it could have on broadcasting. Spall was involved in the development of perceptive media and remains working in new technologies. However, as an ex-employee of BBC R&D, he was not required to promote it as a media form like Forrester. As such, both Forrester and Spall have an optimistic outlook on developing new media forms and are interested in seeing IIPN mature, which will have affected their feedback.

Matrix of production findings

The matrix is composed of two parts. The first area outlines the benefits and drawbacks to IIPN delivery at a more general, abstract level. The second area concerns the practical risks and challenges of IIPN production with some suggestions on possible ways for mitigation.

The matrix is not intended to be used as a checklist of 'must-haves.' It is designed to help originators question and plan their productions, not to dictate narrative forms. It is also not expected to be totally comprehensive because of the complexity of IIPNs. Additionally, one of the big challenges of working with IIPN is the lack of precedent. The matrix is based upon the two available prototypes and will benefit from updating when more forms emerge, and the technology matures. With this in mind, some of the practical production points have been separated into a table of those I predict will become resolved in time rather than being inherent to the narrative form. My intention is that this will in some way future proof the document.

The following table details the possible benefits and drawbacks of using IIPN over other more linear narrative forms for both the audience and the originators as found in the case studies.

Table 10 General benefits and drawbacks to IIPN for the audience and originators.

Benefits of IIPN for the audience	Drawbacks of IIPN for the audience
• Able to make the best viewing experience for the audience in their current context. • Possible to react to the audience in real-time. • Content could be more relatable. • Offers the audience more choice as there is more content to explore. • Provides personalisation without the need for the audience to explicitly interact. • Potentially, exciting as a novel experience. • Possible to use it to catch-up in a series or create a shared variation for viewers at different points in the same series.	• It is possible to misunderstand how data was used in the IIPN. • Giving consent to access data may be an onerous experience. • There is not one shared experience to discuss with others. • It is not possible to experience all of the narrative options. • The data burden/bandwidth needed from the user to receive IIPN content may be higher than a typical programme. • The technology needed to experience IIPN may be state of the art or hard to access. • Could be trapped in a filter bubble or receive content based on incorrect and/or possibly offensive data.

Benefits of IIPN for the originators	Drawbacks of IIPN for the creators
• Opportunity to upskill staff in new technologies and methods. • Opportunity to develop hybrid roles. *I.e. writer/editor* • Great creative potential due to unlimited options of data sources and their combinations. • Potential to enhance creative choices with data. *I.e. Using location data to get local names wrong for comic effect.* • Currently, it showcases the cutting edge of technology. • The possible range of storylines within one narrative provides an exciting chance for actors and other creatives to showcase their talent outside of typecasting. • Possible to reuse existing content to create new experiences. *E.g. removing adverts, creating 'catch-up' versions to engage new audiences in soaps or partway through a series.* • An iterative process could be used which allows riskier narratives to be made. In future releases, popular features can be	• There is resistance to change in colleagues and audiences. • Unlimited choices in data can make it hard to focus on specifics. • Developing new technology to play IIPN is resource-heavy. For one to operate internationally this is prohibitively so. • The ethical issues surrounding using data in narrative are complex and differ with every type of data and the way it is used in the narrative. • IIPN is hard to communicate to others as there are few examples. • The state of the art, in part, dictates the narrative content and scale of ambition of an IIPN including who can work on or be an audience of IIPN. • There is a risk parts of the narrative may fail technologically or artistically due to its design. • The reputational risk of a failed outcome limits the possible partners, creative talent and

developed, and unpopular ones removed improving the narrative experience. • IIPN can be use for targeting in programme advertising such as product placement. • New technologies developed may be sold.	platforms willing to try an IIPN format. • Current legislation and contracts are not designed to deal with IIPN where multiple/infinite variations must be signed off. • It is challenging to archive as there is not one version.

This table is the first of two that deals with the risks in IIPN followed by possible mitigation. These risks I have identified as possibly improving as IIPN matures.

Table 11 Challenges and risks in production and audience experience that may improve as the technology progresses.

Challenge/Risk	Control Measure
The state of the art, in part, dictates the narrative content and scale of ambition of an IIPN including who can work on or be an audience of IIPN.	• Begin with simple applications and use an iterative process to improve the narrative in subsequent releases. • Design early projects to include templates and test cases for future use from the outset. • Fully explore the potential of the easiest to apply technology. • Build upon existing open-source technologies when possible. • Allow time and resources in production for developing new technologies. • Ensure all key team members have access to the technology needed to develop the IIPN.

	• Upskill staff members as needed for the project. • Check that your narrative can be seen by the average audience member you are targeting. *I.e. if you are deploying in India is there bandwidth available to process your narrative?*
There is resistance to change in colleagues and audiences.	• Highlight the benefits of IIPN in relation to old technology. *I.e. a return to responsive oral storytelling.* • Highlight how IIPN can be used to improve on drawbacks from older technology. *I.e. provide a more flexible experience than regular TV. Use more content that was being wasted.* • Ensure that concerns are listened to and mitigated for. • Build time into the production process for learning how to work with IIPN and communicating with colleagues and audiences.
IIPN is hard to communicate to others as there are few examples.	• Refer to the examples there are *I.e. Breaking Out, Take This Lollipop and Breathe.* • Use examples that have similar technology *I.e. Bandersnatch, Elf Yourself.* • Create mock-up examples as needed.
Current legislation and contracts are not designed to deal with IIPN where multiple/infinite variations must be signed off.	• A 'shelf life' may help in negotiating contracts and licensing. • The number of variations may need to be restrained. • Open source materials can provide content free of licensing issues.

Challenge / Risk	Control Measure
I.e. music licensing or acting contracts.	• Ensure there is a method to trace the lineage of data sources including what has been used and exactly how. *I.e. This music track was played for 15 seconds in 3% of playouts.*

Table 12 Challenges and risks in production and audience experience that are less likely to be resolved with advances in technology.

Challenge / Risk	Control Measure
Communicating how the data is used to gain consent from the audience is challenging artistically. / It is possible to misunderstand how data was used in the IIPN.	• Balance the need of the audience to be fully informed with artistic intentions. *I.e. There may be a spoiler warning for audience members who do not want more information upfront and a stripped-down permissions form given instead.* • Use a clear, short, understandable, and accurate form of consent before an IIPN is consumed. Unclearly communicated data use may result in the audience mistaking some parts for being changed that are not or controversy if they are under-informed. • It may be possible to automate the process of detailing how and where data is used about the audience. • Remember consent is still needed for data that is open source as placing it within a narrative is taking it out of its original context.

The IIPN is contributing to a 'filter bubble.'	• Check if you are contributing to, challenging or indifferent to the filter bubble effect. • Provide clear information before and/or after the narrative about exactly how the data has been used to the audience. • Provide a default option for those that do not wish to provide access to their data.
Choosing data sources is complex ethically.	• Balance how much you need the data against how private the data source is considered by the audience. *Least private are content preferences (i.e. TV they enjoy, music they like) next is basic profiling information (age, gender, location) then online patterns and behaviours (i.e. recent purchases, browser history). Most Private of all is socioeconomic information: (i.e. earnings, homeownership) and social information: (i.e. information about friends and family).* • Consider the wider political and sociological context of the data you are using. *I.e. Facebook data is associated with the Cambridge Analytica Scandal.* • Check what the combination of your data sources reveal as a range of information may make someone easily identifiable.
Choosing data sources is complex artistically as the range of options is large.	• Use templates and refer to previously used data sources for inspiration.

	• Limit the number of sources as seeking permission for multiple sources can be off-putting to the audience. • Start with a simple narrative with one data source and then build in more into subsequent iterations once feedback and user testing can be done.
The organisation may be liable or risk reputational damage due to using data.	• Check if it is essential to store or be able to view any data. The 2016 The Investigatory Powers Act means any data you have must be accessible to the UK government. • Fact check and/or verify any third-party providers of data for their accuracy and standards as early as possible. • Have a 'shelf life' for the IIPN so that changes in the credibility of the data source can be accounted for. *I.e. changes in privacy law or a data security problem internal or external to the originator.* • Provide any necessary warnings about third-party data sources and/or terms and conditions that outline the audience's rights should something go wrong. • Ensure that the lineage of data sources can be traced if problems arise. • Include clear contact information to report problems. • Ensure compliance with the General Data Protection Regulation (Regulation (EU) 2016/679) *I.e. the audiences right to delete and access their data and highest privacy settings as default.*

	- Check for and follow any specific guidelines associated with a type of data. *I.e. personality trait data requires contextualisation in its presentation.*
One or more aspects of the narrative fail at playout or are not completed during production.	- The more complicated the narrative is the more areas there are that could break or fail. Have a minimum viable product where the narrative still achieves what you need to but at its simplest as a fall-back option. - Ensure time is planned into the production for creating multiple versions, learning new technologies and communicating the new concept to colleagues. - Have placeholders for failed data insertions and/or a default playout if a bespoke experience is not possible. - Review placeholders and default options before release and whilst the narrative is live to ensure they remain coherent if there is a mixture of successful and unsuccessful data insertions. *I.e. Does a placeholder chosen 5 years ago still work with content gathered now?* - Build in limitations to the software to mitigate against known upcoming issues. *I.e. Only reference the UK is in the EU before January 31st, 2020.* - Multiple data sources spread the risk of complete failure for all the elements.

	• Remove any co-dependencies between data sources where possible so one failure to acquire a data can't affect another that would otherwise be successful.
The data used or assembly of the narrative has unintended artistic connotations.	• Gauge the artistic risk for errors if the data used is incorrect or assembles the IIPN incorrectly and adjust the content accordingly. • Include limitations in the software where appropriate on what content is ok for different audiences. • For single word insertions, including the placeholders used for failed data searches, ensure they meet the artistic aims with a review from the creative team. • Use additional contextual information as needed to ensure a data insertion is understandable. *I.e. watch the movie 'X' rather than watch 'X.'* • Review variation options where possible at key plot points to ensure they are still communicated as intended. *I.e., does this colour grade conceal some action or undermine the tone?* • Check that changes made by variations are consistent with the rest of the content. *I.e. Could the weather mentioned by the algorithm differ to that mentioned in the script?*

The data used or assembly of the narrative results in offensive content.	• Ensure age labelling and a description of the programme is provided before viewing, including information about any known offensive content. • Include clear contact information to report problems. • Whilst the IIPN is live have a periodic review in place where the correct functioning of the IIPN is checked. • During and after production check for bias in any algorithms used, including from third parties, for issues such as racism, sexism or insufficient accuracy/assumptions about the data.
The IIPN unintentionally includes content from a national emergency, terrorist attack or similar sensitive incident.	• Have an automatic stop programmed in or person responsible for suspending the IIPN if it could include this content in an unsympathetic or inappropriate manner. • Ensure third-party content is coming from a reliable source.
There is not one shared experience to discuss with others.	• The narrative's differences and similarities can be promoted as a talking point.
It is not possible to experience all of the narrative options.	• The possibilities of exploring more than one option can be promoted to encourage repeat viewing.

