

Systems of Narrative

A Theoretical Unravelling of Interactive Digital Nonfiction and
Its Currency of Engagement in The Ludic Century

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Abstract

Storytelling is fundamental to the human experience. At its core is the need to communicate - to share our knowledge, ideas and perspectives in ways that feel tangible and concrete to others. Much like the way that the printing press led to a boom in the circulation of information throughout society, digital technologies have expanded our capacity to produce, distribute and consume media objects on a global scale. This expansion has rippled throughout various media industries, including mass media and journalism, where digitisation has made a significant impact on both journalistic practice and user consumption. While digital technologies have created new opportunities for innovation and convergence, they have also brought with them significant challenges relating to platform instability, news avoidance and atomised reading. While digital journalists have embraced adaptability and user engagement as key values of their practice, the highly saturated and diverse nature of news on the internet emphasises the need to distribute content using increasingly user-driven strategies. With topics like interactivity and gamification on the rise, there is currently a need to develop practical frameworks for interactive narrative design, geared toward interactive nonfiction as a category of journalistic storytelling. This presents a research gap, which this study aims to fill by investigating the conceptual and methodological bridge between interactive narrative and digital nonfiction as both product and practice. To do so, this study engages in a theoretical investigation that uses qualitative research methods to draw its conclusions. It uses a double-stacked methodology, combining a meta-synthesis of extant principles and theories into a conceptual matrix that comprises (1) user engagement, (2) digital authoring and (3) system design as its core tenets. This matrix is then used to conduct a case study analysis of three instances of interactive nonfiction, with the aim to reverse-engineer a conceptual paradigm for the design of interactive digital nonfiction as systems of narrative. Key findings suggest that interactive narrative operates as a procedural system, where ludic principles involving spatial and participatory storytelling instantiate meaning on both a semiotic and experiential level. In the context of digital journalism, these principles align with contemporary values of engagement, public advocacy and representation while also positioning the user as an active participant in the journalistic process. Ultimately, interactive and gamified formats can assist in addressing the challenges faced by newsmakers by harnessing user engagement as a valuable digital currency.

Declaration

University of the Witwatersrand, Johannesburg

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SENATE PLAGIARISM POLICY

Ethics Clearance Number: H23/08/38

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- I confirm that ALL the work submitted for assessment for the above course is my own unaided work, except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
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Signature:  . Date: **30 March 2025**

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¹ Including Alba - my dearest companion, furriest friend, and the only other creature with the words 'system', 'interactivity' and 'narrative' scored into her brain.

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A Note on Language

This study uses the authorial first-person perspective throughout. It does so for two reasons: (1) to embrace the user-centred principles associated with interactive narrative design, where accessibility and comprehension are central values to the storytelling process; and (2) to position the reader as a comrade and associate in the conceptual, theoretical and critical elaboration outlined throughout its argument.

In doing so, this study's use of the first-person perspective aims to welcome the reader into what is not only a scholarly investigation but a journey following its thought process across four chapters and three interrelated fields of study.

Ultimately, this language intends to present an argument and findings in a manner digestible to specialists, students, practitioners and curious onlookers - all of whom admire the plasticity of the computer as a creative medium.

Introduction

Storytelling is fundamental to the human experience. At its core is the need to communicate - to share our knowledge, ideas and perspectives in ways that feel tangible and concrete to others. Since the dawn of culture, our societies have continuously discovered, developed and invented new, more efficient ways to communicate these aspects of our lives. From cave paintings to video games, humankind has amassed a 'library' of media types through which we can represent our inner and outer worlds.

This library formed alongside our technological developments, which continuously remediated the principles and conventions of older forms of communication into newer, 'better' formats (O'Niell 2008, p.23). Such was the development of new media, which amalgamates the technological history of analogous media into a post-industrialist 'technoculture' characterised by digital communications technologies (Lister et al. 2009).

In the last 30 years, the prevalence of these technologies has come to dominate our lives. Smartwatches measuring our heart rates, virtual assistants managing our schedules, and social networks maintaining our social and parasocial relationships are all digital systems that supplement our day-to-day existence. As a result, the ever-growing presence of new media has caused major shifts in the ways that we communicate with one another and interact with the world around us - ways which are "technological, textual, conventional and cultural" (Lister et al. 2009, p.13). In short, ways which are *digital*.

Much like the way that the printing press led to a boom in the circulation of information throughout society, digital technologies have expanded our capacity to produce, distribute and consume media objects on a global scale (Lister et al. 2009, p.31).

This expansion has rippled throughout various media industries - including mass media and journalism, where digitisation has made a significant impact on both journalistic practice and user consumption (Wilding et al. 2018). This impact has spurred shifts in news and journalism's role, perception and economic sustainability within the digital age (Wilding et al. 2018). On the one hand, these technologies have destabilised a long-standing media economy. On the other hand, they have opened new opportunities for innovation and convergence within the professional and public sphere (Newman et al. 2024).

This study positions itself within this context and aims to not only understand the new media climate but also address challenges related to the production and consumption of digital media through formats which are increasingly personalised, networked and interactive. It entails a theoretical investigation that uses qualitative research methods, and which is guided by the following research question:

How can interactive storytelling principles be applied to digital nonfiction to secure a greater currency of engagement among digital users?

To answer this question, this study interrogates three interrelated disciplines: (1) new media studies, (2) digital journalism studies, and (3) games studies towards a holistic understanding of interactive digital narrative as a long-form storytelling format in the nonfictional sphere. While new media studies provide insight into the nature of the digital media ecosystem, digital journalism studies scope this study's focus to a particular area of inquiry - grounding a solutions-oriented approach to interactive digital narrative and its potential applications to the mass media industry.

Ultimately, this study was born from a desire to see games and play more readily manifest themselves in daily life. Gamification has become a significant point of discussion across various fields, including commerce, media and education - and with good reason. Play is one of our oldest and most instinctive forms of self-expression (Zimmerman 2014), teaching us skills that challenge our physical and mental capacity, and which can foster human connections through shared experiences.

Grounded by this thinking, and fascinated by the ebb and flow of the digital media environment, this study explores what John Grierson coined as the "creative treatment of actuality" (Dowling 2021, p.5), where real-life stories are communicated through a user's experience within a virtual context. This is a concept prevalent in the digital journalism sector, where multimedia journalism, interactive documentaries and newsgames manifest as participatory forms of long-form journalism - converging traditional values of public advocacy and representation with the affordances of the digital environment.

Since the .com boom of the 90s and increased commercial access to digital web browsers, storytellers of all kinds looked to cyberspace as a new frontier for cultural production, distribution, and reproduction. This includes journalists, who identified that emerging technologies innovated ways to produce and read the news - which could exist alongside other popular broadcasting media while keeping pace with the tech-evolution (Scott 2005, p.92-94). Today, digital journalism has evolved into a distinct form of news production and consumption, demonstrating an inherent sense of creativity and adaptability within the field.

However, such rapid developments are not without their growing pains. While digital journalists have already extended their production pipelines to include increasingly audience-centred outcomes, the highly saturated and diverse nature of news on the internet emphasises the need to distribute content using increasingly user-driven strategies (Ferrucci and Perrault 2020, p.1307-1309). Social media, podcasts and content aggregators have been used to keep audiences quickly and conveniently informed - especially in the realm of fast-paced hard news. But, with the rising popularity of interactive documentaries and serious games, combined with the internet's capacity as a globally collaborative and highly accessible communication network, the slower-paced, narrative-driven interests of long-form (or soft) news have also found a space to bloom.

With principles like interactivity and gamification on the rise in the nonfictive space, there is currently a need to develop practical frameworks for interactive narrative design, geared toward this category of storytelling (Gaudenzi 2019; Jacobson et al. 2015). As it stands, digital, long-form nonfiction is

trying to bridge a gap between ludic narration and journalistic reporting by implementing theories and practices from both disciplines.

This study aims to contribute to this developing area of inquiry by synthesising values, principles and theories across digital journalism and games studies towards a series of recommendations for the development of interactive nonfiction through a process of system design. These recommendations not only aim to support journalists and factual storytellers interested in interactive formats but also serve emerging narrative designers and interactive storytellers interested in the nonfictional sphere. In doing so, this study simultaneously interrogates the intervention of digital technologies within traditional storytelling frameworks, where interactivity, immersion and user-centred design become core tenets in theory and practice.

More specifically, these aims are grounded by the following research objectives:

- To establish a critical and theoretical foundation digital journalism and interactive narrative within the contemporary new media landscape. This foundation is underscored by the history and use of the computer as a creative medium.
- To investigate the challenges and shifts in the production, consumption and distribution of digital news and evaluate how ludic approaches to storytelling could respond to phenomena such as news avoidance and atomised reading.
- To explore the convergence of media studies, digital journalism studies and games studies as a transdisciplinary space for storytelling, in order to conceptualise interactive nonfiction as a hybrid narrative form.
- To apply existing analytical frameworks for interactive narrative to a nonfictional context, addressing its efficacy as a tool to better understand system architecture and its relationship to user-centred narrative.
- To conduct a case study analysis of selected works of interactive nonfiction, with the goal to identify design patterns and storytelling strategies that inform a practical approach to system-driven narrative design.
- To synthesise findings into a conceptual paradigm for interactive narrative as system design, supporting both journalistic practice and emergent digital storytelling formats in theory and practice.

To address these aims and objectives, the investigation unravels through a four-chapter structure:

[Chapter 1: Theoretical Contexts for Digital Storytelling](#) provides a robust literature review across all three of the proposed areas of investigation. This review uses an analytical approach to establish an in-depth understanding of the ongoing trends, challenges and innovations within the new media

environment, while also identifying and expanding on significant research gaps before using extant studies to conceptualise potential solutions.

[Chapter 2: A Theoretical Framework for Ludic Narrative](#) presents the first part of this study's methodology, which involves a meta-synthesis of prevailing theories and principles into a three-dimensional conceptual matrix that comprises (1) user engagement, (2) digital authoring and (3) system design as its core tenets. This matrix will then be used to fulfil the second part of this study's methodology in [Chapter 3: Case Study Analysis](#), which applies the conceptual matrix to three instances of interactive nonfiction, each of which is a different genre of the format. These case studies include *Millennials are Screwed* (2017), a multimedia article published by the HuffPost Highline; *Seven Digital Deadly Sins* (2014), an interactive documentary produced by The Guardian; and *Bad News* (2018), an independent newsgame developed by GUSMANSON.

This double-stacked methodology (which combines primary and secondary data collection) aims to address the relationship between interactive narrative and digital journalism in both theory and practice, using Hartmut Koenitz's SPP (Koenitz 2023) model to reverse-engineer each case study as a narrative system - which will be elaborated in written and diagrammatic forms. This analysis will then be used to inform [Chapter 4: Discussion](#), where major trends identified throughout the case study analysis are corroborated with the study's theoretical positioning. This discussion then lends itself to the study's final recommendations, which manifest as a two-pronged conceptual paradigm for interactive digital nonfiction.

Ultimately, this dissertation unfolds as a theoretically driven exploration, captivated by the mystique of the computer as a creative medium and its potential to enrich our lives in unexpected ways. With that, the journey begins!

Chapter 1: Theoretical Contexts for Digital Storytelling

A Review of Existing Literature

This study begins its investigation with an analytical literature review that (1) addresses ongoing trends, challenges and innovations within the new media environment; (2) identifies research gaps affecting both digital nonfiction and interactive narrative; and (3) defines existing theoretical principles for the design of interactive digital narrative in a news media context.

In doing so, it provides an in-depth overview of three interrelated disciplines: new media studies, digital journalism studies and games studies. This is the longest chapter in the study, with the aim of contextualising its discussion, theoretical potential and relevance to the greater media industry before conceptualising solutions to the identified gaps and challenges.

1.1. The Contemporary Media Landscape:

New media studies investigates the social and cultural significance of the digital media objects and communications technologies that support our contemporary media environment. Drawing from these 'new', technologically mediated formats, this study focuses on computers as communicators of narrative. In this context, the term 'computer' refers to any digital technology used to produce and interact with screen-based media. This can include desktop computers, laptops, smartphones and tablets - as well as associated peripheral devices such as mice, keyboards and styluses.

In doing so, this study considers the computer as a creative medium for the production, dissemination and consumption of authored stories. This classification uses the term 'medium' in two ways:

- 1) An intermediary channel through which information, messages or ideas can travel between two or more parties (O'Niell 2008, p.16) - relating to the computer as a messenger or mediator for media consumption.
- 2) A technology that enables communication by implementing a set of cultural practices and conventions (Jenkins 2006, p.15) - relating to the computer as the technical means for media production or creative practice.

New media has been a topic of discussion for the last thirty years, beginning with shifts in media consumption around the same time the home computer became prevalent in the 1980s (Lister et al 2009, p.33). Some theorists look back even further, recalling the avant-garde storytellers of the early twentieth century who experimented with multimedia formats that were inspired by the computer, or were perhaps an inspiration for the computer as we know it today (O'Niell 2008, p.20). From as far back as Vannevar Bush's hypothetical Memex machine in 1945 - a device which could be used to store and access linked bodies of information - storytellers have experimented with the idea of non-linear and participatory narration (O'Niell 2008, p.20-21).

This suggests a historic enthusiasm for the potential of computers as communications media, due to their ability to conveniently store, organise and represent complex bodies of information. This 'new' way of cataloguing data organises information based on the logical and interconnected flow of its contents, rather than through the use of alphanumeric methods (Lister et al. 2009, p.28, Murray 2016, p.87). This process is said to mirror a more 'natural' way of gathering and analysing information, which better aligns with how humans cognitively interact with knowledge (Lister et al. 2009, p.28) - a compelling feature among creatives, media industries and those who engineered the technologies themselves (O'Niell 2008, p.20-21).

Although the growing interest in these technologies and their media objects was understandable in the twentieth century, these ideas still hold their relevance today. This is thanks to convergence - the root of new media studies, which continues to evolve with digital technologies to shape the production, distribution and consumption of digital media objects.

In his seminal theory, *The Language of New Media* (2001), Lev Manovich describes convergence as the collision between "two separate historical trajectories" (Manovich 2002, p.44). These trajectories were the development of the mass media industry, and the introduction of the computer, which he suggests happened at around the same time. He goes on to explain that the ability to quickly store and share the same information across large groups of people was necessary for modern 'mass societies' (with growing populations in the industrial age) who needed to simultaneously keep track of public records and uphold the same ideological beliefs at a larger scale than ever before (Manovich 2002, p.46). This suggests that the computer and the mass media industry share an intertwined objective, driven by the need to accurately compile, catalogue and communicate massive amounts of information to a growing global population.

In *New Media: A Critical Introduction* (2009), Martin Lister and his colleagues introduce convergence as the belief that all media technologies would at some stage combine into a single, 'black box' (Lister et al. 2009, p.202). Although this reigns true to some extent, as devices like smartphones have combined internet browsing, telecommunications and broadcasting networks into a singular, convenient device, Lister and his colleagues prefer to describe convergence through two, more compelling ideas:

Convergence as corporate merger

First is convergence as the merger of media corporations, which sought to capitalise on the growing media market by adopting a diversified range of distribution platforms (Lister et al. 2009, p.202).

The Walt Disney Company is a contemporary example of this phenomenon - an enterprise which once started as an animation studio quickly grew from Hollywood cinema into the television and radio broadcast industry in the late 80s, before delving into the world of gaming and direct-to-consumer internet streaming services today (Disney Now, Disney+ +). Additionally, Disney's takeover of the media and entertainment industry includes corporate mergers and acquisitions of TV networks such as ESPN, National Geographic and FX (Chen et al. 2021).

Convergence as user behaviour

Second is convergence as a consumer-driven phenomenon, where media consumers are themselves convergent in their continuous exploration and consumption of media content. Lister derives this idea from Henry Jenkins (2006), who defines convergence as the cross-current flow of media objects, media industries and media consumers within the digital environment. (Jenkins 2006, p.2-3).

Jenkins characterises convergence as a cycle of consumption, meaning-making, discussion, and re-circulation of media objects (Jenkins 2006, p.2-5). In other words, consumers derive meaning from the media objects they encounter in the digital environment. They then discuss these media objects on digital platforms like social media and online forums. As a result, even more media objects are created and shared, this time as user-generated content. While many of these objects are critical or discursive, some can be creative - as is popular in 'fandoms', where fanfiction, fanart and fan Wikis are made in response to existing media (Murray 2016, p.43-47). This user-generated content keeps pre-existing media relevant, which in turn fuels the corporate media machine outlined above (Jenkins 2006, p.2-5).

In this sense, convergence is about the intermingling of media objects at the hands of consumers, who in turn produce content that cross-pollinates with media owned by corporations. Through this phenomenon, the passive viewers and readers of 'old media' transform into active *users* of new media objects (Murray 2016, p.43-47), breeding a participatory media culture.

Drawing from these theories, we can identify convergence as a social and cultural phenomenon, driven by the collision between digital technologies and media industries. Through this phenomenon, the lines between producers and consumers have been blurred into a collaborative and co-creative media environment. This is facilitated by the inherent nature of this environment - which is characteristically digital, networked and interactive (Lister et al. 2009).

To better understand how the new media environment operates, let's expand on each of these characteristics:

Digital

For media to be considered 'digital', it must involve some kind of algorithmic processing - the translation of continuous analogous data (such as image, video, sound and text) into discrete numerical data that can be moved, stored and displayed by computers (Lister et al. 2009, p.16-18, Manovich 2002, p.49). This translation changes media objects from something that humans can perceive and understand to have meaning, into binary 'packets' of information that a computer can process through a series of commands. This shifting of information from a physical format to a numerical format is referred to as the process of digitisation (Lister et al. 2009, Manovich 2002).

The dematerialisation of analogous media objects into numerical forms has inevitably made them much easier to manipulate by both producers and consumers (Lister et al. 2009, p.18). This ease of manipulation is a consequence of both the modularity and variability of digitised media objects.

Manovich describes modularity as the ‘interconnectedness’ of the digital environment and its media objects, which are made up of a series of small parts working together to fashion a whole system (Manovich 2002, p.52-53). For instance, a blogger’s website is made up of multiple components such as HTML and CSS scripts, images and text. Although independently created, all of these facets work together to display a navigable website. In this sense, digital media objects can exist in their own right, but can also be combined to create a larger, multimedia experience.

The principle of modularity gives way to the principle of variability, which Manovich describes as digital media’s ‘unfixed’ nature. In this sense, various versions of the same media object can exist simultaneously (Manovich 2002, p.55-56). Lister describes this phenomenon as a perpetual state of ‘flux’ (Lister et al. 2009, p.19). Here, he suggests that new media objects lack the static properties of analogous media and are susceptible to changes across platforms, users, and devices (Lister et al. 2009, p.19). For instance, a user could download an image from a blog, apply a black-and-white filter to it, and then re-upload it to their personal Facebook profile. These characteristics support the configuration and personalisation of digital media objects and environments based on individual user preferences. This is because new media capitalises on the networked and decentralised characteristics of digital technologies.

Networked

Networks involve structures of content, producers and consumers that are interconnected across a web of associated links (Manovich 2002, Lister et al. 2009, Murray 2016). In other words, networks are formed through the ‘connecting’ of different types of media objects, industries and audiences through similar characteristics, such as the genre of content (news), type of producer/distributor (a newsroom or newspaper), and type of consumer (the newsreader).

Communications networks are not necessarily a new concept and have existed in the physical world since the first global trade routes² were established in the second millennium. As our technologies developed over centuries, so did these networks, which grew increasingly complex and sophisticated - and in many instances, oppressive³.

² See the following interactive timeline for a more comprehensive breakdown of these trade routes, and their impact on the world as we know it today: [A timeline of global trade, BBC \(n/d\)](#).

³ In many ways, these oppressions have been digitised, taking shape as state-controlled media, the big data industry, and even the algorithmic filtering of digital media content. To learn more, see platform studies - a critical field concerned with the impact of digital platform affordances on human behaviours (Wilding et al. 2018).

Today, digital communications networks can be globally accessed through the internet, existing within varying scales and specialisations - such as social media platforms like Instagram and X, which are in themselves part of a larger network on the World Wide Web (Lister et al. 2009, p32). This facilitates a media environment that is both dispersed and highly accessible. It is dispersed in that it is not anchored to a specific place of production or distribution (such as a printing press or magazine stand) and is also accessible through multiple points of entry (such as a search engine or website URL).

Manovich characterises this networked structure as the 'computer layer' of cultural transcoding, where operations native to computers bleed into our cultural modes of communication (Manovich 2002, p.63). By this, Manovich explains that the computer's inherent purpose as a storer, collector and displayer of data has had implications for how humans perceive the 'logic' of new media (Manovich 2002, p.63-64). In other words, the interconnected organisation of digital media objects has made an impact on the way that we perceive and share such objects through a technologically mediated lens.

We have seen this take shape in the news media industry, where consumption on digital networks such as social media and content aggregators has surpassed television as the most widely used source of news across the globe (Wilding et al. 2018, p.25). This is thanks to the rise in access to mobile devices and the internet, where approximately 98% of global media consumers own smartphones and use them to spend about three hours and forty-nine minutes online daily (Moran and Hughes 2024). This consumer behaviour has made a significant impact on the way that news content is produced and distributed in the digital environment, where we have seen an increased reliance on digital platforms such as Facebook and Twitter from both a consumer and publisher standpoint (Wilding et al. 2018, p.25-27).

Not only has this changed the way that news is shared and read, but it has also changed the way in which news is perceived by consumers. With an increasingly malleable digital environment comes a lack of control over credible and reliable content, lending to the risks of fake news and misinformation. This is often coupled with aggressive algorithmic filtering on social networks - which can work to perpetuate a homogenous public narrative that is not necessarily accurate or responsible (Wilding et al. 2018, p.31-37. 49-56). In some cases, this filtering can even contribute to selective news avoidance, where users are less likely to engage with news content because of fatigue or overwhelm (Newman 2024, p.26-31).

However, this layer of cultural transcoding has also been overcome, and even exploited by publishers to reach a greater volume of readers faster and more frequently.

For instance, [The New York Times](#) (NYT), once limited by the physicality of its printed format, has digitised its publication for mobile and the web. This adaptation diversified their publication strategy across platforms; and introduced editorial categories beyond hard news (e.g. Games, Cooking and Wirecutter) (New York Times 2024). The benefit of this publication strategy is specialised reporting on specific topics, which can be accessed by readers on an individual basis - based on their interests or search queries on the World Wide Web (thanks to developments in SEO) (Wilding et al. 2018 p.68). This process is referred to as the 'atomisation' of the news, where users can read and engage

with individual articles rather than complete editions, perpetuating a culture of personalisation and individuation that has become native to the digital experience (Wilding et al. 2018, p.51-56).

This convergence has increased the NYT's content library far beyond the capacity of its original, analogous format - impacting both the rate of publication, as well as the volume of published content. This means that different readers of the same publication could have unique reading experiences tailored to their content preferences. In this way, the NYT was able to (1) adapt to the digitisation of the news; (2) cater to the more specific interests of its readers; (3) capitalise on the digital environment as both a source of revenue and a new way of engaging with its audience.

This creates a distribution network fuelled by reader behaviours, suggesting the intention to reach an audience that has been 'configured' to the digital environment (Lister et al 2009, p.21-25). In other words, NYT and its competitors have adapted not only to the affordances of digital formats but to the behaviours and expectations of their readers *within* the digital environment - which have moved away from mass standardisation towards increasingly user-tailored experiences (Manovich 2002, p.49-51).

Beyond the news, 'prosumer technologies' also have a role to play - blurring the lines between the production and consumption of digital media objects (Lister et al. 2009, p.34).

These technologies are aimed at both professional and amateur content creators, empowering them to become producers and distributors of proprietary digital media (Lister et al. 2009, p.34). Encompassing digital content creation platforms (DCCs), social media platforms, and computers themselves, prosumer technologies lessen the institutional barriers of media production and distribution towards a more independent model (Lister et al. 2009, p.34).

This means that prosumer technologies have empowered content creators to independently reach an audience far greater than what was previously possible - thanks to the support of globalised digital networks. However, it does throw a spanner in the works for the stability of the digital media economy and its revenue models (Wilding et al. 2018, p.27).

These decentralised and generative qualities of new media can be attributed to the characteristically interactive nature of digital technologies.

Interactive

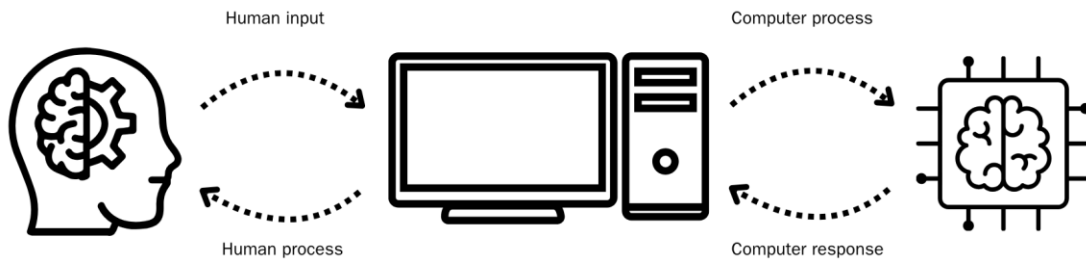
Interactivity is a much-debated concept across fields of study, including game studies, interaction design, computer science and new media studies. Because of this variability, it can be difficult to pinpoint a singular definition that considers all associated variables.

Manovich argues that the term 'interactivity' has lost its meaning because the concept has become 'too broad to be truly useful' (Manovich 2002, p.70). His argument stems from the notion that all computers are inherently interactive because they will always require a user's input to do their work (Manovich 2002, p.70-71). In other words, computers require some level of human intervention to

fulfil their purpose. This is often referred to as human-computer interaction (HCI) driven by a 'feedback loop' - where humans and computers collaborate in the sharing, storing and creating of digital information through a cycle of input and response (Murray 2016, p.87-90):

Interactivity

A feedback loop driven by the input, processing and response of information between two or more parties.



The user interface (UI) mediates communication between human and computer. Here, the human can interpret and respond to interfaced prompts via peripheral device inputs; and the computer can process and deliver an output response via the same interface.

Adapted from Murray (2016) and Manovich (2001)

Figure 1: A visualisation of the human-computer feedback loop.

Interestingly, Manovich still spends some time connecting interactivity to ideas of customisation, where variable digital media objects can be transformed into multiple formats depending on a user's needs or preferences (Manovich 2002, p.57). Specifically, Manovich explores 'branching-type' or 'menu-based' forms of interactivity (Manovich 2002, p.57). This shapes his perspective on user-centred consumption, where users can navigate through, and derive meaning from, a series of interfaced options (Manovich 2002, p.58-60). He explores two different types of branching interactivity:

- 1) **Open Interactivity:** which describes infinitely branching networks or 'nodes' of information stemming from procedural content generation (Manovich 2002, p.59). This type of interactivity is most prevalent on the web (Manovich 2002, p.60) - facilitating extensive, exploratory navigation with no limitations from the network's boundaries (Lister et al. 2009, p.25-30; Murray 2016, p.55-58).
- 2) **Closed Interactivity:** which describes simpler interactive systems. These systems are still an arrangement of nodes, which are 'fixed' or designed to allow for a limited set of branching paths (Manovich 2002, p.59). This type of interactivity is most common in games and hypertext fiction, where the system's structure is carefully designed by the author to facilitate a specific result or experience (Murray 2016).

Two terms here become significant: (1) nodes and (2) system. As discussed above, nodes refer to contained bodies of information that are procedurally displayed to the user. This definition is most clearly exemplified by hypertext systems, where nodes are called *lexia* (Murray 2016, p.58). Lexia are connected to one another via hyperlinks - keywords⁴ that direct one body of information to another via associative linkage (Lister et al. 2009, p.28) or associative indexing (Murray 2016, p.87). The term 'associative' describes the interrelatedness of each node's contents. When drawn in between and across various nodes, these links begin to form an information structure that resembles a network of pathways, creating a 'system' of fragmented units working together to form a whole object (Manovich 2002, p.55-60). These systems can either be very complex (open), or very simple (closed). While most evident in hypertext systems, we can apply this fundamental logic to other forms of interactive systems, such as apps, websites or video games.

Here, we can see how both the digital and networked characteristics of new media combine to inform computer-based interactivity.

Lister and his colleagues highlight the importance of choice in these systems. Here they suggest that instead of the term 'interaction', the term 'configuration' should be used (Lister et al. 2009, p.24). This is closely linked to Manovich's idea of customisation and describes the process where humans can manipulate computer interfaces to fashion a specific outcome - such as choosing to open and read an email, or to simply mark it as read.

In another sense, these technologies also 'configure' humans to adopt behavioural patterns based on their experiences with other systems (Lister et al. 2009, p.24-25). This highlights that technologies do not determine human behaviour but can influence certain behaviours towards specific experiences or outcomes (Wilding et al. 2018, p.47-49).

In this way, interactivity informs the concept of user experience (UX), which can be described as the cumulative process of how a user perceives, cognitively and physically reacts during the use of a particular product or service (Kim 2015, p.10). In this case, the product is the new media object encountered by the user. UX is a context-dependent phenomenon, founded not only on the delivery of content but also on the organisation of that content from a perceived start point through to its end point (Kim 2015, p.10). In short, UX not only relies on the sensory experience of interacting with new media objects but also on the haptic experience of the system's 'flow' from one node to another (Kim 2015, p.10).

Lister and his colleagues also explore interactivity as a 'value-added' characteristic of digital technologies. Here, they suggest that interactivity challenges notions of 'passive old media consumption' by introducing 'active' audience engagement through the feedback loop (Lister et al. 2009, p.21). Here, activity is understood as the user's ability to alter or contribute to media objects in the digital environment, which stands in contrast to more passive forms of media consumption, such as watching a film or reading a newspaper (Crawford 2013, p.29-30). In this sense, activity is

⁴ When hyperlinks appear as words or text, they are referred to as instances of hypertext (Murray 2016, p.55-58). However, hyperlinks can also appear as other media types, such as image or video. Hyperlinks of this nature are referred to as instances of hypermedia (Manovich 2002, p.57).

action beyond reaction - instead, true active reading involves the user's ability to *meaningfully* respond to interface prompts (Crawford 2013, p.29-30). This response can be measured by degrees of interaction, which are quantified through variables of speed, depth and choice (Crawford 2013, p.37-41).

In this way, interactivity plays an important role in the convergent new media environment, by facilitating the 'active audience' (Murray 2016, p.43-47). Due to the pervasiveness of personalised experiences, digital audiences have been configured to anticipate meaningful interaction with new media objects. Murray expands on this in *Hamlet on The Holodeck* (2016), where active audiences are contributors to digital narrative, alongside authors who welcome their participation (Murray 2016, p.43-47).

But, what does this authorship and engagement look like, and how have these technologies actually impacted the contemporary media landscape?

1.2. Impact and Adaptation: The Response to New Media

In 2024, the global media and entertainment industry grew by 4.8% to a value of \$2.96 trillion. By 2028, its aggregated revenue is projected to reach \$3.4 trillion (Ballhaus et al. 2024). Within this context, digital media contributes to about 41% of global sales (Buchholz 2024).

While the new media environment continues to grow and change with digital technologies, our existing media industries have had to adapt to the ebb and flow of this landscape. It is important to note that new media is comprised of a multitude of formats and genres across the cultural economy - including the film, music and gaming industries, to name a few. While its ripples have been felt throughout this economy, digitisation has made waves in the mass-media industry - particularly in that of news and journalism.

The primary impact was felt through networked digital platforms such as social media and content aggregators, which have changed the mediation of news from a centralised publisher to a decentralised intermediary that brings together producers and consumers within a 'democratised' digital environment (Wilding et al. 2018, p.15). In other words, digital platforms have aggravated news media convergence in a way that has fundamentally changed the production, consumption and distribution of news towards an increasingly personalised and user-centred model.

A 2018 report from The Centre for Media Transition in Australia identified the scope of this impact as one which affected the role, reception and economics of the news within the new media environment - with both positive and negative effects. This global inquiry identified the following impacts:

The Role of Journalists and Their Practice

Traditionally, journalists have been regarded as ‘watchdogs of the state’ - born from the need to “facilitate the public sphere” (Wilding et al. 2018, p.19) away from the grips of monarchies and other forms of centralised power in the 19th century (Wilding et al. 2018, p.19). This has positioned journalists and news practitioners as entities separate from the clergy, the aristocracy and the common man. Within this role, they deliver a public service through the objective, autonomous, ethical and timely delivery of information, which aims to advance democracy (Wilding et al. 2018, p.18-21). This is a fundamental underpinning of journalistic practice, and aims to fulfil three core functions of news media:

- 1) To supply information to individuals and groups so that they may monitor, understand and make informed decisions regarding their social, economic and political environment (Wilding et al. 2018, p.20).
- 2) To facilitate the discussion of social and political affairs in the public sphere (Wilding et al. 2018, p.21). In other words, to magnify and represent the voices of those living within their communities.
- 3) To perform cultural and recreational functions relating to the education, enlightenment and entertainment of the public sphere (Wilding et al. 2018, p.21).

The impact of digitisation has not necessarily changed this role, but rather adapted it suit a more collaborative model, where public voices are not only amplified through journalistic discussion, but are also in themselves active contributors to this discussion. In other words, digital platforms have enabled the public to participate in the generation and dissemination of news through means which are not subject to the (controlled and regulated) editorial process - such as sharing across platforms and contributing to comment threads. Further, the prevalence of blogs and social networks have given rise to new types of journalism, such as citizen journalism, representational journalism and networked journalism - all of which benefit from the hypertextuality, interactivity and multimediality of the digital environment (Wilding et al. 2018).

Today’s media climate indicates a consistent reliance on social networks for news. While the flexibility of text-based content preserves its status as the market favourite, video-based platforms such as YouTube and TikTok are growing in popularity - with TikTok being the most popular among younger groups (Newman 2024, p.3, 11-14). On these platforms, journalists compete with social media giants that share hundreds of millions of followers - indicating an expansive and highly influential reach of the public sphere (Newman 2024). Concurrently, consumers are more interested in video content as they associate this format with greater trust and accuracy, convenience, and diverse perspectives (Newman 2024).

While facilitating a dynamic news ecosystem, these platforms have also fuelled concerns relating to the prevalence of 'fake news' and poor (or, unregulated) journalistic outputs - which may perpetuate social biases and risk the integrity of the news industry (Wilding et al. 2018, p.31-33). However, digital technologies and participatory journalism have also shifted the function of news from one focused on providing information to something more active and contested (Wilding et al. 2018, p.30). Here, two new values inform journalistic practice:

- 1) **Adaptability:** traditional publishers have transmediated their offerings into the digital environment, converging across a variety of platforms to reach their audiences and stay relevant within a highly competitive and saturated content sphere. In doing so, publishers are adopting multimedia formats across interactive interfaces to engage their audiences (Wilding et al. 2018, p.35).
- 2) **Engagement:** in this environment, user engagement has become a valuable currency that can be measured alongside economic gain. Here, engagement is measured across five dimensions, including time spent, reach and readership across online formats (Thurman 2018, p.36) that foster a more connected, two-way form of communication (Wilding et al. 2018, p.34-37). High levels of engagement are not only a measure of success for any story but also function as a channel for content distribution and connection with public interest (Wilding et al. 2018, p.35). Consequently, audience interest has become the main driver for what is reported on, posted and published because their interaction is what drives content visibility on algorithm-driven platforms.

Holistically, this convergent media culture has changed the types of content that are created and consumed - where social media rewards news that is shorter, more visual and more emotive (Wilding 2018, p.36). As a result, publishers and editors believe that digital platforms favour softer forms of news (Wilding et al. 2018, p.36). As of 2024, 72% of news content is accessed and consumed on online platforms, rather than directly on news sites (Newman 2024, p.10). However, some evidence suggests that readers across all age groups are starting to favour online search, AI chatbots and content aggregators over social media for accurate and personalised news feeds (Newman 2024, p.21). While digital news is still created through journalistic practice, these behavioural dynamics raise significant implications for news in the contemporary media landscape.

Consumer Interest and Behaviour

Digital platforms do not exist in a vacuum - their purpose is to build, feed and serve their user networks. In this sense, digital platforms do not necessarily determine user behaviour but rather influence certain behaviours by encouraging users to engage with content in specific ways (Wilding et al. 2018, p.46).

Today, digital platforms shape the consumer's experience by using algorithms to determine which content they see, based on their browsing habits (Wilding et al. 2018, p.46). This informs the

personalisation of their digital presence through technological determinism and instrumentalism⁵. Digital platforms exist in-between determinism and instrumentalism, providing enough room for the user to configure their experience, while adhering to the affordances and constraints of the technologies providing that experience (Wilding et al. 2018, p.47).

Because journalism is an audience-driven practice, the relationship between contemporary news production and consumption is determined by the relationship between a platform and its user. This relationship is founded on the affordances and constraints native to the platform, which shape (1) users' experience and (2) the ebb and flow of the new media environment through algorithmic filtering (Wilding et al. 2018, p.47). In this context, an affordance refers to what a technology allows a user to do (Wilding et al. 2018, p.47). In contrast, a constraint refers to what a technology prevents a user from doing.

Because humans and technologies work together to construct the new media environment, this relationship can make a significant real-world impact - evidenced by the 2014 GamerGate harassment campaign (Dowling 2021).

While these algorithms work to deliver more relevant user experiences, providing publishers with a precise overview of their audience's interests and engagement metrics, they also raise concerns about the neutrality of the digital media environment (Wilding et al. 2018, p.48). This is because these algorithms are owned by private companies that control digital platforms, which are subject to change based on their commercial interests rather than journalistic values. We see this with companies like Meta, which is reducing the role of news across its networks, lowering visibility and further disrupting an already fragile digital news economy (Newman 2024, p.11-14, 31).

