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# Lo-Fi, Quick and Glitchy

## T(h)inking with Unreal Engine in Digital, Hybrid, and Expanded Theatre

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### ABSTRACT

This paper explores the creative tensions involved in bringing together the rapid ideation of theatre devising process with the meticulous development typical of 3D and immersive production. With reference to a collaboration between University of Plymouth and the Wardrobe Ensemble theatre company, the text focuses on the integration of Unreal Engine into devised theatre production. It discusses: the navigation of these differing temporalities; methodologies for creating media in a way is incorporated into the devising process; and the promotion of media assets as active elements within the narrative. The approach of "t(h)inking" is introduced—combining the concepts of thinking and tinkering—as a process that eschews linearity of common 3D, animation and VFX production pipelines, emphasizing instead reflection and experimentation in media creation. The text explores how low-fidelity assets and fast turnaround times facilitated a dynamic dialogue between theatre and creative technologists and concludes by emphasizing a shift in perspective towards viewing Unreal Engine as a sandbox for experimentation rather than a linear production tool, advocating for a process-oriented approach to media creation.

### KEYWORDS

Digital and Hybrid Theatre, Immersion, 3D Animation, Unreal, Photogrammetry, Motion Capture, Devised Theatre.

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## 1 Introduction

This paper explores the integration of devised theatre and immersive production, focusing on the problem of aligning their radically different temporalities. Initiatives such as the *Immersive Arts Space (IASpace)* in Zurich University of Arts, [1] the National Theatre UK's *Immersive Storytelling Lab*, [2] XRNetwork and Royal Shakespeare Company's *R&D Challenges*, or the *iDesign* platform, [3] showcase a growing appetite to examine, 'the convergence of media-based and performative practices.' [4]

For example, XRNetwork aims to discover 'the creative possibilities of virtual production technologies in live theatre performance,' [5] and *iDesign* allows theatre designers and directors to collaborate in virtual space. Yet, as the head of IASpace, Christopher Salter notes: 'To build a computational environment that [responds] as fast as these performers [is] difficult. The dynamics of live performance, and the dynamics of authoring computational environments that support that performative context is still a big area of research.' [6]

In 2021, the University of Plymouth began a collaboration with the theatre company Wardrobe Ensemble (W.E.), to explore the role Unreal Engine might play in creating a devised theatre production. The central tension—or driving force—within this project was balancing the quickness of devising versus the slowness of creating media assets such as animation and motion capture. Devised theatre involves improvisation, reflection, discussion, and many other facets, but its key modus operandi is for ideas to be quickly translated into words and actions, with imagination and performance becoming methods to establish provisional story beats, each translatable into more concrete aspects of script, dialogue, action etc. at some later date. By contrast, 3D animation and immersive production is typically slow and meticulous – a sequential and stepwise set of processes that requires careful planning, design, and execution. A narrative scenario can almost be devised in the time it takes to open an Unreal Engine project! While there are now multiple platforms developed to support the incorporation of mediated elements into performance - from *Hyve-3D* [7] and Peter Torpey's *Media Scores*, [8] through to Vectorworks *Spotlight* [9] and Jennifer Roberts-Smith's *Simulated Environment for Theatre (SET)*, [10] each of these relies on pre-prepared materials and is to aid production, rather than focused on pre-production or devising. The fresh interest in expanded and complimentary forms of theatre, film, animation and games is partly motivated by the desire to develop new and challenging forms, and partly to reach new audiences, there are also practical considerations, such as the possibility of avoiding the large carbon footprint of traditional touring shows or the economic benefits of streaming theatre to multiple venues. But there have also been counter voices to this apparent goldrush arguing for 'post-immersive' perspectives to critically reflect on media technologies, their relation to society / economy / ecology. [11] Through adopting critically reflexive positions with regard to technology and creativity,

this project sought to consider both the applications and the implications of involving immersive production within theatre devising.

A Post Graduate Studentship embedded Gregg Bott one of the authors, as a creative technologist within W.E.'s devising process, resulting in a series of vignettes and scenarios (see Figure 1) that established shared thematic concerns, modes of working between theatre and creative technology, and a refined set of research questions. The project developed further in 2023-24, to produce a 1-hour work-in-progress performance.