It is challenging to archive as there is not one version.	• Check whether or not you are required to archive a copy of the IIPN for legal reasons as an organisation. Then liaise with that department. • Consider the implications of which version is archived as this is a complex cultural decision. *I.e. Whose choices are being privileged? Why is this one important?*

Feedback from the BBC on the production findings

The matrix was well received by both Forrester and Spall who felt that it was very useful to people working on IIPN productions. I have compiled the highlights of the discussion of the matrix with Forrester and Spall into the sections below. This includes amendments to the matrix where I removed or added in points, highlights of the wider discussion, and why they felt the matrix was useful.

Areas added or removed based on the discussion

There were several ideas Forrester and Spall raised that were incorporated into the matrix. One of these is a straightforward addition to the drawbacks in the first table. This is that Forrester has found that writers can be overwhelmed when there are so many data source options. This comment lines up with my own experience in production in general and the creative process. A broad design brief can often make the decision-making process of what to work on longer and more difficult. Consequently, this aspect was added to the matrix with some practical suggestions to help with this. These were; to start with only one data source to then add more in later releases, to reuse data sources in a new way, and to generally keep the range of data sources low to not put off the audience.

Another idea from Forrester that was included after the discussion, was around IIPN's potential for commercialisation. In the first draft of the advantages, I included the possibility of selling the new technology developed for a programme. This idea was based on how a programmer worked on *The Break Up* (Amedume, 2016) for a lower fee as they could reuse the work in another project. Forrester built upon this when we discussed the findings. Whilst not applicable for a public broadcaster like the BBC, he highlighted that the technology itself can be used for commercial gain through advertising. Green screens can be used in production to enable product placement in scenes and the adverts themselves can use IIPN technology to be tailored to audience segments and markets in different regions. All of this can be done up until the last moment, which reflects how advertising contracts are made. Based on this, I added a point to the general benefits to cover commercialisation in a wider way.

One of the general points 'able to make the best viewing experience for the audience in their current context' was expanded into another more specific one after discussing with Forrester and Spall. Forrester explained that as well as using IIPN to add commercial content it can remove it too. For example, in American television, the advert breaks are more frequent than in the UK. As a result, on channels and streaming services with fewer or no adverts, the old advert gaps create false crescendos in tone and bizarre editing where breaks would have been in the USA. Forrester argued that IIPN can be used to remove these creating the most appropriate experience for that setting. Spall took this idea of repurposing existing material further and suggested using it to re-edit soaps and series into catch-up episodes for new audiences. For example, if a couple usually watch a series together but one of them misses an episode, IIPN delivery can be used to reconfigure the next episode to still be a shared experience. The new episode could contain flashbacks to contextualise events without the person who has seen them already having to watch the entire episode again. This has potential for long-running content like soap operas. Episodes can be designed to catch new audiences up to the current storylines. There are significant cost benefits to reusing old material for IIPN as less material needs to be made. It is also a potentially attractive way to engage new audiences for some productions. As a result of this discussion, a new point 'possible to reuse existing content to create new experiences' was added to the benefits for originators general points.

An idea was proposed by Spall to help solve the issue of IIPN being resource-heavy. This involves using an iterative process where originators begin with a straightforward story with simple IIPN features, release it, gather feedback and then improve it based upon what worked well and what did not. Rather than thinking about moving from one episode and story arc to the next, the story arc deepens within one episode instead of starting over with each iteration. The budget and production could be planned to reflect this from the outset. This offers the scope to release the programme over multiple platforms easily and make economies through not having to think about content in an episodic way. This style of working reflects how software is developed and released and fits into the wider trend of transmedia storytelling. Transmedia storytelling is multiplatform and offers a way of world-building rather than telling one story the same way.

One benefit of the iterative process that Spall describes could be for producers who typically make soap content. In soaps, there are large cyclical story arcs with lots of points of view on the same event from different characters that runs across several weeks. IIPN could offer an economy in that whole story arcs could be shot in one go rather than in the order of the episodic content. It would not be additional work as they would be shooting that storyline in a few weeks' time anyway. Then, having this content labelled, and able to be dynamically assembled, audiences could view the content in the way that best suits them. Spall sees this as a strategy to help people worry less about the amount of content needed for IIPN and it could make a more streamlined way to complete their work. Based on this, the notion of an iterative process was added to the table as a possible way to mitigate against IIPN's resource-heavy nature.

Spall provided another practical suggestion that was added to the matrix to help mitigate the problem of graceful degradation. Graceful degradation is where a technology becomes out of date, but remains functional and coherent until it is discontinued entirely. Spall felt that the idea of a shelf-life was excellent as graceful degradation had not occurred to him. Building on this, he suggested that, where possible, developers could write in limits to the program to help. For example, a rule could be to only mention that the UK is in the European Union (EU) when the programme is played before the 31st of January 2020.

Following this suggestion, I added a point to write limitations into software to help mitigate against failed data insertions.

Forrester raised an important point about the ethics of having a 'default' option of an IIPN which was then added to the matrix. He felt that a default option was a really good idea for solving issues around people not wanting to share data or a lack of technology preventing them from viewing otherwise. However, he raised concerns about the problem of then having to decide what the default should be. There are many large questions around what a chosen version of an IIPN would be, for example, whose version are we privileging? Who is missing? What does this say about our society? These are issues Forrester had experienced when trying to select a version of the case study prototypes to archive at the BBC. For the purposes of this matrix, it is sufficient to draw attention to the fact that it is problematic. The ethics and cultural questions around deciding what to archive and set as a default could form a thesis in itself. For the BBC, this will need immediate attention as it is required by law to have a copy of the content it airs.

Highlights from the wider conversation with the BBC not included in the matrix

The legislation around broadcasting is not currently designed to deal well with digital products or with IIPN style delivery. Despite this, I have placed legislative challenges in the table with areas likely to improve in time. Forrester disagreed with this placement and felt that this is a sticking point that is much more likely to get worse before it improves as people realise the implications of IIPN. Taking music rights as an example, in Case Study Two, Forrester was forced to use open source music via creative commons[9] as he was unable to secure any music rights. This was due to lawyers requiring that they must be able to view every possible iteration of a programme before signing it off. This is not feasible when there are so many possible variations. A problem that only grows when this could involve partial tracks that play for only one audience member. This makes it essential for exactly what is played where and how often to be tracked in an IIPN. This is a problem that

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[9] 'Creative commons' is a free copyright license that allows the distribution of otherwise copyrighted works.

Spall explained is felt in many areas of legislation that intersect with digital products. He described that legislation is still being applied to digital products that were made for physical ones. For example, at Spotify, they use licensing based on counting music streams in the same way as they would have counted physical record sales. Whilst accepting that this is very complicated, Spall disagrees with Forrester in that this won't be solved with time. He believes this is being worked on already with technological solutions such as blockchain, which is a way of keeping an encrypted record of transactions between two parties, being proposed. As IIPN is not the only technology that is going to require legislation that can deal with instances like this I am inclined to agree with Spall that this will eventually be solved. Regardless, right now, it is a sticking point that must be navigated for current IIPN producers.

An additional legislative challenge for anyone working with data in the EU or with EU audiences is complying with General Data Protection Regulation, (discussed briefly in Case Study One p.152. Forrester and Spall both felt it was good that I had included this as an aspect to look at in the matrix. Spall has spent the past year working on how GDPR intersects with the products he manages at Spotify and developing internal guidelines on how to comply with this. It is work that will need to be completed by any broadcasters planning to use IIPNs in the EU in the future. Applying GDPR law will help clarify which types of data are the most straight forward to use and how, and perhaps go some way to informing the content of any consent forms. As such a large area, it is well beyond the scope of this thesis to interpret GDPR for IIPN projects.

In response to the ethical concerns about data use, Forrester had a specific proposal that he felt may go part way to resolving some of the problems. Forrester described a BBC project known as 'Databox' (*Databox*, 2020) which is focussed on creating personal data storage devices. The idea behind this is to put the audience in charge of their own data as they own and control the device in which all their data is stored. This is in contrast to data about the audience being spread amongst various companies and service providers as is typically the case now. The advantage of this is that for an IIPN originator, they would only need to ask permission of the audience to access their databox. This removes some of the risk to the originator in verifying that data is accurate, reliably stored or offensive to that audience

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member as they are the ones providing the data. The downside to this, highlighted by both Forrester and Spall is that this assumes that the databox itself is totally reliable. Do both the audience and the originator want to put all of their trust in one personal data storage device and the ability of the audience member to set it up and maintain it correctly?

Another ethical concern around data that came up in discussion with Spall was about censorship. When talking about how to reduce the likelihood of offensive content from algorithms creeping into IIPN, Spall suggested building in basic primitives (a way of labelling and understanding data) about whether something is ok for different audiences into the coding itself. Whilst effective, this approach creates danger of censorship, so the risk of offensive content needs to be balanced against whether this is unduly censoring the audience. For example, is nothing religious ever included now? Both Forrester and Spall felt that using cached data (data that is stored for later use) that could then be reviewed for offensive material automatically would help with this risk. The disadvantage of this is that it increases the processing power needed to deliver the narrative. This leaves the simplest way to mitigate for offensive content as providing a warning to the audience. It shifts the decision away from the originator and may be the only reasonable method to protect against reputational damage when there is always some small risk, no matter how well controlled for, that offensive content could be included.

The issue of the amount of data being requested being off-putting to the audience was explored in both interviews. Asking for access to a lot of information upfront can create a negative audience experience as they wonder why all of it is needed. Forrester and Spall both highlighted that there is a track record for bad practice in many digital applications who take more information than needed to run their software. They then go on to sell or use this for commercial gain. This shows the importance of consent being very clear so that an audience knows why it is needed. This would also mitigate a problem highlighted in Case Study Two, where people believe IIPN has been changed for them in different ways than it has. This is important, as Forrester and Spall, in their interviews, both recalled experiences in user testing where this had been the case. Forrester had a couple of suggestions for mitigation. One was that it may be possible to use automation to help pinpoint for the audience member exactly what data was used where in the narrative they received. An idea

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he nick-named 'x-ray.' The other was that he was encouraging writers to settle on using fewer data sources in a smarter way. This would minimise the turn off for the audience of an intrusive and onerous consent experience and the reputational risk this brings.