This highlights major changes in news consumption, which introduce new challenges for digital newsmakers. The *Reuters Institute Digital News Report 2024* summarises them as follows:

- **A major platform reset is underway:** due to the prevalence of generative AI as well as increased regulatory concerns around misinformation, digital platforms such as Google and Meta are changing the way their algorithms work (Newman 2024, p.11, 31). The result is the fragmentation of news on social media, where several networks are now used in combination for news (Newman 2024, p.11). This further disperses news in the digital environment, which simultaneously reaches a wider audience and increases the risks of uncontrolled and misinformed distribution. These risks are attributed to social media influencers and partisan commentators - who are 'filling the gaps' left behind by mainstream news channels (Newman 2024, p.11, 15-16).
- **Consumer trust and interest are waning:** due to the proliferation of partisan commentary and news dispersal, many consumers worry about the reliability of online news (Newman 2024,

⁵ Determinism is a concept that suggests user behaviour is shaped by technology, impacting our lives in such a way that we have no choice but to behave in accordance with its affordances and constraints; while instrumentalism suggests that we are free to choose the ways in which we use and interact with technology (Wilding et al. 2018, p.47).

p.17). Across markets, about 59% of consumers say they are worried about what is real and fake news, with South African consumers showing the highest rates of distrust at an 89% average (Newman 2024, p.17-18). Further, there is growing concern around trust-literacy, where users are finding it increasingly difficult to differentiate between real and fake news online. This is aggravated by 'synthetic', AI generated news and deepfakes, and heated ideological biases pushed by politicians, commentators and influencers (Newman 2024, p.17-20).

User gateways to the news have also changed. About 33% of all markets prefer to use search and aggregators to access specific news sources - contributing to the atomisation of news reading. This contrasts with the 29% who prefer to use social media, and the 22% who prefer to use direct access via apps and news sites. This is a positive turn for publishers, because users are more likely to come across their content based on active interests rather than 'fly-by' social media referrals (Newman 2024, p.21).

However, publishers are currently battling greater unpredictability in traffic from existing social media streams. They anticipate that this unpredictability will only grow, spurring urgent explorations of alternatives (Newman 2024, p.22). These alternatives aim to maintain traffic within existing ecosystems, by publishing in formats that are proven to drive engagement (Newman 2024, p.31).

- **News fatigue and selective news avoidance are on the rise:** news engagement has declined in the post-COVID climate, where about 39% to 50% of consumers say they actively avoid reading the news (Newman 2024, p.27; Moran and Hughes 2024). This ambivalence is a long-term trend, where women and young people make up a significant proportion of the decline (Newman 2024, p.26). Consumers say their reason for this avoidance is the repetitive and even 'boring' cycle of news media, coupled by consistently negative topics that make them feel anxious and powerless in the public sphere (Newman 2024, p.27). Consumers also report that they feel 'worn out' by the amount of news they come across, mentioning that the frequency of coverage on wars, disasters and politics is overshadowing other, less emotionally taxing topics. About 40% of South Africans attest to this, which seems to be fuelled by the frequency of notifications sent to mobile devices from digital platforms (Newman 2024, p.27).

These user attitudes indicate a need to broaden the news agenda across formats which are more accessible and engaging, without risking the accuracy and severity of the content reported on (Newman 2024, p.27). To combat these issues, publishers are adopting the 'user needs' model, developed by Dmitry Shishkin at the BBC (Thulin 2022, p.15-16). This model aims to supplement news that keeps consumers up to date, with content that educates, inspires, provides perspective, and entertains (Newman 2024, p.28).

Further, topical gaps should also be addressed. Currently, local and international news remain the greatest market draw-in. However, this is demographically dependent as younger people are less interested in political topics in favour of those about the environment, climate change, and wellness (Newman 2024, p.29). This is in direct contrast to the interests

of older groups - indicating a need to tailor content strategies towards more specific market segments.

The Economics of News and Journalism

Historically, the news has been subsidised by governments to quell concerns that private entities might reshape its rhetoric to suit their commercial interests (Wilding et al. 2018, p.29). However, we now see that today's algorithms negate these efforts.

Due to a decrease in user interest and increase in active avoidance, it has become difficult for publishers to convince consumers that their news is worth reading, let alone paying for (Newman 2024). Since the rise of free, online news, users have grown accustomed to an 'open access' distribution model. This echoes the sentiment that news is a 'public good', which all consumers should have equal access to, because they all benefit from its contribution to public transparency and accountability (Wilding et al. 2018, p.29).

This puts financial strain on publishers, who incur significant labour and resource-related costs that must be leveraged to maintain the quality and regularity of reporting and distribution (Wilding et al. 2018, p.28). Today's convergent landscape also indicates that increased news access and engagement metrics exponentially increase the value of news content - referred to as "the network effect" (Wilding et al. 2018, p.28). For good journalism to exist, it must be sustained by a viable revenue model.

Publishers traditionally relied on two sources of revenue: advertising revenue, and client revenue (one-time purchases and subscriptions) (Wilding et al. 2018, p.27-30). However, digital news cannot solely rely on these models due to the built-in nature of the digital environment:

- **Variability and modularity:** digital content can be easily shared and reproduced often without credit, payment or compensation (Wilding et al. 2018, p.29). Further, the atomisation of news brings into question the relevance of a single-issue purchase model.
- **Decentralisation:** with the disappearance of paid advertising such as the classifieds, there is limited access to advertising revenue. Instead, online publishers rely on digital advertising spaces directly on their websites, which are often mediated by third-party advertising services (Wilding et al. 2018, p.29). Due to the networked nature of social media, publishers may even find themselves in direct competition with advertisers.

To combat these problems, digital publishers such as the New York Times (NYT) have explored alternatives that provide more services than just the news - such as features and proprietary platforms. This diversification introduced new revenue streams, where consumers can pay a monthly subscription to access exclusive content. However, the uptake of these subscriptions has been low, with only about 17% of consumers saying that they pay for online news. Further, a considerable

proportion of these digital subscriptions go to larger enterprises such as the NYT, leaving smaller entities at a disadvantage (Newman 2024, p.3).

New prospects also remain limited, where low interest and an abundance of free news encourages 55% of consumers to say that they will pay nothing for the news (Newman et al. 2024, p.31). To combat this, publishers are exploring new, more competitive formats that can address these challenges of engagement from both a user needs and economic perspective, shifting away from platforms that are reliant on private algorithms and towards proprietary formats that can offer value-added services (Newman et al. 2024, p.31).

However, digitisation has also made a positive economic impact on the news, where the material costs of production and distribution have lowered due to the capacious and modular nature of the digital environment (Wilding et al. 2018, p.29).

To summarise, digitisation has made a permanent impact on the news industry. At its core is the question of value. While journalistic values have shifted to better suit audience interests, the perceived economic value of journalism has dropped significantly. This is further aggravated by negative shifts in consumer behaviour, driven by fatigue, mistrust, and changes in platform stability. However, journalists and publishers are exercising their adaptability and exploring solutions to these problems, such as proprietary formats that are proven to drive meaningful user engagement by guaranteeing exclusive user experiences. While somewhat ambiguous, these solutions seem to favour the dynamic and interactive nature of the digital environment - indicating a growing interest in exploring these formats in ways that are innovative, impactful, and which uphold the virtues of good journalism.

1.3. New-Age Nonfiction: User Engagement is Digital Currency

Many of the challenges faced by the digital news industry are long-term problems that have been compounded by digitisation - in both the technological and cultural spheres. So far, we have identified three major problems faced by the news media industry:

1. Platform instability.
2. Selective avoidance and news fatigue.
3. Atomisation of reading and decreased brand loyalty.

While platform instability is currently out of the control of publishers and journalists, selective news avoidance and user engagement are areas they can address. In addressing these problems, there may also be a potential opening for increased brand loyalty and revenue by providing users with more appealing content that meets their needs. In other words, by providing users with an in-demand *product*.

This increase in revenue could then incentivise publishers to fund their independent, proprietary platforms that can meet user needs with increased effectiveness, by taking advantage of the affordances and constraints presented by both the digital environment, and the computer as a storytelling medium. In this way, the news media industry can attempt to regain control over their publication and distribution strategy towards a more economically stable model.

Some publishers, theorists and practitioners have already started to explore this frontier, with the most significant event occurring in December of 2012. During this period, the New York Times (NYT) published [Snow Fall: Avalanche at Tunnel Creek](#) - a multimedia feature and an icy retelling of the avalanche that swept 16 skiers across the Washington Cascade mountains (Branch 2012).

Over six web pages, the feature unfolds a dramatic beat-by-beat narrative that strikes readers with heavy feelings of danger, loss, and a willingness to survive. This was achieved through the deeply immersive quality of the article, brought about by the combination of text and multimedia, which pulled readers through the snowy highs and lows of the story's events. Fully accounting for its digital format, the article incorporates interactive images and visual simulations that trace the journeys of trapped skiers, creating a sense of immediacy that draws readers further into the struggle for survival. Image slideshows not only capture scenes before, during and after the avalanche but also give insight into the lives of those involved in the incident - heightening the emotional appeal that arguably won the piece a Pulitzer Prize in Feature Writing, and a Peabody Award (Bahr 2022).

The feature was produced over six months by a team of eleven reporters and graphics editors; and is said to have marked a pivotal moment in digital journalism - forging an interactive and graphically driven path for long-form nonfiction across the globe (Bahr 2022). Since then, professional and scholarly discussions have focused on three major areas:

- 1) The convergence of interactive and multimedia technologies with the written word (Jacobson et al. 2015, p.528).
- 2) The ethical dilemmas of maintaining objectivity through such a highly emotional and user-driven form of narration (Jacobson et al. 2015, p.528).
- 3) The involvement of sources, characters and the public in works of this nature (Jacobson et al. 2015, p.528).

Over the last twelve years, numerous publications and production houses have experimented with interactive long-form, birthing new genres of nonfictional storytelling, including newsgames (Bogost 2010, Dowling 2021), interactive documentaries (i-docs) (Gaudenzi 2019; Dowling 2021), and long-form multimedia journalism (Jacobson et al. 2015).

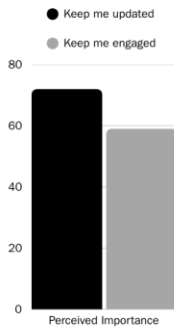
These genres exemplify the strategic adaptations made to journalistic practice in the face of digitisation - fully accounting for the affordances, constraints, and characteristics of digital media in both form and content. Each genre tackles these elements differently, providing diverse storytelling approaches that address several aspects of Shishkin's user needs model:

User Needs Model (2.0)*

A way for journalists to better understand and engage with their audiences, measured by the market's perception of importance.

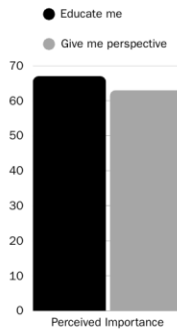
Knowledge: 65%

The need to stay up-to-date on current affairs, and to remain engaged with societal issues.



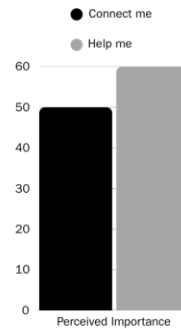
Understanding: 65%

The need to be educated on topics and current affairs, and given different perspectives on societal issues.



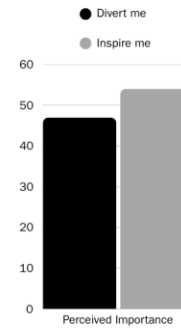
Doing: 55%

The need to feel connected to others in society, and to have practical information and advice for daily life.



Feeling: 50%

The need to be entertained and inspired by the good in the world.



Adapted from Newman et al. (2024)

Figure 2: Bar graphs measuring the market's perceived importance of user needs (Newman et al. 2024, p.47-48).

While users prioritise knowledge and understanding, a large portion of the market also seeks news that satisfies their need to interact with the world around them and feel a positive impact in some way (Newman et al. 2024, p.48). Although news avoiders might take more easily to inspiring and 'entertaining' content, this preference remains demographically segmented (Newman et al. 2024, p.48). As such, we need to strike a balance between news that entertains, and that which informs - and potentially find ways to meet these needs at the same time.

This is also important from an economic perspective. While only 17% of the market currently pays for digital news, many subscribers are paying heavily discounted rates for their subscriptions, as publishers have found these discounts useful in attracting new subscribers. However, this does not guarantee long-term loyalty. Publishers are currently exploring alternative forms of content, such as games, which can help to secure long-term engagement (Newman et al. 2024, p.52). Again, we see the publisher's need to create a desirable, 'value-added' product for their consumer market.

So, what if we gamify the news in such a way that prolongs engagement, and secures continuous customer loyalty? Newer, interactive genres of nonfiction might be the solution. But, if this is the case, why aren't we seeing as many newsgames or interactive documentaries circulating the internet? Has the buzz died down since 2014? What are the challenges associated with this format, and how can we overcome them?

Digital Nonfiction: A Case for Interactivity

Gaming is one of the fastest growing media and entertainment sectors, which will account for about 9.8% of the entire media and entertainment industry by 2028 (Ballhaus et al. 2024). This indicates a growing market interest in interactive media consumption - which has been echoed by key stakeholders within the global media industry.

Since 2014, various organisations that are not necessarily news publishers have experimented with interactive storytelling formats - including the Getty Research Institute's *Persepolis Reimagined* (2022); SBS Online's *The Boat* (2015), *After 6/4* (2014) and *K'gari* (2017); and even *Google Arts and Culture's Online Exhibits* and virtual tours (n/d). None of these artefacts are 'the news', but are instances of interactive nonfiction - offering immersive and participatory narratives that, like journalism, aim to inform, represent and entertain the public to varying degrees.

This growing interest in interactive and immersive media indicates a desire to adopt these formats further - especially within a media environment that is increasingly user-driven and accessible to both producers and consumers. Further, the rise of hackathon culture has forged the path for budding storytellers to independently participate in this practice - urging academics and practitioners to develop their own training initiatives. This includes Sandra Gaudenzi's *!F Lab*, aimed at "factual storytellers" (Gaudenzi 2019, p.111) and *Hackastory* workshop aimed at journalists (Gaudenzi 2019, p.111). Both initiatives were designed to expose storytellers to the affordances and constraints of the computer as a storytelling medium (Gaudenzi 2019, p.111).

In *I-Docs: The Evolving Practices of Interactive Documentary* (2017), Gaudenzi discusses her findings from quantitative surveys and observations in her *!F Lab* workshops. Here, she identifies that while factual storytellers were interested and cognizant of interaction design principles, they struggled to adopt them in their own practice (Gaudenzi 2017, p.115). She goes on to suggest that these design methods go beyond individual storytellers, and require more collaborative workflows (Gaudenzi 2017, p.115). In other words, storytellers need to adapt their practice to not only accommodate the digital environment, but also to a team-oriented approach with other artists and designers.

Gaudenzi's findings suggest that a more formalised design approach could help authors to collaborate in this way (Gaudenzi 2017) - especially because this workflow can be particularly expensive in an already struggling media economy. Dowling's findings echo this sentiment, where, in an article tracking the American development of i-docs, he suggests that "highly produced" works of nonfiction have been costly due to large production teams and extended output times (Dowling 2021). Thulin corroborates this, stating that newsgames can take anywhere from a few days to several months to produce - putting even more strain on the timeliness of news content (Thulin 2022, p.6-9). However, the softer, long-form nature of this type of production might be able to offset the issue of timing. This could also provide some relief for news avoiders who are overwhelmed by the pace and severity of hard news.

While independent projects have made use of lower-cost technologies, the barrier to entry remains high - where creators with different methodological perspectives must converge to deliver a successful interactive output (Dowling 2021, p.6,13).

On the flip side, Dowling also identifies positive outcomes, where both long-form journalism and documentary filmmaking have used digital technologies to “deliver richer understandings of the experiences of others” (Dowling 2021, p.17). Immersion has a role to play here, affording user experiences that are less like escapist realms and more like parallel realities - where interactivity and gamification can facilitate the communication of highly personal narratives (Dowling 2021, p.11,15).

Thulin reinforces this outcome in her 2022 report, *Newsgames: Journalism at Play*. Here, she emphasises the appeal and benefits of gamifying the news from the lens of both production and consumption. Throughout her interviews and case study analyses, her consensus is that gamification can increase loyalty, build social capital and cultural identity, and improve learning and productivity by incorporating elements of play into the digital experience (Thulin 2022, p.13-14). Moreover, her interviews reveal that newsgames have the potential to convey multifaceted societal phenomena in ways that strengthen user engagement and empathy through choice (Thulin 2022, p.13-14). In this sense, she suggests that the gameplay experience is “sticky”, maintaining the attention of players for extended periods - a valuable metric for user engagement (Thulin 2024, p.11).

Finally, her findings indicate that the news media’s problem is not necessarily content-related, but rather interest-related. In this sense, the challenge is to connect readers with the right kind of content, to make the news feel ‘stickier’ (Thulin 2022, p.12). As her interviewee, Christopher Pleitgen, states:

“Gamification could help create that better and more fun experience, and one that will hopefully help to create more long-term loyalty and commitment towards a news brand.”
(Thulin 2022, p.12)

Evidently, gamification can potentially cater to the ongoing problems of loyalty and engagement. With access to such a dynamic and flexible media environment, storytellers, designers and programmers must form a collective and streamline their workflow towards a practice that is more linear and efficient, while meeting user needs. To do so, research suggests that a more formalised design approach is necessary.

Experience and engagement have been ongoing trends throughout this review; however the notion of play seems to throw yet another spanner in the works. Our investigation only seems to grow in complexity! Fortunately, it also opens doors towards a creative landscape that combines aspects of interactivity, user experience and storytelling: ludic and playful media.

1.4. Storytelling in the Ludic Century: Affordances, Constraints and Play

In *Inventing The Medium* (2012), Murray identifies that an effective design process is guided by a clear and specific use of design language (Murray 2012, p.20-21). As such, our investigation into gamification, ludic and playful media requires both a robust understanding of each concept, as well as their manifestation within the digital environment.

Gamification: Ludus, Paidia and Design

Gamification is a term that has grown in popularity since the mass-digitisation of our information and communication networks (Zimmerman 2014). *The Gameful World* (2014) opens by contextualising gamification and its significance to contemporary culture, not by providing existing definitions but rather by addressing its oversimplification of ludology and play within our daily lives (Walz and Deterding 2014, p.6).

Some perceptions assume the term is used to describe anything 'game-related', causing a schism among scholars and practitioners who distinguish between serious or 'good' game design and exploitative or 'bad' game design - with gamification situated on the latter half of the spectrum (Walz and Deterding 2014, p.6). In other words, gamification is considered by some as the surface-level application of ludic elements, such as goals, challenges and score keeping to otherwise non-ludic media. The goal of this practice is to brand content as more engaging, with 'value-added' elements that could potentially be economically or psychologically exploitative in nature (Walz and Deterding 2014).

However, this is an ethical and ideological issue that ignores the significant contributions that games and play have made to our culture and daily life. Instead, Walz and Deterding understand gamification as a larger consequence of the "ludification of culture", driven by an increasingly information-driven society that, by its very nature, facilitates playful day-to-day interactions (Walz and Deterding 2014, Zimmerman 2014). These interactions are driven by cultural convergence, where digital users are simultaneously producers and consumers of content - much like players are both participants and spectators within a ludic experience. In this sense, they define gamification as "the interpretation of games within daily life" (Walz and Deterding 2014, p.6-7), where social and cultural practices, tools, materials, languages and concepts from games and play grow increasingly prevalent in our day-to-day interactions (Walz and Deterding 2014, p.6-7).

In this context, we live in a world run by complex, intertwined systems of information (Zimmerman 2014, p.20). This applies not only in the digital sense, where indexed networks store and retrieve information, but also through our systems of language, social norms, and culture. Digital systems facilitate play through convergence - not because they are inherently playful, but because human interaction necessitates this element of play. In other words, humans foster innovation and creativity within these rigid systems, by simultaneously participating in and experiencing through them (Zimmerman 2014, p.20-21). This interplay between the rigid system, and playful human draws a direct connection to games. Like storytelling, games are one of our most ancient forms of creativity, resulting in the natural progression to the "ludification of culture" and the turn of the "Ludic Century" in the digital age (Zimmerman 2014, p.19, Walz and Deterding 2014, p.6-7).

In other words, while games and play have always been a part of the human experience, the digitisation of culture and communication has spread gamification into many more aspects of our lives. When convergence puts information into play, game-like experiences replace more linear forms of media through increasingly participatory and customisable systems (Zimmerman 2014, p.20). Here, audiences are users who can manipulate the digital environment as a *system* - where they can

interact with, share and even generate digital content. This mirrors the role of a player in a game, who also manipulates the ludic system to generate a unique game state, gameplay dynamics, or gameplay experience.

From Walz, Deterding and Zimmerman (2014), we can identify three ways in which games contribute to daily life:

- 1) Games and play are natural human behaviours driven by creativity and imagination.
- 2) Our world is comprised of information systems that circumscribe this creativity and imagination.
- 3) We as humans learn how to navigate and derive meaning from these systems through play. In other words, we interact with these systems, each other and the world around us in creative and imaginative ways.

Through this, we understand why gamification drives communication in a way that is more naturally suited to the digital environment. In this sense, gamification can be used to tell stories in ways that are participatory and convergent - key characteristics of new media. This is how gamification works to drive user engagement (a necessity for of digital newsreaders and publishers) - but how does this unfold, and how can we harness it?

Gamification is the cultivation of ludus (Walz and Deterding 2014, p.6-7):

This is seeded by two theoretical concepts: paidia, which refers to open, exploratory forms of play (often likened to the experience of playing pretend during childhood); and ludus, which is a more formalised instance of play bound by a system of rules or constraints (likened to what we call 'games' today) (Walz and Deterding 2014, p.6-7). While distinct, both are intertwined concepts used to explain how meaning can be derived from participatory experiences.

Game design is the practice of creating ludic systems (Walz and Deterding 2014, p.9):

Design is a discipline that combines people and practice (Salen and Zimmerman 2004, p.40). Because ludic systems are governed by rules and driven through play, they must be designed to afford meaningful, *human* experiences.

In this context, game design is the process of creating the rules and content of a game (Brathwaite and Schreiber 2009, p.2). In other words, it is the creation of an interactive system and the message which it relays.

But, what even is a game? *Challenges for Game Designers* (2009) provides the following definition:

An activity with rules - which facilitates a form of play. This activity often but not always involves conflict (with the system, players or chance). Most games also have (1) goals; (2) defined start and end points; and (3) decision-making on the part of the player. But many games do not have one or more of these elements.

(Brathwaite and Schreiber 2004, p.5)

The partial ambiguity of this definition is intentional, as the term 'game' is used to describe different types of ludic systems. This means that there is no universally accepted definition for games, because different game designers approach their practice, and their understanding of this concept, from different perspectives (Brathwaite and Schreiber 2004, p.5). Instead of focusing on the semantics of games as they can be defined, a better approach is to understand how they can be designed.

Brathwaite and Schrieber outline 'good' game design as that which introduces goals that a player should feel motivated to reach. Concurrently, the game's rules should work to encourage the player's meaningful decision-making in pursuit of those goals (Brathwaite and Schreiber 2009, p.2). In this way, game design is a player-centric practice where the focus of the system's design is on the player and their desires (Brathwaite and Schreiber 2009, p.2). These desires are contextualised by gameplay mechanics (systemic components or affordances); which give rise to gameplay dynamics (player interaction); and which ultimately generate gameplay aesthetics (emotions, experiences and meaning derived by the player) (Hunicke et al. 2004). This forms the basis of the MDA framework, which outlines a formal approach to understanding games (Hunicke et al. 2004).

The role of the game designer is to allow enough flexibility to afford goal-centred decision making, while also nudging the player in the direction that the designer wants her to go (Brathwaite and Schreiber 2004, p.2). This means that the designer is responsible for creating:

- 1) The context within which the player makes decisions (which can include spaces, objects, narratives and behaviours) (Salen and Zimmerman 2004, p.44-46).
- 2) The meaning or message derived by the player, because of their active participation within the game's context, through the course of play (Salen and Zimmerman 2004, p.44-46).

In *Rules of Play* (2004), Salen and Zimmerman suggest a schematic approach to analysing and designing games. While distinct from the MDA framework, it provides a three-tiered, conceptual lens:

- **Rules:** the 'formal' game design schemas - in other words, those which define and uphold the system's structure. From a design standpoint, this refers to the essential logic and mathematical function of a game. In other words, this is the mechanical organisation of the ludic system, which the player perceives as its affordances and constraints (how they can and cannot interact) (Salen and Zimmerman 2004). In this sense, rules serve two functions: they define the system and set up the player's means of interaction with it.

- **Play:** the experiential, social and representational schemas that drive the player's participation with the game's system, and with other players (Salen and Zimmerman 2004). In other words, play stems from the player's understanding of the game's rules, and their application of these rules within the game's context. In this way, play represents the human experience of the ludic system through their participation (Salen and Zimmerman 2004).
- **Culture:** the larger, cultural contexts within which games are designed and played. In other words, this schema investigates how different social and cultural values, perceptions and attitudes affect the ways in which games are played and experienced (Salen and Zimmerman 2004).

At the centre of these schemas is play - which reemphasises the designer's goal to centre her system around the player.

Play is the human experience of, within, and through ludic systems (Salen and Zimmerman 2004, p.14-15):

Games are designed to produce meaning through player interaction. This meaning can either be embedded or emergent and is usually the outcome of the player's engagement with the system (Braithwaite and Scribeb 2009, p.171). In this sense, game design is about giving the player opportunities to make meaningful decisions that affect the outcome of the game (Brathwaite and Schreiber 2009, p.2).

Play is what occurs when these systems are set into motion (Salen and Zimmerman 2004, p.60-62).

In other words, play is the result of interactivity - a feedback loop between the player and the ludic system at hand. Here, the player makes informed choices within the game, which is designed to support those choices and their outcomes (Salen and Zimmerman 2004, p.60-62). For these choices to be meaningful, they must be coherent within the game's context and the player's understanding of that context. For example, in a game of chess, players can only compete meaningfully once they understand the rules associated with each chess piece, and how these pieces interact with each other and their opposition. Based on this knowledge, players can make informed, strategic decisions that facilitate a competitive (and arguably enjoyable) gameplay experience.

In other words, meaning is derived from 'what happens' as a result of the player's responses to the system's affordances and constraints, which can change over time with the game state⁶ (Salen and Zimmerman 2004, p.44-45, 60-62).

⁶ The 'game state' describes all of the "relevant virtual information that may change during play" (Brathwaite and Schrieber 2009, p.25). This concept represents a specific moment in time where a game, its mechanics and dynamics are positioned as a result of player intervention. In digital games, this state is often captured during the 'pause' menu. In analog games, this state is represented by the position of pieces, tokens or cards at any given moment. In this sense, the 'game state' is an ongoing phenomenon, where the player's

In this sense, interactivity promotes a relationship between the player and the system, where both entities 'communicate' with each other to manifest meaning through an active and collaborative experience (Salen and Zimmerman 2004, p.60-62).

With this in mind, play can be defined as free movement within a more rigid structure (Salen and Zimmerman 2004, p.113-115). In other words, play emerges when action can be taken within the system's rules (Salen and Zimmerman 2004, p.113-115). For instance, a deck of cards can only be put into play once the rules of poker or rummy are imposed onto it. These rules create a "space of possibility" - which encompasses all the interactions that the system affords, and all of the meanings that can be derived from them (Salen and Zimmerman 2004, p.73-75). As such, play occurs when we take advantage of this space of possibility, navigating within the system's affordances and constraints (Salen and Zimmerman 2004, p.113-115).

Play drives human engagement with ludic systems - which extends beyond games into our 'ludified' digital culture. As Walz and Deterding suggest, our digital communication networks are inherently playful because they serve a human purpose - where we can freely navigate within and converge throughout their systematic boundaries to create, share and derive meaning. Evidently, principles of game design can inform an approach for participatory storytelling in the digital environment, which aims to address the problems of engagement outlined in section 1.2.

While these principles give us some direction, not all instances of participatory storytelling can be defined as games - even when using an ambiguous definition. For instance, hypertext fiction, visual novels and interactive cinema are all forms of participatory storytelling that do not describe themselves as games. However, they can be described as ludic activities - those which relate to or are reminiscent of play, but which do not only include games. In this sense, all games are ludic activities, but not all ludic activities are games (Salen and Zimmerman 2004, p.302-304).

Interactive storytelling is a creative discipline that aligns with these notions, and which presents its own challenges - which are similar to that of games but more concerned with the integration of narrative within playful systems.

Because journalism is the practice of reporting, interactive storytelling could provide a more linear solution that benefits from the user-centred aspects of gamification, while focusing on core, journalistic goals. Further, this study's interest in new media means that its approach should take advantage of the participatory and experiential qualities of the computer as a creative medium - as both an intermediary for consumption and communication, and a tool for media production.

Lessons from The Holodeck: Computers as Intermediaries

interaction with the game's mechanics its change into a different state, and so on.

In *On Interactive Storytelling* (2013), Crawford defines this discipline (also referred to as interactive digital narrative or interactive drama (Montfort 2015, Murray 2016)) as:

The dynamic process of creating an active narrative experience through the combination of story and technology.

(Crawford 2013, p.46)

In other words, 'interactive storytelling' is a verb used to describe a collaborative creative practice undertaken both by a system's author and its intended user. Here, storytelling is considered to be an age-old form of communication (Murray 2016, Glassner 2017), while technology is considered to be the medium through which stories are narrated as participatory and immersive experiences (Murray 2016, Crawford 2013).

While a more novel format, interactive storytelling looks to the successes and techniques of traditional disciplines as intertextual, collaborative and non-linear points of reference. Janet Murray expands on this extensively in *Hamlet on the Holodeck* (2016), where she reviews traditional formats such as those of literature (*The Garden of Forking Paths*, 1941), film (*Groundhog Day*, 1993) and television (*Star Trek*, 1966 - present) to unpack the potential role of the 'active audience' as a participant and co-creator of digital narrative (Murray 2016, p.35-67).

In the book's formative chapters, Murray elaborates on 'active' media consumption as one which existed before digital media, but which only grew in prevalence with the advent of the computer (Murray 2016, p.37-58). More specifically, this is credited to the computer's digital environment - where stories can be constructed, experienced and altered through active user participation.

This review has vaguely referred to the digital environment as a cybernetic realm in which new media objects reside. When Murray describes the digital environment, she likens its spatial and programmable qualities to those of *Star Trek's* Holodeck - a grid-patterned room that can be configured to emulate real-world scenarios (Murray 2016, p.23-31).

While similarities between the Holodeck and Virtual Reality (VR) cannot be ignored, Murray's digital environments encompass:

- 1) immersive, computer-based settings;
- 2) where users can activate meaningful experiences;
- 3) based on their navigation and interaction within digital boundaries (Murray 2016).

The Holodeck is a metaphor for the digital interfaces we encounter every day - such as video games, apps and websites. Although not all-encompassing like the Holodeck, these environments can still be configured to relay immersive bodies of information through their digital and interactive characteristics.

From the voyeurism of scrolling through Facebook to the kinetic manipulation of VR, most important is the *presence* that the digital environment affords - the real-time, 'right here, right now' experience brought about by user interaction (Murray 2016, p.53-55).

This phenomenon is referred to as immediacy (Murray 2016, Laurel 2014), and is as prominent a principle of interactive storytelling as it is of interaction design - a field of study concerned with the ways in which a user derives meaning from digital systems through their engagement with the graphical user interface (UI) (Murray 2016, Tidwell 2020). Because interactive storytelling is the combination of story and technology, and human-computer interaction is mediated through the UI, it is worthwhile to address immediacy from both perspectives.

Immediacy in Interactive Storytelling

Murray's ideas stem from tabletop role-playing games (TTRPGs), where role-players engage with a ludic narrative in real-time, lending to a 'personalised' experience fuelled by the spontaneous unfolding of story (Murray 2016, p.46-47). In this way, TTRPGs encapsulate Murray's definition of active audience engagement - where the game's story can only be told if its players directly build onto the sequence of events portrayed by the story master (Murray 2016, p.46-47).

The story master⁷, is the individual responsible for constructing, maintaining and guiding role-players through the story world (Glassner 2012, p.25). Their duty is to set up the sequence of events, while ensuring that all role-players adhere to both the game and story world's rules. These rules can be perceived within the bounds of a 'magic circle' - a concept originating in Johan Huizinga's classic work, *Homo Ludens: A Study of the Play-Element in Culture* (1949). Here, Huizinga argues that all forms of play exist within a separate 'space' constructed and inhabited by consenting players. Within this circle, the rules of play apply to, and are respected by, all participants involved (Juul 2008, p.56-57).

With these rules set into motion, TTRPGs are a form of guided improvisation where the game's story unfolds procedurally through player engagement. In turn, the game's mechanics determine a player's success rate when performing specific in-world tasks (Glassner 2017, p.24-25). Here, the lines between narrator and audience almost completely blur. This is because the game's role-players, who seek the pleasure of consuming the story, are as significant to narration as the story master, who operates as its guiding hand (Glassner 2017, p 24-25).

Digital environments do not facilitate such a degree of spontaneity. This is because computers must be pre-programmed or pre-configured to deliver a narrative experience (Murray 2016, p.73-74). In this way, computer-mediated stories are heavily authored or designed by their creators (Murray 2016, p.73-74). This authoring mirrors the role of the story master, who must pre-plan their roleplaying adventure, but forfeits flexible, real-time adjustments based on player engagement. However, computers can facilitate a magic circle - which takes shape as the digital system. This system offers the user a procedural experience based on pre-programmed (authored) commands.

⁷ Also referred to as a game master or Dungeon Master (in the Dungeons & Dragons franchise).

Immediacy in Interaction Design

Also referred to as UI or interface design, interaction design concentrates on the semiotic aspects of system design, including:

- Social and cultural elements of communication and meaning. This refers to how users assign contextual meaning to interfaced content - based on factors such as language or target audience (Tidwell 2020).
- The graphical and technical components of a system's overall cohesion and performance (Murray 2012, p.11). These include the visual organisation of the system itself - grounded by principles of interface and experience design - as well as the technical organisation (flow) of the system and its user journey (Tidwell 2020, Cabrera 2017).

Interaction design highlights 'immediate feedback' as a core design principle for effective, computer-mediated communication. This refers to the real-time information perceived by the user based on the system's response to human input (Speirling 2015, Kim 2015, Tidwell 2020). Real-time feedback can include the speed with which a response is received; the sensory delivery of the response (graphics, sound or vibrations); or the physical, emotional and cognitive impact of that response within the user. This feedback is essential, as it indicates to the user that the system is responsive to their interaction - driving engagement by reinforcing the HCI feedback loop.

In *Computers as Theatre* (2014), Brenda Laurel draws parallels between interfaced and theatrical narrative by outlining user/audience participation as an integral part of the storytelling process (Laurel 2014). This draws from the notion of performance: where a cast of actors perform in real-time for their audience, the interface performs in real-time for its user (Laurel 2014, p.24-28). Concurrently, through their active participation, the user becomes a performer in their own right - a story actor who drives the narrative forward (Laurel 2014, p.24-28).

In this sense, the UI should be designed afford this performance - to facilitate some kind of *action*. However, this is meaningless unless its user understands *how* to take action. Much like players need ludic context to make meaningful decisions, users need interfaced context to interact with computers.

Laurel describes interface design as the visual representation of system affordances, highlighting the importance of accessibility for the unfolding of interactive narrative (Laurel 2014, p.6). She outlines the ongoing need for ergonomic design when developing tools for humans to execute complex tasks. Beginning with physical 'knobs and dials', to the digital menu bars and buttons on computer monitors, Laurel suggests that the relationship between humans and computers is grounded by the user-friendliness of the computer as a tool to perform specific actions (Laurel 2014, p.2-16). Most notable are two interdependent principles of ergonomic design:

- 1) The optimisation of human well-being (Karwowski & Zhang, 2021).
- 2) The optimisation of overall system performance (Karwowski & Zhang, 2021).

In highlighting this relationship, Laurel centres interactive storytelling around the user. She describes the interface as a bridge between human perception and the computer's internal systems (Laurel 2014, p.3). Holistically, immediacy helps us to understand how the digital environment works to communicate narrative - through a combination of semiotic, interactive and experiential elements.

With this in mind, we can explore how the digital environment affords the design of these interactive, narrative systems. In other words, what can we as designers do with the digital environment, and how can this inform an approach for participatory, digital storytelling?

The Four Affordances: Computers as Vehicles of Expression

In order to use the computer as a creative medium, we should first understand its composition. Murray identifies four fundamental properties of the digital environment, which stem from the fundamental nature of the computer as a capacious harbour of information. In short, the digital environment is: (1) procedural; (2) participatory; (3) spatial; and (4) encyclopaedic (Murray 2016, p.72-96). From these four properties Murray derives two categories:

- 1) Properties which make digital environments interactive (procedural and participatory).
- 2) Properties which make digital environments immersive (spatial and encyclopaedic).

In *Inventing The Medium* (2012), Murray classifies these properties as affordances. Here, she provides a framework for interactive design based on human needs, rather than legacy media conventions (Murray 2012, p.1-8) - echoing Laurel's sentiments on ergonomics. In other words, through a design ethos focused on the affordances and constraints of digital technologies, Murray establishes design methods native to interactive media objects. With this perspective, Murray's affordances form a 'toolbox' for the authoring of interactive digital narrative based on the capacity of the computer as a creative medium.

Procedural

The digital environment is procedural because it can be programmed to independently execute a set of commands (Murray 2016, p.73). These commands are 'rules' which are created by the system's designer, who accounts for the human-computer feedback loop (Murray 2016, p.73-74).

Through its ability to execute commands, the computer delivers context-relevant responses based on the type of input it receives (Murray 2016, p.73-74). In our case, this pattern of input and response allows for the incremental unfolding of narrative. However, Murray notes that these systems do not deliver generative responses, and rely on a pre-registered dataset or information library to execute the feedback loop (Murray 2016, p.72-74).

In this context, the designer determines how the system responds to input through a set of predetermined interaction mechanics - forming the bounds of the system's magic circle. In ludic terms, interaction mechanics provide the user with their own set of affordances with which to engage the digital system (Nicklin 2022). When activated, these mechanics can emulate specific actions or events within the digital environment, enabling user participation.

Procedurality thus governs how user input is received by the system, and information is delivered through the system's interface. We can argue that this affordance gives way to the concept of flow. Well-designed interfaces facilitate UX flow by minimising distractions and bringing the user's focus to the interface's primary task or goal. This goal tends to create an interaction flow state (Tidwell et al. 2020, Crawford 2002) - which we have conceptualised as the magic circle. In this way, we can understand flow as a state of immersion, brought about by procedural, mechanical interactions that feel natural or subconscious to the user. For our purposes, the system's narrative adds another dimension to this concept of flow, where interaction mechanics feel both relevant to its digital environment and are conducive to the unfolding of narrative.

Participatory

Through its procedurality, the digital environment is also participatory. Murray suggests that part of the computer's allure is the human ability to incite rule-generated behaviour (Murray 2016, p.74). Thus, the participatory affordance focuses more on the user's ability to manipulate a system's rules in a way that creates meaning, rather than the system's role as a mediator of meaning-making (Murray 2016, p.74-79). Here, participation forms the basis of play.

Murray suggests that viewers become active participants of a narrative when they are given the 'pleasure' to enter the author's mind - bringing to attention the storytelling process (Murray 2016, p.43-45). This pleasure is also associated with the 'dramatic engagement' (Murray 2016, p.80) of decision making brought about by the system's interaction mechanics, which can offer binary or multiplicitous possibilities for user engagement. In other words, when a user is able to choose how and when to employ specific interaction mechanics, the feedback loop evolves from a simple call-and-response to a meaningful cause-and-effect relationship between human and computer. This meaningful interaction between reader, system and author is what Murray refers to as collaborative storytelling (Murray 2016, p.37-43). In this way, the user transforms from passive viewer to an active narrative agent (Murray 2016, Crawford 2013).

Murray expands on this phenomenon through an analysis of *Zork* (1981), a text-based adventure game where the user must type responses to the game's written prompts. *Zork*'s storyline follows a labyrinthine journey delivered as on-screen text, followed by an open text field designed for user response.

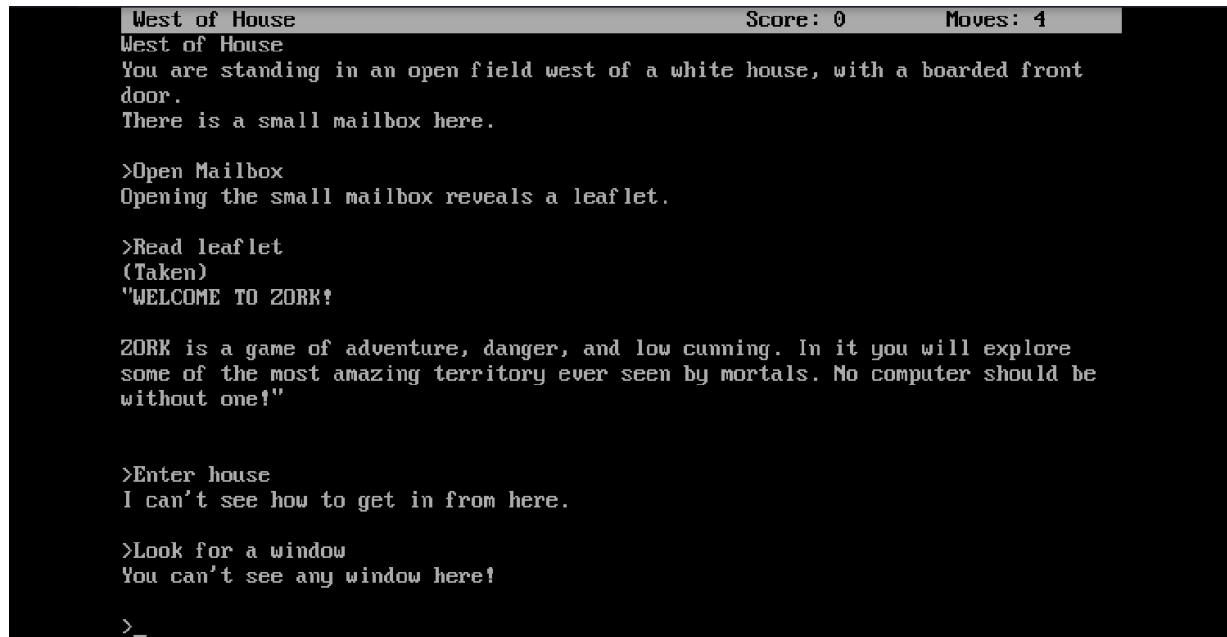


Figure 3: A screenshot of the *Zork* gameplay interface (*Zork* 1981).

In a constrained system like that of *Zork*, Murray suggests that authors must 'script the interactor' by ensuring that the system's user correctly engages with its interface (Murray 2016, p.78). This is an interaction design principle referred to as 'nudging' or habituation, which ensures that the user is able to navigate the digital environment with no external guidance.

Tidwell suggests that consistency informs habituation - highlighting cohesion across a system's UI and interaction mechanics (Tidwell et al. 2020, p.18-19). Some instances of habitual behaviours are universal, such as understanding that Ctrl+S saves progress on a document (Tidwell 2020, p.18-19). Other forms of habituation may require authors to adopt different approaches based on second-person insight - a design method that predicts as many user-centred outcomes based on the system's space of possibility (Crawford 2013, p.30-32).

Through habitual inferences, digital technologies can shape the behaviours and experiences of their users - as we discussed in section 1.1.

Spatial

Digital environments are spatial in that they use navigation metaphors to suggest movement across venues, entities or bodies of content (Murray 2016, p.79). This movement is implied through representational, semiotic or written cues that indicate locations or 'avenues' across the system's nodes. The spatial affordance thus focuses on how users navigate the digital environment.

Navigation occurs through the representation of location - which can be understood in literal terms, such as *Stardew Valley's* (2016) map, or in more abstract terms, such as *Zork's* text-based corridors (Murray 2016, p.79). Echoing Murray's sentiments on the active audience, this navigational quality shifts the user experience from one which is voyeuristic in analogous media to one which is active and involved in interactive media. For instance, a novel may describe a character's movement from place to place in either the first or third-person focalisation. However, *Zork* is input-dependent - to fully explore its environment (and its narrative), the user must engage with the system that constructs its space. In this way, the user's point of view becomes the primary means through which the digital environment is understood, irrespective of whether its narrative is delivered in the first, second or third-person focalisation.

When a user navigates across a branching interactive system, they are actually travelling from node to node. Navigational metaphors help users how users grasp where they are, where they have been and where they have yet to explore (Tidwell 2020, p.129). In game and interaction design, navigational strategies include signposting, wayfinding, 'fated' narration, and local and global navigation (Nicklin 2022, Crawford 2013, Tidwell 2020).

Encyclopaedic

This property refers to the computer as a capacious medium with the ability to store and regurgitate vast amounts of information (Murray 2016, p.83). Murray suggests that this affordance allows designers to include almost limitless levels of detail in their work - further strengthening the immersive potential of the digital environment in terms of both scope and particularity (Murray 2016, p.83).

This review has discussed this affordance at length - starting with the hypothetical Memex, which has both inspired and enabled our contemporary, networked media culture. Further, the encyclopaedic affordance of the digital environment is also conducive to the ease and speed with which we can use computers as digital communications media.

However, Murray also argues that the almost infinite-open-endedness of the digital environment can lend to 'formlessness' or 'long-windedness' within narrative projects (Murray 2016, p.85). This is especially true for open interactive systems on the internet, which are at risk of losing focus and direction due to the segmentation and dispersal of lexia, leading to a superfluous user experience (Murray 2016, p.84-86).

This point of contention has been thoroughly critiqued in the realms of hypertext fiction - where the greater a text's library of lexia, the more navigational and immersive its narrative experience can be. However, such a large library is also an unmanageable task for authors, who must also consider other digital affordances and constraints, as well as the scope and feasibility of such a large project (Murray 2016, p.84-86).

Overall, notions of immediacy and Murray's four affordances of the digital environment bring to light the creative potential of the computer as a storytelling medium, which is simultaneously interactive, immersive and exploratory in nature. Through these concepts, we can identify how elements of play and principles of gamification - particularly those which revolve around experiential communication within rule-bound systems - manifest within the digital environment. In doing so, we have identified interaction design as a significant sub-discipline focused on effective, interfaced communication.

However, we have also encountered additional challenges or considerations relating to participatory storytelling within the digital environment, including notions of navigation, accessibility, and choice architecture within interactive systems.

1.5. Summary

Throughout this review, we have established the scope of this study and the problems of practice and consumption that it aims to address. In doing so, this review poses questions of how, what and why:

How have digital technologies changed the ways we produce, consume and distribute media objects?

- Digitisation has fostered global communication networks that are simultaneously convergent, decentralised and individuated.
- The interactive characteristics of digital media have shifted the passive role of the audience into that of an active user. This facilitates a form of communication that is generative, configurable and experiential.

How has the media industry adjusted to these changes, and what are the associated challenges currently faced by newsmakers?

- While true to its tradition of education, representation and recreation, the role of journalism has shifted to also fulfil notions of adaptability and user engagement within a highly competitive digital environment.
- Third-party, algorithmically-driven platforms have upheld a dynamic yet precarious news economy that is largely controlled by the moods of private, profit-driven conglomerates.

- Consumer interests and behaviours have also changed due to an influx in fake news and ‘influencer journalism’, a decrease in trust-literacy and an increase in selective news avoidance and news fatigue.
- Trust issues, coupled with a high saturation of free online news, also fuels the atomisation of news reading and decreased brand loyalty, making it difficult for publications to retain consistent readers.
- As a result, the economic viability of the digital news industry has suffered progressively. Decreased opportunities for proprietary advertising revenue and a low uptake of digital subscriptions have raised concerns around the perceived value of digital news media among the consumer market. This, too, is the result of the variable and decentralised nature of the new media environment.

Why might ludic media be a potential solution to these challenges, and what are its implications for digital news?

- The digital media environment is fuelled by a currency of engagement, driving user interest and brand loyalty. Increased metrics of engagement could potentially assign more value to digital products and encourage users to more frequently interact with the news and subscribe to publications for their offerings.
- Users engage with products that meet their needs. In the case of digital news, these needs include knowledge, understanding, doing and feeling. Because the digital environment is configurable and individualised, newsmakers are finding ways to meet these needs through more engaging and interactive publication styles.
- The user-centred and participatory nature of ludic media provides a potential avenue to increase these levels of engagement. Further, ludic principles can inform a structured approach to reporting and publishing that allows users to explore news topics in meaningful ways through play.
- Through practice and investigation, theorists have identified workflow and economic challenges associated with the development of ‘ludified’ projects. It is noted that most of these projects are softer, long-form narratives that can stay ‘relevant’ within a longer project timeline (but not always).

How can we harness the principles of ludic media to address the challenges presented above?

- By understanding gamification as the interpretation of games in our everyday lives, we can draw connections between our networked, digital and interactive media landscape and our human tendency towards play.
- Play informs meaning-making through experience. In this way, ludic or gamified systems can formalise play within a rulebound context.

- Game design frameworks and schemas can serve as a starting point for participatory storytelling within the digital environment. However, other ludic contexts should also be considered - such as interactive storytelling.
- Interactive storytelling is a ludic activity that combines collaborative narration with digital technologies - capitalising on the digital environment as a platform for the creation and consumption of participatory narrative.

Ludic principles can form the basis of interactive storytelling within journalistic practice, fuelling a publication model that prioritises user engagement. This approach informs the design of compelling narrative experiences as products 'worth paying for' - meeting reader/user needs while also maximising the computer's use as a storytelling medium.

Chapter 2: A Theoretical Framework for Ludic Narrative Engagement, Authoring and Design

Equipped with an extensive review of the histories, contexts and affordances of the new media environment, we can revisit this study's research question with a renewed perspective:

How can interactive storytelling principles be applied to digital nonfiction to secure a greater currency of engagement among digital users?

This chapter marks the first part of this study's methodology, which involves a meta-synthesis of existing theories and arguments in the realms of digital journalism, interactive narrative, and game studies. The goal of this chapter is to establish a theoretical framework that can begin to address the challenges faced by digital newsmakers, through the lens of ludic narrative. It does so across three dimensions, which form a conceptual matrix through which we can understand how IDN could operate in a news media context:

User Engagement

While the digital environment is a highly accessible and convergent media landscape, it also poses the dangers of fake news and information overload. The result is decreased trust, and increased news avoidance among digital users (Newman et al. 2024, Wilding et al. 2018). Further aggravated by the volume of free news online, users are less likely to pay for their news, with only 17% of the market contributing to subscriptions (Newman et al. 2024).

This positions user engagement (or the lack thereof) as a major research problem. In doing so, it also highlights the core objective of this study: the stabilisation of the digital news economy through more engaging content that can incentivise user buy-in. A potential way to meet this objective is by creating content that offers a more 'valuable', tangible user experience within the intangible digital economy, thereby increasing reader loyalty through more interactive formats.

Researchers have identified gamification as a potential solution to issues of engagement. This is because gamification can present newsworthy content in a way that is more 'sticky' and memorable - taking advantage of the affordances of the digital environment, while integrating ludic storytelling principles (Thulin 2022). These elements of 'fun' and reader autonomy can possibly work to serve user needs. However, this approach also interrogates the relationship between interactivity and the user experience, uncovering the 'problem of agency' as a major barrier in interactive digital narrative (IDN) (Crawford 2013, Murray 2016), but which is also the key to prolonged user engagement in the digital environment.

Digital Authoring

A greater emphasis on user engagement requires a renewed perspective of the user's involvement throughout the storytelling process. This is because the digital environment is configurable in its interactivity, and digital convergence has habituated greater user participation within the media cycle (Jenkins 2006; Manovich 2002).

In contrast to more 'passive' or traditional formats, interactive storytelling positions the user as a narrative agent (Crawford 2013; Laurel 2012; Murray 2016). In commodifying digital narrative through a 'valuable' or unique user experience, storytellers must shift their practice to an increasingly user-centred model. We can use pre-existing studies to understand how this shift has occurred in the realms of digital and interactive journalism, highlighting obstacles related to the production of interactive nonfiction, and why this format has not been more readily integrated into the digital media landscape (Plewe and Fürsich 2020). These are key considerations for both the analysis of pre-existing works, and pragmatic recommendations for interactive storytelling as a mode of long-form reporting.

Most significantly, this section explores the shift required to embrace interactive formats - moving away from traditional notions of authoring as a linear form of communication to an act of design across disciplinary modalities. In doing so, we can interpret the authoring of interactive narrative as a process of system design, where numerous interdependent parts must work together to manifest a whole experience (Koenitz 2015). For journalists, this suggests a transdisciplinary approach to digital reporting.

System Design

While narrative systems primarily aim to communicate a story, they do so via a build-up of abstraction layers - from computational binaries to interface elements (Murray 2012, p.105). As such, the author's role is to not only structure but represent this story to users in a way that is accessible and sensical. Like many other design disciplines, a successful outcome can be measured by the user's ability to *understand how it works* and *derive meaning from this understanding* (Norman 2013).

Because this study confronts engagement from a ludic perspective, we can use game design principles and schemas as a guidestick for narrative design. This approach positions the role of the author to afford goal-oriented decision making, while simultaneously guiding the user in the direction the narrative should unfold (Brathwaite and Schreiber 2004, p.2). Here, classic narrative elements provide the context in which users make decisions, facilitating emergent meaning from the system's response to decision-making (Salen and Zimmerman 2004, p.44-46).

Koenitz's framework for interactive digital narrative, which combines his SPP Model (Koenitz 2020) with a new vocabulary to describe IDN, serves as the formalisation of narrative design in both theory and practice. Holistically, it provides a method for analysing IDN towards a better understanding of the relationship between plot and agency, embedded and emergent narrative. Not only does this framework help us to unpack and the 'problem of agency' as an avenue for engagement through

experience; but could also help us to potentially reverse-engineer existing works of interactive nonfiction towards a series of recommendations for the design of experiential narrative systems.

2.1. User Engagement

As an ongoing trend in new media and digital news research (Newman et al. 2024; Wilding et al. 2018), this study has labelled user engagement as ‘digital currency’. This is because regular and prolonged engagement is indicative of value - in reference to both journalistic practice and economic gain (Wilding et al. 2015). In this sense, value is centred around the user and their participation within the media cycle. To drive higher levels of engagement, newsmakers keep audience interest at the forefront of their content strategy (Wilding et al. 2018).

In digital reporting, audience participation is seen as a way to scale readership by not only serving user needs, but more deliberately incorporating their ideas and experiences into the reporting process (Perrault and Ferrucci 2020, p.1307). This approach facilitates revenue-based publication models focused on building brand awareness for the purchase of other, related news products, rather than directly through advertising revenue on articles and videos (Perrault and Ferrucci 2020, p.1307). In this sense, user engagement can build brand loyalty.

To combat issues of news avoidance, greater market competition and the decentralisation of advertising revenue, publishers and practitioners have capitalised on “the network effect” by using higher engagement metrics to substantiate increased content value (Wilding et al. 2018). In other words, the more clicks and views an editorial output gains, the greater its market impact and potential to generate revenue.

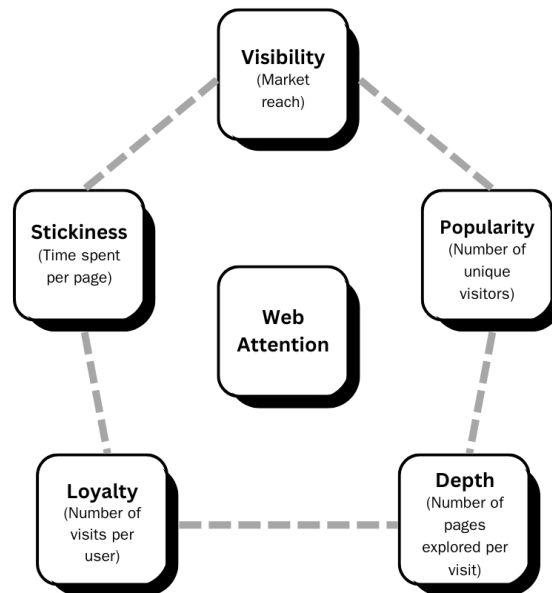
Social media journalism, where readers can interact with likes, shares and comments, is the most prominent area of focus for this strategy, because it reaches a larger, younger audience (Perrault and Ferrucci 2020, p.1307). But, platform instability poses risks for key journalistic values - such as independence, transparency and objectivity - where algorithms can be easily updated to ‘shadow ban’ or filter news that does not align with certain political objectives (Wilding et al. 2018). This is a major point of concern in today’s climate, where tech barons become increasingly influential in global politics - especially that of the United States, home to popular social media platforms like Facebook and Instagram.

In response, and true to the spirit of adaptability, newsmakers have developed proprietary channels that reclaim digital sovereignty and economic independence through subscription plans and value-added services, such as specialised imprints (e.g. *New York Times Games* and *New York Times Cooking*) and increasingly participatory and experiential outputs (e.g. newsgames and interactive documentaries). Their challenge is to maintain consistent engagement on these channels, and measure their success rate - especially when competing with popular social media platforms.

To do so, publishers analyse user data collected from interactions⁸ across their channels. This data can then be categorised into one of five dimensions, offering an empirical assessment of a publication’s digital presence:

Capturing ‘Human Bandwidth’

A five-dimensional model for measuring web attention.



Adapted from Zheng, Chyi, & Kaufhold (2012)

Figure 4: A diagrammatic breakdown of the five dimensions or measures of user engagement (Zheng, Chyi, & Kaufhold 2012).

The above model represents user engagement as a multifaceted concept, where a strong output fulfils each dimension of user attention (Zheng, Chyi, & Kaufhold 2012). In this context, user engagement involves multiple points of entry and exit, driven by a platform’s own means of interaction (comments sections, likes, shares, reposts) (Royal 2023, p.591). In other words, the affordances and constraints posed to the user - which we can interpret as ‘interaction mechanics’ in a ludified sense. As a result, the nature of engagement is closely related to how a platform (and product - an article, interactive documentary, or even a game) is designed, developed and executed (Royal 2023, p.591).

In practice, an engagement-driven strategy capitalises on user preferences by fulfilling a particular need or desire. For instance, publications now place a greater emphasis on short-form video content, which is the preferred format for 66% of digital consumers (Newman et al. 2024, p.10). But, platform instability and the atomisation of news reading have negatively impacted engagement metrics anyway (Newman et al. 2024; Wilding et al. 2018), especially those of depth, loyalty and visibility.

⁸ When using analytics tools, these interactions are categorised as ‘events’ that can be filtered into very specific and accurate representations of a platform’s user insights.

Stickiness (measured by the amount of time a user spends per webpage (Zheng, Chyi, & Kaufhold 2012)) is a point of interest, not only for this study but for researchers and practitioners experimenting with more engaging ways to produce and publish news (Thulin 2022). This is because stickiness is indicative of prolonged, positive engagement - and the longer a user remains on a publication's channel, the greater the potential for advertising revenue, multi-page exploration, and recurring page visits.

This brings us to guaranteeing user engagement: how newsmakers ensure that their outputs meet all dimensions of user attention. In short, readers are more likely to engage with content that meets their needs (Newman et al. 2024). When journalists shift their reporting style and subject matter towards these needs, publications can position their output as viable digital products in the place of a printed issue or edition. In doing so, users can be more easily persuaded to purchase a subscription and access exclusive content that is more personalised, resonant and fulfilling.

Newsmakers use Shishkin's *User Needs Model 2.0* as a framework for understanding how they can better engage with their audiences (Newman et al. 2024). According to this model, newsreader needs are as follows:

- **Knowledge:** the need to stay up-to-date on current affairs, and to remain engaged with societal issues (Newman et al. 2024).
- **Understanding:** the need to be educated on newsworthy topics and current affairs, and be given different perspectives on societal issues (Newman et al. 2024).
- **Doing:** the need to feel connected to others in society, and to have practical information and advice for daily life (Newman et al. 2024).
- **Feeling:** the need to be entertained and inspired by the good in the world (Newman et al. 2024).

In her study, Thulin identifies that gamified formats can serve user needs by creating content that is more entertaining and relatable to readers (Thulin 2022). Through play, gamified content can also make complex or heavy topics more digestible, offering a safe space for readers to engage in public discourse (Thulin 2022). However, Walz and Deterding warn against gamification as the surface-level integration of ludic elements within a non-ludic context (Walz and Deterding 2018). As such, it is important to strike a balance between playfulness and meaningfulness, interactivity and reporting.

So far, we have identified that gamified content is inherently stickier, because the interactive feedback loop is designed to keep players engaged for a longer period (Thulin 2022). A greater inclination towards interactivity creates opportunities for gamified forms of storytelling, where the unfolding of narrative relies on an active and patterned human-computer feedback loop - a value-added feature for story-heavy content such as digital news.

But, how is this stickiness achieved? While newsmakers have already centred the user in relation to their subject matter and distribution channels, IDN centres the user within the storytelling process itself. This signals a fundamental shift in the traditional relationship between author and reader, grounded by agency as a means for *user integration*.

Agency

Agency is a form of decision-making that is contextually meaningful. Murray provides the following definition:

“...the satisfying power to take meaningful action and see the results of our decisions and choices.”

(Murray 2016, p.123)

Here, meaning is derived from the user’s ability to operate within a realm of possibility, which (in the digital environment) is driven by user interaction. To understand agency and how it manifests itself in IDN, it is a good idea to revisit our definition of interactivity beyond that of a systematic exchange. In his definition, Crawford personifies interactivity as a *conversation*:

“A cyclic process between two or more active agents in which each agent alternately listens, thinks, and speaks - a conversation of sorts.”

(Crawford 2013, p.28)

In doing so, he acknowledges interactivity as an act of *communication*, where messages are relayed, understood, and amplified. While his definition considers the user and computer as active parties in this conversation, we must also remember that computers are procedural - they are pre-programmed to respond to user input in specific ways (Murray 2016). In other words, the ‘conversation’ between user and computer is actually pre-scripted by a designer to unfold in a particular direction, and within a space of possibility⁹ (Salen and Zimmerman 2004).

We also know that when users engage with interactive systems, a user experience (UX) emerges (Kim 2015). Here, the user infers meaning from their cognitive and physical perception of the system’s prompts and responses during its ‘use’ (Kim 2015). In this context, the UX embodies the conversation between user, system and designer, echoing contributions from all parties into a singular ‘voice’. This voice represents a collaborative narrative - a story emerging from the user's intervention with a procedural system. To better understand this concept, we can revisit Murray’s affordances of procedurality and participation:

⁹ Here, we must acknowledge the advent of generative artificial intelligence (gen AI). While these systems seem to learn and converse autonomously, this behaviour is also pre-programmed in incredibly sophisticated ways. The potential of gen AI in interactive storytelling is a topic worthy of its own study.

Interactivity is the outcome of a procedural digital system that responds to meaningful user input, lending to a narrative experience that is a collaboration between author, user and the computer.

(Murray 2016, p.74)

In *Inventing the Medium* (2012), Murray explores this further. Like Manovich and Lister, she identifies that the term 'interactivity' has lost its meaning because it has been overused to describe digital systems that comprise varying degrees of interactivity (Murray 2012, p.12-13). For instance, a website like Wikipedia and a videogame like *Stardew Valley* (2016) capitalise on the same procedural and participatory affordances, but are different manifestations of interactive systems. This is because both systems are designed to offer a different UX driven by different design objectives (Murray 2012, p.12-13).

This study is interested in ludic systems - those which are bound by rules, but which also allow enough free movement to facilitate play (Salen and Zimmerman 2004, Walz and Deterding 2014). In turn, play creates meaning through experiential, social and representational schemas (Salen and Zimmerman 2004). Thus, for a user's interactions to be meaningful, they should *feel* contextually relevant within the system's space of possibility.

Based on our working definition of games, we understand that play is fostered by active participation within the ludic system, which is framed by the player's decision-making (Salen and Zimmerman 2004, Brathwaite and Schreiber 2009). Likewise, many definitions of interactivity highlight the significance of choice (Lister et al. 2009, Murray 2016, Crawford 2013). In both cases, choices and decisions are a series of possibilities that define the scope of user interaction - communicating the system's 'rules' or affordances to the user (Crawford 2013, p.41). These choices can exist to varying degrees - such as the dialogue options in *Stardew Valley* or the hyperlinks on a Wikipedia article. Their role is to gatekeep the next point of interaction: another quest from an NPC, or another article on household chemicals.

The user's critical reasoning informs this decision-making, based on contextual cues before, during, and after the choice has been offered. Choice not only highlights the feedback loop native to interactive systems but also frames play within the system's rigid structure.

In this sense, the degree of choice¹⁰ - measured by the impact of a user's decisions on the system's response - correlates to its degree of interactivity and facilitation of play (Crawford 2013, p.37-41). This distinguishes Wikipedia as a digital encyclopaedia and *Stardew Valley* as a farming simulation game¹¹. While Wikipedia's response is to open another, hyperlinked article; *Stardew Valley* responds through perceptible changes within its realm of possibility - such as collecting enough gold to upgrade one's house.

Thus, systems with a higher degree of interactivity empower users to alter the status quo - allowing them to move freely within rigid boundaries. In turn, the degree of movement within these boundaries heightens the user's propensity towards play (Salen and Zimmerman 2004).

If we align this concept with our definition of interactivity as a conversation, we identify that a higher degree of interactivity enables a user to not only *activate* the conversation, but also *contribute* to it in impactful ways. Instead of interactivity, Murray suggests that 'agency' is a better term to describe this phenomenon.

In interactive narrative, agency is the pleasurable outcome when both procedural and participatory affordances combine into a collaborative narrative experience (Murray 2016, p.91). To be meaningful, agency must position user decisions as ones that can make a perceptible impact on the direction, structure or outcome of the system's narrative. Here, the user adopts a certain level of creative control, while the author relinquishes the same level of control (Nicklin 2022).

But, this poses a major clash in form, as integrating user agency within a fixed plot can be challenging (Crawford 2013). This is the 'problem of agency' - rooted in the combination of an authored story with user-driven intervention (Crawford 2013, p.50-54). In other words, how can storytellers ensure that a fixed message comes across correctly, while facilitating this degree of free movement? This notion seems almost paradoxical when compared to traditional, more controlled, notions of storytelling.

Another concern is the weight of user intervention in the news media cycle. While social media likes, shares and comments are arguably the consequence of user agency, IDN suggests that agency should be a built-in feature of the story itself. Because this level of intervention blurs the lines between author and audience (Murray 2016), there are ethical and ideological risks in embedding the user too deeply within the journalistic process. As such, the relationship between user and author should be clearly defined, preserving the values of good journalism while maximising the affordances (and conventions) of the digital environment.

On the other hand, increased agency can foster more involved reading experiences, where users can contribute to journalistic outcomes after they have been published. This provides a 'safe' and

¹⁰ Choice is only one degree of interactivity, which culminates two other degrees: speed and depth (Crawford 2013, p.37-41).

¹¹ It is worth noting that the degree of interactivity is not the only distinguishing factor between both media objects. Instead, the degree of interactivity distinguishes the hypermedic nature of Wikipedia as a repository of information, from the ludic nature of *Stardew Valley* as a game.

controlled environment for action and change - in other words, a magic circle where users may ‘play’ within the boundaries of a narrative system and experience the “creative treatment of actuality” head-on (Dowling 2021). Further, this approach poses the opportunity for readers to explore different perspectives, learn about current affairs, and enhance their understanding of social topics through interactive multimedia.

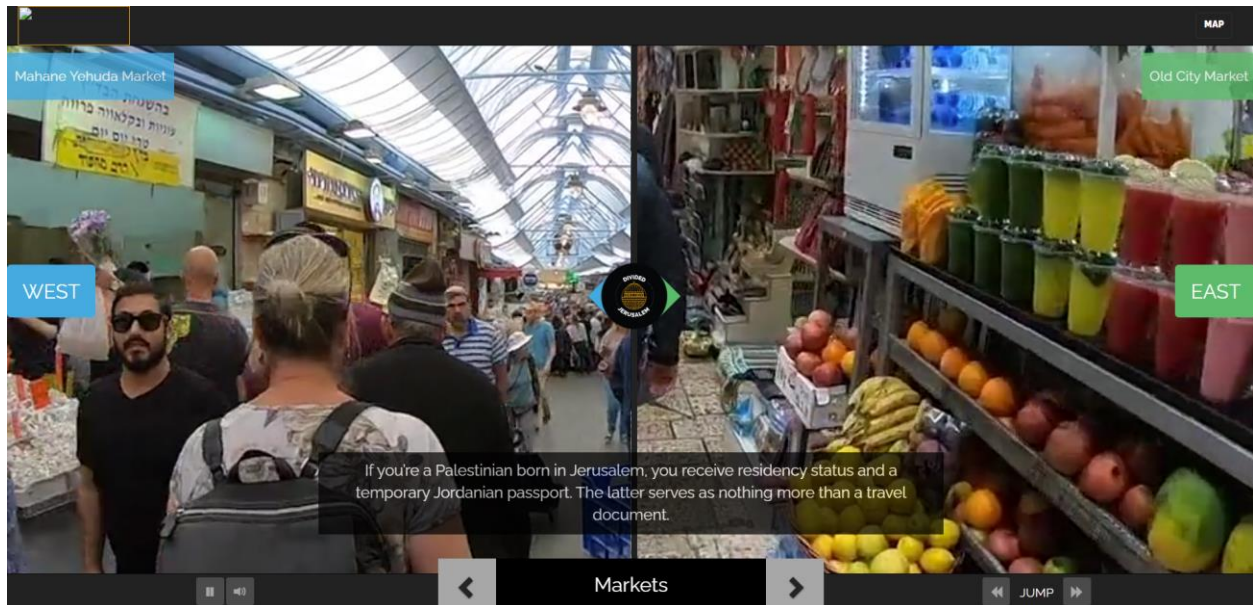


Figure 5: A screenshot taken of *Divided Jerusalem*, showcasing the split-screen interface (Al Jazeera n.d).

Notable examples of these implementations include The Guardian’s [Seven Digital Deadly Sins](#) (2014), where users are invited into the i-doc’s data collection process, resulting in a ‘living’ record of user engagement, which confronts the habits and attitudes ingrained in their digital presence; or Al Jazeera’s [Divided Jerusalem](#) (n/d), where users are immersed in a split-screen video of East and West Jerusalem. While the split-screen visually represents the political and ideological segregation of Israeli and Palestinian life, the visual contrast of the video footage drives this message home - a sobering reminder of the lived realities of the city’s population.

Agency illuminates a path towards stickier, gamified storytelling formats. But, it also complexifies the traditionally passive relationship between reader and journalist. In an agencyful narrative, the role of the user is as a ‘co-creative’ - a voice not only echoed by reporting for the public good, but actively contributing to the conversation itself. Despite these muddy waters, agency poses the opportunity to capitalise on the properties of the digital environment towards prolonged user engagement and meaningful reading experiences - which can address both the needs of digital readers and challenges faced by newsmakers. Collectively, this signals the need for a new approach to storytelling (or authoring), suited to the digital environment as an interactive, multimodal and networked media ecosystem.

2.2. Digital Authoring

Traditionally, the role of the author is ingrained in the production, circulation and reception of media objects (otherwise known as texts). While this role is tied to the act of creation, it also upholds notions of social, cultural and economic value.

Foucault suggests that a text incurs value based on its association with an individual's name as an 'identification system' (Beard 2009). This system is used to categorise texts and signify intellectual ownership (Foucault 1977), substantiated by other stakeholders involved in the circulation of these texts, such as critics and publishers. Holistically, Foucault's author function speaks to the role of the author as one beyond the 'genius' writer of a text, to a regulator of texts, their discourse and significance within a society (Foucault 1977).

But, the digital environment brings Foucault's notion into question. Through its variability and modularity, it breeds a participatory culture that dismantles the author function from the individual to the masses. In the digital realm, anonymity and virtuality shift value from status and institution to reception and engagement (Beard 2009). Here, Barthes' 'death of the author' reemerges - where he describes writing as an inherently neutral form. He argues that a greater emphasis should be placed on the text's language and structure as the manifestation of meaning, rather the author's identity (Barthes 1977). To him, the role of the author starts and ends by bringing a text into existence. The onus is then placed on the reader to create and uphold the text's meaning based on their own inferences of its content, thereby affirming its value (Barthes 1977).

In news media, journalists author a reported narrative - that which accurately expands on a sequence of events, while also expressing creativity through structure, tone and style (Hart 2017). While accuracy is emblematic of the journalist's role as a public advocate, creativity makes this advocacy palatable through engaging presentation. As watchdogs of the state, they uphold the advancement of democracy and social justice through public discourse. To spur this discourse, reader interests and opinions remain at the forefront of their practice (Wilding et al. 2018).

While the interplay between readers and journalists suggests an interdependent relationship, the above notions of authorship still highlight a passive exchange of ideas across both parties. In other words, communication follows a one-way channel, without a feedback loop to foster collaboration.

Digitisation has disrupted these notions, where interactivity and agency reduce the gap between authors and readers, facilitating a convergent environment for continuous production, consumption and distribution across parties (Jenkins 2006). We have seen this manifest itself in digital and social media journalism, where digital convergence facilitates real-time discourse between journalists and their readers. The result is a media environment where readers are placed at the centre of the media cycle more than ever before, because their engagement as users can drive cultural relevance long after an article has been published. The result is a reimagining of Foucault and Barthes' theories - where both authors and readers work *together* to continuously produce and sustain meaning in digital texts.



Figure 6: The first of the seven-image sequence in Richard Drew's photo collection, taken on September 11th, 2001 (Junod 2021).

This is a natural part of the news media cycle, where current events can bring to attention to older publications. A good example is Esquire's [The Falling Man](#), a 2003 article covering the infamous photograph taken by Richard Drew of the Associated Press (Junod 2021). The image depicts Norberto Hernandez - one of the several individuals who plummeted to their death during the 9/11 terror attacks (Junod 2021). The photograph was published and broadcast across numerous platforms almost immediately after it was taken, and on a global scale.

The result was public outcry, where "audiences recoiled" (Curtis 2021) at the perceived exploitation of a man's death, stripped of his dignity for the sake of a news story (Curtis 2021). Junod's article aims to restore this dignity by discerning the identity of The Falling Man, while also interrogating whether images like these should be open for public viewing and discussion.

Here, we can identify the power held by newsreaders, echoing Barthes' sentiment that readers manifest and sustain a text's meaning, and thus its relevance within the media economy. The more relevant a text, the more engagement it receives and the more value it incurs. While [the article was originally released in print on September 1st 2003](#), it was re-published in a free, digitised format on

September 9th 2021 as 20-year tribute to the attacks. Junod announced this on his X on September 10th, 2021.