Why Forrester and Spall thought the matrix was useful

Forrester and Spall saw the main advantage of the matrix as that it presents the complex and often abstract issues with IIPN in a practical way. Spall felt that I had touched on "all of the horrible pain that a lot of the people testing stuff in R&D used to have" (2020). He explained that the way I am describing it makes these issues really tangible. This is useful, as communicating this way of working to colleagues who have worked only with television, sometimes for decades, is difficult. Resistance to change is an issue that both Forrester and Spall found was a large factor in their work. Spall felt that the matrix made IIPN much more understandable and so could help with this. Additionally, Spall explained that this was a good tool for R&D staff as it includes considering ethical issues in relation to data. Spall's experience of working in R&D departments showed him that awareness of data ethics was a big problem. He found that people could have poor data literacy and not understand that you need to protect data and have warnings. As both Forrester and Spall believe the matrix to be helpful, hopefully, it will be used to support future IIPN work.

General discussion of production findings matrix

The main theme of the benefits of IIPN to the audience is its ability to give them more choice and content that relates to their niche interests. In the case studies, this was done through localised content in *Breaking Out* (BBC, 2012) and providing varied options for experiencing the drama in *The Break Up* (Amedume, 2016)*.* This fits into the wider trend of personalisation and adaption found in the Historical Context of IIPN chapter. For example, in sports broadcasting, niche sports are becoming more popular (Peckham, 2018). Large broadcasters who hold the rights to major events are losing younger audiences who are frustrated with advertising content on major channels and excited to see other sports they play and engage with on online channels. This leads to them tuning in less or not at all to major events and the channels that host them. Whether in terms of niche sports or

otherwise IIPN can be used to provide content that speaks to particular interests and groups that are underrepresented in mainstream broadcasting.

The benefits of IIPN for the originator is not limited to a way to retain audiences. Making IIPN provides an opportunity to create hybrid roles in production. This was based upon Case Study Two, where the director was also the writer and editor. The hybrid role greatly streamlined the creative process throughout as it meant multiple people did not have to be involved at every stage. An important factor as different storylines were lost as the production process went on and the script could not contain every detail. Issues in Case Study One also underlines the importance of hybrid roles as without them there is a greater need for close communication. For example, a grammatical error and some weaker creative choices were made by the technologists in the writer's absence. Having the writer more closely involved in the technological process would have helped prevent this. The nature of how hybrid roles will work will depend on the genre of the narrative made as production processes vary greatly between them.

In terms of challenges, the first hurdle to pass is effectively communicating what an IIPN is. There are few examples of them in action and the BBC's prototypes are designed as proofs of concept rather than as excellent narrative experiences. Even with initial buy-in from colleagues, explaining the ways in which an IIPN narrative can fail is very abstract. An IIPN can not only fail to play technically but can also accidentally communicate artistically in unexpected ways. For example, in *The Break Up* (Amedume, 2016) a key plot point was obscured where one character proposed to another by a darkly shaded colour grade. The audience could not see they had a ring. These failures are somewhat inevitable in a narrative form that can never be fully reviewed but there are steps that can be taken to help control for this. One of these is to use risk assessment. In a typical risk assessment, the possibility of something going wrong is weighed against how bad it would be if it happened. This idea can be applied to IIPN and failures around data and assembly too. If something could obscure a major plot point, as it did with the proposal in *The Break Up*, this may be considered a bad enough outcome to remove this colour grade entirely or severely limit its use.

An IIPN delivery also risks causing offence. In this list of risks and challenges, I have made two sections on offending the audience. The first is for an offence in any situation and the second is in the instance of a national emergency. This is because a national emergency may cause significant distress and reputational damage to an originator. As a risk, this was raised in the case studies due to the inclusion of a news snippet in *Breaking Out* (BBC, 2012). Here the cached[10] news snippet is about a violent domestic assault. As *Breaking Out* had little information about its content and age appropriateness this highlighted issues around safeguarding for vulnerable audiences and the risk of including live content. Future IIPN would benefit from planning for this in the interface and the design of content.

From comments in BBC Writers Room when Forrester pitched the idea of perceptive media (a form of IIPN) in Case Study One where one person said "it would ruin storytelling" (Forrester, 2017b) through to audiences commenting on an article about Case Study Two saying "what happened to freedom of choice?" (MacDonald, 2015, p231) people are not always open to new experiences. IIPN is a change in narrative structure. An unavoidable part of IIPN is that it does not have the same experience for everyone, and no one is going to see every possible variation. The sense of missing out on other content is part of what makes it special, a factor Epsen Aarseth (1997) highlighted as a key difference in explicitly interactive narrative when compared to a linear narrative. Whilst this difference is also a selling point, as it is a deviation from the norm it is an area that needs accounting for in terms of time and effort in a production plan for IIPN. There is a great deal of literature and advice on change management that could be brought in to help in this which is beyond the scope of this thesis. As a starting point, originators could focus on the benefits that technology offers.

A part of IIPN that will not change is that making multiple versions of content takes more time and money. In the future, this may greatly reduce as a barrier to production in several ways. Firstly, as more productions are completed templates will emerge for every stage. From planning a shoot, agreeing contracts through to the algorithms that power the

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[10] Caching is temporarily storing data so that it can be accessed again more quickly.

narrative, previous work will provide a basis for this. Secondly, technologies developed for older versions can be reused. The HTML5 video compositor (Shotton, 2016) from Case Study Two, for example, can be used to compile video in future productions. The growing abilities of machine learning, as highlighted in the Historical Context of IIPN chapter, may help automate some of the software development needed for new IIIPN. The staff working on the projects will become more experienced and less time will be needed to communicate how this type of project works and creating 'buy-in.' This will be greatly helped by an increased number of examples existing. General improvements in technology may also help with other issues. Staff will be more likely to be able to access the technologies needed to work on IIPN when they are more accessible. This would solve the problem in Case Study One where the writer was unable to access the play, for example. IIPN can also be resource-heavy in terms of bandwidth and processing power for the user. This is especially problematic for trying to reach audiences in countries with less infrastructure and lower access to new technology. Hopefully, in time infrastructure and access to the technology will improve as costs come down with developments. These infrastructure improvements have already begun to happen since the prototypes were first made. The Historical Context of IIPN chapter demonstrated how streaming content over the internet is now much more popular with services like Netflix now major players in broadcasting.

Another issue related to being resource-heavy is that the data burden is potentially placed on the user not the sender in IIPN. This means that whilst previously the smaller package of just one program would be sent, now the user may be sent multiple versions with an algorithm that potentially uses more data whilst it searches for further content. Where personalisation through object-based media is already every day, in advertising, the issue of requiring the user to download large amounts of data is already being recognised. Some media outlets picked up (Salmon, 2015) on the large cost of data to load personalised advertisements compared to the content itself. However, whilst IIPN would be more data-heavy, it would not be unwanted extra advertising material. To help deal with this, clear information of the amount of data needed to download a program could be given.

The more complicated the project, the more areas there are that could fail. The risk of failing to capture content during production was most evident in Case Study Two. Here, two

of the three genres the BBC had originally intended to make failed to be completed. One way to mitigate this is to focus on a minimum viable product. The core elements of the storyline that must be captured would then be prioritised in production. To help demonstrate how a minimum viable product concept could be applied, these are some of the ways it could work in a film short production. The production schedule for capturing shots could be structured to prioritise key parts of the story. It can make clear which shots are essential to complete each variation. In a large enough short production, there is someone on set who notes down what has been captured and its quality as the footage is taken. During this, they could highlight which variations are completed. As shooting continues time can be saved by not shooting footage that would be linked to otherwise missing content. This also helps the editor later on, who needs only focus on content that has a complete set. In this way, the concept of a minimum viable product could be applied at different stages of production saving on resources where possible. It is worth highlighting that there is a large difference in television production methods even between genres and those used in radio as a different medium are even more so. Consequently, in this matrix of risks and controls for any IIPN, it is only possible to suggest challenges and solutions at a broad level.

Some of the most complex challenges with IIPN are related to it using data. Firstly, there is the technological and ethical challenge of choosing which data source to work with. Once chosen, knowing exactly where the data comes from is important. Any data from a third-party needs carefully vetting to make sure it is reliable. For example, in Case Study Two, the data source they had selected turned out to be poorly evidenced and so had to be abandoned. As shown in the Cambridge Analytica scandal, there is a high reputational cost of using unethical sources. In addition to knowing the provenance of any data, every data type has its own set of ethical issues. This was shown in Case Study One where social media data which was personal to the audience carried with it a very different risk around personal privacy compared to including a news snippet. Here the ethical concerns were around continual consent for using the snippet and whether it was possible that upsetting content could be brought in. Consequently, each data choice needs its own evaluation. Beyond this, care needs to be taken to ensure that, taken together, multiple data points do not put an audience's privacy at risk.

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A production challenge for IIPN is the way in which the audience is informed and able to give consent to having data included in their narrative. This is something that needs careful design from both an artistic and ethical perspective. Ethically, it is essential to inform the audience exactly what data is being used and how within the narrative. For originators in Europe, this is required by law under GDPR. As raised in Case Study Two, there is a wider issue with informed consent and digital products already, with many having overly long and technically worded consent forms. For IIPN consent forms it is important to word them using non-technical language, in a concise way to encourage the audience to read it. One way to minimise the need for a long consent form is to have a minimal amount of data sources used in the narrative.

Streamlining the consent form is also important from an artistic perspective as IIPN is supposed to be a sit-back experience. An overly long consent process beforehand would undermine the minimal interaction it is aiming for. Another artistic concern is that telling the audience beforehand which data is being used and how could spoil the narrative experience. *Breaking Out* deliberately did not inform the audience exactly which data was being used beforehand as it was made as an experiment. Future work may also want to use an element of surprise. This could be done by using a 'spoiler' warning on the content so that the audience can decide whether to give consent without knowing exactly how the data is used beforehand. This information can still be given after the programme for those that are interested.

From completing the case studies there are another two ideas I propose to help solve some of the issues in IIPN delivery. These are the 'shelf life' and the 'default' option. Providing a default version of an IIPN would make it possible for those that do not ever want to share their data to still view it. It would also provide a possible shared experience for those who want it and a way of easily avoiding a filter bubble of content tailored only to you.