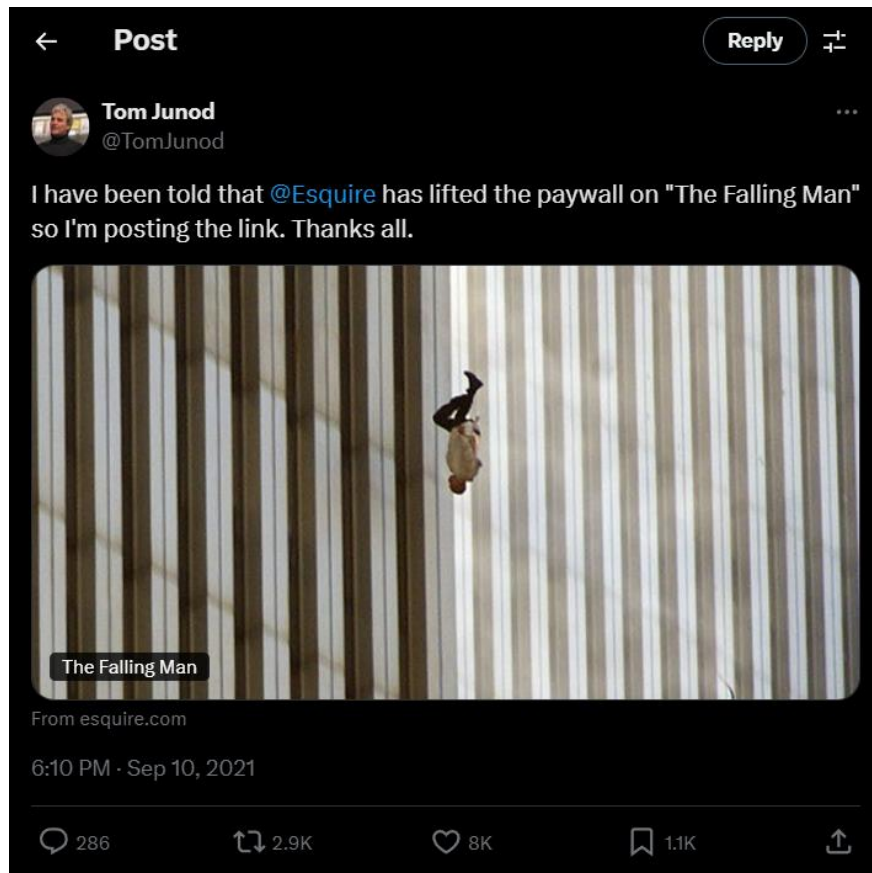


Figure 7: A screenshot of journalist Tom Junod's announcement of the free-to-read release of *The Falling Man* (@TomJunod 2021).

This time, the public response directly unfolded as a 'live' discussion on Twitter. Some users were grateful for free access to a haunting yet moving text; others were disturbed and angry to see the image published again (shared on X as the article's banner image); and a few were confused to encounter a paywall.



Figure 8: A screenshot of multiple comments on Junod's post, expressing admiration for the article's content and composition (@Lindademocat 2021; @magibson 2021; @BrianHa84402559 2021).



Figures 9 and 10: Two screenshots of negative comments on Junod's post, expressing disappointment at the shared format, as well as the continued re-sharing of Drew's photograph (@MatseyPat 2021; @tyizar 2021; @OreoBuffy5 2021).



Figure 11: A screenshot of various exchanges between Junod and his commenters, in relation to the Esquire payroll (@NickGDavidson 2021; @TomJunod 2021; @SwiftWriter 2021; @howlowtheywillgo 2021).

Interestingly, Junod responds to his audience almost as though he is in service of their experience - especially regarding the ominous payroll. While exchanges like these were somewhat possible in more traditional news formats (e.g. letters to the editor or callers-in to radio shows), the digital environment provides an immediate line of communication between author and reader.

Still, this relationship remains complex and there is never a true balance of power, as Junod also 'claps back' to his critics by recommending some additional resources to support his work:

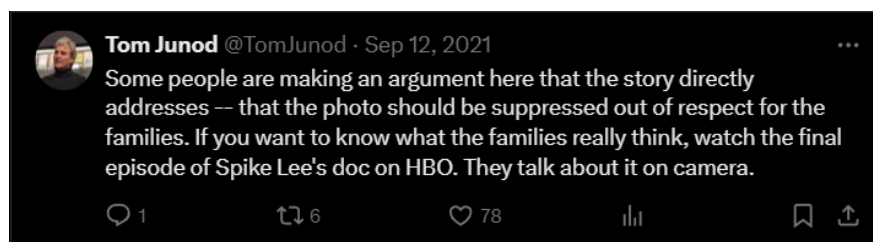


Figure 12: A screenshot of Junod's response to commenters, where he defends his work by recommending an HBO series - driving traffic to alternative media objects (@TomJunod 2021).

This further distorts the role of the author from an invisible regulator or figurehead, intentionally separate and untouchable to the reader, to a comrade who must answer to his readers and even defend his text. The result is a remediation of Foucault's author function within the digital

environment, where author and reader share a mutually inclusive, symbiotic relationship in the media cycle.

The 2021 re-release of *The Falling Man* is part of a collection of similar stories titled [9/11: Twenty-Two Years Later](#) - which are free-to-read and mobile-friendly. Instead of simply generating revenue from subscribers or advertisers, the collection works to drive more traffic to the Esquire website, especially amid a heated X thread such as the one above. The result is increased engagement across all five dimensions. When coupled with the quality of the published content, its subject matter, and the convenience of its digital format, the collection incurs longer, multi-page visits on Esquire's proprietary platform. This turns the collection into both an archive of (US) state affairs and a sticky marketing tactic, benefiting from good timing, the networked characteristic of new media, and the sentimentalities of its readership as a North American publication.

As a case study in journalism on social media, *The Falling Man* speaks to a pragmatic shift in journalism as a consequence of digitisation. By commodifying user engagement and building a more intimate relationship between author and audience, digitisation has inevitably spurred journalists to take on a more technologically involved role within the media cycle (Doherty et al. 2023; Royal 2023). In adopting engagement as a core value of digital journalism, their practice increasingly centres user interactions, where technology, speed and audience interests drive digital production (Perrault and Ferrucci 2020, p.1305-1307).

Gamification is a way to further capitalise on the user-centred dynamic of the digital environment, but this format poses a challenge in production workflows. Here, authors must not only adapt to a new platform of delivery, but also tailor their storytelling styles to leverage the agencyful nature of IDN. In other words, storytellers who are interested in interactive nonfiction must shift their practice from written¹² reporting to experiential reporting. This necessitates a reconfiguration of the role of the author, specific to interactive nonfiction.

In identifying those nonfictional storytellers struggled to adopt interaction design principles in their practice (Gaudenzi 2017, p.115), Gaudenzi also highlights two major points of contention in the production of interactive nonfiction:

- 1) The power imbalance between designer and user, where designers are more interested in producing content for 'ideal users' rather than 'real users' who may engage with narrative systems in unexpected ways (Gaudenzi 2017, p.120-122).
- 2) The design methods involved in linear documentary filmmaking as opposed to non-linear interactive storytelling (Gaudenzi 2017, p.117-120).

These challenges are valid and are the result of embracing the 'newness' of an experimental format. When an experienced draughtsman shifts their medium from graphite to paint, they will inevitably encounter a learning curve. Despite this, they can still use their existing knowledge to master a new

¹² The term 'written' is used quite loosely here, and broadly refers to more passive, linear forms of media and the stories they tell, such as text, video and image.

artform. The same principle applies to storytelling, where similar narrative concepts and elements from traditional formats extend to interactive formats, but with adjustments in process and presentation.

Fortunately, interactive nonfiction is achievable and has experienced great success in the past (*Snow Fall* (2014) being the most popular example). While our exploration of *The Falling Man* indicates that interactivity and mutual exchange have become a condition of digital newsmaking; nonfictional storytellers have also explored other forms of user-centred storytelling that embed interactivity as a core aspect of the reading experience (such as newsgames and i-docs). Thus, in addressing challenges associated with the production of interactive nonfiction, it is important to acknowledge its realities.

News at Play

While newsgames, i-docs and multimedia journalism are all viable and tested forms of interactive nonfiction, their production is marred by issues native to the digital context. So far, Dowling (2021), Gaudenzi (2017) and Thulin (2022) have identified three major touchpoints:

- **Collaboration:** where multidisciplinary teams work together to produce an individual editorial outcome. Instead of only being centred around plot, this outcome should also be centred around a particular UX (Gaudenzi 2017).
- **Time:** where interactive projects can take anywhere from a few days to several months to produce (Thulin 2022). This has an impact on the relevance of urgent or news stories, suggesting that interactive formats may be better suited for long-form projects.
- **Budget:** due to the larger size of the production team, and the lengthier timelines associated with their production, interactive projects tend to be more costly - a serious consideration for the already-precarious digital news economy (Dowling 2021).

These issues highlight why interactive nonfiction is not more readily produced or available when compared to other formats (written articles, short and long-form video, social media journalism, etc.). In *Producing Newsgames Beyond Boundaries: Journalists, Game Developers, and the News Business*, Plewe and Fürsich expand on the intricacies of production straight from the newsroom. While only speaking to European newsgame development, we can use their findings to understand how game developers and journalists coalesce their knowledge to produce content that aligns with their professional expectations, as well as the demands of the media industry (Plewe and Fürsich 2020, p.486).

They identify that newsgame production poses the same resource-intensive workflow associated with game development, which can detract from newsroom priorities if left unchecked (Plewe and Fürsich 2020, p.487). In this workflow, multiple roles are delegated to fulfil specialised tasks, such as writers, game designers, programmers and project managers. Finding journalists who are also equipped with the technical knowledge associated with game development is a difficult task in itself

(Dowling 2021; Plewe and Fürsich 2020), so production teams must inevitably become multidisciplinary. This can pose issues in terms of project management and development, where room for error exists within technical, conceptual and methodological gaps.

However, a multidisciplinary team is not necessarily a disadvantage. Because interactive formats typically combine story with multimedia, interaction design principles, and technical processes (programming, content management and maintenance), a multifaceted team can ensure a successful outcome on a holistic level, and in the long term. This not only applies to newsgames, but i-docs (Dowling 2021; Aston and Gaudenzi 2014) and multimedia journalism (Hiippala 2017) as well.

This means that, an effective production workflow prioritises collaboration, where all roles work harmoniously to author enduring interactive stories (Plewe and Fürsich 2020, p.487). Plewe and Fürsich's semi-structured interviews identified the following trends:

- **Iterative design methods:** meticulous planning took place well before any design or production phases started. This was an effort to ensure that concepts could be introduced, agreed upon, and more easily implemented in later stages of production. However, this rigorous planning phase did not prevent a rigorous prototyping phase, where games were created, tested and improved later (Plewe and Fürsich 2020, p.492).
- **Shared knowledge:** surprisingly, many journalists and game developers shared professional or academic backgrounds in each other's occupational fields. This meant that there was no outright conflict during cooperation, and in understanding project tasks and technical concepts. In this sense, journalists and game developers were curious about one another's perspectives, and welcomed open collaboration (Plewe and Fürsich 2020, p.492).
- **Organisational structure:** due to non-linear and cross-functional cooperation among team members, project managers were required to understand and manage multiple different tasks at once. Their primary role was to coordinate a wealth of ideas and perspectives in line with the project's editorial goals, communicating changes or alterations and showing equal appreciation for all members of the team. This led to a non-hierarchical organisational structure, which facilitated the open exchange of ideas among practitioners (Plewe and Fürsich 2020, p.493).
- **Content issues:** newsgames had to be scoped to spotlight topics that were relevant and timely, but which also existed beyond the daily news cycle. This approach considered the time taken to produce newsgames, as well as the impact of its journalistic goals, allowing the project output to 'survive' the production cycle (Plewe and Fürsich 2020, p.494). The study found that rigid production timelines hindered the ability to discuss topics fully, forcing the production team to only focus on the most central aspects of a given topic (Plewe and Fürsich 2020, p.494-495).
- **Audience impact and usability:** producers working on smaller projects were particularly frustrated by the lack of user feedback throughout the design process. This hindered

production in the sense that more focus was placed on the technical system rather than its narrative and overall UX (Plewe and Fürsich 2020, p.495-496). This also lent itself to criticisms on device compatibility - resulting in difficulties accessing playable content from a user-end perspective. These issues not only affected users, but became a time-consuming challenge to overcome (Plewe and Fürsich 2020, p.496).

Overall, Plewe and Fürsich identify that journalists and game developers work well as a team due to mutual interests and parallel ways of working. Further, interactive projects are best suited to long-form or ongoing stories that are not as impacted by time constraints. Most interestingly, journalists and game developer shared roles and chose to transgress their assigned activities - indicating an interest in *transdisciplinary* operation instead of only *multidisciplinary* co-operation.

But, these findings also represent production teams that are fairly well-resourced, evidenced by the allocation of a project manager and clearly defined roles between journalists and game developers - even in instances where they chose to act beyond their allocated responsibilities (Plewe and Fürsich 2020). In contrast, Gaudenzi's findings highlight the needs of independent storytellers, who may not have the funding or network to accommodate production at this scale. In this case, the pressures of time and scope heighten due to an increased workload and decreased feedback potential.

This suggests that independent practitioners who are interested in IDN are left with few resources to either conceptualise or execute their creative ambitions. A potential solution is to take advantage of the parallels identified in Plewe and Fürsich's findings and nurture transdisciplinary storytellers who can execute more than one of the roles associated with production - namely reporting (writing) and system design. Smaller teams could require a smaller budget, and could manage tighter production timelines through well-scoped project outcomes.

Within this study's scope of possibility, there is an opportunity to develop a pragmatic storytelling method for journalists transitioning into interactive media, who can adopt a transdisciplinary role in executing their projects. This role already exists in game design spaces and is embodied by a narrative designer who conceives an experiential narrative by combining plot with agency. But, before we can understand narrative design as a practice, it is sensible to first address how interactive narrative operates as a discipline.

Interactive Narrative

"A narrative text is a text in which a narrative agent tells a story."

(Bal 2017, p.11)

Narrative has a storied history, from Aristotle's three act structure to Freytag's pyramid and the six elements of drama (Koenitz 2015; Laurel 2014). Theoretically speaking, a sequence of events only becomes a narrative once it is artfully communicated to an audience (Bal 2017; Salen and Zimmerman 2004). The result is a *narrative system*, where multiple story elements work together to

fashion a whole text (Bal 2017, p.3). These elements can be broken down into three overarching categories:

1. **Fabula:** a raw sequence of events thrust upon actors - usually with a predetermined chronology (Bal 2017).
2. **Story:** the way in which events are organised through sub-elements such as structure (sequential ordering), pacing (temporality, rhythm and frequency), space and focalisation (Bal 2017).
3. **Text:** the final form through which the narrative is presented to an audience, such as a book, film, visual novel or game (Bal 2017).

While they allude to more traditional notions of storytelling, these elements apply to all manifestations of narrative - including interactive narrative. As an interdisciplinary practice that combines tradition with technology, interactive storytelling positions narrative within a more malleable context (Crawford 2013, Glassner 2017, Murray 2016). This is driven by its aim to deliver story through experience - embodying narration through collaboration between user, system and author (Crawford 2013, Glassner 2017, Murray 2016).

By addressing interactive storytelling as a form of mutual narration, we can better understand IDN as a fundamentally user-driven format. This is because interactivity disrupts traditional notions of storytelling from that of passive consumption to active collaboration (Crawford 2013). Previously, we addressed interactivity as a conversation across three parties: the user, the system and its designer.

In IDN, the system's designer takes on the role of a game master, tasked with constructing the 'magic circle' embodied by the system itself. In doing so, the system operates the story's logic by procedurally presenting information and choices (or branching options) to the user. When a user interacts with the system by selecting a choice, a unique narrative instance emerges, creating meaning through user engagement (Koenitz 2015).

But, while operating independently, this system was deliberately pre-programmed by a designer to allow just enough room for user choice and interpretation within a more rigid sequence of events (Crawford 2013, Murray 2016, Nicklin 2022). In this sense, the designer collaborates with the user to narrate a story *through* the system (Jenkins 2004).

This train of thought reframes the act of narration from the autonomous hands of an author to a collaborative, emergent experience. But, even in the traditional sense, authors are distinct from narrators.

Traditionally, a narrator is the voice of the story itself - the actor or agent that brings the narrative situation to life (Bal 2017). This agent is a part of the story world - a victim to (or director of) its sequence of events (Bal 2017). In this sense, a narrator is as separate from the author as the story's protagonist.

But, In the context of IDN, narration is open to the user, whose participation ignites the unfolding of narrative. This throws a spanner in the works for authors, who must now grapple with the user as a co-creative - echoing the 'problem of agency'. Rather than a dead-end, this problem encourages a shift in trajectory: instead of perceiving the user as an interloper on an authored narrative, we should position them as a narrative agent in of themselves (Nicklin 2022, Murray 2016, Laurel 2014).



Figure 13: A still from *Journey*, showcasing its co-op gameplay feature (Van der Velde 2021).

While agency can be a conceptual challenge for interactive storytellers, there are various instances where it has been 'done right'. One example is [Journey](#) (2012), an independent story game produced and published by ThatGameCompany. The game follows a wordless narrative, in which meaning is communicated through visual cues, such as environmental storytelling (in-world pictograms and architecture); expressive movement (animated cues during gameplay and cutscenes), and player-driven action. Upon its release, *Journey* made a significant impact on the gaming community due to its highly experiential and emotionally resonant narrative design (Kain 2012; MacDonald 2012; Van der Velde 2021).

This is credited to the focalisation of its player, who is immediately immersed in an environment that is almost poetic in its desolation. By combining visual design with wayfinding techniques, the game relies on player intuition to drive narrative beats. Most notably, it does so without the 'bells and whistles' of high-action combat or a complex, branching narrative to keep players engaged (Kain 2012; Van der Velde 2021).

The game tells the story of a lost civilization, unfolding through third-person environmental exploration. Here, the player embodies the role of an anonymous nomad, donned in striking red and gold. Androgynous and ageless, the nomad is an ideal cipher for any player to embody, deliberately depersonalising the individual in favour of an escape into the desert and its ruins.

In turn, the story world becomes the focus of the game's narrative, directly embedded into gameplay through puzzles and challenges that guide the player from one location to the next. These challenges present mandatory skill gates - mechanical obstacles that the player must overcome through their pattern recognition and problem-solving skills.



Figure 14: A still from *Journey*, showcasing its co-op gameplay feature ([Steam](#) n/d).

After each skill gate is overcome, the player is rewarded by visiting a new in-game location. One after the other, each location expands on the game's elusive narrative through artefacts and cutscenes that build on from previous events. The result is a tapestry of the game world's history - an enigmatic depiction of its culture, community, language and rituals. Because the player can only infer the significance of each location (to both the world and their role as its nomad) they have no choice but to *centre their journey* as a way to understand the meaning of the game's narrative.

This lends to a compelling user experience that toys with the player's sense of autonomy within the game's magic circle. While the user flow between locations and skill gates feels almost natural to the player, it is the consequence of a rulebound system that scripts their interactions through a series of linear game beats (Murray 2016). Player autonomy is thus an illusion upheld by the system's architecture and respected by its inherent trust in the player's judgement.

Journey is not only an example of how games are an artform, but also a masterclass on agency in interactive storytelling. In ludic systems, agency comes about through the integration of mechanics within a predefined context - a story, its world and characters. These mechanics serve to both limit

and facilitate user interaction, sustaining the game's logic and affording play within a procedural system (Hunicke et al. 2004). Further, mechanics act as a point of contact between the player and the playspace (Jenkins 2004), driving narrative beats through their real-time interaction with the game world. In this sense, mechanics provide opportunities for narrative events to unfold through a narrative agent (the player) (Koenitz et al. 2015).

Because *Journey's* narrative is communicated through its playspace, we can observe the interplay between its story and mechanics as the manifestation of agency, where the game's environment implicitly lends itself to spatial storytelling - a distinguishing feature of interactive narrative (Jenkins 2004).

This sets a stage where players can embody the game's context and bring about gameplay dynamics and aesthetics that create meaning through experience (Hunicke et al. 2004; Salen and Zimmerman 2004). As we discussed, this experience is a unique narrative instance - a story emerging through play (Koenitz et al. 2015). But, this story does not emerge spontaneously - it manifests by design.

This positions the author as a system architect. Rather than telling a story, their role is to create an environment that supports player agency and autonomy (or the illusion thereof), enriched with contextual cues that make sense of the mechanics, challenges and rewards posed by the system (Jenkins 2004). In other words, they construct the magic circle, its rules and logic (Jenkins 2004). In turn, the role of the user is to accept its conditions and perform within its boundaries (Koenitz 2015; Laurel 2014).

Narrative Design

In addressing authorship from a ludic perspective, we can understand it as the act of interactive narrative design (IND). Here, the author is not only responsible for the cohesion of story elements, but also the user journey from their point of entry to point of exit. This goes beyond 'just writing', and is rather "the practice of game design with story at its heart." (Nicklin 2022, p.23)

Game design is a process of system design, where rules and content are created to relay meaning in unison (Koenitz 2015; Walz and Deterding 2014). Beyond traditional elements, interactive narrative is also comprised of choice design, interaction design, visual design and spatial design. Other areas of game design, such as level design, where skillgates, obstacles and challenges are orchestrated, can also inform narrative design (Nicklin 2022, p.23-24).

When compared to more traditional notions of authorship, narrative design involves communicating how a player can and should interact with game mechanics, interfaces and characters to drive a greater narrative experience (Nicklin 2022, p.23-24). In this sense, the narrative designer is tasked with orchestrating an embedded narrative, which anticipates an emergent narrative.

An embedded narrative is a structured story, built into the game's environment and ready to be activated by the player (Jenkins 2004, p.11). This story is 'pre-scripted' by a narrative designer and

encapsulated within environmental opportunities such as collectibles or non-playable characters - packets of information that, when combined, piece together a sequence of events.

Through the player's exploration and discovery of these opportunities, the embedded narrative emerges through a player-driven sequence, where its chronology unfolds in real-time based on the player's decision making (Jenkins 2004). The result is an emergent narrative, where the player infers meaning based on the organisation of the events as they are encountered during gameplay (Jenkins 2004).

Because different players might have different play styles, emergent narratives are unique to each player and their engagement with a game at a specific point in time (Jenkins 2004) - hence a narrative instance (Koenitz 2015). *Palia* (2023), a massively multiplayer online (MMO) life sim, is an example that caters to different play styles, each of which have an impact on the player's inference of its embedded narrative.

Once they have customised their avatar, each player begins the game by spawning in as a human of legend in a fantasy-coded world. Upon entry, the player learns that significant events took place several thousand years ago, where humans disappeared at the height of their existence (Palia n/d). This sets up the context of the game, as well as the conditions of its world.

Following this, players are introduced to their Housing Plot or spawn point, and are assigned a series of quests designed to tutorialise the game's core mechanics. Thematically, these quests are tasks given to the player by villagers, outlining a series of objectives that must be completed before the game can progress.

Quests are thus structured around contact with environmental actors. Each quest unlocks new in-game tools or skills that facilitate different play styles. For instance, players more interested in resource collection can focus on gardening and building quests, while others more interested in story and roleplay can focus on lore and character-driven quests.

Palia is comprised of eight quest types: Main Quests, Skill Quests, Discovery Quests, Friendship Quests, Romance Quests, Found Item Quests, Event Quests and Secret Puzzles. This quest structure forms a complex system of narrative, where various branching opportunities lend themselves to the unfolding of the embedded plot as unique, emergent experiences.

While *Palia*'s lore is the 'main' embedded narrative, there are also several sub-narratives associated with each villager and their backstory. These sub-narratives branch out from the main narrative, contributing to variation in emergent narratives. Quests also enable players to set self-directed goals, where they can achieve in-game outcomes that are not prerequisites to the embedded narrative or skills acquisition - highlighting the significance of player autonomy.



Figure 15: Different villagers (such as romanceable characters) enabling different types of emergent narratives, suited to individual player interests and preferences (Palia 2023).

Narrative design refocuses the concept of narrative and narration from the arrangement of classic story elements to the *operation* of story elements within a malleable environment. Here, meaning is embedded within a world and its lore; and emergent through goal setting, challenge and reward. The narrative designer must thus account for all relevant variables (characters, collectibles, locations, weapons, etc.); their relevance to events embodied by the player as an actor (story beats encompassed by quests); and medial expressivity (voice and style through visual design, interface design, in-game copy, etc.) (Nicklin 2022).

Palia gives us perspective on narrative design as a multifaceted form of storytelling, focused on developing narrative opportunities within a system of interaction. In other words, it is the “design of telling a story” (Nicklin 2022, p.23). While a narrative system like that of *Palia* is not necessarily relevant or possible within a news media context, it does remind us that interactive authoring is an act of co-production. Games are often produced in large teams with various stakeholders involved. In this case, the narrative designer is only one member of a team where each stakeholder contributes significantly to the final product.

In this context, storytelling shifts from an individual¹³ practice to a more expanded set of roles and responsibilities across an authorial collective. Based on our above discussion and the technical nature of digital content creation, we can summarise these roles into three key stakeholders:

¹³ Needless to say, co-authoring is and has always been possible across storytelling formats. Storytellers who have experience in co-authored projects (like many journalists) will more easily adapt to the expanded set of roles associated with interactive authoring.

- **The writer:** she who procures the content to be delivered through the interactive narrative. In the case of news media, her role is to execute journalistic practice through her reporting for the public good. Further, she uses literary elements to establish the structure, tone, and plot of an embedded narrative.
- **The designer:** she who translates the writer's narrative into an agencyful system of interaction. Gaudenzi suggests that the role of the designer is to propose solutions that address a holistic user experience. Considerations such as interface, navigation, platform and system design must be made and tested (Gaudenzi 2017, p.117-120). This process is broadly referred to as narrative design (Koenitz 2015).
- **The programmer:** she who develops the system's architecture to execute both the writer and designer's vision. In other words, the programmer's role is to turn a design concept into a functional output.

While distinct in function and purpose, these roles can and often do converge in practice (Nicklin 2022). In some instances, the programmer and designer might share roles, as could the writer and designer. Because role-sharing is also common in newsgame workflows, and most digital publications have a tech team¹⁴ of some kind, it is possible to speculate a methodology for narrative design, where journalists can adapt their existing practice towards more interactive and 'agencyful' forms of storytelling - simultaneously embodying the role of a writer and designer.

2.3. System Design

By reframing journalists as transdisciplinary storytellers, we also reframe their practice as the act of design. Because narrative design is effectively a form of game design (Nicklin 2022), its process involves the technical orchestration of a system of interaction, where abstraction layers work in unison to manifest a user experience (Murray 2012).

Systems can be described as entities composed of multiple, interdependent parts working together to fashion a unified outcome (Salen and Zimmerman 2004). To function this way, systems are comprised of four elements:

- **Objects:** the individual parts of or variables within the system (Salen and Zimmerman 2004, p.64).

¹⁴ **Technical proficiency is an inescapable part of interactive narrative, where storytellers must inevitably familiarise themselves with the technical affordances and constraints of design platforms. However, we should acknowledge the power of push-and-play or codeless platforms that enable interactive production without the need for heavy programming. Programs like [Twine](#) are also an accessible means for nonfictional storytellers who are just starting to dip their toes into technical execution.**

- **Attributes:** the properties of system objects, based on the 'rules' imposed by the system (Salen and Zimmerman 2004, p.64).
- **Internal relationships:** the shared interactions between objects because of their attributes (Salen and Zimmerman 2004, p.64).
- **Environments:** the greater context within which system objects operate because of their surroundings (Salen and Zimmerman 2004, p.64).

As ludic systems, games structure experience within their playspace - an environment where all possible actions and meanings can emerge through the course of play (Salen and Zimmerman 2004). This aligns well with Jenkins' embedded narrative, where player driven experiences emerge through pre-scripted, environmental opportunities.

In digital systems, these opportunities come about through pre-programmed commands - or *rules* (Murray 2016). In games, rules refer to the mathematical logic by which they operate (Salen and Zimmerman 2004). This logic facilitates free movement within a space of possibility, reinforcing the game's context and the meaning that players can derive from it (Salen and Zimmerman 2004).

Rules are significant to narrative design in that they form the basis of systems as compartmentalised narrative opportunities. By prescribing the user with a series of choices and outcomes, narrative designers reclaim control over their plot, which is seemingly lost during play. This challenges the notion that interactive storytellers must learn to 'lose' or relinquish creative control in favour of the user's experience. On the contrary, narrative designers are in such a degree of control that they anticipate player decisions before they are even conceived (Crawford 2013). This is a concept called 'second-person insight', where designers imagine as many outcomes to a designed interaction as possible in order to ensure that their system's architecture drives their intended narrative experience (Crawford 2013, p.30-32).

In this sense, rules are used to 'script the interactor' in a particular direction, by shaping their understanding of the narrative's context, and their role within its boundaries. Also referred to as 'nudging' (Nicklin 2022; Salen and Zimmerman 2004), this is an interaction design principle that implicitly guides the user towards a 'fated' outcome (Crawford 2013, p.298-300). Nudging can be achieved through a variety of techniques, such as goal setting (Crawford 2013, p.300), 'forced' plot points (Crawford 2013, p.298-300), or breadcrumbs (Tidwell 2020, p.193).

Holistically, system rules and interaction mechanics work together to drive user behaviour, through which the user can infer meaning on two levels:

1. The **semiotic level**, based on sensory elements, such as the audiovisual cues provided by an interface, or the haptic cues emanating from a controller. This draws from the notion of immediacy in interaction design, where interfaces should aim to situate the user within a digital context, and inspire some kind of action (Laurel 2014; Tidwell 2020).

2. The **experiential level**, based on the user's decision making within the digital environment and its space of possibility. This is a manifestation of the interactive feedback loop, where certain actions can be fulfilled while others are not possible, thus 'training' the user to operate in a particular way and infer meaning based on the system's affordances and constraints. This draws from the notion of immediacy in interactive storytelling (Glassner 2017; Murray 2016), where experiential meaning emerges from mutual collaboration.

Both levels come about through abstraction layers in action. These layers operate from the most basic to the most sophisticated elements of digital media, from the binaries of computer processing to the hex codes in interface graphics (Murray 2012). In this way, abstraction layers are a build-up of components that manifest a digital object into the final form it is intended to be consumed.

Murray suggests that the designer's role is to ensure the harmonious collaboration between abstraction layers, resulting in a digital system that meets its objective by performing and communicating its purpose to the user. In other words, an effective design is one that user can *understand and use* to fulfil its purpose (Norman 2013). In the context of interactive narrative, this involves the combination of spatial storytelling with system architecture to serve the purpose of experiential narrative.

To better understand the relationship between spatial storytelling and system architecture (and how it manifests itself in practice), we can look to Koenitz' framework for understanding IDN, which has grown in complexity over the last fifteen years of investigation (Koenitz 2010, Koenitz 2015, Koenitz 2023).

A Framework for Interactive Digital Narrative

In his chapter, *Towards a Specific Theory of Interactive Digital Narrative* (2015), Koenitz identifies that IDN goes beyond the adaptation of traditional narrative modalities into a digital format. Instead of a narrative in of itself, IDN is actually an interactive computer program with narrative as its intended output (Koenitz 2015, p.95-96). While narratology can provide a suitable framework for analysing this output, a more unified approach to IDN considers its existence as a system of interaction (Koenitz 2015, p.96).

As such, Koenitz recommends his own model for the analysis of IDN. To start, he distinguishes IDN from traditional narrative on a molecular level, identifying three core elements:

1. The computer as a **system**, in its combination of software and hardware, as vessel of narrative - akin to the author who orchestrates a traditional narrative (Koenitz 2015, p.97).
2. Interaction as a **process**, as a result of a user or player's active engagement with the system - setting its sequence of events into motion much like the act of writing or 'telling' a story in a traditional narrative (Koenitz 2015, p.97).

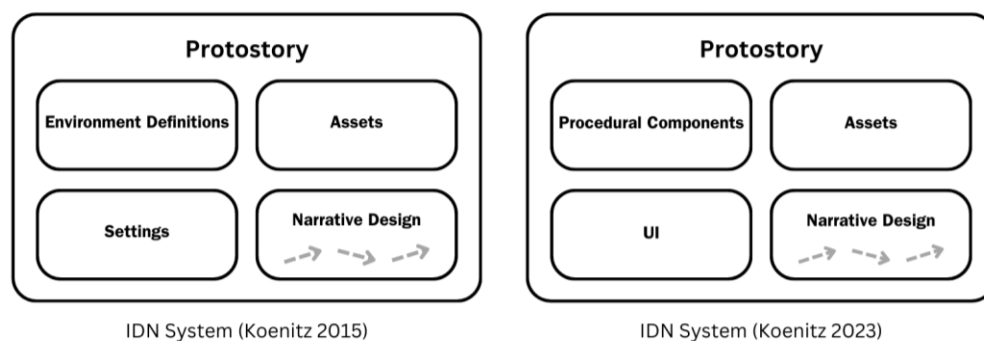
3. The output as a narrative **product**, which is a narrative instance unique to the user's interaction and which can be recorded for future analysis - much like the final manifestation of a text as a novel or film, an archive of a story told (Koenitz 2015, p.97). In later writing, Koenitz also includes the retelling or reporting of a narrative instance as an additional product centred around the user's inference of meaning through narrative as experience (Koenitz 2023, p.

In his book, *Understanding Interactive Digital Narrative* (2023), Koenitz names this the SPP (System, Process, Product) Model and uses it to form the basis for a theoretical framework that accounts for IDN as a generative, procedural system (Koenitz 2015, Koenitz 2023). Throughout this chapter, we have identified similar ways of thinking, where the narrative designer (author) and user (interactor) work together to manifest a unique narrative experience through a pre-programmed system of interaction. But, we have also focused on the role of the author, highlighting their involvement as the orchestrator of the system's logic. This approach coincides with the goals of our investigation, which aims to identify practical recommendations for the design of these systems.

Despite these differences, both Koenitz and this study maintain that the user's active participation sets IDN apart from more traditional storytelling formats. While readers, listeners or viewers might play an active role in their inference of meaning from a traditional narrative, their decision-making is a *requirement* of IDN that must be upheld by the system as a vessel of *potential narrative* (Koenitz 2015). In doing so, he insists that the act of instantiation - of manifesting narrative as an experience unique to the user - is the harbinger of IDN as a form of meaning-making and creative expression (Koenitz 2023, p.68-69).

A Framework for Interactive Digital Narrative (IDN)

An analytical tool used to break down narrative systems into their core elements, to understand their operation as experiential storytelling programs.



Adapted from Koenitz (2015, 2023)

Figure 16: Side-by-side diagrammatic representations of Koenitz's framework for IDN, including his first version originally published in 2010 and then again in 2015, and the second, updated version published in 2023.

Equipped with the SPP Model, Koenitz also uses specific terminology to dissect a narrative system's objects (story and discourse) and attributes (structure and delivery) into manageable parts (Koenitz

2015, p.98-99). As a result, this approach allows for a compartmentalised breakdown of IDN, focused on identifying the internal relationships between its objects and attributes, and their potential towards the instantiation of narrative (Koenitz 2015, p.98-99). He offers the following terms:

Protostory - a “procedural blueprint” for all narrative possibilities contained by the system (Koenitz 2015, p.99). He derives this term from the prototypes of computer science, using it to describe the code that drives the system’s logic on an operational level, and the interfaces that communicate this logic to users (Koenitz 2015, p.99). This term can also be used to encompass the designer’s intent to produce a system that realises participatory narrative (Koenitz 2015, p.99).

Narrative Design - a term used to account for the content and structure of a protostory, which manifests as a grouping of compartmentalised narrative opportunities (Koenitz 2015, p.99). We can think of this grouping as a series of interconnected nodes of content, or *lexia*. Narrative design accounts for both the sequencing or chronology of nodes, as well as the connections drawn between them (Koenitz 2015, p.99). In other words, Koenitz’s narrative design comprises embedded narrative and the procedural logic by which it can possibly unfold.

Narrative Vectors - sub-structures of the narrative design that communicate the direction of its sequence of events to the user (Koenitz 2015, p.99). Traditional narrative elements can manifest themselves here, such as an inciting incident that ignites an adventurous plot. In an interactive context, these vectors are ‘motivators’ that drive user actions along a narrative sequence (Koenitz 2023, p.78).

Among these three terms, he also describes “assets” (static, audiovisual elements that communicate meaning), “environment definitions” (scenes and the virtual environment) and settings (user preferences and configurations) as key aspects of the IDN system (Koenitz 2015, p.99). In a revised overview of this framework, he replaces environment definitions and settings with the terms “procedural components” (the ‘rules’ by which the virtual environment functions, and within which the user operates) and “UI” (the interface through which users engage with the virtual environment) (Koenitz 2023, p.77-79). Holistically, this theoretical framework provides a way of analysing IDN as a procedural system, driven by user agency towards emergent narrative experiences.

This framework also consolidates the topics covered throughout this chapter, including the correlation between user engagement and experiential meaning; the interplay between plot and interactivity; the user’s positioning as a co-narrator; and narrative design as system design. Additionally, it provides us with a methodology for reverse-engineering pre-existing IDNs (both fictional and nonfictional) to understand their operating logic and apply these findings to narrative design as a creative practice.

2.4. Summary

This chapter grounds our way of thinking about IDN and its potential within news media. In doing so, it has dissected IDN as a creative practice that is centred around user experience as a form of

collaborative narration, leveraging user engagement as a valuable commodity in the digital environment. In establishing a theoretical framework for our investigation, this chapter highlights several key takeaways:

- In a competitive media environment, user engagement is a form of digital currency that signals value from both the user's (personalised, memorable and meaningful experiences) and publication's (increased usage metrics, which can be used to target revenue streams) point of view.
- Digitisation has shifted journalistic practice towards more user-centred models, focused on the production of content tailored to user needs and preferences for format, content and delivery.
- Given the status quo, one of the major hurdles that newsmakers must overcome is building brand loyalty. Studies suggest that stickier or gamified media formats can boost brand loyalty through prolonged, positive user engagement.
- While interactivity can boost a publication's engagement metrics, securing prolonged and meaningful engagement from the user's point of view requires the provision of agency. But, agency is a double-edged sword that contests the relationship between fixed plot and flexible decision-making.
- To untangle agency as a core element of interactive narrative, journalists must adapt their practice towards transdisciplinary methods that embrace the merger of story and technology. This approach is best suited to long-form projects that are less affected by lengthier production timelines.
- Interactive narrative operates on embedded and emergent levels, where an experiential story unfolds based on the user's behaviour within a pre-scripted environment.
- Rather than a linear story, this environment operates as a system comprised of narrative opportunities. This system is created by a narrative designer, who curates the user's journey from their point of entry to point of exit. Here, we can understand agency as the illusion of freedom, upheld by the designer and their control over the system's architecture.
- This curation involves a ludic approach to system design, where rules are created to bind the system's embedded and emergent narrative, and script the interactor towards a particular outcome. These rules are the system's logic, which manifests through abstraction layers.
- IDN is thus a computer program rather than a story - with the goal to produce an instantiated narrative, unique to user interaction at a particular point in time. To understand how IDN operates in this way, we can analyse it as a system comprised of interdependent elements - including protostory, narrative design, narrative vectors, scenes and assets.

- By using this method of analysis, we can learn from the successes or shortcomings existing instances of IDN and reverse-engineer a pragmatic approach to narrative design, which considers the schemas and principles discussed throughout this chapter as well as enduring literature on the subject.

Equipped with this conceptual matrix, we can tackle the next stage of this study's methodology: a case study analysis of three instances of interactive nonfiction, each of which is a different manifestation of the format. In doing so, we can identify whether the above positioning is a valid, informed and executable approach to long-form digital nonfiction.

Chapter 3: Case Study Analysis

Theory, Demystified

So far, this study has observed interactive digital narrative (IDN) and its relationship to news media through a largely theoretical lens. This chapter aims to apply this theoretical framework to real-world instances of interactive nonfiction produced by publications across the globe. It does so through an exploration of three genres¹⁵:

Multimedia and Digital Long-Form Journalism

Since the 18th century, long-form¹⁶ or narrative journalism has used classic literary techniques such as environmental descriptions, dialogue and plot structure to create immersive reading experiences (Krieken 2018). Presently, this format has surged in popularity due to the constant, uninterrupted nature of the digital media environment (Krieken 2018).

Enter *digital* long-form (or digital multimedia) journalism - a storytelling genre that combines text, audiovisual media, data visualisation, and interactive interfaces to capture the attention and emotions of its audience (Hiippala 2017). Through these implementations, innovations such as simplified navigation and seamless transitions between multimedia content have been shown to prolong reading time - hence producing a stickier reading experience (Hiippala 2017). In this sense, digital long-form journalism offers its reader a 'cognitive container' free of distraction, where users can be fully immersed in its multimodal narrative (Hiippala 2017). By adopting a more literary format that appeals to readers' emotions, long-form multimedia treads the border between news and entertainment (Dowling 2021, p.10), contrasting the fragmented nature of short-form digital news.

Interactive Documentary (i-Doc)

Dowling defines i-docs as "an innovative hybrid form at the intersection of film, journalism and digital games" (Dowling 2021, p.1-3). He goes on to explain that i-docs are immersive media that experiment with narrative journalism towards social activism and artistic expression, converging multiple media objects and digital technologies (Dowling 2021, p.1). This experimentation aligns with the aesthetics of transparency and social responsibility associated with both journalism and documentary filmmaking, while incorporating the dynamics of cause-and-effect user interactions and immersive media-scapes related to digital games (Dowling 2021).

¹⁵ Like other forms of media, the term 'genre' is used here to group texts that share similar characteristics in their treatment of style, subject matter and presentation.

¹⁶ Also referred to as literary journalism (Jacobson et al. 2015), long-form journalism is categorised as works of more than 2000 words in length.

In *Interactive Documentary: Setting the Field* (2014), Judith Aston and Sandra Gaudenzi define i-docs as “any project that starts with an intention to document the ‘real’ and that uses digital interactive technology to realise this intention” (Aston and Gaudenzi 2014, p.125). They suggest the broad use of this definition, as they identify that i-docs are not platform-reliant but rather driven by form and purpose. In other words, interactivity is not only treated as a mode of delivery but as a principle of design and creative objective (Aston and Gaudenzi 2014, p.126).

Newsgames

Newsgames combine algorithms, infographics, texts and diagrams to deliver narrative experiences that are playful representations of real-life events (Bogost 2010, p.1-5). In other words, rather than telling stories as a sequence of events, newsgames represent narrative as system dynamics - as Bogost exemplifies in his analysis of [Cutthroat Capitalism: The Game](#) (2009) (Bogost 2010, p.1-5).

Identifying the need for greater buy-in from their reader base, Bogost argues that newsrooms felt the push to diversify their publication formats in the early 2000s (Bogost 2010, p.5-6). He uses this dilemma to anchor the appeal of newsgames as ‘good journalism’ by suggesting that games apply to the news because they “simulate how things work” (Bogost 2010, p.6). He goes on to establish various categories of newsgames, including documentary newsgames (which, much like i-docs, offer simulative experiences of real-world events); puzzle newsgames (including crosswords, as well as content-related puzzles such as National Geographic’s educational games); literacy newsgames (which teach players the importance of journalism to their citizenship and communities); and community newsgames (which can take place in physical environments) (Bogost 2010, p.6-10).

By addressing each genre, this analysis investigates the use cases of ludic interactivity within nonfictional narratives. Using the conceptual matrix established in Chapter 2, it aims to identify significant trends in the design of these narrative systems, which may include interfaced elements, interaction mechanics and system dynamics. The ultimate goal is to establish a series of recommendations based on these design trends, towards a more streamlined relationship between writing/reporting and interactive narrative design.

Methods of Analysis

2012 was *the year* for interactive nonfiction, starting with the New York Times’s *Snow Fall* (2012) and trickling down to other publications that took notice of the article’s success. Today, interactive nonfiction is so prevalent that the [Online Journalism Awards](#) honour the format and its contributions to public advocacy, education and representation.

With such a wealth of material to evaluate, this chapter scopes its analysis to three core case studies - each of which explores one of the abovementioned genres:

1. [Millennials are Screwed](#) (2017) - a long-form, multimedia article published by the Huffington Post Highline. This text was selected based on its treatment of layout design, interactive data

visualisations, and execution of ‘scrollytelling’ (Seyser and Zeiller 2018).

2. [Seven Digital Deadly Sins](#) (2014) - an interactive documentary published by the Guardian. This text was selected based on its treatment of multimedia, multi-page navigation, real-time data collection and visualisation, and the use of interactivity to drive its core messaging.
3. [Bad News](#) (2018) - an independent newsgame developed by GUSMANSON. This text categorises itself as a serious game and was selected based on its use of inoculation theory to educate players on the dangers of fake news, its choice-based format and badge reward system.

Holistically, this analysis aims to explore how IDN principles manifest themselves in journalistic practice. Using Koenitz’s framework for IDN (2015, 2023), each case study will be treated as a protostory that can be broken down into its constituent parts: narrative design, narrative vectors assets, UI and procedural components.

In doing so, we treat each case study as a system of narrative opportunities, designed to instantiate a UX based on user interaction. This provides a qualitative approach to analysis, where we can use Koenitz’s SPP Model (2023) to address all three dimensions of our conceptual matrix: (1) starting with system design as a way to understand each case study’s ‘build’ (system); (2) exploring interactivity and the relationship between author, system and user (process); and (3) concluding with its emergent user experience as a commodity that serves user needs and drives engagement metrics (product).

Data Collection

This will be a self-conducted analysis. Because it deals with an experiential component, it is important to be aware of the subjectivity (and potential biases) that may arise from my individual experience. To ensure consistency across all three case studies, I will be using a ‘three-phased’ approach to data collection:

Phase 1 - Initial Read: My first read-through of the case study. This should happen in a single sitting and will be timed for the sake of transparency. While still an investigative matter, this stage is focused on *the pleasure of reading* - reviewing the case study as it was intended to be consumed (outside of an academic setting).

Phase 2 - Reflection: Directly after the read-through, I will compile a series of reflective notes focused on the reading experience, its correlation to the case study’s embedded narrative, and its relationship to interactivity and emergent narrative. I may also take note of any sensory, visual or interactive elements that were particularly memorable or impactful. Please refer to the Appendix to read these notes in their ‘raw’ form.

Phase 3 - Concentrated Read: A second, more critical read-through of the case study. This read-through is focused on integrating theoretical concepts into an in-depth analysis of the case study’s

structure, operation and delivery. Here, technicalities such as the integration of specific interaction mechanics, the flow between narrative vectors, and even the layout and design of the UI will be broken down into granular details. These notes will be included in the case study write-up or data analysis.

Data Analysis

This concerns the written portion of the analysis. In terms of structure, each analysis will begin by contextualising the case study, including its publisher and a brief summary of its subject matter.

Following this will be a breakdown of its narrative design, identifying a core interaction mechanic through which the user can engage with the system's embedded narrative. Instead of analysing them as separate components, as suggested by Koenitz's framework, this breakdown will integrate assets, UI and procedural components as constituent parts of narrative design, much like practising designers would approach them (Nicklin 2022).

Finally, we will analyse its narrative vectors or plot points, around which user interaction is structured and an emergent narrative experience is instantiated. This will be corroborated by the reflective notes and assist in drawing a series of observations for each case study, focused on system, process and product (SPP).

3.1. *Millennials are Screwed* (2017)

The Huffington Post Highline describes itself as the collision of old and new tradition - merging 'old' journalistic values with 'new' digital formats. More specifically, it is "a magazine that only runs cover stories" - ambitious pieces that intend to influence reader viewpoints or even change the course of policymaking (Morris and Veis n/d).

Millennials are Screwed, written by Michael Hobbes and crafted by a team of web designers and developers, is one such cover story - and it certainly leads with impact.

As an example of long-form multimedia journalism, the article capitalises on relatability as a core storytelling aesthetic. This is evident through its use of tonal voice and style, which treads the boundaries between familiar colloquialisms and formal reporting. Because the article is a text-heavy piece, it also uses animation to sustain visual attention in between longer bodies of text. These animations appear as scroll-activated sequences, many of which star 'Becky' - an in-story character and 'spiritual guide' that leads the reader throughout the piece's exploration of millennial turmoil in the mid-to-late 2010s.

Thematically, the piece deals with the various economic and political issues faced by 'new adults' or individuals born between 1982 and 2004¹⁷ (Hobbes 2017). In empathising with the millennial plight, the article deliberately speaks to millennials as its core target audience - evidenced through continuous references to the internet culture at the time of publication (2017); use of slang abbreviations such as TFW (that feeling when) and FTW (for the win); and consistent (perhaps even alienating) references to older generations as "The Olds" (Hobbes 2017).

The piece is also cognizant of accessibility¹⁸, and this manifests itself on two levels: (1) contextually, where niche concepts such as the above slang terms are explained to ensure all readers can follow along irrespective of their age or generation; and (2) perceptibly, where Highline offers the article in a 'text only' format suited to users who may have a difficult time reading content as it is displayed on the multimedia version, or whose devices cannot support the volume of media content that requires display.

Despite its utilisation of literary devices to tell a relatable and entertaining story, the piece is rooted in reality. Its embedded narrative is comprised of three key elements: numerical data, expert insights, and anecdotal leads. These are storytelling techniques that facilitate a historical overview of the events that led up to the status quo and illustrate common experiences or trends observed in research. The result is a factual narrative packaged in an interface that resonates with readers on both an emotional and visual level - constructing a 'cognitive container' or story environment that lends itself to a multisensory experience at the verge of journalism and entertainment.

¹⁷ Different sources cite different timelines for the millennial cohort. It is convenient that my age group happens to fall within the article's definition of a millennial, thereby grouping me into its target audience.

¹⁸ All case studies were analysed using a desktop computer. As such, layout, access and user experience on mobile devices would require a separate (possibly comparative) investigation.

To achieve an interactive, engaging and informative outcome, various system objects and attributes work together to relay meaning on both the semiotic and experiential levels. Using Koenitz's SPP framework, we can break the piece down as a system and understand how its narrative design achieves this outcome.

System: Interface and Interaction

Scrolling is the user's primary means of interaction with the piece. This convention is established early on, where the article's landing page¹⁹ displays a flashing "FML" acronym overlayed with an infinite glitch effect that distorts the displayed text. There are no additional interactive or clickable features other than the Highline site's main navigation menu anchored to the top of the interface:



Figure 17: A screenshot of the *Millennials are Screwed* landing page, with Highline's main navigation menu circled in red (Hobbes 2018).

By omitting other points of interaction, and based on habituation and their familiarity with the digital environment, users are likely to scroll down the webpage to discover the rest of its material. This design feature relies on the user's intuition to navigate the webpage and also introduces scrolling as the piece's primary interaction mechanic as soon as the reading experience commences. In a way, this operates similarly to an in-game tutorial, where the user must master a mechanic to engage with the playspace, meaningfully. Further, the act of scrolling feels familiar to the user and is reminiscent of the reading experience on more conventional digital platforms.

The result is a natural and unobtrusive UX, lending to an immediate flow of interaction that brings the user's focus to the article's material rather than complex 'bells and whistles' as a means of engagement. While the vertical scroll feature adheres to digital reading conventions, the text itself is

¹⁹ The term 'landing page' is used in a general sense to refer to the first point of entry to a website or webpage. From a technical perspective, this webpage may also be categorised as a 'home page'.

anything but conventional. Instead, it complements familiarity with novelty through considered interface cues - including its treatment of typography, layout design and colour.

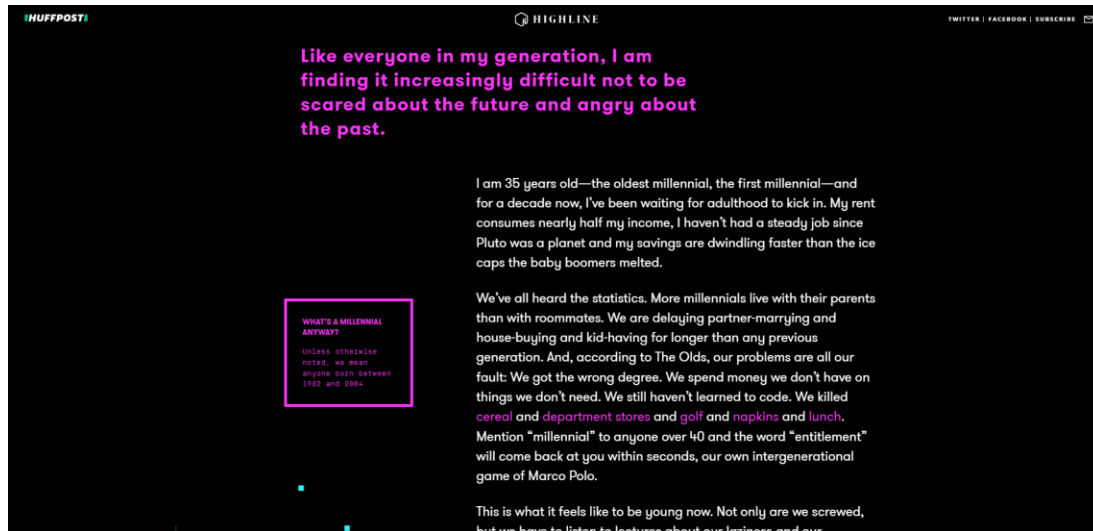


Figure 18: A screenshot indicating the two-column layout employed throughout *Millennials are Screwed* (Hobbes 2018).

The article makes use of a saturated colour palette and a two-column layout, with a wider column relegated to its primary text and a narrower column used for additional information such as definitions, statistics and even subscription prompts. This layout is utilised for longer bodies of text, which are separated by decorative segments or 'breaks' that appear to provide the user with cognitive breathing room and contribute a playful or artistic quality that echoes the piece's voice and style.



Figure 19: A screenshot indicating a section or 'break' in between text segments (Hobbes 2018).

Pictured above is one such segment, including an animated vision of Becky struggling to escape a maze. The vibrant colour palette and consistent allusions to 'old-school' internet culture create a visual aesthetic that is reminiscent of pop culture at the time millennials were growing up (between 1982 and 2004). Similarities can be seen in games like Atari's *E.T. the Extra Terrestrial* (1983) and

even Sega's *Sonic the Hedgehog*. The stark, RGB-forward colour palette emphasises the digitality of the article itself, as well as its presence on the internet - a social and cultural environment dominated by millennials.

These inclusions are a creative approach to classic web design elements (sections, typography and colour) and ensure that the article speaks directly to its target audience, crafting a story environment that feels immersive, relatable and engaging in its familiarity. Its unconventional presentation also creates an air of playfulness throughout the reading experience, without directly integrating ludic elements such as goals, challenges and rewards.

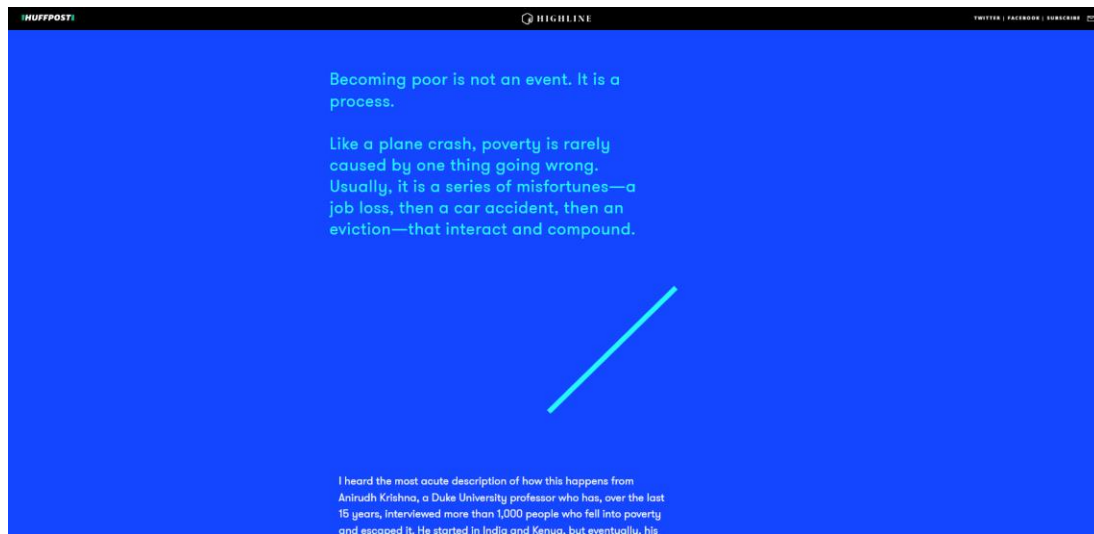


Figure 20: A screenshot indicating a new segment of text, introduced with a lead-in in mint and followed by a paragraph in white (Hobbes 2018).

Alongside decorative segments, colour also plays a significant role in visually distinguishing sections of the text's argument or discussion. While a decorative segment could be thought of as a chapter heading or label, text sections are typically introduced with a lead-in or section header to indicate a different angle. Additional graphics, typically glitch animations or diagonal lines, are used to guide the reader's eye between lead-ins and paragraphs in each section. However, this use of colour can be visually overwhelming, and some pairings between background and font colours can impact readability.

Beyond these aesthetic integrations, the article's coyness also comes about through its treatment of scrolling - utilising it to energise the flow of reading by integrating horizontal scrolling effects and scroll-activated animations.

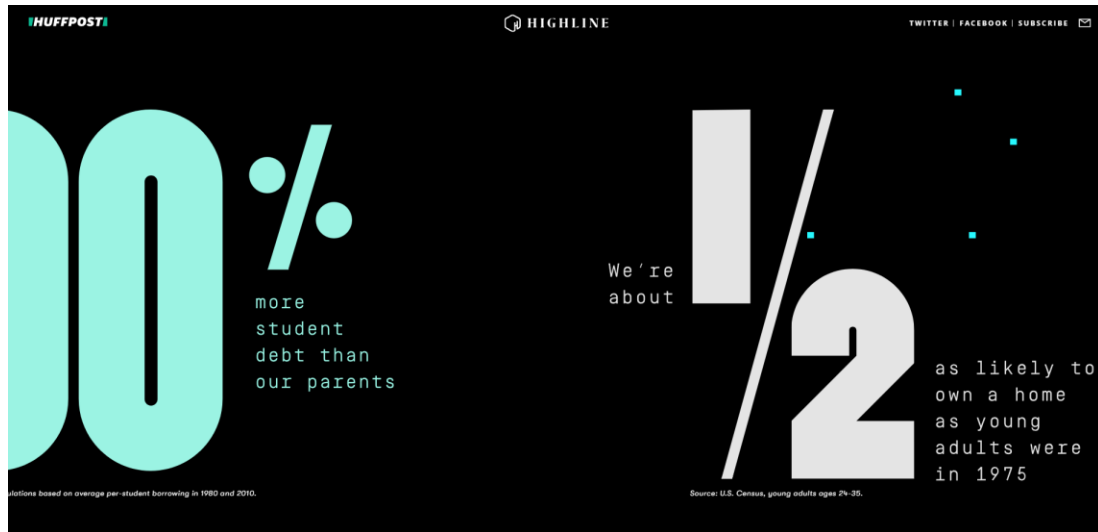


Figure 21: A screenshot indicating a horizontal scroll feature, utilised to list various statistics (Hobbes 2018).

Pictured above is the article's first horizontal scroll integration - a carousel of relevant statistics. This integration introduces horizontal scrolling as an interface feature (which becomes more prevalent later in the article) and subverts the reader's expectations by disrupting the vertical scrolling convention. In other words, the article makes use of a feature common across other web interfaces, such as digital galleries and storefronts, but recontextualises it within a digital publication. The outcome is a sensation of novelty, which could pique the interest of an unsuspecting user.



Figure 22: A screen recording of a scroll-activated animation utilised to prevent information fatigue or cognitive overload (Hobbes 2018).

Scrolling is also used to activate animations, such as the screen recording above. This integration can simulate a sense of user participation, where visual feedback 'acknowledges' the user's presence and their role to play in the piece's progression. It should be noted that the user's role remains passive throughout the unfolding of narrative - their interaction does not deliberately influence the portrayed story or its outcome. However, scrolling in this sense is used as a means to

recapture user attention in between bodies of information, much like the decorative segment pictured in Figure 22.

The relationship between scrolling and visual feedback, especially when embedded in the context of each text section, creates a powerful narrative experience. Most notable is its use to portray the passing of time during a section on the housing market, which will be elaborated further in the next part of this analysis (Process). While some of these integrations feel impactful, others can feel distracting, such as Becky's introduction.

As a system, the article offers a sequence of events with a single point of entry and exit. In Koenitzian terms, the protostory is comprised of a linear narrative design, all of which is contained on a single lexium. However, this narrative can be broken down into six sections or 'chapters', sequenced chronologically in the following order:

Millenials are Screwed (2018) – A linear narrative system

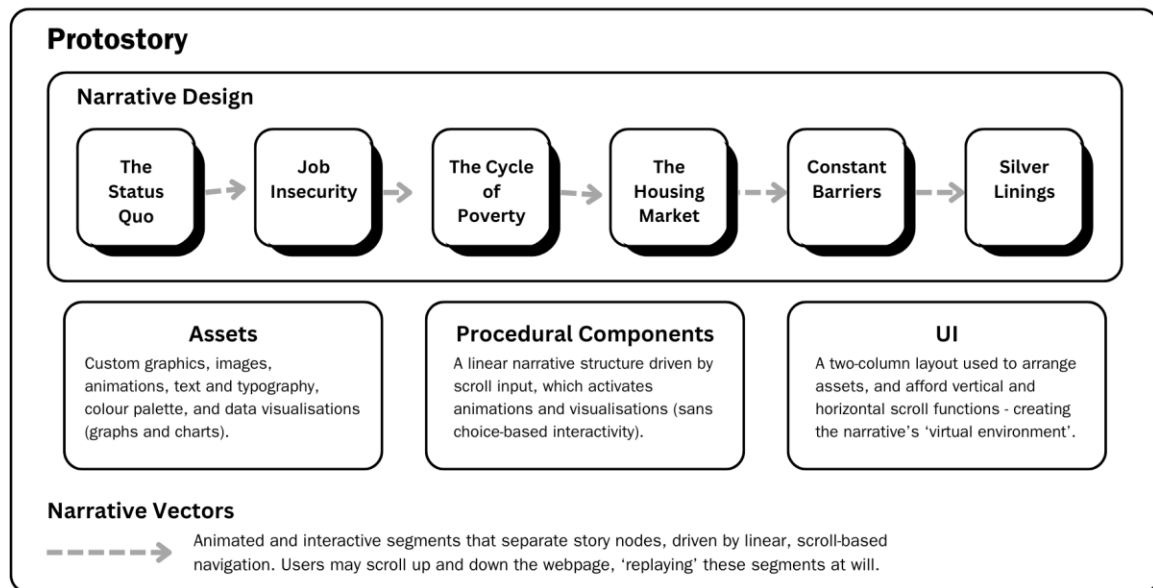


Figure 23: A diagrammatic representation of *Millennials are Screwed* as an IDN system.

This sequence of events is driven by scrolling through the article's webpage, where decorative segments act as narrative vectors that guide the user from one section to the next. Because the piece offers little to no room for decision-making, these connections are moments of user engagement (such as scroll-activated animations) and cognitive breaks between bodies of text (the content of the narrative design).

Further, assets such as custom graphics and animations contribute to the article's tone and visual messaging. These assets are complemented by the piece's layout, which creates a virtual setting or cognitive container where the user can immerse themselves in the reading experience, free of distraction.

Process: The Power of Scrollytelling

Scrollytelling is a style of narrative long-form journalism that prioritises visual storytelling as a core aspect of the reading experience (Seyser and Zeiller 2018). The style is native to online spaces, like websites with inherent vertical scrolling capabilities, and is characterised by its use of static or interactive data visualisations to convey complex bodies of information (Seyser and Zeiller 2018). Most significant is the format's multimodality, which aims to heighten user engagement and comprehension throughout the reading experience. In this sense, interactive and non-interactive multimedia content such as infographics, images and video is combined with text-based content to inform a cohesive narrative structure that leverages multisensory information processing to convey its messaging (Seyser and Zeiller 2018).

Millennials are Screwed is exemplary of scrollytelling in practice. Its narrative vectors are comprised of two key components: (1) decorative graphics and visualisations, and (2) scroll input - both of which work together to create the cognitive container elaborated above. As narrative vectors, these features are embedded directly into the reading experience, instantiating an interactive narrative that is not necessarily unique to the user in terms of structure or chronology but is unique in terms of their perception of the narrative as a sequence of events.

As the dominant interaction mechanic throughout the reading experience, scrolling is used to immerse the reader in the story environment (represented by the webpage's interface) and communicate information in a way that is memorable and emotionally resonant. This manifests through Becky - an in-world character whose 'journey' throughout the piece is driven by the user's scroll input.



Figure 24: A screenshot indicating the article's introduction of Becky, who is animated using a horizontal scrolling feature (Hobbes 2018).

The protostory, comprised of its narrative design, assets and environmental definitions, is the architecture of the virtual environment that is Becky's world. Like all well-rounded characters, Becky

has a quirky and relatable personality, evidenced by her use of colloquial language and animated gestures. She also has a central goal: being a homeowner. But, the status quo is in the way of her goal - where millennials are chronically overworked, underpaid or even unemployed. This status quo is set up and corroborated by real-world evidence, outlined by Hobbes in the text entries scattered in between Becky's sequences.

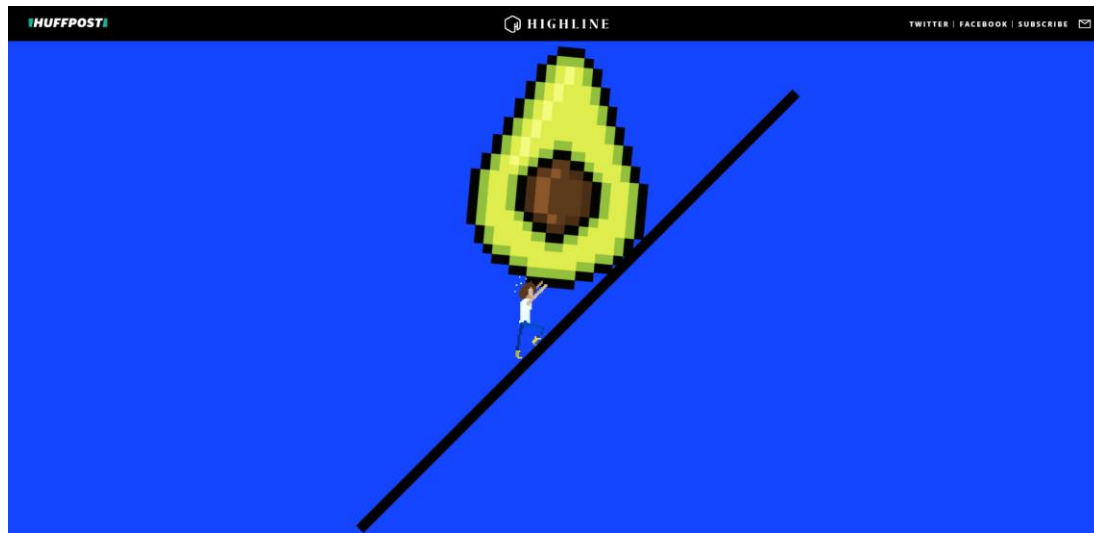


Figure 25: A screenshot of a scroll-activated animation depicting Becky pushing an avocado up an incline (Hobbes 2018).

In this way, the virtual environment is not only Becky's story world but an abstraction of our lived reality. This abstraction takes place on two layers: textual and graphical. Throughout the article, Becky experiences a character arc that runs parallel to the subject matter portrayed in text entries, where she initially 'falls into the discussion' and grapples with the complexities of reality at the same time that the user grapples with the article's content.

Becky's presence thus strengthens the user's relationship to the piece and its subject matter - playing into their emotions as an empathetic character. In activating most of her sequences through direct interaction (scrolling), the reader builds a responsive connection to her arc, which seamlessly flows in and out of text entries that align her fictional journey with the factual topic at hand. She is not only a novelty and point of cognitive relief but a visualisation of the social, political and economic barriers that the article aims to explore - thus conveying this information in a way that is relatable and entertaining in its presentation.

Further, Becky operates as a co-narrator, creating literary bridges between sections and 'speaking into' their content from her perspective, thus reinforcing her presence as an integral part of the article's narrative.

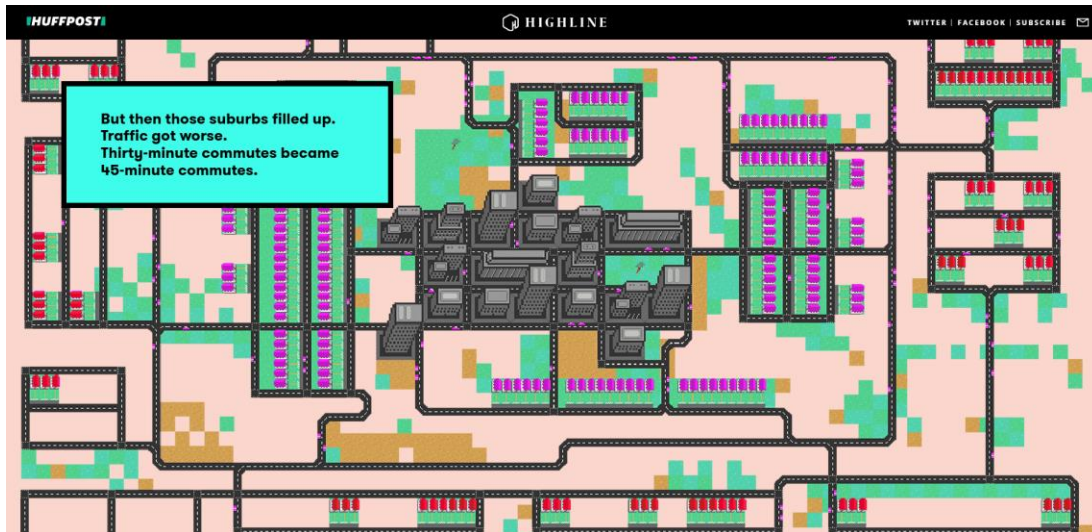


Figure 26: A screenshot of the scroll-activated map feature in a segment covering the housing market (Hobbes 2018).

Becky's arc comes to a head during a section on the housing market (the fourth node in its narrative design), which uses scrolling to visualise the growth of suburban spaces in response to the concentration of labour in city centres. This visualisation includes a stylised map of "downtown" and "the suburbs", as well as an interactive collage that visualises the passing of time from the 1970s to the modern day (Hobbes 2018). In between these visualisations are interactive animations used to expand on zoning and the cost of city living - most of which star Becky and end in a *Space Invaders*-esque battle with a granny figure (representative of "The Olds"). Due to the intensity of the scroll input and Becky's battle scene during this segment, we can characterise this section as the article's climax before it enters a swift denouement.



Figure 27: A screenshot of Becky's final 'boss battle' (Hobbes 2018).

Because scrolling is the user's primary point of contact between the system and Becky's arc, the user's interaction integrates their presence as a participant in the unfolding of the article's narrative. This level of interaction thus bridges the reader's relationship to Becky and the piece, not providing a

sense of agency but affording a sense of involvement that is amusing and light-hearted amidst the doom and gloom of the status quo. Fittingly, the article ends on a hopeful note - a reward for staying by Becky's side throughout her journey. Holistically, this process lends to a reading experience that marries content, visuals and user engagement.

Product: Interface as Form

In the absence of agency as defined by this study, *Millennials are Screwed* creates meaning through well-paced novelty and relatability. While decision-making is not a core aspect of the reading experience, this experience still feels involved and centred around the user based on its use of scrollytelling as a narrative style and its intentional positioning towards its target audience.

Most significantly, *Millennials are Screwed* is an example of the use of the digital interface as a *narrative form* - moving beyond a surface of display into a virtual environment that captures and sustains reader attention through the convergence of visual design and narrative progression. Its interface upholds the article as a cognitive container, with well-paced visuals and interactive elements to prolong engagement without overwhelming or fatiguing users.

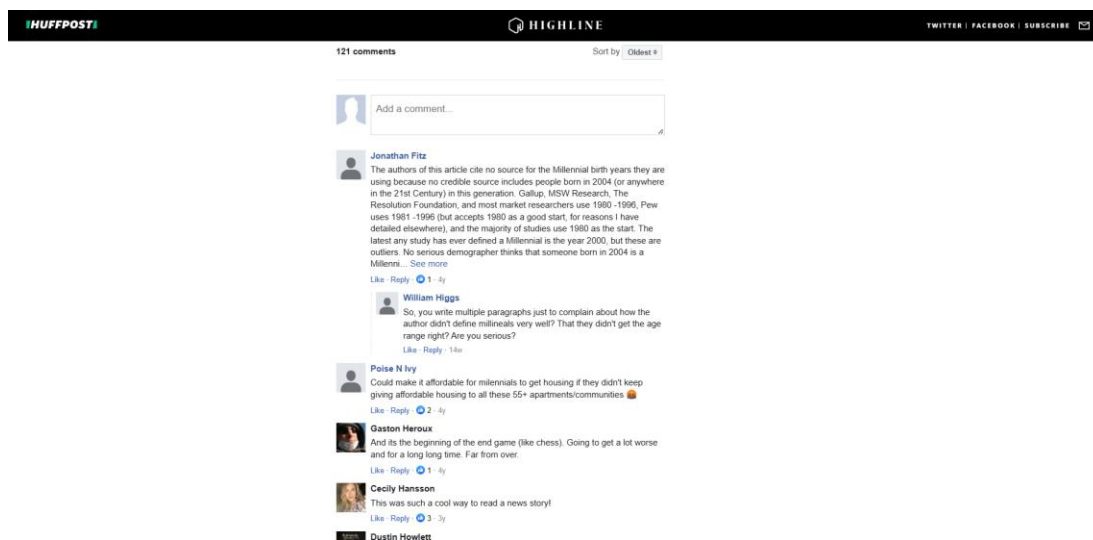


Figure 28: A screenshot of the *Millennials are Screwed* comments section (Hobbes 2018).

In terms of its dimensions of engagement, the article's greatest strength is its stickiness - with an uninterrupted reading time of 40 minutes and 36 seconds. Second to this would be its visibility, as the article contains embedded Facebook comments that indicate its reach beyond the Highline website. Further, this comments section acts as a point of collaborative engagement among readers, whether on Facebook or directly on the article's webpage.

The article also addresses various aspects of Shishkin's User Needs Model, primarily relating to knowledge (remaining engaged with societal issues), understanding (receiving different perspectives on societal issues) and feeling (being entertained and inspired through a sense of camaraderie with

others). These needs are not only addressed through the article's subject matter but also its playful and involved presentation.

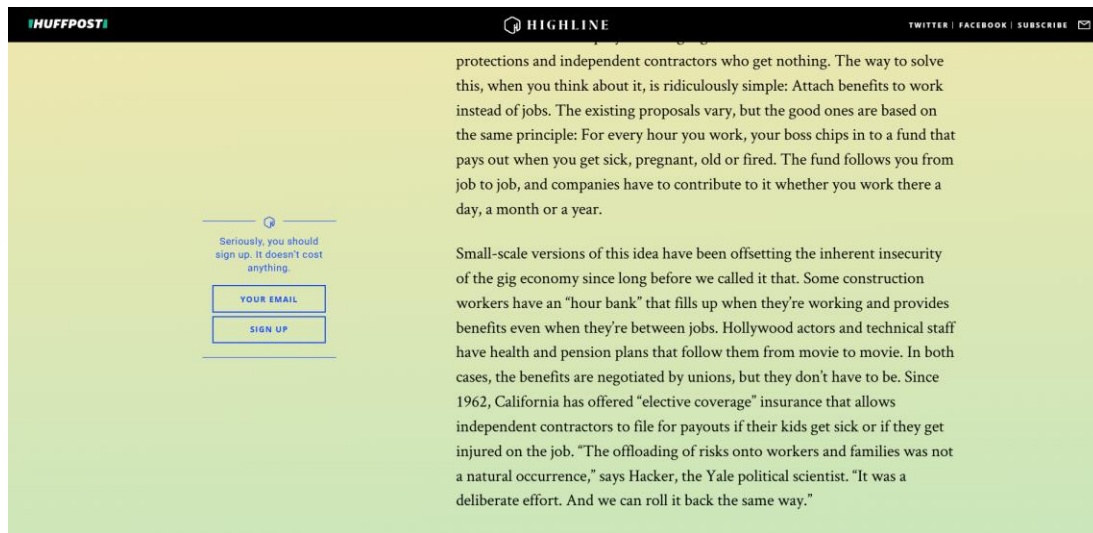


Figure 29: A screenshot of a sign-up prompt positioned during the article's 'last leg' (Hobbes 2018).