The other idea, of a 'shelf life,' is to solve some of the issues around graceful degradation and accidentally incorrect or offensive content. The shelf life principle is that the IIPN would be made available for a set amount of time where it is actively maintained and regularly reviewed. This idea is in response to Case Study One. *Breaking Out* (BBC, 2012) is not currently maintained and consequently is now a patchwork of working and broken data

sources. This has resulted in inconsistent internal narrative time and increases the risk of it pulling in offensive sources. Having a shelf life where the IIPN is actively maintained would help prevent a patchwork of failures and lower the risk of incorrect or offensive content. Additionally, this may alleviate some of the contractual problems as rights would only need to be agreed for a set period.

7 Conclusion

Introduction

The Findings and Discussion chapter brought together the results of the two case studies. These were a theoretical model proposal for examining Implicitly Interactive Pervasive Narrative (IIPN) and a matrix of the benefits and drawbacks of producing IIPN. The contents of the matrix were discussed in the context of feedback on them from the British Broadcasting Corporation's Research and Development department (BBC R&D) and wider technology trends. This chapter recaps the definition of IIPN, puts the findings and those from earlier in the thesis in relation to the project's research questions, and rounds off with suggestions for future work. The research questions were:

- To what extent is current narrative theory useful in examining IIPN?
- What are the key production benefits and drawbacks to working with IIPN?

Definition of IIPN

As a new narrative form, IIPN required defining in order to achieve the aims of this thesis. As is often the case with new technologies, there is no existing commonly used term. Perceptive media was coined by the BBC R&D team and some academic communities collaborating with them. This term is not commonly used outside BBC projects and has limited currency. Consequently, for the purposes of this thesis the term Implicitly Interactive Pervasive Narrative was coined to describe this narrative form. The words 'implicitly interactive' and 'pervasive' are already well established in the field of computer science.

The following definition of IIPN was developed:

- IIPN has a discernible beginning and an end, a protagonist within a world with other characters, and events.
- IIPN is delivered through a digital platform.

- IIPN has multiple variations in final form that are informed by data about the audience and/or their context.
- The audience data is collected using pervasive media, such as GPS, social media profile, time of day, heart rate etc.
- The narrative is implicitly interactive as it requires no intentional action by the audience beyond agreeing to their data being used and/or pressing play.
- IIPN uses technology such as object-based broadcasting, as defined by the BBC, where conceptual or medium based aspects of the narrative (such as text, image or character) are assembled, according to rules set out by the originator, at the time it is shown to the audience.

The extent current narrative theory applies to IIPN

The process of conducting the literature review and developing the model proposal allowed me to answer the project's research question; to what extent is current narratological theory relevant to IIPN? As it is beyond the scope of a thesis to consider every possible narrative theory, I looked at the theory most relevant to IIPN. The field of interactive digital narrative theory is the most closely applicable to IIPN. The literature review process demonstrated that the majority of interactive digital narrative theory is focussed upon explicitly interactive narrative. For example, in a definition of interactive digital narrative by Hartmut Koentiz (2015), an emphasis is made on the audience having to work to experience the text. Koenitz defines interactive digital narrative as being "experienced through a participatory process" (Koenitz, 2015). The audience member is actively carving their way through the story. Despite much of interactive digital narrative theory being an imperfect fit, it is mostly the ideas from this area that apply to IIPN and went on to inform the model proposal.

Ideas from Epsen Aarseth (1997) were useful in understanding how IIPN differs from explicitly interactive narrative forms. For example, he explains that a narrative is explicitly interactive when it requires the audience member to be an active participant. In contrast, a traditional narrative's audience is a passive recipient of one unchanging text. The IIPN sits

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somewhere between the two. The IIPN audience has more than one path to follow but the algorithm, informed by their data, does the work for them.

A key idea that informed the model proposal was that an examination of a digital narrative should contain the computational structure too (Koenitz, 2015; R. Aylett and S. Louchart, 2003, p. 126; Miller, 2008; Ferri, 2015). An IIPN is made up of dynamic computational software that is responsive, and rules based. Unlike the book-based novel, an IIPN is not a single object, it is also a system that can create objects. The IIPN is a space for potential narratives as well as its discrete outputs. Consequently, the IIPN theory model proposal includes a consideration of the 'pre-narrative,' the elements and system that work together to produce an IIPN product.

Koenitz and Carolyn Handler Miller's diagrams provided ideas on how to show the pre-narrative computational structure of an IIPN. They used illustrative diagrams of the possible pathways an audience member could take through an explicitly interactive digital narrative to help describe its structure. Koenitz and Handler Miller were making their diagrams for explicit interaction which limits its relevance to IIPN. They are both accounting for the agency of the audience within the process of substantiating the narrative. In contrast, in an IIPN these choices are not made by the audience. They are made by the algorithm that determines how the narrative should be assembled to accommodate the data. In IIPN, a set of rules in the software and the data source is fulfilling the role of the participatory audience member in an explicitly interactive narrative. This distinct role in IIPN is not currently accounted for in narrative theory. It is covered in the model proposal as an essential part of an IIPN.

Another key idea from explicitly interactive digital narrative theory was to examine more than one product made by the same system. This is to capture where the difference between products may lie. There were several theories that informed how multiple products were analysed in the case studies. Inspired by earlier narrative theory, the notion of working with lexia proved to be relevant to the IIPN model proposal. A term coined by Roland Barthes (2000) and updated for the digital by George Landow (1992, p.4), a lexia is a part of a narrative separated from the rest that is a suitable size to analyse. When Barthes uses lexia, he does so in one literary narrative text at a time. For IIPN, I suggest examining

the connotations of lexia taken from the same point (where possible) in more than one output. Looking at multiple texts creates a large volume of work to analyse. This makes the idea of breaking a text down into manageably sized lexia useful for IIPN.

Work from Vladimir Propp (1968) and Umberto Eco (1982) also provided good examples of how to distil a common structure from multiple texts. The way in which they use tables to compare and contrast before moving on to an exhaustive analysis of the findings was used in both case studies. The idea of finding the key story elements and the order they can appear in across all of the narratives was useful. Whilst a valuable method in my case studies, this is not relevant to the broader model proposal. Future IIPNs may not adhere to this style of storytelling and may be more experimental. It would, therefore, be overly reductive to include a technique that requires story events to occur in the same order.

There is not much literature that deals with implicit interaction in narrative theory. In my own model this is captured through the inclusion of looking at how data affects both the pre-narrative and subsequent narrative products. One theory, around metalepsis was included in the literature review as it connects with this issue. Metalepsis is where one narrative world moves into another. IIPN is inherently metaleptic because data from the real world informs the narrative world. Whilst too specific for inclusion in the IIPN model, Alice Bell works with this concept in explicitly interactive digital narrative and may prove a useful starting point for other researchers.

As there is no existing theory dealing directly with analysing IIPN my model is designed as first step towards this. It is a framework from which to begin an IIPN analysis. It is made to accommodate theories that relate to different mediums (film, radio, graphic design, etc) and theories relating to the aims of the researcher (character, feminism, post-colonialism, etc). For example, within the case studies, as my aim was to look at the benefits and drawbacks of producing IIPN, I utilised theory from film studies (Bellantoni, 2005; Bordwell, 1985; Bordwell and Thompson, 2008; Chion, 1990), graphic design (Crow, 2010), as well as post-structuralist theory from the Literature Review around narrative elements and time (Bal, 2009; Chatman, 1978; Ricoeur, 1980). The flexibility of the model is deliberate as IIPN is not medium-specific, and the aims of a researcher working with IIPN will not always be the same.

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Matrix of drawbacks and benefits to producing IIPN

To answer the research question 'what are the key production benefits and drawbacks to working with IIPN? I produced a matrix of these findings based on the case studies. As a new form of storytelling, there is not yet a set of templates or tried and tested production methods that can be used to help make an IIPN. This matrix is a start on creating this knowledge based on case studies of the two prototypes from BBC R&D that are currently available (2020). The matrix was then refined after being presented back to staff at BBC R&D. There are two parts; the first part is a list of benefits and drawbacks at a more general level for the originator and the audience. The following part is a table of drawbacks when working with IIPN alongside possible practical ways to mitigate them. This matrix is made for those working on producing IIPNs both in industry and university research centres and is available in one document in Appendix 1 a discussion of the matrix is available in the previous Findings and Discussion chapter.

The matrix details how the IIPN format can provide exciting experiences for audiences and opportunities for production teams. For its creators, it has massive potential for commercialisation, both in terms of selling software to make it work, but also in tailoring advertisements within the IIPN itself. For producers with existing content, it can be utilised for re-editing old programmes to suit new time segments, audiences or as shorter 'catch up' episodes. It is a way for producers to showcase new technology, maintain a leading-edge market position and upskill staff. In a benefit for audiences too, IIPN offers potential for providing content to both niche and underserved audiences through its many variations. Most of all, IIPN offers the audience a chance to see content made just for them.

As well exciting possibilities, there are many complex challenges that surround working with IIPN. In the matrix, I have divided these up into issues that I feel are likely to improve with time and those inherent to the format. In those that are likely to improve in the future, many of them are related to having to spend time and resources as new processes and skills are developed. The problems inherent to the format are mostly around the complexity of producing something with so many variations and the ethics and practicalities of working with data.

Areas for future work

One of the issues with IIPN is that at this moment in time there is no standard term for it as a narrative form. In this research, I have tried to counteract this by using terms already established in computer science to increase the likelihood that this work will be searchable in databases for other researchers. My definition in itself is a useful touchstone for academic colleagues in this area. The adoption of this definition within the broadcasting industry and beyond is unlikely without a sustained effort to do so making this an area for future work. There is some potential for this task being taken up within parts of industry and academia as there is a wider call for fixed definitions around IIPN from broadcasters and academics. The calls seen during this project were at a digital storytelling event at *Sheffield Doc Fest 2016* (Forrester, 2016) and in the creation and activities of an online, text-based, discussion forum devoted to defining terms in this media.

There is, of course, a possibility that IIPN will not develop beyond that of prototypes from a small range of broadcasters. This means that the work made for a specific narrative model proposal to examine it and the matrix of production findings may only be of complete use for a limited amount of time whilst IIPNs are still being created. And then only of use to a small corpus of pieces subsequently. If IIPN does not become established, optimistically this work will serve as a precursor to the next media form that involves either implicit interaction and/or pervasive technologies. The future of IIPN looks positive for the moment as it is part of a trend for the increased personalisation of narrative and technology. As demonstrated in the Historical Context of IIPN chapter, major online broadcaster Netflix has begun to screen explicitly interactive narratives (Slade, 2018) and the BBC in 2020 remains invested in developing more prototypes.

In terms of the model proposal, future work from narratologists could test the model on a wider corpus from other makers and new work of this kind. This would demonstrate how transferable the model is to emerging narratives. By looking at more forms of IIPN an expanded set of techniques can be developed to make a more comprehensive toolkit for examining IIPN narratives. In addition to expanding the toolkit by applying this to other examples, future work would add to the available example analyses of digital narratives.