On the level of commodifying the news, this article and the rest of the case studies explored in this analysis are free to read/play with no advertisement interruptions. Instead, the article presents various sign-up prompts throughout the reading experience. It should be noted that while noticeable, these prompts are unobtrusive towards the reading experience, ensuring the user remains focused on the article's content. In this sense, these prompts are cognizant of the user's intention to read and engage with the article. While a bid for greater brand loyalty, the article also speaks for itself in terms of both system design and editorial quality - with minimal to no 'bugs' or errors noticed during the initial or concentrated read.

3.2. *Seven Digital Deadly Sins* (2014)

Developed and published by The Guardian in collaboration with the National Film Board of Canada (NFB), *Seven Digital Deadly Sins* is an interactive documentary hosted directly on the NFB website. While serving the Canadian creative industry, the NFB dedicates itself to audiovisual content in various forms, which is made available to the public via a proprietary streaming platform directly on its website (National Film Board of Canada n/d).

Seven Digital Deadly Sins is an experiment in form, combining video, text, illustration and data visualisation into a non-linear narrative experience. The narrative itself is structured as a content web, where the user can independently navigate each of the biblical sins and their associated subject matter. Thematically, the piece deals with taboo aspects of human behaviour in the digital environment.

From cyberbullying to piracy and even impersonation, the piece harbours a collection of reported narratives told largely from the first-person perspective. The resultant experience feels almost voyeuristic and complicit in the reported material - especially when combining one-on-one video interviews and text entries with interactive questionnaires intended to situate the user's online behaviour within that of the greater public opinion.

This multimodality creates a narrative environment that is both intimate and confronting. While its non-linearity affords a self-regulated user experience, its choice design remains largely open-ended without integrated goals, challenges or stop gaps. Given the piece's subject matter, this creates a sense of autonomy on the user's part, where they may withdraw their participation should the material become too overwhelming.

The result is a 'living' artefact with a memory of its users and their engagement - thanks to its questionnaires, which are designed to operate as a visually responsive data collection mechanism. This integration not only capitalises on the networked nature of the digital environment but also provides an anonymous public forum through which users may contribute to the greater discourse around cyber-habits and digital identity. In doing so, the piece constructs and reinforces itself as a 'safe space' through which users may explore the darkest recesses of digital morality.

Using Koenitz's SPP model, we can address how the piece operates as a non-linear narrative system, facilitating a user experience that feels simultaneously safe and dangerous, while operating as a form of social activism.

System: Branching Structures

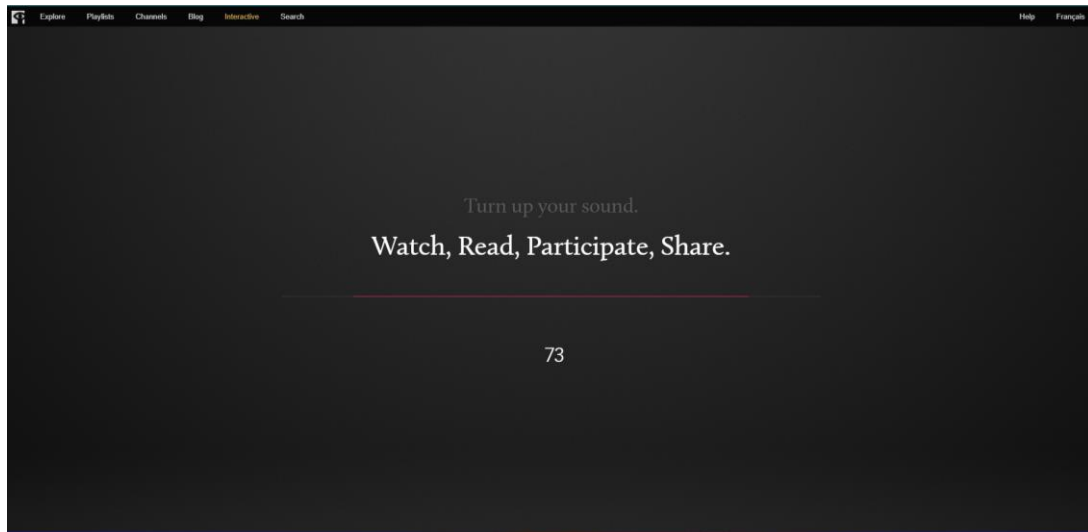


Figure 30: The *Seven Digital Deadly Sins* loading screen, prompting users with two calls to action at once (National Film Board of Canada 2014).

Seven Digital Deadly Sins opens with a call to action, followed by a short video introduction: a compilation of all its interviews designed to set the tone and contextualise the rest of the piece's subject matter. The user may skip this video and navigate directly to the documentary's main interface, which involves a collection of animated image tiles that turn over with a magenta overlay to indicate their functionality.

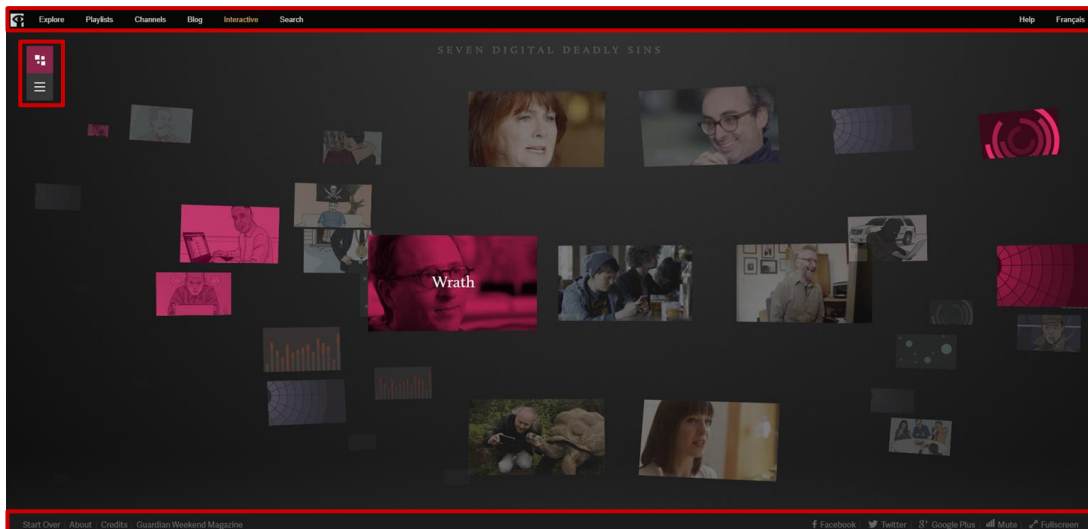


Figure 31: A screenshot of the i-doc's main interface, indicating all clickable tiles in magenta. All navigation menus are also highlighted in red (National Film Board of Canada 2014).

Beyond these tiles, the documentary's interface is comprised of a variety of navigation features:

- Anchored to the top of the screen is a main navbar menu, which allows the user to explore the rest of the NFB site.
- Anchored to the bottom of the screen is a settings and configuration menu, which allows the user to toggle in-documentary preferences, such as the background audio and window size;

as well as options to start over, view the documentary's credits and navigate to The Guardian's website.

- A collapsible sidebar menu that organises all the documentary's video content and text entries into a navigable hierarchy.

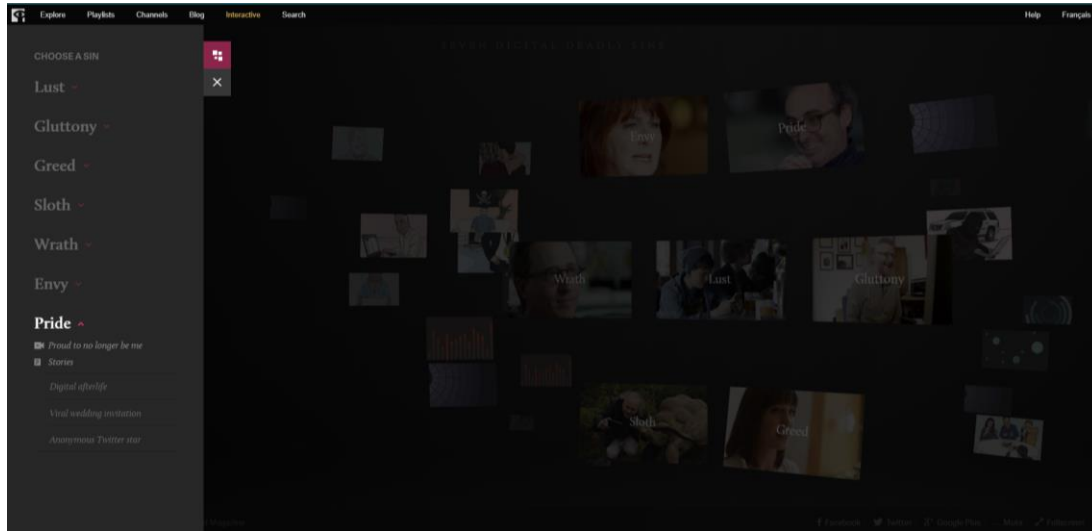


Figure 32: A screenshot indicating an expanded view of the i-doc's sidebar menu (National Film Board of Canada 2014).

Mechanically, the documentary relies on click-based interaction, where the user may explore its content nodes at their discretion. In this sense, ease of navigation is a core component of the documentary's system design, where the user's freedom of choice is grounded in a series of structural conventions. These conventions follow a standardised UI design pattern, where each of the seven sins contains a set of seven nested components.

The repeated use of the number seven visually reinforces the documentary's thematics through its layout and interface cues, while also scoping the system's branching architecture. Due to this architecture, the piece operates similarly to a hypertext narrative - which can easily become bloated or overwhelming from the user's point of view (Manovich 2002; Murray 2016). Further, this internal structure necessitates the sidebar navigation menu, which can be used to toggle between different sins or return to the documentary's main interface, should the user lose themselves to the system's various modal windows.

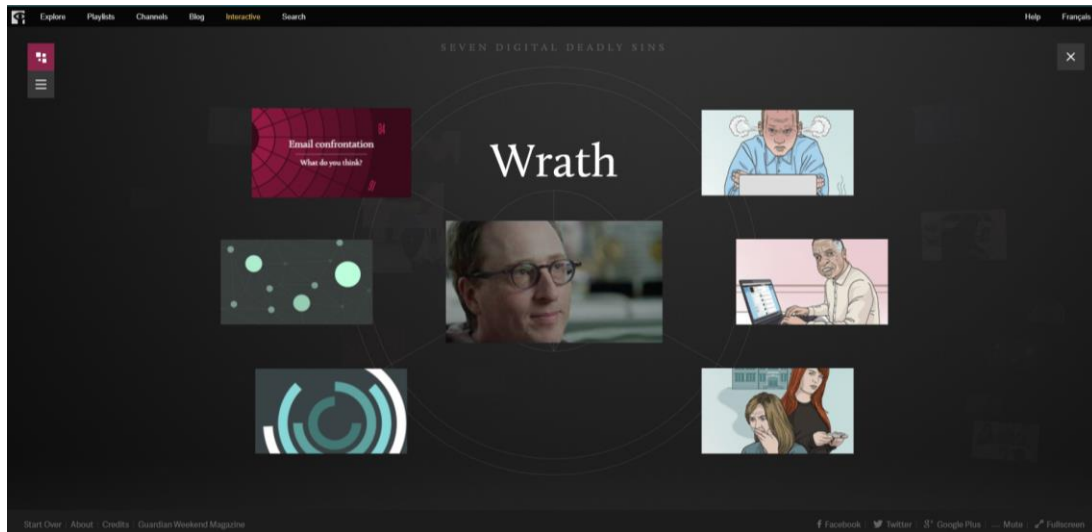


Figure 33: A screenshot indicating 'Wrath' in its expanded form (National Film Board of Canada 2014).

Figure 33 visualises the internal structure of an individual sin (a parent node), where its content is organised using a branching sequence of child-nodes. These child-nodes can include video interviews (always one instance - pictured in the centre of Figure 33); text entries (two to three instances - represented by the illustrations on the right in Figure 33); and interactive questionnaires (two to four instances - represented by the abstract designs on the left in Figure 33).

This branching structure embeds interactivity directly into the piece's narrative design, where the user clicks on each node to 'activate' it and either watch or read its material, or contribute to the piece's data collection procedure via the questionnaires. These questionnaires are also comprised of a standard structure, which can be split into three consecutive parts:

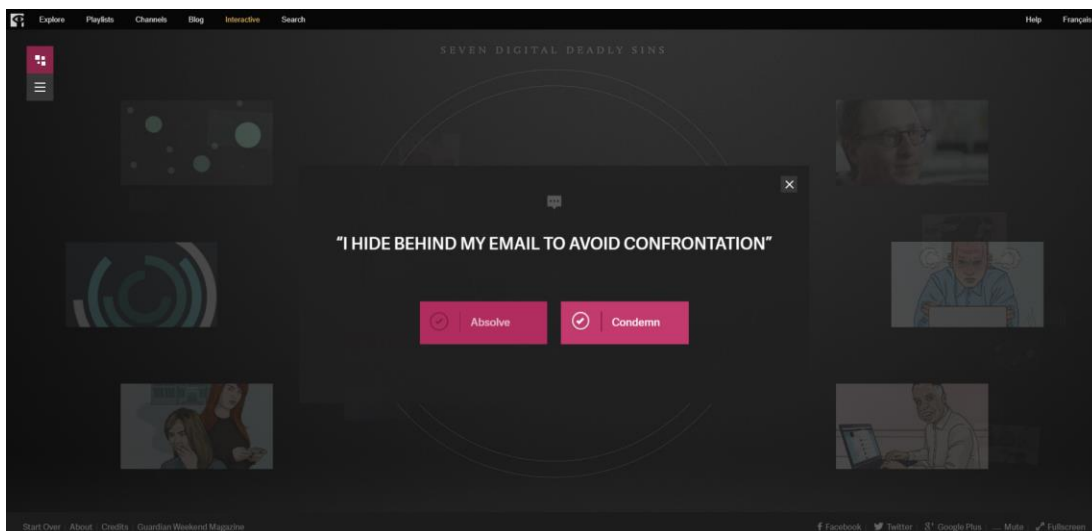


Figure 34: A screenshot indicating part 1 of the i-doc's interactive questionnaires (National Film Board of Canada 2014).

First, each questionnaire opens with a hypothetical action that users can elect to absolve or condemn. These actions relate directly to the subject matter of the individual sin (parent node) in

question and can even speak directly to the video or textual material represented by the rest of its child-nodes.

It should be noted that the language used in this part can feel a bit confusing - especially to English speakers who are not extremely fluent or familiar with the use of the terms “absolve” or “condemn” in this context. From a literary point of view, the use of language reinforces the objective tone of the piece - echoing a sense of neutrality amid its moral peculiarity. However, from a UX perspective, these prompts can feel unclear and conflict with the second part of the questionnaire’s structure:

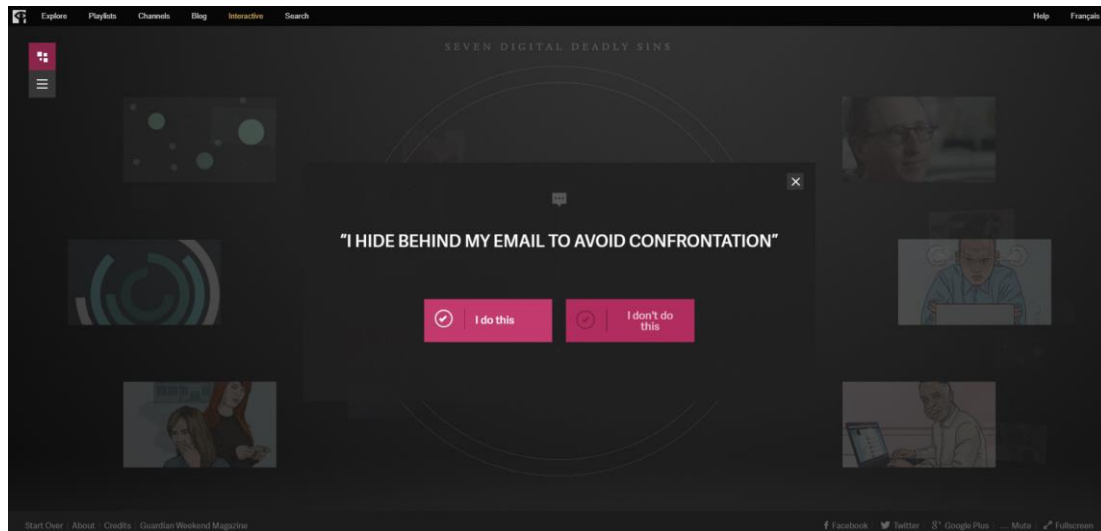


Figure 35: A screenshot indicating part 2 of the i-doc’s interactive questionnaires (National Film Board of Canada 2014).

After electing to absolve or condemn the hypothetical action, users are required to confirm whether they do or do not engage in such behaviour. But, these options feel even more confusing, as it is unclear whether the “I do this” or “I don’t do this” refers to the hypothetical action itself, or their previous input during the first part of the questionnaire. While one could argue that these prompts refer to the action as it is displayed on the questionnaire card, the rapid sequence from part 1 to part 2 could suggest a cognitive connection between user responses, rather than the action itself.

Ultimately, the micro-copy used in these questionnaires leads to a somewhat confusing UX, which can skew the results portrayed in the third and final part of its structure:

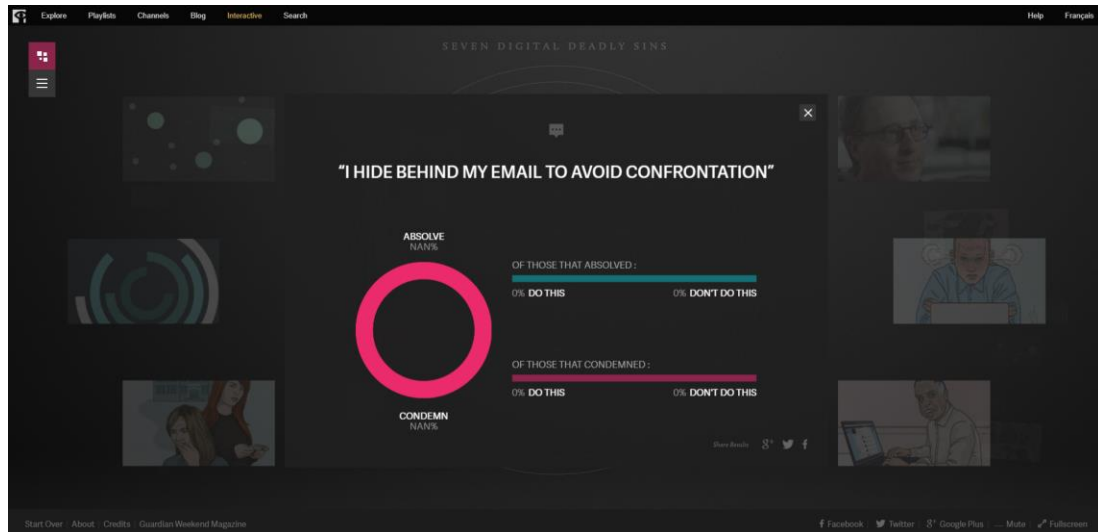


Figure 36: A screenshot indicating part 3 of the i-doc's interactive questionnaires (National Film Board of Canada 2014).

Once all user input has been collected, the questionnaire displays individual user responses amid those of other users who have previously engaged with the same questionnaire. It does so through animated visualisations via a colour-coded chart. The result is an experience that aims to confront the user's internal biases and potential hypocrisies amid both the documentary's subject matter and the attitudes of the general public. In other words, the final part of the questionnaire gauges the user's status as a 'sinner among sinners' - bridging the documentary's content and interactivity into a message that lands with impact, thanks to its experiential quality.

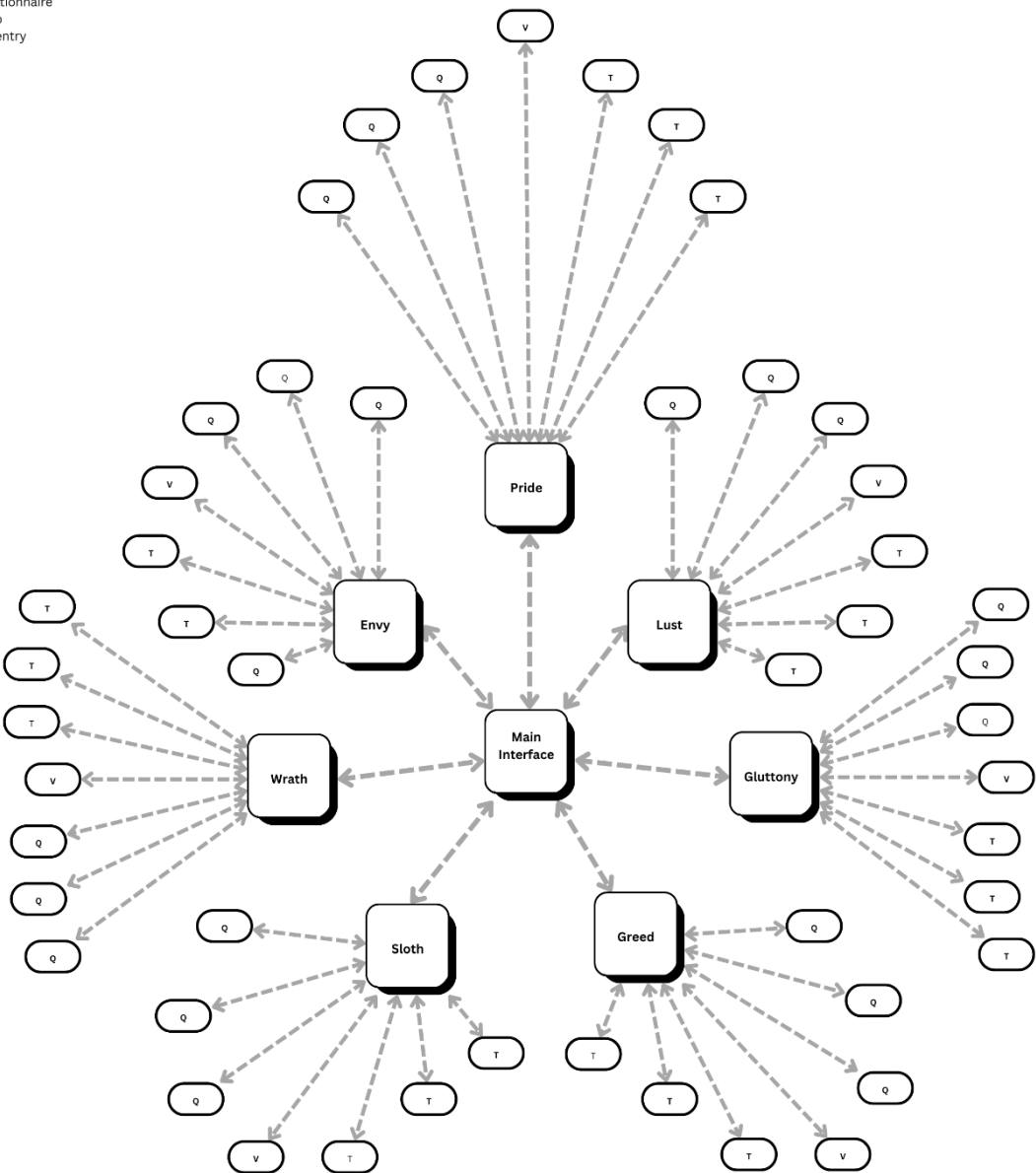
This pattern is repeated for every questionnaire throughout the documentary, reinforcing a reading convention that settles the user into its narrative flow. The outcome is an experience that unfolds through deliberate collaboration - not only between user, system and author, but also with other users. In Koenitzian terms, we can analyse its system design as follows:

Seven Digital Deadly Sins (2014) – A branching narrative system

Protostory

Narrative Design

Q: questionnaire
V: video
T: text entry



Assets

Video interviews, illustrated text entries and three-part interactive questionnaires. Additionally, interface features such as a limited colour palette, image tiles and typography can fall under this category.

Procedural Components

A tree or multilevel navigational structure that facilitates an exploratory narrative environment. This exploration is driven through click-based interaction, where individual nodes are activated through modal window overlays.

UI

In-documentary configuration settings for audio and full-screen features. To support its exploratory structure, three navigation menus (anchored to the top, bottom and far-left of the interface) are available throughout the documentary.

Narrative Vectors



Click-based navigation throughout the documentary's branching structure, including the main interface, parent nodes and child nodes. The user is free to navigate content as they please, with no obstacles or restrictions. This facilitates a two-way loop where the user may indefinitely travel 'back and forth' between content nodes.

Figure 37: A diagrammatic representation of *Seven Digital Deadly Sins* as an IDN system.

The system's protostory comprises a non-linear narrative design, supported by a branching web of content nodes. These nodes are exploratory, where click-based navigation reveals various lexia grouped according to their subject matter. This means that the user is free to explore nodes in the order and direction that they choose - without prompting or limitation. In contrast to *Millennials are Screwed*, the documentary's narrative vectors are looser and less directional to account for the system's nonlinearity. As a result, emphasis is placed on user navigation, where various interface cues such as menus and image overlays are used to guide the user's exploration, which will be elaborated further in the next part of this analysis (Process).

The outcome is a looping sequence of interaction, where the user explores each sin's child-nodes before returning to the documentary's main interface. This pattern continues until each sin has been reviewed to the user's satisfaction, or the user grows bored and chooses to explore a different branch. In doing so, we can observe how the system's architecture lends to a pattern of interaction that embraces its structural complexity without losing its user to its layers of narrative.

While the piece itself is limited to a single point of entry via the introductory video, the sequential ordering of its narrative offers numerous opportunities - where each sin and its associated material operate as a cognitive container for its own 'micro-narrative'. In doing so, the piece offers a considerable sense of autonomy to its user, contributing to a narrative experience that feels independent but never puzzling.

Choice is thus a central aspect of the system's design, with its most significant implications embedded in the interactive questionnaires. However, it should be noted that these questionnaires are no longer operational, retrieving null results upon user input. This has a significant impact on the user experience, as the outcome of engagement is far less confronting when the user's morality cannot be gauged against that of others. Data-driven pieces such as these necessitate digital preservation, which can become challenging given server maintenance and capacity constraints.

Process: A Disquieting Commute

In interaction design, user navigation is likened to the act of commuting (Tidwell et al. 2020, p.129). Navigation is focused on the user's understanding of the virtual environment or "information and task space" (Tidwell et al. 2020, p.130), its affordances and constraints (Tidwell et al. 2020). An interaction designer's ultimate goal is to produce an interface that allows the user to seamlessly 'travel' between different areas of a website, game or interactive narrative. When an interface is navigable, it encourages the UX flow state by allowing the user to focus on its content, messaging and functionality through an intuitive cycle of human-computer interaction.

There are two key concepts that interaction designers keep in mind when designing navigable interfaces:

1. **Signposts:** features that assist the user in understanding their immediate surroundings, including logos, window titles, captions and selection indicators. Here, global and utility navigation principles inform users of their location in a virtual environment and the potential avenues they can explore (Tidwell et al. 2020, p.130).
2. **Wayfinding:** the means through which users achieve their goals, based on environmental clues such as progress indicators, breadcrumbs and even modal windows (Tidwell et al. 2020, p.130-131).

While many interaction designers deal with interfaces displayed on flat surfaces, such as screens and monitors, the above concepts treat these planes as a spatial environment in which various objects (links, buttons, images and text) interact with one another. Further, various ‘spaces’ can be interconnected through hyperlinks, which suggests that lexia are contained ‘scenes’ of their own. This aligns with Koenitz’s notion of the protostory’s environmental definitions (Koenitz 20015); and is also reminiscent of video game design, where different levels are constructed within separated virtual spaces called ‘scenes’.

Seven Digital Deadly Sins makes use of signpost and wayfinding techniques to situate the user within its branching network, while also curating a narrative environment that operates as a ‘safe space’ for their engagement with its material.

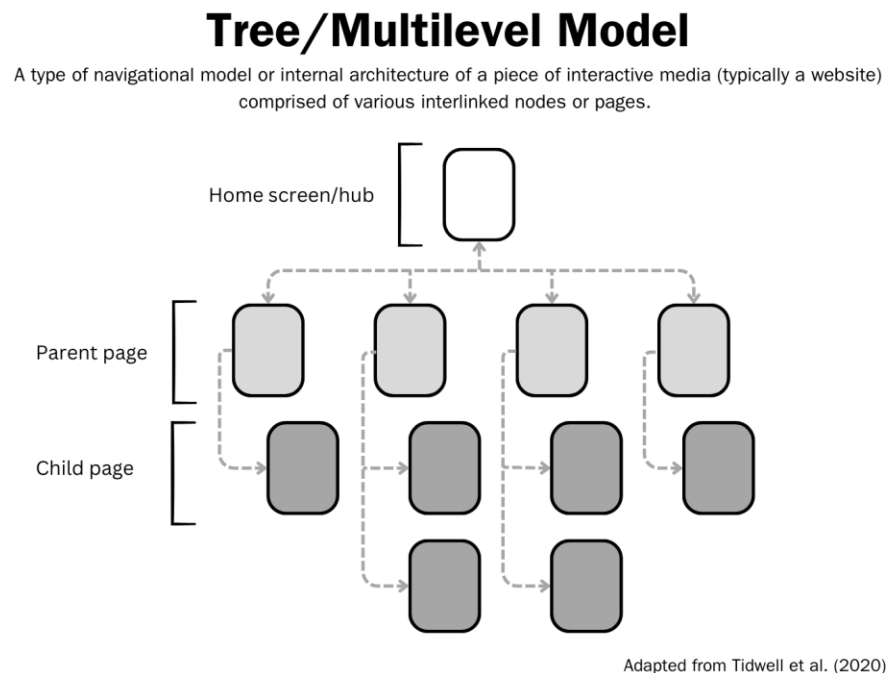


Figure 38: An adaptation of Tidwell’s diagram depicting the tree/multilevel navigational model (Tidwell et al. 2020, p.138).

In a pragmatic sense, the documentary’s use of menus, modal windows and progress indicators (magenta and patterned overlays) all work to track the user’s journey throughout the piece. To do so, the piece makes use of a “tree” or “multilevel” navigational model - a type of system architecture

comprised of a single home screen or ‘hub’ (in our case described as the ‘main interface’) linked to multiple pages (nodes), which in of themselves comprise a series of sub-pages that can only be accessed via the parent page (Tidwell et al. 2020, p.138). These pages link directly back to the home screen, meaning that a user can click through them to explore individual nodes before returning to a consistent point of origin. By implementing a single point of entry, the piece establishes a pattern of interaction that affords a seamless, directional UX. This is achieved through the consistent use of modal panels that can be easily opened and closed to return to the documentary’s main interface.

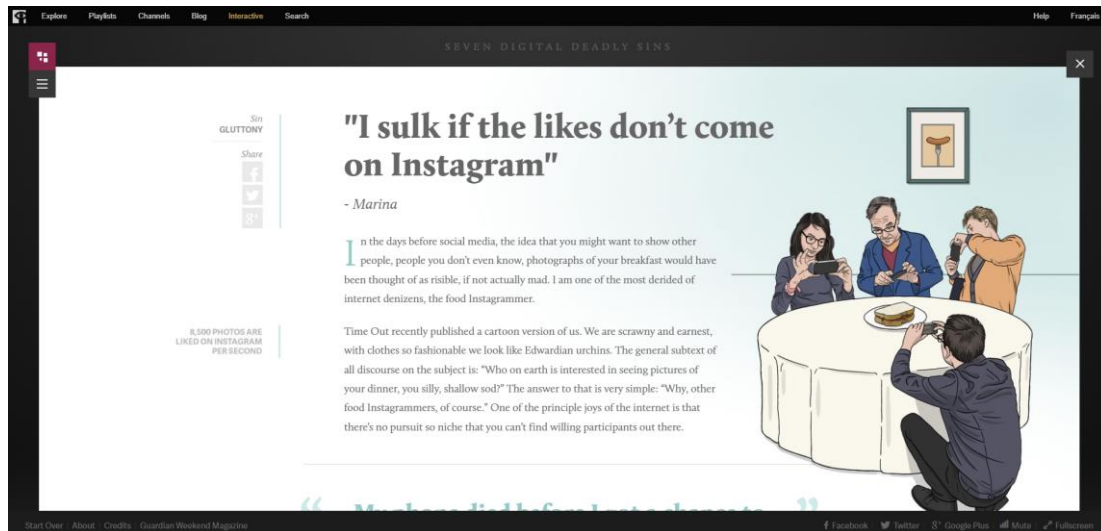


Figure 39: A screenshot of a modal panel for the sub-node, ‘Gluttony’ (National Film Board of Canada 2014).

While these navigational features make the documentary easy to operate, its multimodal nature creates a story environment that operates similarly to a magic circle - where no harm or external consequences occur outside of the system’s boundaries. This is reinforced by the anonymity of the questionnaires, constructing a ‘safe space’ where the user may confront their internal taboos or biases, free of judgement.

Strikingly, the instantiated narrative can be described as a voyeuristic experience founded on the interplay between the intimacy of the documentary’s material, and its invitation for user interaction. While the user drives the narrative’s sequential ordering, this has little bearing on the embedded narrative’s messaging. Instead, the true impact of decision-making is felt through the questionnaires, where we see participation manifest as a confrontation between user and system, story and audience. Because the questionnaires are thematically connected to each sin and its subject matter, participation is used to echo an embedded message by making the user complicit in the journalistic process - almost as though they, too, were an interview subject.

The potential outcome is a memorable user experience, where the piece deliberately lures the user into a sense of security through its confidentiality, before urging them to come to terms with their own attitudes and behaviours. The contrast between seeing and being seen - especially in and among the greater public opinion - is what ultimately delivers the piece’s core message with impact.

Product: Action and Interaction

By trusting its users' decision-making and facilitating their journey through a concentrated focus on navigation, *Seven Digital Deadly Sins* is a stark reflection of the human condition in the virtual environment. To do so, it communicates a layered narrative through multimodal representation and branching system architecture - a classic choice-based design technique employed in games and interactive fiction alike (Crawford 2013).

Most significantly, the documentary uses these design features to directly integrate its user base into the journalistic process, using data collection and visualisation techniques to secure its messaging. This approach capitalises on the networked and decentralised nature of the digital environment and reimagines what public representation and participatory discourse could look like in the journalistic process. In doing so, the piece instantiates a narrative experience that is driven by user intuition, and which plays on their emotions. Further, by recording the user's data in such a way, their voice is integrated into public discourse in a way that is emblematic of interactive documentary as an experimental genre that uses interactivity as a means of public advocacy *and* narrative delivery.

However, while the questionnaires 'change' based on user input (visualised via shifting data metrics) and the user is free to navigate the piece autonomously, the documentary does not necessarily afford agency in the theoretically accepted sense. While these changes are evident and impactful in the sense that they create experiential meaning, the system itself is not necessarily designed to instantiate narrative through embedded opportunities. As an experiential product or commodity, the system's impact is perceived through its intimacy with interview subjects, and positioning the user among these subjects, rather than centring the user as a narrative agent.

Through this experience, the piece addresses Shishkin's User Needs Model 2.0 on three levels: understanding, by unpacking various digital behaviours and their impact on society; doing, by building connections with others in society via questionnaires and reported narrative; and feeling, by playing into user emotions as a way to instantiate meaning or learn a lesson from the piece, which they could hopefully apply to their own lives.

In terms of its dimensions of engagement, the piece is sticky, evidenced by its navigational design and multimedia expressivity, which provides interest and cognitive breathing room between media types. The immersive audio also assists in creating a vacuum for user engagement. Further, the documentary supports depth through multi-page (or multi-node) navigation. It also offers visibility to both the NFB and The Guardian websites as outbound links are built directly into its navigation menus. If the questionnaires were operational, they would also provide a measure of the piece's popularity, already tracking engagement metrics as a value-added feature on the publication's part.

3.3. *Bad News* (2018)

Bad News is a serious game developed by GUSMANSON, hosted by TILT and licensed by the Cambridge Social Decision-Making Lab at Cambridge University. This piece was designed to be an educational tool focused on media literacy for users aged 14 and up (TILT 2018).

As an interdisciplinary project, the game was developed with scientific insights in mind, particularly inoculation theory. With roots in social psychology, inoculation theory suggests that an individual's attitudes or beliefs can resist external influences by exposing the individual to weakened or watered-down versions of those external factors (Compton et al. 2021). *Bad News* uses inoculation theory to educate its users on the dangers of disinformation and fake news by exposing them to the manipulation tactics used by "fake newsmongers" (TILT 2018). To do so, it challenges the user to embody the role of such a newsmonger. Their goal is to acquire as many followers and as much credibility as possible, by publishing the most outlandish and conspiratorial material possible (TILT 2018).

With a primary focus on educating the public, the game is free to play online and contains numerous links to external resources, as well as an [information sheet](#) that can be used by educators and researchers alike.

The piece makes use of several ludic elements to convey its messaging, largely observed through its format as a choice-based text adventure. While rooted in reality (with direct references to Twitter, now X), the piece unfolds in a fictional universe where the user plays as the editor of a fake news publication. Their initial decisions revolve around shaping this publication's presence and persona, where the user chooses to publish different headlines and Twitter posts - all to gain as much public attention as possible. Eventually, the user's choices lead them down a path of destruction, stirring up controversy among the game world's public officials and even garnering the attention of more credible news outlets.

Through roleplay, the game conveys its message via system dynamics. As the outcome of choice-based mechanics in motion, these dynamics are reinforced by the game's voice or narrator - a nameless, omnipotent presence that consistently reminds the user of their goal. In doing so, this narrator also quells any moral doubts the user may experience and even corrects their decision-making by eliminating all 'ethical' options until the user is forced to take the darkest path.

Structurally, the game's choice design uses collapsing decision trees or "foldback schemes" (Crawford 2013, p.118-121) to create the illusion of agency, which sustains a linear narrative experience. Most notably, the system's choice architecture creates meaning through play by providing a boundary within which the user may operate and experience the consequences of their actions.

System: Linear Agency

Like *Seven Digital Deadly Sins*, *Bad News* relies primarily on click-based input. The game's title screen makes a striking impression, emblazoned in yellow with an overlay of animated keywords that procedurally pop in and out of view. From a semiotic perspective, these keywords highlight some of the themes tackled by the game's embedded narrative and mimic notification pop-ups typical across digital platforms. In doing so, the game sets up its story environment well before gameplay begins.

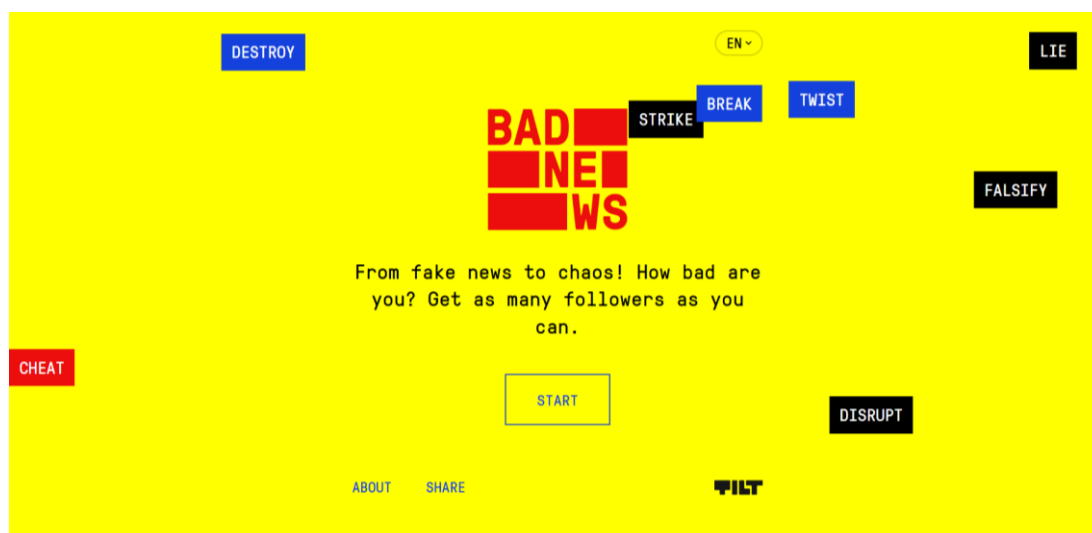


Figure 40: A screenshot of the *Bad News* title screen, indicating keyword pop-ups (TILT 2018).

While visually striking, these cues are subtle, and the game's interface remains minimalistic throughout. This approach emphasises its text-based format, with accessibility features built directly into its layout, including a button to toggle language options, a high-contrast colour palette for readability purposes, and a sans-serif typeface suitable for digital displays. As a text-based adventure, all of these features contribute to the gameplay experience by ensuring that the interface remains clear and readable to users of various nationalities, demographics and reading levels. This is reinforced by the tone and style of the game's copy, which remains personal and accessible through the use of colloquial language and the second-person perspective.

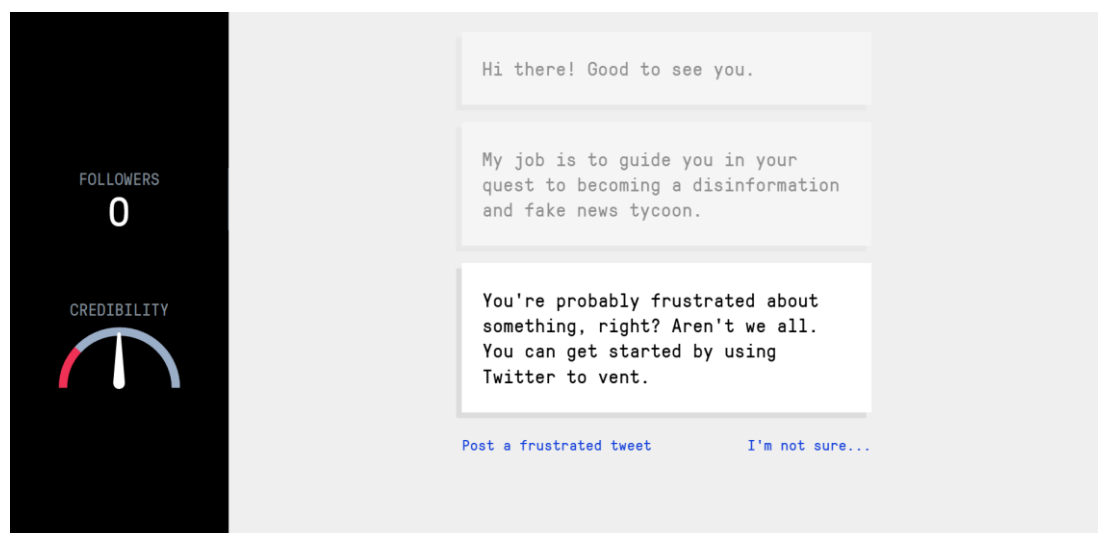


Figure 41: A screenshot of the *Bad News* primary playspace, indicating follower and credibility metrics on the left, and a text input-and-response interface on the right (TILT 2018).

The game's playspace comprises a two-column layout (pictured in Figure 41), with two progress trackers located in the left column and the main text interface located in the right column. 'Narrated' content appears in white text boxes, presumably from an unnamed guide or influence that reasons with the player and directs their decision-making. The system affords three types of choices or decisions:

1. **Dialogue options:** available as blue text underneath narrated segments (pictured in Figure 41). These are predominantly binary options, creating branching paths that ultimately collapse into a single decision tree (see Figure 42 below). These options are framed as actions the user can take or their dialogue with the system's narrator.
2. **Twitter posts or article headlines:** typically presented in a group of three to four possibilities - each garnering a different response from loyal Twitter followers. Some of these options present as Twitter memes.
3. **Drop-down options:** available in late-game questionnaires, which are used to 'test' the user's knowledge once they have collected all of the game's badge rewards.

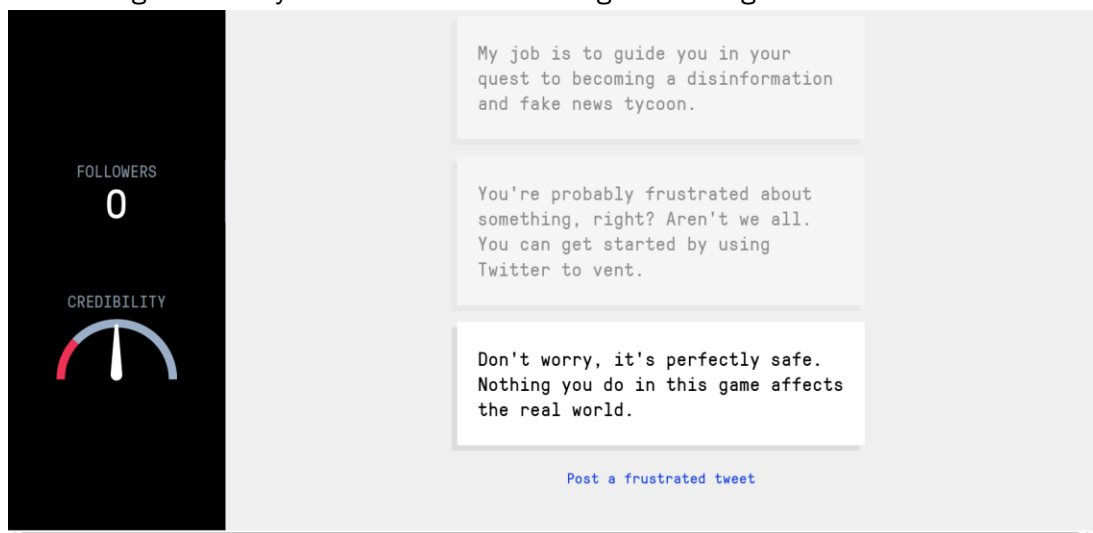


Figure 42: A screenshot indicating a collapsing decision tree, following the prompts displayed in Figure 41 (TILT 2018).

Like *Seven Digital Deadly Sins*, user decision-making is central to the system's architecture, which operates in a multilevel or branching structure. However, instead of looping back and forth between nodes, the user's choices direct their journey along a linear pathway that cannot be reversed. This creates a sense of finality in the user's decision-making process, where the consequences of their choices affect the rest of the gameplay experience. The relationship between choice, consequence and experience creates a sense of agency, as theoretically described by Murray (Murray 2016).

The result is an emergent narrative that is shaped by embedded opportunities. The emergent narrative is instantiated by the user's decision-making, where they create a pseudo-publication, and

share Twitter posts and article headlines (with varying results). Meanwhile, the game's embedded narrative is the dominant part of the story experience, which largely remains fixed with potential pathways eventually collapsing into a single opportunity as pictured in the progression from Figure 41 to Figure 42. Crawford refers to this collapsing structure as a “foldback scheme” - a design method used to prevent branching systems from becoming overly complex or “geometrically exploding” by redirecting deviating branches to ‘loop back’ into the main, embedded rather than extending into a separate pathway entirely (Crawford 2013, p.121-122).

The result is a system that takes on a more axial structure, rather than the arboreal structure employed in *Seven Digital Deadly Sins* (refer to Figure 46 for a visualisation of this structure). This creates the illusion that the user has a say in their role as a fake newsmonger, but they are ultimately pushed along a pre-scripted pathway. Unlike in more traditional story games, the revocation of agency does not feel limiting so much as it is *illuminating* through its use as a *narrative device*.

This is due to the narrator's constant presence, who establishes a one-on-one relationship with the user. This narrator reasons with the user and ultimately influences their choices down the morally dubious path. From a narrative perspective, this relationship drives the piece's messaging by emphasising moral disengagement as a core theme. The relationship between the user and the narrator, combined with their limited yet flexible decision-making, creates a gameplay dynamic that reinforces the game's messaging by situating the user within the psychology of a fake newsmonger. By allowing the user to initially choose the moral high ground and then challenging this morality by taking away their autonomy, the system highlights that fake news prioritises followers and public influence rather than ethics and integrity.



Figure 43: A screenshot of a triadic choice opportunity, where the user may select the name of their pseudo-publication (TILT 2018).

By balancing agency with passivity, the system creates a narrative environment that is cohesive in its messaging, while simultaneously embedding the user in its story world. In doing so, the system can tackle the ‘problem of agency’ by delivering a fixed plot facilitated by user intervention - not only as

an embellishment but as a means of tapping into the user's mindset and questioning their convictions. In this sense, agency and the lack thereof facilitate user engagement on two levels: directly with the system, and indirectly through their moral positioning.

Balance is a game design principle that ensures different elements of a ludic system operate equitably - such as balancing skill and challenge in a way that feels competitive and engaging to the player, while not frustrating them to the point of quitting (Brathwaite and Schreiber 2009). Balance can also refer to the distribution of roles in multiplayer games, where both teams should have equal opportunities for success.

In *Bad News*, the balance between agency and passivity ensures that the user can focus on both narrative progression and goal achievement. Unlike other case studies in this analysis, *Bad News* presents the user with a core objective right from the start: they must acquire as many followers as possible. By the end of the game, they are encouraged to challenge their friends by sharing both their score and a link to play the game.

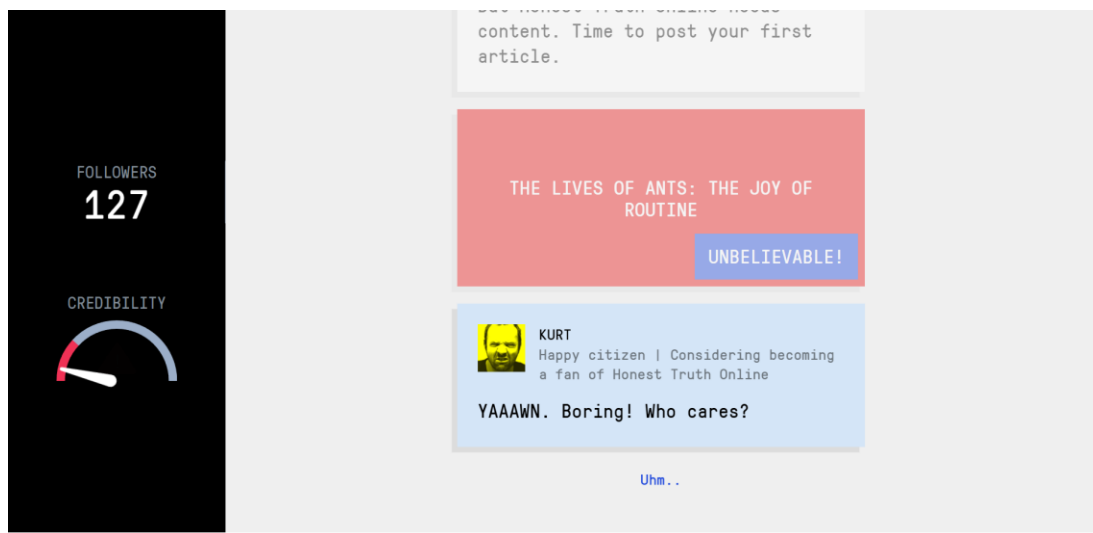


Figure 44: A screenshot indicating an unsuccessful outcome (TILT 2018).

Throughout the game, the user is positioned as more than a reader or voyeur of its narrative (as seen in previous case studies). Instead, the user operates as an active, in-world character who is directly responsible for the success of their publication - and is held to account by in-game actors if their performance is not up to standard.

The game's narrator is one of these actors, however, other actors include the publication's loyal followers who respond in kind or protest to the user's selections. Most prominent is Kurt (pictured in Figure 44) who is often used to highlight the reception of fake news from the 'public perspective' - where content should be conspiratorial and interesting, but not too unbelievable. In this sense, the notion of balance echoes throughout the system's design and user engagement, where their gameplay strategy should consider the credibility of their selections in line with their follower base.

The more effective the user's selections, the more followers they gain and vice versa. While this dynamic is framed as a reward in that it assists the player in reaching their goal, the game also employs a badge-reward system based on skill mastery.

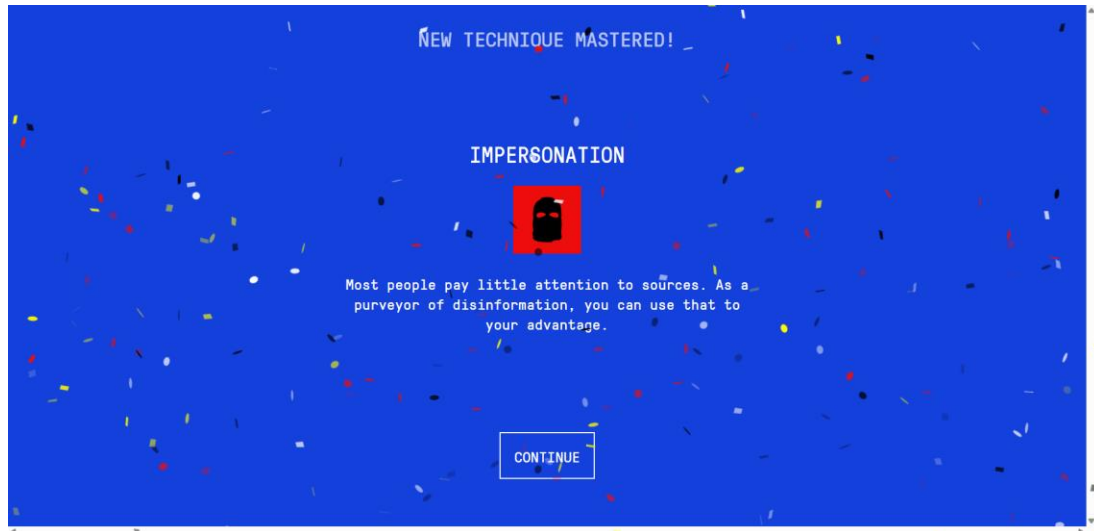


Figure 45: A screenshot indicating the achievement screen for the Impersonation technique (TILT 2018).

In this context, skill mastery refers to the acquisition of “disinformation techniques” used by fake newsmongers in the real world. Each disinformation technique is awarded with a badge that is eventually displayed on a collector’s grid. It should be noted that there is a dissonance regarding in-game skill acquisition, as these techniques do not facilitate gameplay strategically or mechanically. Instead, these skills refer to the user’s ability to identify and critically interrogate fake news in the real world, based on six key strategies used by fake newsmongers.

These badges are unlocked based on the user’s progression throughout the piece’s narrative, rather than their ability to overcome in-game challenges, and can be used to determine the system’s structure in Koenitzian terms:

Bad News (2018) – An agencyful narrative system

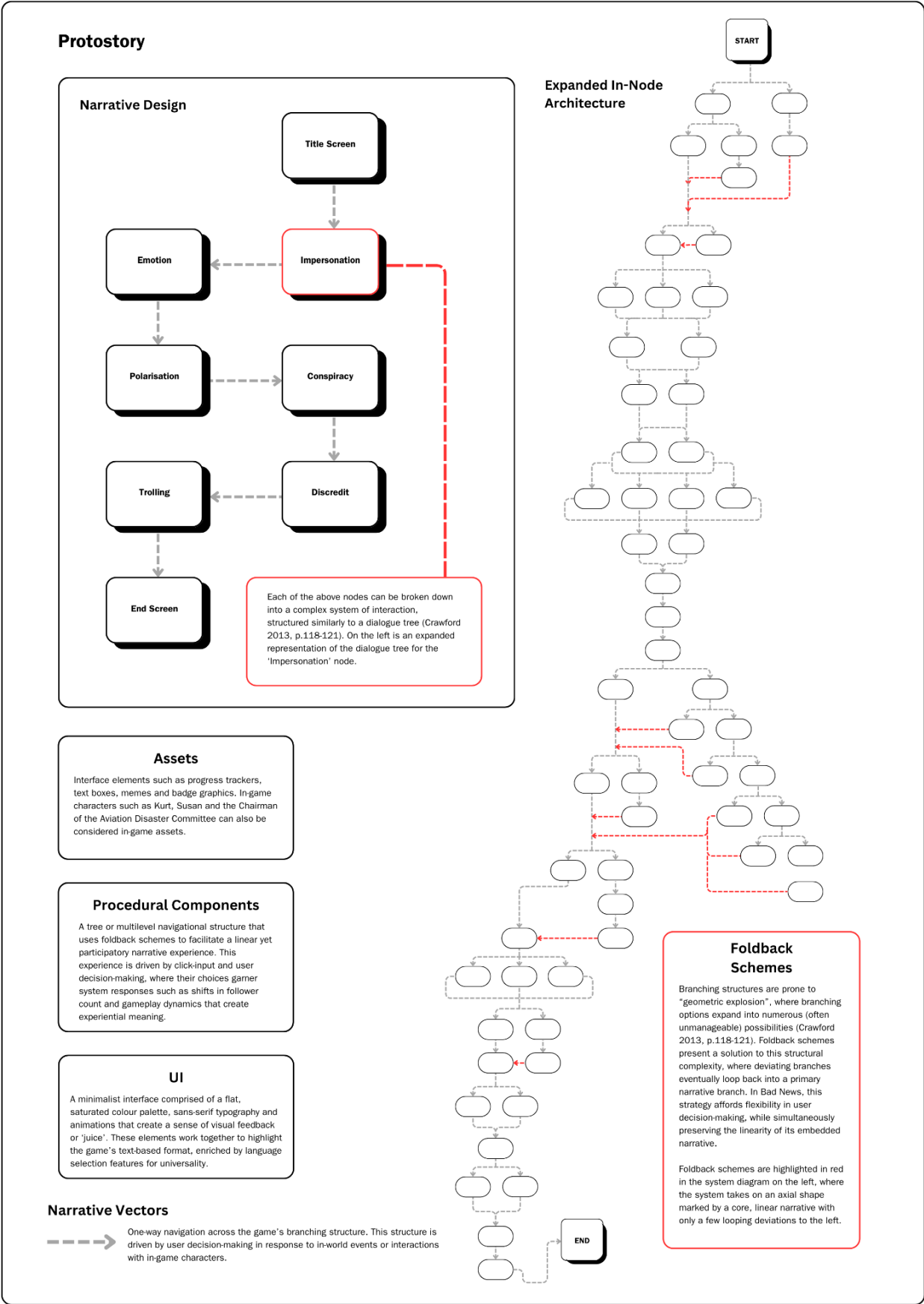


Figure 46: A diagrammatic representation of *Bad News* as an IDN system.

Using badge-rewards as an identification mechanism, the protostory's narrative design can be broken down into six primary 'levels' or narrative branches, each of which follows a linear progression driven by collapsing decision trees. However, some decision trees allow for variation in the instantiated narrative - particularly regarding customisable elements and the user's success rate in posting credible fake news. These decision trees are driven by the piece's narrative vectors, which culminate in the user's decision-making in response to in-world events or their interactions with in-game characters.

The piece's assets include badge graphics; progress trackers; and text boxes that represent narrated segments, Twitter posts and memes, or article headlines. In-game character profiles, such as Kurt, can also constitute in-game assets, along with associated typographic elements. These assets comprise the piece's minimalist UI, which makes use of various animations to create a sense of visual feedback that feels responsive and visually engaging (often referred to as 'juice' in the game design spaces).

Process: Rewarding Bad Behaviour

By Bogost's definition, *Bad News* is a literacy newsgame aimed at educating users on the importance of good journalism and the impact of false information within the greater social and political landscape (Bogost 2010). As we have seen, the game conveys its messaging through the illusion of agency, where the user may play within the system's boundaries. In doing so, it generates experiential meaning through an instantiated narrative as a result of the user's decision-making process.



Figure 47: A screenshot indicating a moral impasse in the game's 'Impersonation' badge level (TILT 2018).

This is facilitated by the game's virtual environment, which (much like *Seven Digital Deadly Sins*) operates as a magic circle where the user may question and deliberately override their convictions in favour of a higher score. In adopting this position, the game blurs the boundaries between user and author in the sense that the user embodies the role of a morally corrupt journalist. Like *Seven Digital*

Deadly Sins, this internal conflict and role reversal creates a stark contrast that ensures the piece's messaging lands with impact - felt in a way that is both engaging and memorable.

A key aspect of this impact is the sensation of fun - echoed by the narrator's coy attitude, the confetti animations and even the amusing profile descriptions attributed to loyal followers. These diegetic elements work to create a playspace that is approachable and relatable, while simultaneously dealing with its serious subject matter.

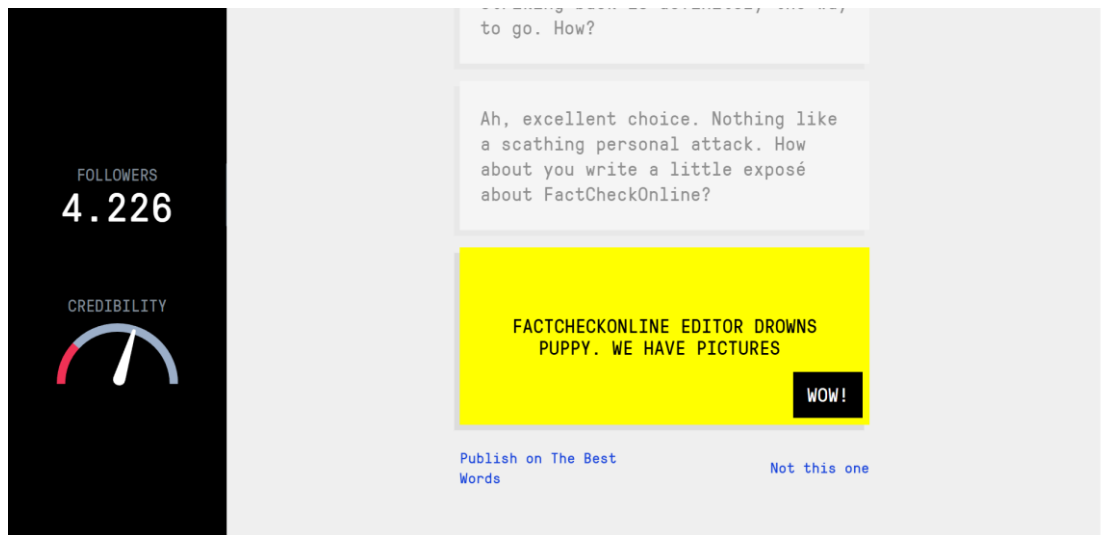


Figure 48: A screenshot of an attack option, aimed at the Factchecker character under the 'Discredit' badge level (TILT 2018).

While fun gets the user 'stuck into' the system and its narrative, its chronology and progression are upheld by the user's interaction with in-game characters who present embedded opportunities for experiential learning. The user encounters these characters while learning disinformation techniques, and includes Susan, Joe and Jolene, whose lived experiences can be exploited for views in pursuit of the 'Polarisation' badge. Some in-game characters pose challenges, such as the Factchecker encountered under the 'Discredit' badge, whom the user can 'attack' to boost their credibility (while discrediting a morally just organisation in the process).

The piece's climax also involves the downfall of an in-game character under the 'Trolling' badge, the Chairperson of the Aviation Disaster Committee, who the user can force to resign after casting doubt on their competence during an overblown aircraft investigation scandal. This scandal is the result of both an embedded opportunity and a foldback scheme - testing the user's moral resolve or willingness to abide by the system's (bad) influence. Irrespective of their moral positioning, the outcome remains the same, and the Chairperson eventually resigns.

These encounters occur chronologically, compounding into a sequence of events that showcase the impact fake news can have on real individuals, organisations and the media landscape at large. More relevant now than ever before, this message is packaged in an inconsequential magic circle, where the user may succumb to the system's affordances and constraints and learn by becoming the very enemy the game seeks to expose.

By integrating badge-rewards in return for ‘bad behaviour’, the system urges users to invest themselves in its storyline and ultimately learn through their roleplay. In doing so, the system achieves its goal as an educational artefact without outwardly reminding the user of this intention (at least until the ‘test’ sequence at the very end), or even the bells and whistles of a graphics-heavy virtual environment. The experiential outcome is an exercise in critical thinking and pattern recognition, inoculating users against the predatory nature of fake news by letting them into the mind of the fake newsmonger.

Product: Learning in Action

Ultimately, the game’s product is an educational experience interwoven with aspects of challenge and reward. Most unique is the element of fun it brings to the table, which is built into its systemic structure through both media expressivity and agencyful system architecture. However, its most valuable commodity is the knowledge it imparts to the user, which should bear significant staying power given the user’s embodied experience within the fake news cycle.

This experience is a consequence of the piece’s self-referential undertones, where the role reversal of user-as-journalist centres the user as a story actor who is responsible for their actions and outcomes. While the game does not necessarily present unbridled user agency, its architecture provides sufficient room for the user to learn from their mistakes - highlighting the plasticity of the virtual environment as a magic circle where users may play and fail without experiencing real-world consequences. Making the most of this environment, *Bad News* draws parallels with the real world by alluding to current affairs and embedding Twitter as a core aspect of its narrative and systemic operation (follower counts, posting, responding, etc.)

In doing so, *Bad News* enmeshes play with reality in a way that is simultaneously inconsequential to the user’s well-being, and consequential to their outlook and engagement within the digital media environment at large. Thus, the piece fulfils user needs on all levels, where knowledge is gained by learning about fake news and its impact on the greater media ecosystem; understanding occurs by playing from the perspective of a fake newsmonger, and perceiving the consequences of fake news on both the public (loyal followers) and in-world characters (the Chairperson and Factchecker); doing is fulfilled by the game’s equipping of the user with the necessary skills to identify and interrogate fake news in the real world; and feeling by fulfilling these needs in a fun and relatable way.

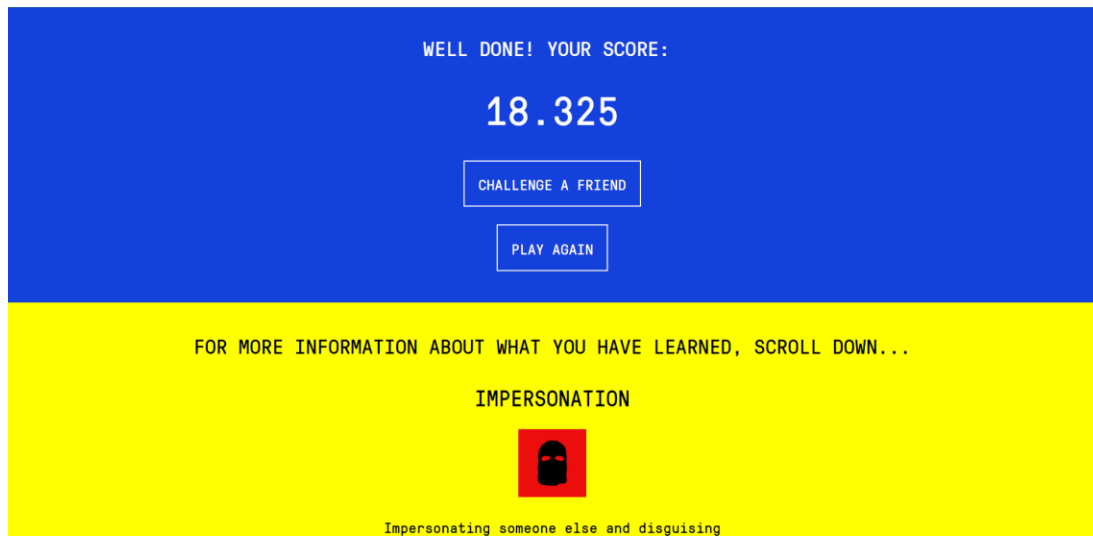


Figure 49: A screenshot indicating the game's end-screen (TILT 2018).

On the level of engagement metrics, the piece harbours stickiness in its ability to sustain user attention through agencyful participation; depth in its multi-page navigation; and visibility and popularity in the challenge it poses to users in both the start and end screens - using high scores as a tempting invitation for individual replays, as well as sharing with one's network (once capitalising on this characteristic of the digital environment).

Chapter 4: Discussion

Recommendations for Interactive Digital Nonfiction

After an extensive interrogation of interactive digital narrative (IDN) in theory and practice, we can revisit our research question one last time:

How can interactive storytelling principles be applied to digital nonfiction to secure a greater currency of engagement among digital users?

The case study analysis conducted in Chapter 3 provided numerous insights into the narrative and systemic trends exemplified in three pieces of interactive nonfiction. All three pieces maximised their use of the digital environment, not only as a platform for distribution, but also as a storytelling medium. In doing so, they prioritised new media's networked, convergent and interactive characteristics to facilitate experiential narratives that spoke to lived realities.

As instances of interactive nonfiction, these case studies illustrate user engagement strategies that serve user needs (as per Shishkin's User Needs Model 2.0) and address issues of news fatigue and avoidance, atomised news reading and (to some extent) platform instability. While different genres of interactive nonfiction, the case studies all operate as IDN systems and thus echo similar design principles. As a result, the case studies also illustrate the merger of journalistic storytelling techniques and interactive narrative design towards nonfictional narrative as a user-centred experience.

By using our theoretical framework to interpret these case studies as IDN systems, we can identify five significant narrative design trends born from the merger of journalism and interactive storytelling: (1) medial expressivity; (2) interactivity as a spectrum; (3) navigation and accessibility; (4) system architecture as experience design; and (5) shareability.

4.1. Design Trends in Interactive Nonfiction

Medial Expressivity: Story in Layers

Nicklin refers to medial expressivity as an interactive narrative's 'voice and style' represented through a combination of visual style, interface design, and the tone of in-game copy (Nicklin 2022). Feedback cues, such as audio integrations, animations, visual effects and scene-to-scene transitions, could also be examples of medial expressivity, as they convey embedded narrative through multimodal forms.

This multimodality is prevalent throughout all three genres of interactive nonfiction observed in this study. *Millennials are Screwed* utilises emphatic language, scroll-activated animations and data

visualisations to direct user attention and appeal to their emotions; *Seven Digital Deadly Sins* combines background audio, video interviews, illustrated text entries and interactive questionnaires to create a safe space where users can explore reported and internalised taboos; and *Bad News* utilises relatable narration, meme culture and progress trackers to create a magic circle that is both familiar and inconsequential - the ideal environment for immoral roleplay.

While multimodality leverages the modular and encyclopaedic nature of the digital environment (as a capacious and flexible platform for communication) (Manovich 2002; Murray 2016), this approach also embraces long-standing traditions in reporting and publishing, where newspapers and broadcasters readily combined image and text, video and audio to convey information through increasingly visceral means. For example, the use of photojournalism to capture a moment in time or reinforce a text-based article's messaging, as we observed in [our discussion of *The Falling Man* in Chapter 2](#).

In digital systems, this multimodality manifests itself through the combination of abstraction layers, from the repeating UI design patterns evident in *Seven Digital Deadly Sins*' internal architecture, to *Millennials are Screwed*'s use of typography to differentiate between section headers and body text. Collectively, these layers convey meaning through the combination of sensory cues, which, when initiated by user interaction, contribute to the overall user experience and instantiated narrative. In this sense, medial expressivity is used to communicate meaning by curating a diegetic environment unique to the piece and its messaging, and presenting information in a way that enhances the user's ability to process it through multiple sensory cues

As a result, medial expressivity represents and upholds the system's narrative environment, story world or playspace from the user's point of view. In other words, medial expressivity communicates the system's affordances and constraints as a magic circle - be it through the animated confetti in *Bad News*' badge reward screens, or the magenta overlays used to indicate interactive tiles in *Seven Digital Deadly Sins*. In Koenitzian terms, this expressivity is upheld by the system's assets and UI. These are designed to form the cognitive framework that supports uninterrupted user engagement and attention, a feature central to multimedia journalism (Hiippala 2017), and applicable to i-docs and newsgames.

Overall, medial expressivity is a design principle that focuses on the representation of the system as a narrative environment. This environment is cohesive and expressive of a system's aura, themes and message through multimodal or multisensory cues. The result is often a stickier or immersive narrative experience that can sustain user attention for longer periods, ideal for long-form works of nonfiction.

Interactivity as a Spectrum: Rethinking Agency

Interactivity is a defining aspect of IDN, where a closed feedback loop between human and computer facilitates a cycle of communication that can be likened to a pre-scripted conversation (Crawford 2013; Murray 2016). However, we also understand that interactivity is a much-contested concept due to its ambiguity in describing systems with varying degrees of user interaction. In [Chapter 2, we expanded on this by presenting agency as an alternative concept](#), where *meaningful* interaction is

marked by a perceptible change to the narrative system, based on user decision-making. This meaning should be contextually relevant, where user decisions are informed by past (and potentially future) experiences within the magic circle (Murray 2016).

Despite being a key concept in interactive narrative and game design, agency is problematic due to its contested relationship with the fixity of a predefined plot (Crawford 2013). *Bad News* was the only case study that manifested agency by theoretical definition. *Seven Digital Deadly Sins* was a close second, where users had the autonomy to make decisions about the chronology of the narrative experience and contribute to a pool of data. *Millennials are Screwed* came last in support of agency, where the user's scroll input was treated as an interactive feedback mechanism rather than a catalyst for diegetic change.

This treatment of agency or interactivity correlated to the user's relationship with the digital system and its instantiated narrative. Where *Bad News* positioned the user as a protagonist - a narrative actor responsible for in-world calamity; *Seven Digital Deadly Sins* positioned the user as a voyeur and interloper of covert behaviours; and *Millennials are Screwed* positioned the user as a reader on a narrated journey.

However, the case studies that lacked agency were not necessarily ineffective as IDN systems. In the context of nonfictional narrative, which values accuracy and ethical representation, such a degree of user control is not always necessary or beneficial to a reported outcome. Instead, the more ambiguous notion of interactivity can be used to facilitate a reading experience that *feels* involved and engaging, without risking the vulnerability of its users or even its contributors/subjects.

Through each case study, we observed interactivity manifest itself in three forms: participation (*Millennials are Screwed*), autonomy (*Seven Digital Deadly Sins*) and agency (*Bad News*). While maximising the participatory and procedural affordances of the digital environment (Murray 2016), these observations urge us to rethink notions of agency in the context of digital narrative. Ludic systems are agencyful in that they afford a sense of play or experimentation within predefined boundaries. *Millennials are Screwed* offers an experience that *feels* playful in its presentation and rhetoric, but which is not considered play by theoretical definition. In doing so, the system conveys an engaging but linear narrative sequence, creating the illusion of user involvement through scroll-activated animations and data visualisations.

Seven Digital Deadly Sins provides the freedom of movement and choice typically found in ludic systems, but these elements lack a predetermined objective to ground them. While user interaction determined the chronology of the sequence of events, the content of its story nodes remained fixed. This suggests that decision-making can generate meaning on a participatory and collaborative level, without requiring the user to alter the narrative's content directly. The interactive questionnaires reinforce this notion, where the user contributes to a collective opinion, discerning meaning through a visualisation of their responses in comparison to those of other users.