Using the model on IIPN narratives that have been developed professionally rather than as prototypes would also potentially offer richer findings in the discourse part of the analysis in particular.

In terms of the matrix, as production methods vary between both medium (film, radio, VR etc) and in genre (wildlife, news, historical drama, soap etc) future producers could begin to make templates that are specific to the genre and/or medium that they work within. This will help to save them time in future productions that they make. As with the model proposal, future IIPN works may be of a professional standard and so offer greater insight into how best to produce them. Future work will also be needed to update it as the corpus of implicitly interactive pervasive narrative examples grows and the technology matures.

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9 Appendixes

Appendix 1 – IIPN production findings matrix

A matrix of benefits and drawbacks to producing implicitly interactive narratives with pervasive computing.

This document details the possible benefits and drawbacks of using Implicitly Interactive Pervasive Narrative (IIPN) over other more linear narrative forms for both the audience and the originators. IIPN is a kind of digital broadcast that uses data about the audience and/or their environment in real-time to tailor the narrative it is delivering. For example, imagine a children's programme about caring for pet cats. Within the programme, the creators wish to elicit affection towards cats by using an image of a cat familiar to that child. To do this they insert an image of a cat from a social media account used by the child, or one of their family members. This means that each audience that watches the programme will see a slightly different variation that includes a cat they know whenever possible. The content of the narrative the audience sees has been informed by data about them at that moment. This type of narrative in 2020 is pioneered by the British Broadcasting Corporation's Research and Development department where it is known as 'perceptive media'. For up to date information visit their website on https://www.bbc.co.uk/rd

For an example of an IIPN: www.futurebroadcasts.com

The following two tables cover the benefits and drawbacks to producing IIPN. The first section is at a more general, abstract level and the second is a risk assessment placing possible risks in making IIPN alongside ways to mitigate against them. This matrix is intended for use by those involved in producing IIPN. It is not intended to act as a checklist of requirements, rather is a way to identify possible areas of concern for producers. This matrix is intended to be used as a starting point when planning, producing and maintaining an IIPN project.

This table details the possible benefits and drawbacks of using IIPN over other more linear narrative forms for both the audience and the originators as found in the case studies. It is at a conceptual level.

Table 13 General benefits and drawbacks to IIPN for the audience and originators.

Benefits of IIPN for the audience	Drawbacks of IIPN for the audience
• Able to make the best viewing experience for the audience in their current context. • Possible to react to the audience in real-time. • Content could be more relatable. • Offers the audience more choice as there is more content to explore. • Provides personalisation without the need for the audience to explicitly interact. • Potentially, exciting as a novel experience. • Possible to use it to catch-up in a series or create a shared variation for viewers at different points in the same series.	• It is possible to misunderstand how data was used in the IIPN. • Giving consent to access data may be an onerous experience. • There is not one shared experience to discuss with others. • It is not possible to experience all of the narrative options. • The data burden/bandwidth needed from the user to receive IIPN content may be higher than a typical programme. • The technology needed to experience IIPN may be state of the art or hard to access. • Could be trapped in a filter bubble or receive content based on incorrect and/or possibly offensive data.

Benefits of IIPN for the originators	Drawbacks of IIPN for the creators
• Opportunity to upskill staff in new technologies and methods. • Opportunity to develop hybrid roles. *I.e. writer/editor* • Great creative potential due to unlimited options of data sources and their combinations. • Potential to enhance creative choices with data. *I.e. Using location data to get local names wrong for comic effect.* • Currently, it showcases the cutting edge of technology. • The possible range of storylines within one narrative provides an exciting chance for actors and other creatives to showcase their talent outside of typecasting. • Possible to reuse existing content to create new experiences. *E.g. removing adverts, creating 'catch-up' versions to engage new audiences in soaps or partway through a series.* • An iterative process could be used which allows riskier narratives to be made. In future releases, popular features can be	• There is resistance to change in colleagues and audiences. • Unlimited choices in data can make it hard to focus on specifics. • Developing new technology to play IIPN is resource-heavy. For one to operate internationally this is prohibitively so. • The ethical issues surrounding using data in narrative are complex and differ with every type of data and the way it is used in the narrative. • IIPN is hard to communicate to others as there are few examples. • The state of the art, in part, dictates the narrative content and scale of ambition of an IIPN including who can work on or be an audience of IIPN. • There is a risk parts of the narrative may fail technologically or artistically due to its design. • The reputational risk of a failed outcome limits the possible partners, creative talent and

developed, and unpopular ones removed improving the narrative experience.	platforms willing to try an IIPN format.
• IIPN can be use for targeting in programme advertising such as product placement.	• Current legislation and contracts are not designed to deal with IIPN where multiple/infinite variations must be signed off.
• New technologies developed may be sold.	• It is challenging to archive as there is not one version.

Table 14 Challenges and risks in production and audience experience that may improve as the technology progresses.

This table is the first of two that deals with the risks in IIPN followed by possible mitigation. These risks I have identified as possibly improving as IIPN matures.

Challenge/Risk	Control Measure
The state of the art, in part, dictates the narrative content and scale of ambition of an IIPN including who can work on or be an audience of IIPN.	• Begin with simple applications and use an iterative process to improve the narrative in subsequent releases.
	• Design early projects to include templates and test cases for future use from the outset.
	• Fully explore the potential of the easiest to apply technology.
	• Build upon existing open-source technologies when possible.
	• Allow time and resources in production for developing new technologies.
	• Ensure all key team members have access to the technology needed to develop the IIPN.

	• Upskill staff members as needed for the project. • Check that your narrative can be seen by the average audience member you are targeting. *I.e. if you are deploying in India is there bandwidth available to process your narrative?*
There is resistance to change in colleagues and audiences.	• Highlight the benefits of IIPN in relation to old technology. *I.e. a return to responsive oral storytelling.* • Highlight how IIPN can be used to improve on drawbacks from older technology. *I.e. provide a more flexible experience than regular TV. Use more content that was being wasted.* • Ensure that concerns are listened to and mitigated for. • Build time into the production process for learning how to work with IIPN and communicating with colleagues and audiences.
IIPN is hard to communicate to others as there are few examples.	• Refer to the examples there are *I.e. Breaking Out, Take This Lollipop.* • Use examples that have similar technology *I.e. Bandersnatch, Elf Yourself, Breathe.* • Create mock-up examples as needed.
Current legislation and contracts are not designed to deal with IIPN where multiple/infinite variations must be signed off.	• A 'shelf life' may help in negotiating contracts and licensing. • The number of variations may need to be restrained. • Open source materials can provide content free of licensing issues.

Challenge / Risk	Control Measure
I.e. music licensing or acting contracts.	• Ensure there is a method to trace the lineage of data sources including what has been used and exactly how. *I.e. This music track was played for 15 seconds in 3% of playouts.*

Table 15 Challenges and risks in production and audience experience that are less likely to be resolved with advances in technology.

Challenge / Risk	Control Measure
Communicating how the data is used to gain consent from the audience is challenging artistically. / It is possible to misunderstand how data was used in the IIPN.	• Balance the need of the audience to be fully informed with artistic intentions. *I.e. There may be a spoiler warning for audience members who do not want more information upfront and a stripped-down permissions form given instead.* • Use a clear, short, understandable, and accurate form of consent before an IIPN is consumed. Unclearly communicated data use may result in the audience mistaking some parts for being changed that are not or controversy if they are under-informed. • It may be possible to automate the process of detailing how and where data is used about the audience.

	• Remember consent is still needed for data that is open source as placing it within a narrative is taking it out of its original context.
The IIPN is contributing to a 'filter bubble.'	• Check if you are contributing to, challenging or indifferent to the filter bubble effect. • Provide clear information before and/or after the narrative about exactly how the data has been used to the audience. • Provide a default option for those that do not wish to provide access to their data.
Choosing data sources is complex ethically.	• Balance how much you need the data against how private the data source is considered by the audience. *Least private are content preferences (i.e. TV they enjoy, music they like) next is basic profiling information (age, gender, location) then online patterns and behaviours (i.e. recent purchases, browser history). Most Private of all is socioeconomic information: (i.e. earnings, homeownership) and social information: (i.e. information about friends and family).* • Consider the wider political and sociological context of the data you are using*. I.e. Facebook data is associated with the Cambridge Analytica Scandal.* • Check what the combination of your data sources reveal as a range of information may make someone easily identifiable.

Choosing data sources is complex artistically as the range of options is large.	• Use templates and refer to previously used data sources for inspiration. • Limit the number of sources as seeking permission for multiple sources can be off-putting to the audience. • Start with a simple narrative with one data source, and then build in more into subsequent iterations once feedback and user testing can be done.
The organisation may be liable or risk reputational damage due to using data.	• Check if it is essential to store or be able to view any data. The 2016 Investigatory Powers Act means any data you have must be accessible to the UK government. • Fact check and/or verify any third-party providers of data for their accuracy and standards as early as possible. • Have a 'shelf life' for the IIPN so that changes in the credibility of the data source can be accounted for. *I.e. changes in privacy law or a data security problem internal or external to the originator.* • Provide any necessary warnings about third-party data sources and/or terms and conditions that outline the audience's rights should something go wrong. • Ensure that the lineage of data sources can be traced if problems arise. • Include clear contact information to report problems.