Finally, *Bad News* manifested true agency, creating meaning through user decision-making, which ultimately shaped the instantiated narrative. However, even this system relied on the illusion of agency rather than total agency. In doing so, it allowed just enough flexibility for the user to feel

recognised and involved in the story world, while also ushering them along a linear sequence of events. As the user progressed, foldback schemes looped deviating branches back into the same linear narrative, indicating that user decisions were inconsequential to the narrative's trajectory. In this sense, decision-making was used to highlight the piece's themes concerning morality and ethical reporting, delivering its messaging through a user experience grounded in moral contrast or disengagement.

Interactivity is a Spectrum

Which can range from hard (very interactive) to soft (somewhat interactive) integrations. This hardness or softness is measured by the degree of a user's impact on a system, program or narrative based on their ability to make decisions or initiate change within the system's architecture. Harder forms of interactivity are considered to be more agencyful.

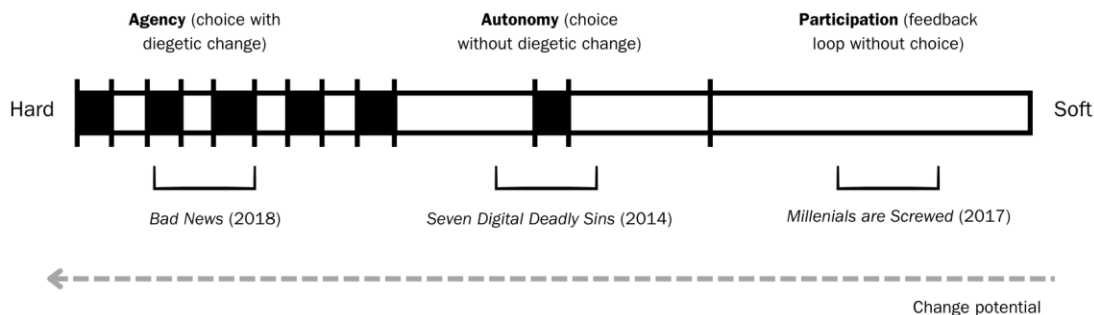


Figure 50: A diagrammatic representation of interactivity as a spectrum.

In [Chapter 2, we compared Wikipedia and Stardew Valley as different types of interactive systems](#), each possessing varying degrees of choice. We see the same principle manifest in the above case studies - reinforcing that interactivity is a spectrum, from open to closed, hard to soft or generative to fixed. Further, a lack of agency or flexibility was not identified as cumbersome or restrictive to the overall user experience - all three case studies achieved a seamless UX flow state despite their degree of interactivity. This suggests that agency is not the only way to create meaning through user participation, where other forms of interactivity can be used as a narrative device that positions the user's relationship to the system and ultimately informs the type of narrative experience they will encounter.

In the context of interactive nonfiction, the 'problem of agency' is not as complex as ludic theory suggests. Further, differing degrees of interactivity facilitate system architecture that speaks to the ultimate goals or purpose of its narrative - where a system intended to inform may benefit from 'softer' forms of interactivity (such as *Millennials are Screwed*); while a system intended to educate may benefit from 'harder' forms of interactivity that introduce and apply new skills within a controlled environment (such as *Bad News*).

Navigation and Accessibility: Human-Friendly Design

We understand that interfaces are navigable spaces that bridge the semiotic gap between a system's internal architecture and its user's cognitive perception. This closely aligns with Murray's notion of the digital environment: an immersive computer setting where users can engage in meaningful experiences based on their navigation within its boundaries (Murray 2016). By maximising the spatial and encyclopaedic affordances of the digital environment, IDN exists as a cognitive container upheld by medial expressivity.

Our analysis of *Seven Digital Deadly Sins* revealed that user navigation is a commute or journey of sorts, carefully guided by signposting and wayfinding techniques built into the user interface (Tidwell 2020). In this sense, navigational metaphors script user behaviour towards a desired outcome, particularly in web-based interfaces, as evidenced by all three case studies. This outcome is an instantiated narrative *and* an intentionally designed user experience.

Navigational techniques manifest on three levels: (1) global navigation tools such as navbar menus that enable exploration of a website at-large (between different articles or landing pages); (2) utility navigation tools that afford settings and configuration mechanisms, such as the language options available on *Seven Digital Deadly Sins* and *Bad News*; and (3) inline navigation where buttons and links are embedded directly into article content, such as *Bad News*' use of dialogue options to navigate between Twitter posts and article headlines.

The significance of navigation lies in the optimisation of the user experience via user-friendly interface features. In this context, user-friendliness refers to an interface's ability to communicate and support a computer program's ability to perform specific actions (Laurel 2014). In this sense, navigation highlights that both narrative and system design are user-centred practices, as they shape the context in which users make decisions and communicate the means by which those decisions can be executed through interaction mechanics.

This philosophy echoes the very culture of the digital environment, which is decentralised, democratic and configurable in its borderlessness and algorithmically driven character. We not only observe this through the ergonomic design of user interfaces (the use of high-contrast colour palettes, web-safe fonts and screen-responsive layouts) but also through the ebb and flow of the digital media economy, where journalists have optimised their practice to prioritise speed, technology and audience interests (Perrault and Ferrucci 2020) - thus embracing adaptability and engagement as core journalistic values (Wilding et al. 2018).

Given that the digital landscape attracts a rapidly expanding, global audience with diverse backgrounds, contexts, and perspectives, navigability and user-friendly design emphasise another core value: accessibility.

Accessibility, a key concept in interaction design, refers to interfaces that are usable by people of all abilities, including those with disabilities. *Millennials are Screwed's* text-only version of the article is an example of accessible design, where users who experience challenges perceiving the multimedia

article's colour palette, or who are sensitive to its glitch animations, can still engage with the article's information in a safe and meaningful way. The language options in *Bad News* and *Seven Digital Deadly Sins* can also be considered accessibility features, as well as the navbar menus that streamline the reading experience.

In this sense, accessible design can decrease cognitive fatigue by producing simplified interfaces that facilitate engagement with a particular media type (Tidwell et al. 2020). For instance, video miniplayers use a universal layout and visual language to toggle video settings while remaining unobtrusive to the viewing experience. Interestingly, we can observe this concept even in the narrative components of all three case studies, where their authors leveraged relatability to convey complex or nuanced concepts in a digestible manner. In this sense, accessibility could also be perceived as a storytelling principle rooted in the user's ability to understand the presented material - be it through the colloquial language used in *Bad News* or the timelapse visualisation of the housing market in *Millennials are Screwed*.

Finally, it should be noted that all three case studies are open-access resources, meaning that they are free to read or play forever. This touches on accessibility from a different angle, where 'the digital environment never sleeps' and users have unmitigated access to content, reminiscent of 24/7 radio and television broadcasting. While none of the case studies utilised integrated advertising features (such as banner or video advertisements), accessibility on this level necessitates advertising as a potential revenue stream, much like the revenue structures used in broadcast media (Wilding et al. 2018).

System Architecture as Experience Design: Narrative Webs

Koenitz's theoretical framework was useful in unravelling each case study as a digital system designed to portray a narrative experience. This involved a breakdown of each piece's constituent parts, which can be grouped into two major categories: (1) surface objects (assets and UI) and (2) internal architecture (narrative design and procedural components).

Internal architecture determines the shape and organisation of an IDN's structure as a group of nodes or lexia. In Koenitzian terms, this architecture includes its narrative design (story content) and narrative vectors (plot points that motivate user behaviour) (Koenitz 2015). Internal architecture also determines the procedural components of a system - the logic or 'rules' by which it operates. In practice, we see procedural components manifest in *Millennials are Screwed*'s strictly linear progression as a scrollable webpage; or the definite, yet malleable trajectory achieved by *Bad News*' foldback schemes. When a system is schematically represented, its logic is visualised by the 'connections' drawn between lexia. These connections are visualisations of its narrative vectors, which, like physical vectors, have momentum and direction, determining the pace and chronology of an instantiated narrative in relation to the user's positioning as a reader, onlooker or narrative agent.

This architecture establishes an interaction pattern or reading convention that informs the feedback loop between user and computer, which ultimately impacts the flow of the user experience from their

point of entry to point of departure. The nature of this feedback loop can also inform the system's degree of interactivity, where we observed that branching architectures offered more autonomous or exploratory experiences, while linear architectures allowed less room for user decision-making. Furthermore, these interaction patterns communicated the system's logic on an experiential level, allowing the user to 'settle into' the system as a virtual environment.

While Koenitz broadly described IDNs as computer programs, all three case studies presented as web-based artefacts - either as individual webpages hosted on larger websites (*Millennials are Screwed* and *Seven Digital Deadly Sins*) or as a standalone website/domain (*Bad News*). As a result, all of the case studies utilised the technical affordances of websites, including internal and external hyperlinks, modal windows and multimedia integration. Interestingly, all three case studies incorporated a text-based component, where *Bad News* and *Millennials are Screwed* relied the most heavily on text as their primary means of communication. In this sense, these instances of interactive nonfiction were still very much *reading* experiences, despite their novel approach to digital storytelling.

All three case studies understood their web-based format and prioritised simplicity in both interface design (neat, grid-based layouts and/or limited colour palettes) and interaction design. Instead of employing complex interaction mechanics, all three case studies utilised conventions to which most, if not all, users should be habituated: clicking and scrolling. These mechanics were bound to mouse or trackpad input as the primary point of contact, which could easily be translated to touch-based input on mobile devices. Here, we see accessibility manifest itself through device compatibility.

Through this simplicity, we can also identify the core objective of nonfictional IDN systems, based on their narrative design and focalisation of the user. Unlike other ludic systems focused on challenge and skill mastery, the case studies were focused on content, even when users were presented with goals or objectives, as observed in *Bad News*. In this sense, interactivity was used as a narrative device to enhance a piece's messaging through visceral impact, irrespective of whether interactivity was agencyful or participatory (see Figure 50).

This highlights the relationship between Process and Product as a result of the system's architecture, where core themes were communicated through contrast (particularly in *Bad News* and *Seven Digital Deadly Sins*). This contrast occurred through the user's decision-making, which was used to question their morality or highlight their internal hypocrisy. Here, we see a bridge between action and emotion, curating narrative experiences that are memorable and impactful in their resonance with user behaviour.

The SPP model considers IDN as a reactive and generative narrative system from both the user's and designer's point of view (Koenitz 2023). In doing so, it prioritises the instantiation of a narrative experience as a core outcome of the system's operation, once again centring the user within the narrative design process and reinforcing the notion that narrative design is akin to user experience design.

In this sense, narrative design as a storytelling practice concerns all elements associated with the narrative system - from traditional narrative elements such as world, character and pacing, to system

logic and interface design. The outcome is a procedural system that communicates its contents through a process of interaction, manifesting narrative experience as an output or *product*.

Shareability: Fun with Friends

Finally, the last trend observed throughout Chapter 3 is the consistent call to action presented across all three case studies: share this with friends!

Seven Digital Deadly Sins was the most direct, incorporating this call to action directly into its loading screen (see Figure 30). *Bad News* came second, where the end-game screen prompted users to challenge their friends by sharing their high scores (see Figure 49) - using competition to cement the game's replayability among new and returning users. This element of competition is reminiscent of arcade games, where players would typically challenge each other to beat the highest score recorded on the arcade cabinet (game system). Today, other types of newsgames, like the New York Times' [Wordle](#) and [Mini Crossword](#), encourage score sharing to drive traffic to its proprietary platform (the NYT Games mobile app or the NYT website).

Millennials are Screwed was more subtle in its approach, using a Facebook comments plugin to encourage discussion among users and bridge the article's presence across different areas of the digital landscape.

While interactive in their own way, these features highlight another principle: community engagement. Thanks to digital convergence, community engagement strategies fuel a participatory culture that can help build a publication or article's visibility throughout the digital environment. These strategies can increase brand loyalty by establishing a sense of trust among users, not only through the quality of content but also by 'word-of-mouth' recommendations through community forums, direct messages, and even Facebook comments sections.

Community engagement is a significant aspect of digital journalism, where social media platforms enable journalists and readers to exchange ideas directly and in a decentralised context. We saw this manifest in our discussion of [Junod's X thread in Chapter 2](#). This speaks to journalism's core functions, which include public advocacy and discourse. Traditionally, we have seen this manifest through citizen interviews during live reporting or callers-in to radio shows. One could argue that digital strategies such as integrated comment sections and share features are a remediation of this practice in the virtual realm. However, simply incorporating these features does not guarantee community engagement.

This is because the reported content itself should be compelling enough to be *worthy* of engagement. Reflecting on [our discussion around user engagement in Chapter 2](#), we can recall that users are habituated to a media landscape designed to serve their needs and interests. Because users have near-constant access to content that is algorithmically tailored to their preferences, media practitioners are left to compete in a saturated market. Selective news avoidance and news fatigue only aggravate this matter, where users are less likely to engage with content that is emotionally or cognitively overwhelming.

Fortunately, sticky and subversive formats like interactive nonfiction can deal with ‘heavy’ subject matter in a way that is both informative and engaging, as seen across all three case studies. By combining aspects of humour and relatability with responsive system design, interactive nonfiction treads the boundary between news and entertainment, serving the spectrum of user needs while also accurately portraying lived realities. This sense of entertainment or novelty can have a positive impact on user perception, as evidenced by the feedback in the *Millennials are Screwed* comments section (see Figure 28).

Not only do interactive formats circumvent cognitive overwhelm through multimodal delivery and user-friendly design, but they also compartmentalise immersive spaces where users can connect with subject matter in unexpected ways, such as the novelty of Becky as a spiritual guide or the coyness of *Bad News*’ meme options. This novelty spotlights each case study’s presence in an ocean of content, imbuing each piece with a sense of character and personality that echoes well after its modals and webpages have closed. More than a body of content, each piece offers an individual experience that engages the user on an emotional, systemic and social level.

4.2. Implications for Interactive Digital Nonfiction

Ultimately, the above findings address this study’s research question in unexpected ways! By using Koenitz’s theoretical framework to bisect nonfictional IDN systems into their (1) surface objects and (2) internal architecture, we have identified two major ways in which the values of digital nonfiction and principles of interactive storytelling overlap:

1. **Spatial storytelling:** concerned with surface objects, this principle involves constructing an immersive virtual environment or magic circle within which the user can interact or ‘play’ and derive meaning from their interactions. This environment provides the context within which the user can make sense of experiential meaning, while accurately representing information in a multimodal and accessible manner that appeals to multiple user demographics.
2. **Participatory storytelling:** concerned with procedural components, this principle defines the system’s operation based on internal logic, which is communicated to the user through interaction mechanics. These mechanics facilitate play and instantiate a pre-scripted narrative experience, while positioning the user as an active participant in public discourse or member of society.

These results inform a theoretical paradigm for interactive nonfiction, derived from reverse-engineering pre-existing works through an analytical process. A key aspect of this process was the schematic representation of these systems as dialogue trees, interactivity diagrams or user flow diagrams (Crawford 2013; Crawford 2013; Tidwell 2020). In doing so, we could identify a case study’s messaging or experiential impact and understand how this experience was curated through the combination of internal system architecture (or rule-based logic) and multisensory feedback.

Narrative design is a practice that concerns the operation of story elements within a malleable or responsive environment. It goes beyond traditional notions of ‘writing’ (which, as seen in the case studies, plays a significant role) to creating narrative opportunities where the user can engage with the text in meaningful ways.

This aspect of engagement is significant to both IDN as a literary format and digital journalism as an audience-driven practice. We have identified user engagement as digital currency because of its relationship to ‘value’ in terms of cultural significance and economic gain. Cultural significance refers to a piece’s reception and public impact, which can be measured by capturing human bandwidth as a series of engagement metrics (Zheng, Chyi, & Kaufhold 2012). These metrics help shape a publication’s digital strategy and guide content decisions to retain readers and attract new audiences. In this way, user engagement metrics enhance brand awareness, loyalty, and visibility by offering data-driven insights into audience interests and behaviours.

Existing literature indicates that user engagement has long been a key focus in digital journalism and new media studies. Present issues affecting the digital media economy include (1) platform instability; (2) news fatigue and selective news avoidance; and (3) atomised reading and reduced brand loyalty - all of which have been identified through decreased or dispersed engagement metrics. In the context of long-form publications, recent studies have shown that gamified or stickier formats increase user engagement and retention by conveying heavy subject matter in a manageable and entertaining manner, thanks to a focus on play as a form of reading.

From a ludic standpoint, play involves free movement within a rule-bound environment (Salen and Zimmerman 2004). When this movement is driven by contextual decision making on a player’s or user’s part, meaning is derived from the environment’s responses to their behaviour (Salen and Zimmerman 2004). In interactive nonfiction, play manifests through the novel or subversive positioning of the user within the journalistic process. This is facilitated by integrating interactivity as a core aspect of the reading experience (in hard or soft forms), which shifts the storytelling process from traditional notions of one-way reporting to a form of mutual communication or conversation.

Unlike prevailing ludic theory, interactive nonfiction does not emphasise play or agency to the same extent as games or interactive fiction. Instead, interactive nonfiction prioritises content and messaging *through* user interaction and playful experiences. While interactive nonfiction still conveys its narrative through system architecture, these systems are designed to relay fixed narrative sequences focused on reported realities. Their experiential quality comes about through the user’s participation in the system’s narration, not as the protagonist of their own story but as a participant in greater public discourse.

Some studies indicate that digital journalists have embraced adaptability and engagement as key journalistic values, harnessing technology as a core aspect of their practice (Perrault and Ferrucci 2020; Wilding et al. 2018). But others also highlight that interactive projects are costly and time-consuming to produce (Dowling 2021; Thulin 2022). Practitioner-focused studies have shown that nonfictional storytellers are interested in creating interactive content, but that methodological gaps in practice and interdisciplinary knowledge can overcomplicate this process (Gaudenzi 2017; Plewe and Fürsich 2020).

Where Gaudenzi identified that factual storytellers struggled to adopt interaction design principles into their practice (Gaudenzi 2017), Plewe and Fürsich identified that journalists and game developers worked well together due to mutual interests and similar ways of working (Plewe and Fürsich 2020). This indicates a gap in merging multidisciplinary practices towards an interdisciplinary production ecosystem. However, due to issues of budget and time constraints, the scale of production teams remains a prevailing issue. A potential solution is to develop a new methodology for the creation of interactive nonfiction, where nonfiction storytellers in of themselves become interactive storytellers and vice versa. In other words, rather than relying on inter- and multidisciplinary workflows, we should work towards a transdisciplinary strategy for the design of nonfictional IDN, adhering to journalistic values while maximising the affordances of the digital environment.

In synthesising ideas, theories and trends across three fields of study, this study's primary contribution is a design paradigm that accounts for issues of production and consumption in the digital media space, while simultaneously converging interactive storytelling and journalistic practice:

A Conceptual Paradigm for Interactive Digital Nonfiction

A two-pronged methodology for orchestrating the interplay between fixed plot and meaningful experience in interactive nonfiction systems.

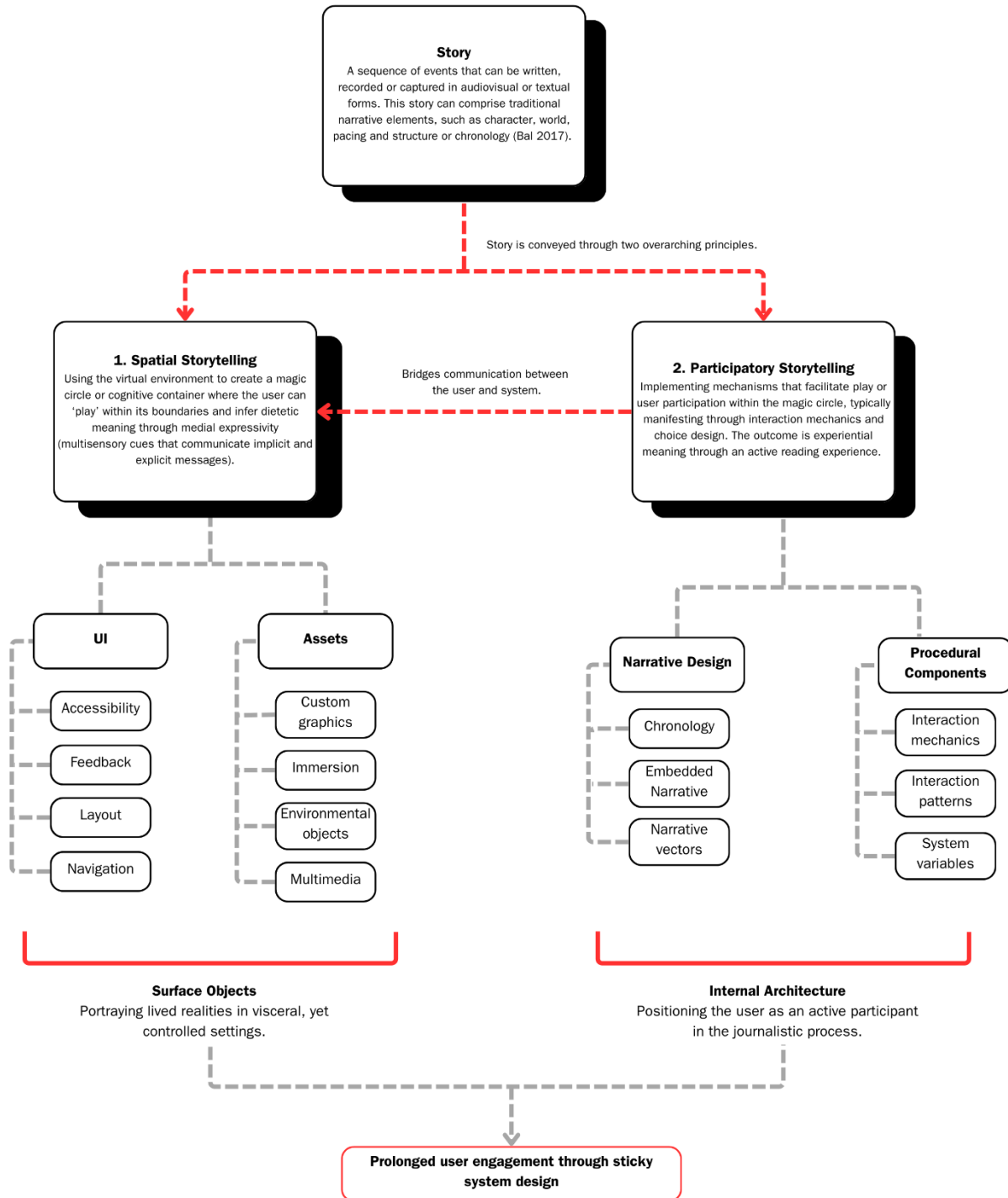


Figure 51: A visualisation of this study's final recommendations.

This paradigm illuminates a transdisciplinary approach rooted in theory and analysis. However, its efficacy as a solution requires further investigation. Because this contribution is a predominantly theoretical model, it would be sensible to apply this theory in practice and gauge its effectiveness in assisting journalists and other factual storytellers with the conceptual and technical aspects of the narrative design process. Speaking to technicalities, another barrier to entry is the programming skillset required to execute systems of this nature. The rise of prosumer technologies (Lister et al. 2009), such as ‘push and play’ content management systems, open source software and freeware that enable codeless or simplified system design workflows ([Twine](#), [Ink](#), [Figma](#)) opens doors for further areas of investigation - this time with practice at its heart.

Conclusion

This study provides a robust theoretical overview of interactive digital narrative and its viability as a story format for long-form nonfiction. This overview unfolded from three disciplinary perspectives: new media studies, digital journalism studies and games studies, where we identified and contextualised key challenges faced by the digital media industry.

These challenges arose due to the dynamic and convergent nature of the digital media landscape, which not only urged journalists to shift their practice towards increasingly user-centred and participatory formats but also disrupted the ebb and flow of the media cycle from autonomous publishers to third-party social media platforms. Because these platforms are algorithmically driven and vulnerable to the economic and political sentiments of their conglomerate owners, the digital news industry has had to grapple with the risk of platform instability while also battling to retain reader loyalty in a highly saturated and competitive market. Further, this saturation has overwhelmed news readers, who have become less trusting of digital news and have started to avoid it altogether. This chain of events has made a significant impact on the digital news economy, where only about 17% of the global market pays for subscriptions (Newman et al. 2024).

In investigating interactive narrative within a news media context, this study aimed to address these challenges by positioning interactivity as a key affordance of new media, which should be harnessed to extract the greatest value from both the computer as a creative medium and the digital media landscape as an inherently participatory and configurable environment. Primarily, it argued that, as a stickier form of reading, interactive narrative can capture and retain user attention for longer periods, thus boosting engagement metrics. In doing so, it also identified user engagement to be a valuable commodity, which could be empirically measured and translated into revenue sources through advertising and subscription-based strategies. In other words, user attention is a tangible yet fickle resource in the otherwise intangible digital environment.

Extant studies reinforce this notion, where multimedia journalism, interactive documentary and newsgames comprise an experiential quality that appeals to user needs and emotions. However, these outputs are more costly, time-consuming and laborious to produce, highlighting operational challenges related to the production of interactive nonfiction within an already-fragile digital media economy. Further, interactive narrative is in of itself a complex field of study, combining traditional notions of storytelling with digital interfaces and system architecture to portray narrative as an instantiated, user-centred experience. Cognisant of these multifaceted challenges, this study set out to accomplish two objectives:

1. Identify the relationship between interactive narrative and digital journalism, towards a cohesive perspective on interactive nonfiction as both a storytelling practice and digital product.

2. Use these insights to develop a set of recommendations for conceptualising interactive nonfiction as IDN systems, which afford participatory narratives that are simultaneously fixed in their representation of reality.

The result is a design paradigm that conceptualises IDN as a combination of spatial and participatory storytelling principles. However, this recommendation is primarily grounded in a theoretical perspective, and future studies that employ a practice-based approach should be used to test its efficacy. In other words, the recommended paradigm presently operates more as a theoretical framework than an applied method for nonfictional narrative design. While it is inconclusive as to whether the proposed paradigm answers the question of ‘how’, this study represents some of the interactive storytelling strategies prevalent in digital nonfiction, which secure engagement on an individual and community level towards greater social and economic value.

But, many questions remain unanswered, such as how effective stickier formats are compared to more ‘mainstream’ digital publications, and whether this strategy would overcome the most precarious challenge digital newsmakers face: platform instability. In response to the former, this study’s case study analysis would have benefited from a larger and more diverse pool of reflective data. This would have mitigated a bias in concluding the relationship between user and system, experience and architecture. To answer the latter, a separate study should be conducted into the efficacy of proprietary, app-based platforms compared to social media journalism with the goal to understand how larger publications are tackling this challenge and whether their strategy is effective or another should be pursued. Like the case study analyses, this approach would benefit from a larger pool of data and potential access to user engagement metrics across all a publication’s touchpoints. Then, one would be able to map a tailored user needs model aimed at addressing this challenge from a user-centred perspective.

Overall, this study unravelled many of the theoretical standpoints behind the precarity of the contemporary digital media landscape and the layered complexity of interactive narrative design. While not necessarily a practical approach to either interactive narrative or digital journalism, these findings also prioritise adaptability as a core aspect of digital content creation, supporting transdisciplinary strategies that take advantage of prosumer technologies and the decentralised nature of the digital environment. In conclusion, this study has showcased the length and breadth of the computer’s capacity as a medium, not only as a messenger but as a hyperplastic creative tool.

Appendix A: Case Study Analysis Reflective Notes

Millennials are Screwed (2017): Case Study 1

Time spent reading: 40:36:09 (this included reading through some of the Facebook-integrated comments at the end).

Key concepts:

- Cognitive containers
- Scrollytelling
- Layout
- Voice and style (classic narrative elements)
- 'Serious entertainment' and merging playful presentation with factual content.
- Capturing attention and emotion through all of the above.
- Compelling and unique data visualisations (scroll-activated animations, continuous call-backs to 'millennial culture' and the scroll-activated housing market sequence).

Reflective thoughts:

- A very American article, which makes sense because it is an American publication. A strong focus on US issues echoed throughout its easter eggs, animations and interactive elements.
- Interestingly, some areas felt like there was a strong call-back to early video games. This felt especially prevalent in Becky's scenes and at the start of the scroll-activated housing market sequence.
- The piece felt very targeted towards millennials and possibly a bit alienating to older audiences (although a glossary of acronyms was provided). This comes through not only in the tone and style of its prose, but the consistent references to (predominantly) internet culture - the millennials' realm.
- A strong interplay between written and visual communication - employing a two-column layout for body text and supplementary material (statistics, glossaries, etc.)
- Interestingly, a 'text-only' version of the article is linked within. This version still belongs to Highline and makes use of a quirky colour palette and layout, but likely exists due to accessibility reasons - for those who may have difficulty reading on digital displays or those whose internet is not strong enough to run all of the animations and glitch effects in the background.
- The piece makes use of vertical and horizontal scrolling, which creates an interesting and unexpected contrast throughout the flow of reading.
- Scroll-activated data visualisations are also very engaging and appealing, although somewhat distracting from the piece's argument. As a result, one might question whether some of these integrations are doing more harm as a gimmick than good. This links to the idea of there being a UX flow state while reading, which is disrupted by visual distractions.

- Throughout visual and interaction design, there is a strong consideration for navigation and reading direction, with various scroll-activated animations (some of which are delayed) designed to direct the reader's attention.
- Some statistics and visualisations are a bit dubious, as is the choice/combination of certain fonts and colours. While they might be web-safe, this piece feels as though it was written and composed with its reader at heart, but some segments are not very user-friendly.
- The piece has a very strong design language and visual identity, and differences in colour and typography are used to segment sections of its argument. This almost creates 'cognitive containers within containers' and does well to separate bodies of knowledge/guide the user throughout its narrative.
- Some interesting typographic effects are also used to convey double meaning both visually and textually.
- The piece itself is very long, even by long-form standards, and its 'interactive' presentation does well to maintain user attention - and also seems very well paced based on when I was starting to feel a bit bored, and another scroll-activated sequence would appear.

Overall impression:

A true use of the digital interface as a narrative form, employing a two-column layout coupled with scroll-activated animations. The article also makes use of hypermedia (linking to external sources - creating a sense of credibility) and bids for subscriber attention in various ways (sign-up cues, as well as easter eggs embedded in the credits list - see Becky's credits). The piece is not necessarily interactive in the ludic sense but still lends itself to a play-like experience through visual metaphor and feedback to interaction via peripheral devices (is this a metaphor of its own?). Instead, this piece makes the most of the webpage as a medium, taking advantage of its affordances to offer a memorable reading experience.

Seven Digital Deadly Sins (2014): Case Study 2

Time spent reading: 59:24:75 (to navigate across all nodes - irrespective of functionality)

Key concepts:

- Multi-page navigation
- Branching structures
- Choice, agency and sequential ordering
- Live data collection
- Multimodality and multimedia integration (video, audio, text and data visualisation)
- The reader experience (a self-paced exploration of human behaviour in the digital environment)
- Relatability
- Interface and menu-based navigation
- Relationship between narrative and interactivity - subject matter and user activity (in relation to responding with 'confronting' questionnaires)

Reflective thoughts:

- The first, most striking element is the ambient audio prevalent throughout the reading experience. Two tracks are used in an infinite loop and are intended to create an immersive story environment. From a subjective point of view, the lyrical track is a bit distracting and tonally disconnected from the rest of the piece.
- While British, the piece is strikingly relatable. The blend of video interviews (which seem casual and authentic, albeit slightly performative - see 'Pride'), text inserts (almost like short stories expanding on some of the most intimate taboos experienced by individuals, often told in the first person) and user interaction in terms of both agency in sequential ordering (through the piece's branching structure - networked or arboreal?) and participation in live data collection (questionnaires with animated data visualisations).
- The piece is split into seven nodes - all connected to one main or 'central' node. Thematically, each node deals with a deadly sin and comprises a similar structure: seven explorable branches, usually one video, three to four text entries, and two to three questionnaires. Once the user concludes their investigation of a branching node, they may return to the central node. The user is not required to explore all branches to proceed - there are no obstacles or skill gates to overcome before progressing through a different narrative beat.
- As a result, the user is still treated like a voyeur (the most apt description, given the piece's subject matter) with only a few moments of decision making that contribute to the piece as a body of information, but which do not treat the user as a protagonist or narrative agent in the literary sense.
- The piece's treatment of agency contrasts the previous case study, where user decision-making is deliberately integrated into the flow of its narrative and the impact of its messaging. Further, user intervention feels meaningful through integrated data collection mechanisms such as the various questionnaires designed to provoke the reader's sense of morality or even hypocrisy in their own behaviour, based on the subject matter presented in each sin's node.
- Unfortunately, the questionnaires are no longer operational, which significantly affected the reading experience. Based on previous reads some years ago, the questionnaires felt quite impactful and confronting as they correlated the questionable and sometimes controversial behaviour outlined in video and text entries. However, this impact was not only felt through the sensation of completing the questionnaire, but also in seeing where one's answers fit into 'the bigger picture' of other users (imagined as the 'general public's') stance on a matter.
- This aspect of the questionnaires is what (subjectively) made the piece so interesting because it almost felt like anonymously taking part in a public forum, as is common on internet platforms like 4Chan and Reddit (known for their own controversial and 'taboo' culture in the digital environment). This not only quantified user interaction but also the user's morality within the broader public sphere. This implementation took advantage of the networked nature of the digital environment and introduced a collaborative aspect that felt familiar and directly correlated with the piece's messaging - instantiating a narrative that was memorable, personal and confronting.

- Further, the relatability of the piece's subject matter and the way it is presented to the user almost lures them into the 'trap' of the questionnaires, using the lived experiences of others to create a 'safe space' and encourage the reader to respond honestly to the questionnaires.
- However, the design of the questionnaires themselves leaves more to be desired - especially concerning their use of language. The terms 'condemn' and 'absolve' are used to describe whether the user agrees or disagrees with a particular stance. While this use of language is logical in the literary sense, as it correlates to the thematics of the piece and the overall tone it aims to convey, the subsequent 'I do this' or 'I don't do this' after the user chooses to absolve or condemn a stance feels tonally disjointed. It is also unclear as to what 'I do this' or 'I don't do this' refers to - absolving or condemning, or the behaviour indicated in a particular stance. This impacts both the user's interpretation of the data presented as well as their ability to provide meaningful responses.
- From a navigatory perspective, the piece is quite strong and provides visual cues to indicate branches that have or have not been explored. The piece also makes use of menus that assist in the navigation of the greater National Film Board of Canada site, as well as settings configurations for the piece itself. The result is a cohesive and coherent interactive system, although one of the questionnaires under 'Greed' seems buggy.

Overall impression:

Stays true to the medium of an interactive documentary, blending pre-existing media types into a piece that not only represents lived realities but also a direct confrontation of our own hypocrisies and behaviours. In doing so, the piece bridges the gap between active and passive 'reading', resulting in an outcome that is not only dynamic in its response to user interaction (or designed to operate that way), but also timeless in its overall messaging - an apt case study for this study's investigation (conceptually, thematically and technically).

Bad News (2018): Case Study 3

Time spent reading: 39:51:12

Key concepts:

- Agency (and the illusion thereof)
- Challenge, obstacle and reward
- Social responsibility and inoculation theory
- Embodiment and roleplay as a form of learning
- The subversion of morality

Reflective thoughts:

- Upon first impression, it is interesting that the game acknowledges it is a game - building a magic circle that the user can 'buy into' from a narrative perspective, and challenge their moral positioning from a journalistic perspective.

- The game employs classic hypertext structures, offering decision-making mechanics via Tweets, text options and drop-down menus.
- While minimal, its interface makes use of follower and credibility metrics that help the player to 'track' their progress, and which are diegetically referred to by the game's narrator. However, these metrics do not necessarily create a sense of pressure or competition, as they seem to be used more to highlight the game's narrative progression rather than track gains and rewards.
- In terms of rewards, the game incorporates a badge-based system that unlocks skills/expertise on six levels. These badges are labelled as 'disinformation techniques' the player learns as the game progresses. Each badge unlocks a new branch or node for the player to explore - thus implementing mandatory skill gates to secure narrative progression. However, there does not seem to be a direct element of challenge or skill mastery that prevents the player from obtaining badges (for example, points or XP). Instead, the player is awarded badges based on how far they have progressed in the game's narrative and learned from its argument.
- Interestingly, this progression is quite linear and restricted. While the player has the liberty to choose the name of their fake news site and post different articles/Tweets with varying results, the narrative itself is mapped on a fixed trajectory. Mechanically and diegetically, this trajectory is driven by moral disengagement, where the system convinces its player to take the morally dubious path. This is reinforced by the system's architecture, which involves collapsing decision trees until the player runs out of decisions and must select the only remaining option to progress.
- The ability to construct one's own publication reinforces the player's presence in the game world and rewards their decision-making with tangible results. This is further reinforced by the positive or negative outcome of their play strategy - indicated by followers' reception to their Tweets or articles.
- The impact of the game's messaging occurs through gameplay dynamics, where the player learns how to identify instances of fake news in the real world by shaping their in-game behaviour into the very enemy it seeks to destroy. This tactic lets the player into the psychology of the fake news cycle, which appears to be focused more on followers and public influence rather than integrity.
- To reinforce its purpose to educate, the game ends with a questionnaire that 'tests' the player's newfound knowledge by asking them to identify whether the provided examples are instances of sensible or fake news.
- Instead of directly punishing the player for 'poor' decisions or incorrect answers to the questionnaires, the game's narrator operates as a teacher of sorts and explains potential outcomes in a way that is digestible from the user's point of view.

Overall impression:

The game is both visually and conceptually engaging with a good amount of visual feedback that lends to a smooth gameplay experience. Further, the game plays into online meme culture, which creates a layer of relatability (supported by its copy) that speaks to its intended audience (teenagers and young adults). The game's narrative is also well-paced and complimented by its system

architecture, which offers a balance of flexible decision-making and linear progression to convey its message. While more complex than the other case studies (from a systemic perspective), the game is quite 'tight' and neatly presented, with a cohesive interface that visually responds to user decisions via follower count and credibility metrics.

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