	• Ensure compliance with the General Data Protection Regulation (Regulation (EU) 2016/679) *I.e. the audiences right to delete and access their data and highest privacy settings as default.* • Check for and follow any specific guidelines associated with a type of data. *I.e. personality trait data requires contextualisation in its presentation.*
One or more aspects of the narrative fail at playout or are not completed during production.	• The more complicated the narrative is the more areas there are that could break or fail. Have a minimum viable product where the narrative still achieves what you need to but at its simplest as a fall-back option. • Ensure time is planned into the production for creating multiple versions, learning new technologies and communicating the new concept to colleagues. • Have placeholders for failed data insertions and/or a default playout if a bespoke experience is not possible. • Review placeholders and default options before release and whilst the narrative is live to ensure they remain coherent if there is a mixture of successful and unsuccessful data insertions. *I.e. Does a placeholder chosen 5 years ago still work with content gathered now?* • Build in limitations to the software to mitigate against known upcoming issues. *I.e. Only reference the UK is in the EU before January 31st 2020.*

	• Multiple data sources spread the risk of complete failure for all the elements. • Remove any co-dependencies between data sources where possible so one failure to acquire a data can't affect another that would otherwise be successful.
The data used or assembly of the narrative has unintended artistic connotations.	• Gauge the artistic risk for errors if the data used is incorrect or assembles the IIPN incorrectly and adjust the content accordingly. • Include limitations in the software where appropriate on what content is ok for different audiences. • For single word insertions, including the placeholders used for failed data searches, ensure they meet the artistic aims with a review from the creative team. • Use additional contextual information as needed to ensure a data insertion is understandable. *I.e. watch the movie 'X' rather than watch 'X.'* • Review variation options where possible at key plot points to ensure they are still communicated as intended. *I.e., does this colour grade conceal some action or undermine the tone?* • Check that changes made by variations are consistent with the rest of the content. *I.e. Could the weather mentioned by the algorithm differ to that mentioned in the script?*

The data used or assembly of the narrative results in offensive content.	• Ensure age labelling and a description of the programme is provided before viewing, including information about any known offensive content. • Include clear contact information to report problems. • Whilst the IIPN is live have a periodic review in place where the correct functioning of the IIPN is checked. • During and after production check for bias in any algorithms used, including from third parties, for issues such as racism, sexism or insufficient accuracy/assumptions about the data.
The IIPN unintentionally includes content from a national emergency, terrorist attack or similar sensitive incident.	• Have an automatic stop programmed in or person responsible for suspending the IIPN if it could include this content in an unsympathetic or inappropriate manner. • Ensure third-party content is coming from a reliable source.
There is not one shared experience to discuss with others.	• The narrative's differences and similarities can be promoted as a talking point.
It is not possible to experience all of the narrative options.	• The possibilities of exploring more than one option can be promoted to encourage repeat viewing.

It is challenging to archive as there is not one version.	- Check whether or not you are required to archive a copy of the IIPN for legal reasons as an organisation. Then liaise with that department. - Consider the implications of which version is archived as this is a complex cultural decision. *I.e. Whose choices are being privileged? Why is this one important?*

Appendix 2 <u>Flow chart of *Breaking Out* (BBC 2012)</u>

User presses play and the following process begins.

Instance 1. Search for user location → **Found?**
- Yes → Location data known. Search for name of local city/area → **Found?** → Yes → City/area found. Insert [*name found*]
- No → Data unknown. Use "*in your city*"
- Found? No → Data unknown. Use "*in your city*"

Instance 2. Search for user location → **Found?**
- Yes → Location data known. Search for name of local tourist attraction → **Found?** → Yes → Tourist Attraction found. Insert [*name found*]
- No → Data unknown. Use "*Imperial War Museum*"
- Found? No → Data unknown. Use "*Imperial War Museum*"

Instance 3. Search for user location → **Found?**
- Yes → Location data known. Search for name of local tourist attraction → **Found?** → Yes → Tourist Attraction found. Insert [*name found*]
- No → Data unknown. Use "*Urbis*"
- Found? No → Data unknown. Use "*Urbis*"

Instance 4. Search for user location → **Found?**
- Yes → Location data known. Search for name of current local weather type. → **Found?** → Yes → Weather type found. Insert [*name found noun & name found verb*]
- No → Data unknown. Use "*rain & raining*"
- Found? No → Data unknown. Use "*rain & raining*"

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Instance 5. Search for social media networks in use.

Found? → Yes → Social media networks being used found. Search for names of social networks. → Found? → Yes → Names of social networks found. Insert [*names found*]

Found? → No → Data unknown. Use "*Twitter and Digg*" or chached data

Found? → No → Data unknown. Use "*Twitter and Digg*" or chached data

Instance 6. Search for user location and today's date

Found? → Yes → Search local cinema listing for comedy film on today's name. → Found? → Yes → Comedy film name found. Insert [*name found*]

Found? → No → Data unknown. Use "*A Fantastic Fear of Everything*"

Found? → No → Data unknown. Use "*A Fantastic Fear of Everything*"

Instance 7. Search for user location and today's date

Found? → Yes → Search local cinema listing for Horror film name. → Found? → Yes → Horror film name found. Insert [*name found*]

Found? → No → Data unknown. Use "*The Harsh Light of Day*"

Found? → No → Data unknown. Use "*The Harsh Light of Day*"

Instance 8. Search for user location

Found? → Yes → Location data known. Search for name of a local bar a and restuarant. → Found? → Yes → Names found. Insert [*name found bar name found restaurant*]

Found? → No → Data unknown. Use "*rain & raining*"

Found? → No → Data unknown. Use "*rain & raining*"

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Search for news
clip from today.

Found?

Yes

News clip found. Trim to
6 seconds and insert.

Yes

Instance 9.
Search for
current date.

Found?

Yes

No

Data unknown.
Use stored news clip.

No

Location data known.
Search for name
of local tourist attraction

Found?

Yes

Tourist Attraction found.
Insert [name found]

Yes

Instance 10.
Search for
user location.

Found?

Yes

No

Data unknown. Use
"Palace Theatre"

No

Insert
[current date]

Yes

Instance 11.
Search for
current date.

Found?

No

Data unknown. Use
"March 9th"

No

Compiled Narrative

Appendix 3 <u>Flow chart showing the path of the program in dark blue to create the Edinburgh variation used in Case Study One</u>

Instance 5. Search for social media networks in use.
- Found? → Yes → Social media networks being used found. Search for names of social networks.
  - Found? → Yes → Names of social networks found. Insert [*names found*]
  - Found? → No
- Found? → No → Data unknown. Use "*Twitter and Digg*" or cached data.

Instance 6. Search for user location and today's date
- Found? → Yes → Search local cinema listing for comedy film on today's name.
  - Found? → Yes → Comedy film name found. Insert [*name found*]
  - Found? → No
- Found? → No → Data unknown. Use "*A Fantastic Fear of Everything*"

Instance 7. Search for user location and today's date
- Found? → Yes → Search local cinema listing for Horror film name.
  - Found? → Yes → Horror film name found. Insert [*name found*]
  - Found? → No
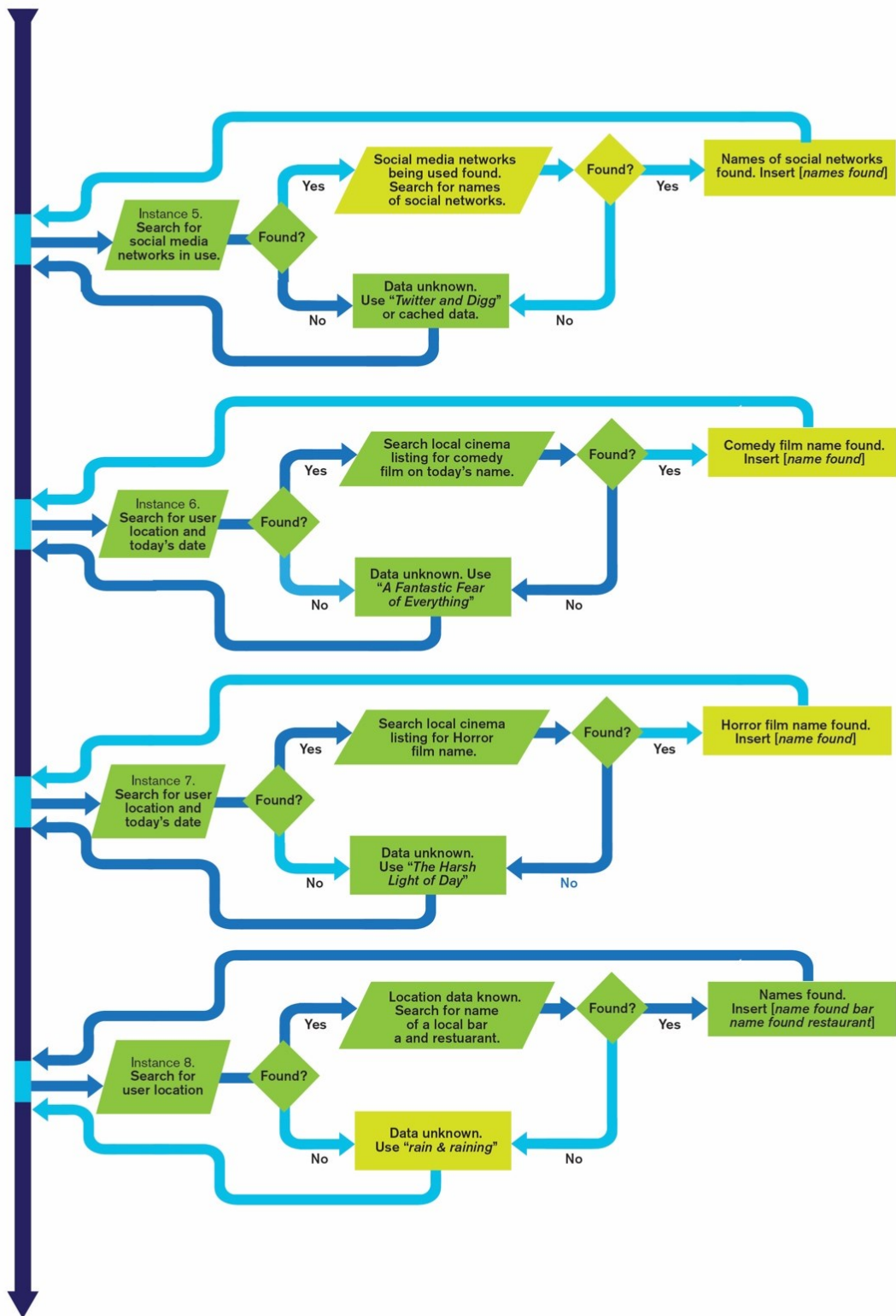- Found? → No → Data unknown. Use "*The Harsh Light of Day*"

Instance 8. Search for user location
- Found? → Yes → Location data known. Search for name of a local bar a and restuarant.
  - Found? → Yes → Names found. Insert [*name found bar name found restaurant*]
  - Found? → No
- Found? → No → Data unknown. Use "*rain & raining*"

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Search for news clip from today.

Found?

Yes — News clip found. Trim to 6 seconds and insert.

Instance 9. Search for current date.

Found?

Yes

No — Data unknown. Use stored news clip.

No

Location data known. Search for name of local tourist attraction

Found?

Yes — Tourist Attraction found. Insert [name found]

Instance 10. Search for user location.

Found?

Yes

No — Data unknown. Use "Palace Theatre"

No

Insert [current date]

Instance 11. Search for current date.

Found?

Yes

No — Data unknown. Use "March 9th"

Compiled Narrative

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A graph showing the duration of *The Break Up* (Amedume, 2016) in all music genres, edits and endings

Duration of Short in all Music Genres, Edits and Endings
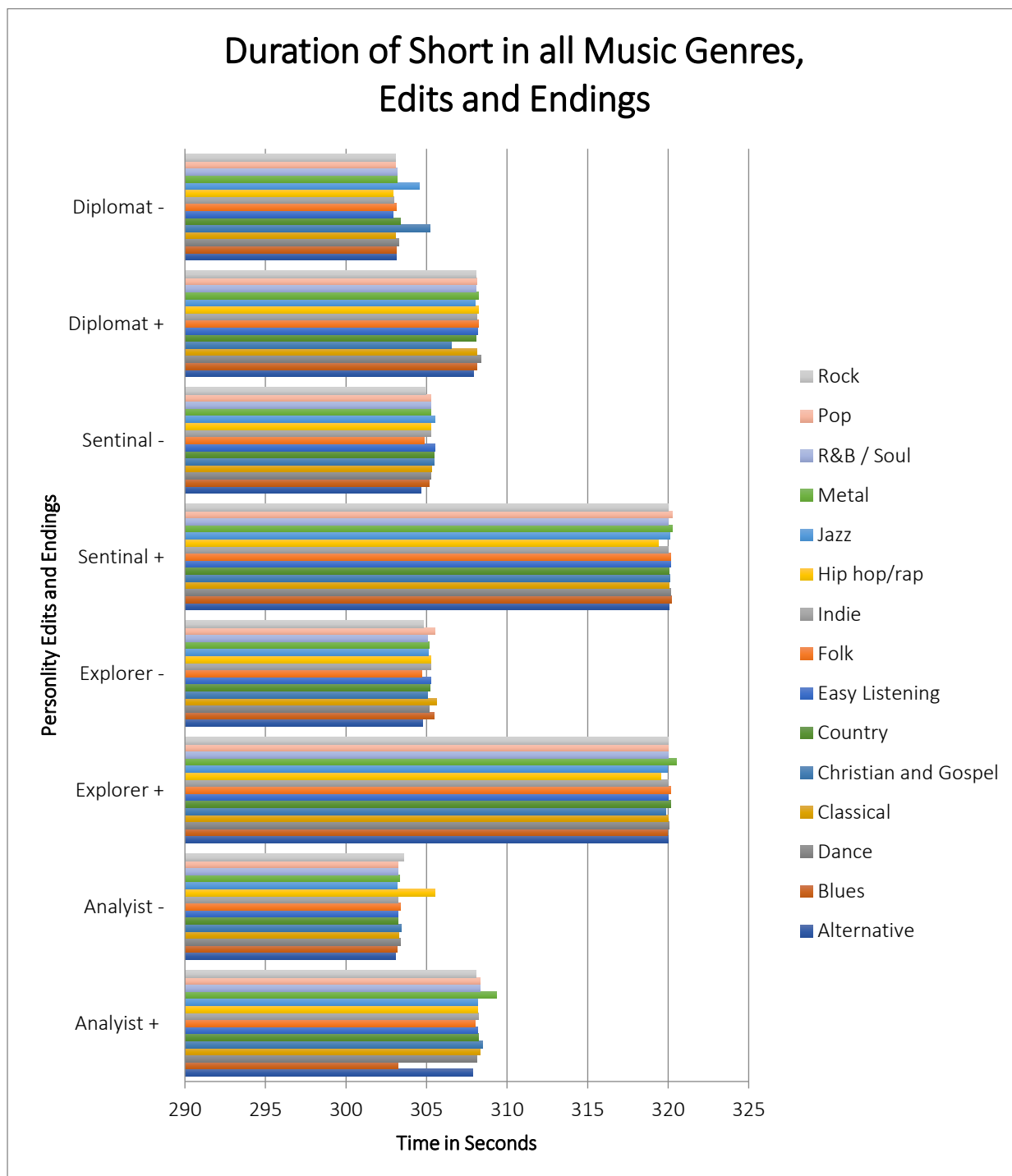
Appendix 5 A graph showing the duration of the start music in *The Break Up* (Amedume 2016) in every edit, ending and music genre

Duration of Start Music
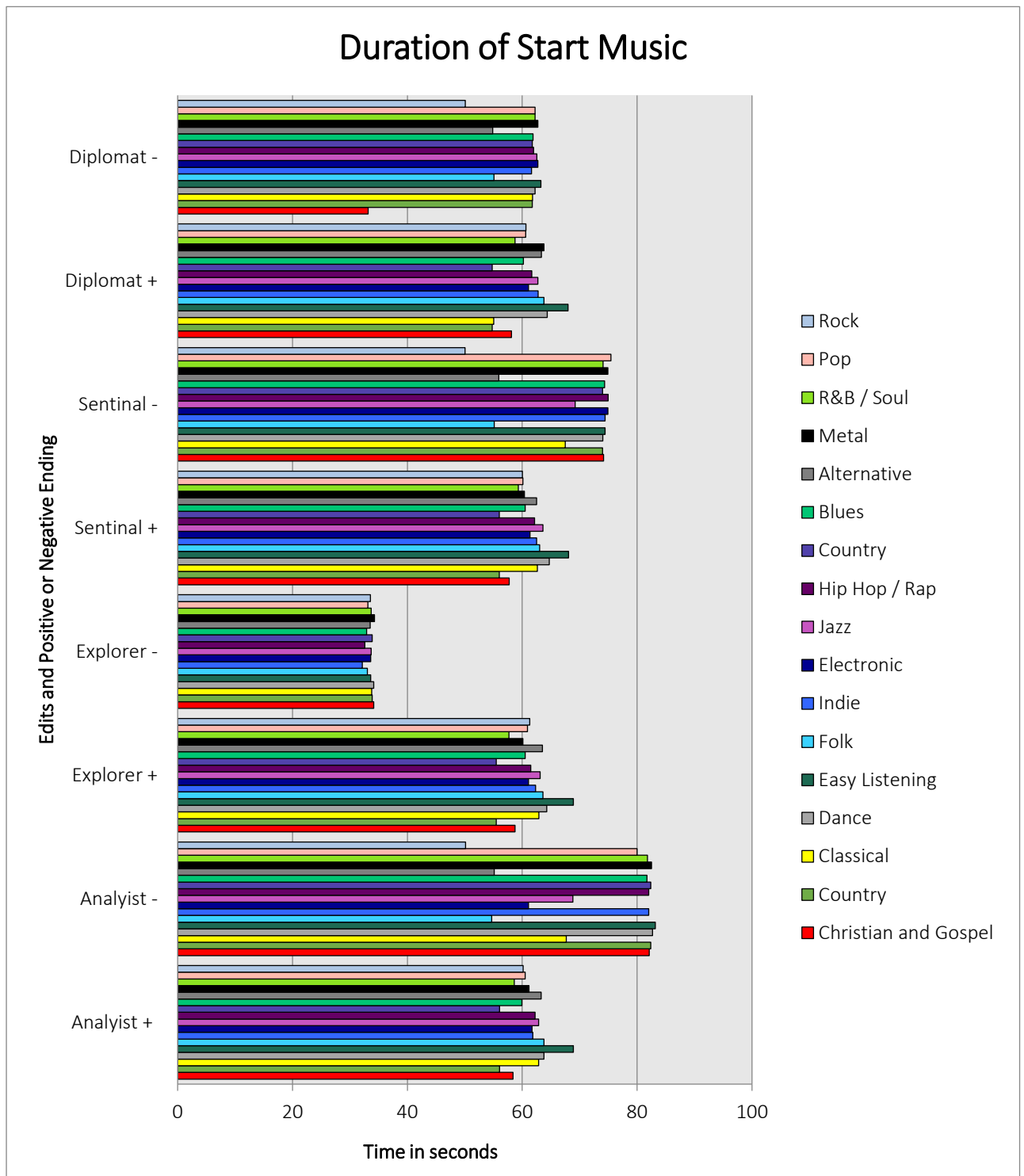
Appendix 6 A graph showing the duration of the end music in *The Break Up* (Amedume 2016) in every edit, ending and music genre

Duration of End music
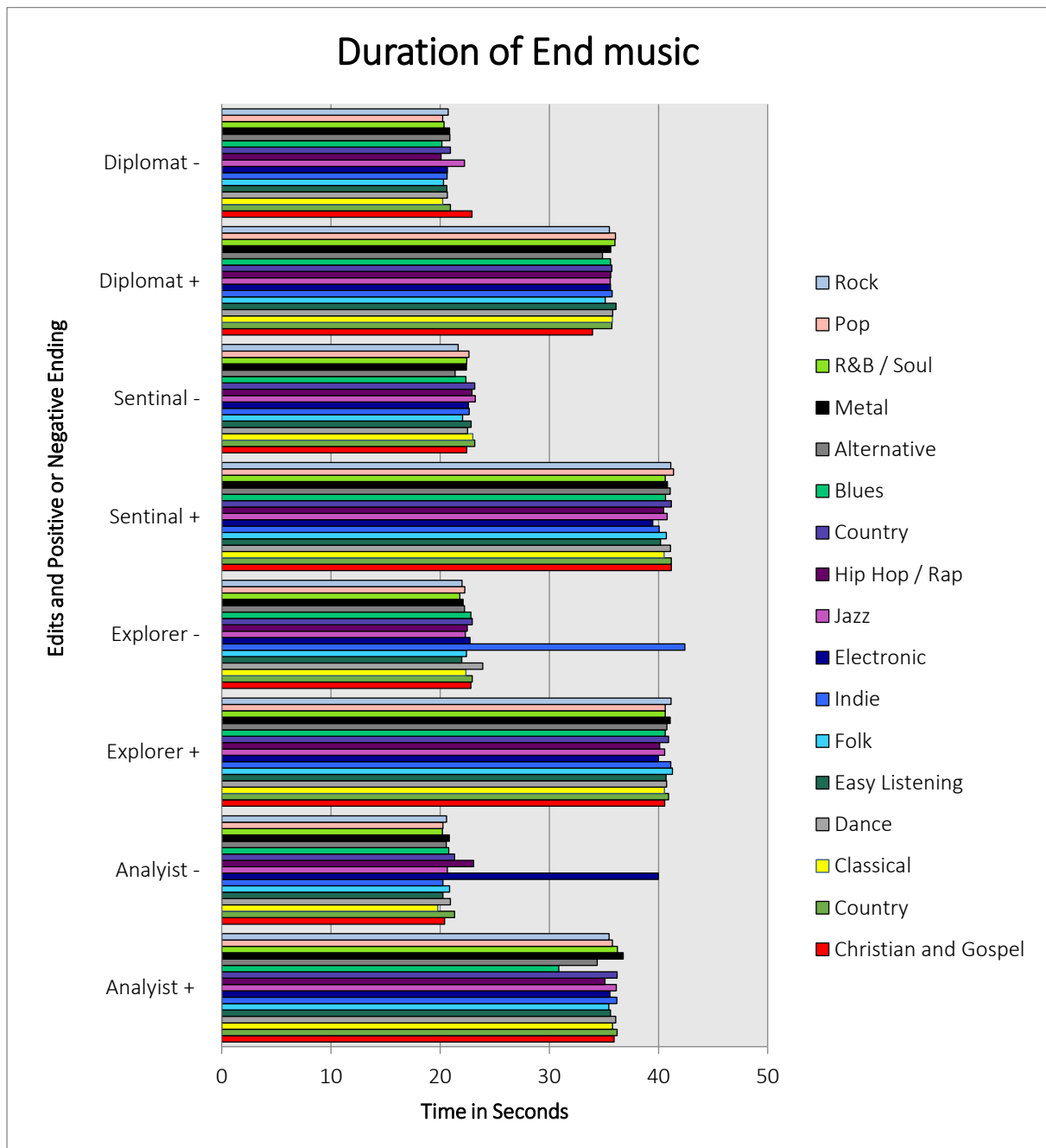
Appendix 7 Tables showing how the narrative events of *The Break Up* (Amedume 2016) vary in the beginning and end.

Table 16 Narrative events distilled into lexia from the opening sequence

Opening Type One	Opening Type Two	Opening Type Three
A. Title Screen: The Break Up B. Exposition, female hands touching her stomach, hinting she may be pregnant C. The camera pans up to show Sarah standing in a park listening to children play, the traces of a black eye are visible D. Sarah walks down a street E. Title Screen: The Break Up F. Ian waits nervously in a bar	A. Title Screen: The Break Up B. Sarah walks down a street C. Title Screen: The Break Up D. Ian waits nervously in a bar	A. Title Screen: The Break Up B. Ian waits nervously in a bar C. Title Screen: The Break Up D. Exposition, female hands touching her stomach, hinting she may be pregnant E. The camera pans up to show Sarah standing in a park listening to children play, the traces of a black eye are visible F. Sarah walks down a street

1. Sarah approaches a bar, pauses to gain her composure and then enters

2. Ian, the other character waits for Sarah, alone in the bar

3. Sarah and Ian's eyes meet, he is expectant and her less enthusiastic

4. Ian paces as Sarah approaches, he looks nervous

5. IAN "Sit", Sarah sits, and he joins her

6. IAN "Drink?" He pours himself her a large glass of water as he asks

7. SARAH "No thank you" shaking her head

8. IAN "Drink" he insists, Sarah takes the water and drinks

9. Ian drinks a glass of wine very quickly and Sarah looks on shaking her head in disapproval

10. Ian notices her disapproval and pauses whilst pouring another glass looking ashamed

11. SARAH "Well?"

12. Ian removes a jewellery box from his jacket pocket, implying an engagement ring and says IAN "I'm sorry."

13. SARAH (replying) "I lost it"

14. Ian looks worried and shocked and sits back in his chair with Sarah looking on in disapproval

15. IAN "It's still worth it"

16. SARAH unconvinced, and a little angry replies "I don't even know who you are"

17. IAN "neither do I"

18. Sarah stands as if to leave SARAH "What were you thinking?" exasperated

19. Ian also stands and replies IAN "I'm here"

20. SARAH accusatorily "Yeah? For how long?"

21. Ian reaches out to touch Sarah's bruised cheek and she flinches

22. Ian tries to touch Sarah another few times, leaning for a kiss. Sarah is not receptive but appears conflicted

23. IAN "Wha.. What is it?" plaintively

24. SARAH "Nothing" in an aggressive in tone

25. SARAH "I'm going" appearing determined

Table 18 Narrative events distilled into lexia from the positive and negative endings

Positive Ending	Negative Ending
28. IAN "wait!" aggressively	28. IAN "wait!" aggressively
29. Sarah continues to walk	29. Sarah continues to walk
30. IAN "I said wait" Louder and angrily	30. IAN "I said wait" Louder and angrily
31. Sarah put on her coat outside of the bar, she rubs her stomach and smiles before walking down the street	31. Sarah stops; looking defeated she turns teary-eyed and returns to stands beside Ian

Appendix 8 – First draft of the IIPN production matrix

Note: *This is the first draft of the matrix that was presented to Ian Forrester and Oliver Spall. They are current or previous members of the British Broadcasting Corporation's Research and Development team.*

<u>The possible benefits of Implicitly Interactive Pervasive Narrative (IIPN)</u>

For the audience:

Able to make the best viewing experience for the audience in their current context.

- Possible to react to the audience in real-time.
- Content can be more relatable.
- Offers the audience more choice as there is more content to explore.
- Provides personalisation without the need for the audience to explicitly interact.
- Potentially, exciting as a novel experience.
- Possible to use it to catch-up current storylines in soap operas or create a shared variation for viewers at different points in the same series.

For the creators:

- Opportunity to upskill staff in new technologies and methods.
- Opportunity to develop hybrid roles, such as the writer/editor in one production.
- Great creative potential due to unlimited options of data sources and their combinations.
- Potential to enhance creative choices with data. *Ie. A character getting local names wrong for comic effect.*
- Potential for magical feeling characters and effects.
- Potential for creating a feeling of uncanniness.
- Currently, it showcases the cutting edge of technology.
- The possible range of storylines within one narrative provides an exciting chance for actors and other creatives to showcase their talent outside of typecasting.

- May be able to commercialise new technologies developed.

- Better able to target your audience to suit or challenge them.

- Serve underrepresented groups and communities. *Ie, using different accents to show a range of places*

Areas to consider for ethical data use in IIPN in the UK

When selecting data consider:

- The wider political and sociological context of the data you are using. I.e, Facebook data is associated with the Cambridge Analytica Scandal.

- Check for and follow any specific guidelines associated with a type of data. I.e, personality trait data requires contextualisation in its presentation.

- Even if it is open source, if you are taking data outside of its original context seek permission to do so.

- Check what the combination of your data sources reveal as a range of information may make someone easily identifiable.

- Different types of data are considered more and less private. Least private are content preferences (ie.TV they enjoy, music they like) next is basic profiling information: (Age, gender, location) then online patterns and behaviours: (ie. recent purchases, browser history). Most Private of all is socioeconomic information: (ie. earnings, homeownership) and social information: (ie. information about friends and family).

How to use the data:

- Is it essential to store or be able to view any data? The 2016 Investigatory Powers Act means any data you have must be accessible to the UK government.

- Check if you are contributing to, challenging or indifferent to the filter bubble effect.

- Ensure compliance with the General Data Protection Regulation (Regulation (EU) 2016/679) For example, the audiences right to delete and access their data.

- Provide a default option for those that do not wish to provide access to their data.

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- Use a clear, short, understandable, and accurate form of consent before an IIPN is consumed.
- Be aware that unclearly communicated data use may result in the audience mistaking some parts for being changed that are not, or controversy if they are under informed.

Identified challenges and risks when making IIPN

These are the challenges and risks I have identified that I think are likely to improve as IIPN becomes established:

- The state of the art, in part, dictates the narrative content and scale of ambition of an IIPN.
- Developing new technology to play IIPN is resource-heavy. For one to operate internationally this is prohibitively so.
- IIPN is hard to communicate to others as there are few examples.
- There is resistance to change in colleagues and audiences.
- The reputational risk of a failed outcome due to using the new technology limits the possible partners, creative talent and platforms willing to try an IIPN format.
- Requiring state of the art technology to operate limits who can work on or be an audience of IIPN.
- Current legislation and contracts are not designed to deal with IIPN where multiple/infinite variations must be signed off. Ie, music licensing or acting contracts.

These are the challenges and risks I've identified that may remain inherent to IIPN production even with development. Alongside these, I've put in some ideas on how to mitigate them.

Risk/Challenge	Control measure

One or more aspects of the narrative fail or are not completed during production.	· The more complicated the narrative is the more areas there are that could break or fail. Have a minimum viable product where the narrative still achieves what you need but at its simplest as a fall-back option. · Ensure time is planned into the production for creating multiple versions, learning new technologies and communicating the new concept to colleagues.
One or more aspects of the narrative fail during playout.	· Have placeholders for failed data insertions and/or a default playout if a bespoke experience is not possible. · Review placeholders and default options before release and whilst the narrative is live to ensure they remain coherent if there is a mixture of successful and unsuccessful data insertions. *Ie. Does a placeholder chosen 5 years ago still work with content gathered now?* · Multiple data sources spread the risk of complete failure for all the elements. · Remove any co-dependencies between data sources where possible so one failure to acquire a data source can't affect another that would otherwise be successful.

The data used or assembly of the narrative results in offensive content.	· Ensure age labelling and a description of the programme is provided before viewing, including information about any known offensive content. · Include clear contact information to report problems. · Whilst the IIPN is live have a periodic review in place where the correct functioning of the IIPN is checked. · During and after production check for bias in any algorithms used, including from third parties, for issues such as racism, sexism or insufficient accuracy/assumptions about the data.
The IIPN unintentionally includes content from a national emergency, terrorist attack or similar sensitive incident.	· Have an automatic stop programmed in or person responsible for suspending the IIPN if it could include this content in an unsympathetic or inappropriate manner.

The data used or assembly of the narrative has unintended artistic connotations.	· Gauge the artistic risk for errors if the data used is incorrect or assembles the IIPN incorrectly and adjust the content accordingly. · For single word insertions, including the placeholders used for failed data searches, ensure they meet the artistic aims with a review from the creative team. · Use additional contextual information as needed to ensure a data insertion is understandable. *Ie, watch the movie 'X' rather than watch 'X.'* · Review variation options where possible at key plot points to ensure they are still communicated as intended. *Ie, does this colour grade conceal some action or undermine the tone?* · Are changes made by variations consistent with the rest of the content? *Ie, Could the weather mentioned by the algorithm differ to that mentioned in the script?*
The data used is sourced unethically.	· Check as early as possible in production that the data being sourced is ethical (see data ethics advice). · Include clear contact information to report problems. · Have a 'shelf life' for the IIPN so that changes in the credibility of the data source can be accounted

	for. *I.e, changes in privacy law or a data security problem internal or external to the originator.*
Current legislation and contracts are not designed to deal with IIPN where multiple/infinite variations must be signed off. *I.e, music licensing or acting contracts.*	· A 'shelf life' may help in negotiating contracts and licensing. · The number of variations may need to be restrained. · Open source materials may provide content free of licensing issues.