Shared thematic concerns of the collaboration included: critiques of technology (and reflections on it); human agency and social connection in technologised contexts; and a creative sensibility that foregrounded the making process – including use of glitch, user-interface elements, and involving media authoring within the narrative itself. We adopted a mode of working between theatre and creative technology that eschewed standard approaches of asset development within film, television and games. Instead, instituting a co-design approach in which W.E. invited our team into the devising process itself, requiring a workflow that challenged the segmented and linear notion of 'production' common to media industries, while trying to leverage the real-time capabilities of Unreal to support this. Out of this process three key research questions emerged:

- How can the dualling temporalities of theatre and working with immersive technologies be navigated successfully?
- What is an appropriate methodology for 'devising' media (that is: an approach to media creation that parallels the methods of devising narrative within theatre)?
- How might this approach understand virtual media assets as qualitatively different from analogue dramaturgy, scenography or props?

This paper takes investigating the first of these questions—that of orchestrating different competing temporalities—as its key focus and organisational logic; but it will also articulate how addressing the second and third points became central methods for responding to these temporal tensions.



**Figure 1 - Documentation of vignettes and scenarios from phase one of the collaboration (2022)**

## 1.1 Clashing temporalities

In contrast to scripted theatre, which starts with a prewritten text, devised theatre is a process in which performers develop an original product from the ground up, seeking to remain alive to the possibilities and abilities of actor, prop, set, scenario, narrative – including their interplay and any other factor that may bring extra value to the work – ‘the understanding of what one is actually doing emerges gradually.’ [12] As Behrndt & Lotker argue: ‘Theoretically speaking, this is not exclusive to devising, but, unlike a process that starts with a play or pre-existing score, [...] one builds and devises the performance, its structure and dramaturgy from scratch.’ [13] While collaboratively devised works are arguably as old as theatre itself, Proudfit and Syssoyeva suggest that the European approach to devised theatre began to emerge from the 1900s onwards in response to the rise of the director. [14]

Devising is a live, in-the-moment process that thrives on spontaneity and adaptability in which meaning can be created out of a glance, a wry smile, a prop and a context. Since devised theatre does not start with, ‘a play text that someone else has written to be interpreted [but rather, is] work that has emerged from and been generated by a group of people working in collaboration,’ [15] the challenge of integrating 3D animation, projection mapping, or other responsive, digital dramaturgical elements into the process is a complex one. Indeed, we quickly realised that to create media in a way that is idiomatic to the devising process, was to be at odds with established pipelines and workflows within animation and VFX – such as the linearity of scripting followed by storyboarding, then previsualisation, then production, and so on.

The challenge of this collaboration was learning, or indeed, ‘unlearning’ how to use time-consuming tools such as Unreal Engine and other pipeline games development programmes for 3D modelling, animation, and media creation, and bending these to meet a timeframe that more suited a method of theatre devising which is rapid, ephemeral and capricious. As is well known, 3D-modelling and computer animation are typically slow and energy intensive processes (though vastly accelerated from traditional animation). Computer rendering systems through the 1980s - 2000s were large, expensive and required detailed technical knowledge to set up and configure. Rendering could take multiple days using many computer systems networked together in render farms.

Over the past decade however, so called ‘real-time’ game engines have seen a substantial improvement in the quality and speed of rendering. Such engines are now almost able to produce the same visual fidelity as their non-real-time counterparts, an affordance that forms the basis for virtual production. [16] The time taken for rendering has gone from hours per frame, to fractions of a second. Engines like Unreal and Unity have implemented the likes of real-time global Illumination and ray-tracing reflection algorithms to improve

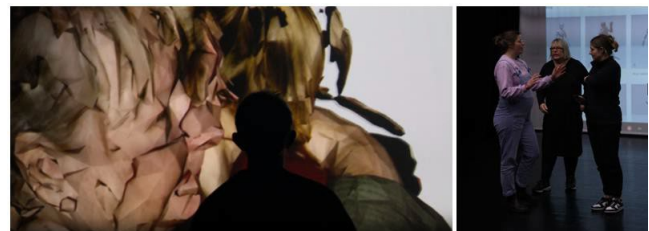
the fidelity and quality of lighting and reflections, enabling photorealism of lighting in real-time. [17] Introduction of Nanite virtualised geometry (a 3D file handling system) into Unreal 5, has allowed users to create and import far more detailed 3D assets with high polycounts. This has enabled the use of 3D assets that are created by 3D scanning and photogrammetry without optimisation, retopology and remapping – processes that are otherwise very time-consuming. For example, actor scans within this (relatively modest) project totaled a staggering 45 million polygons each and working with such assets would previously have necessitated working at low resolution, before sending to render on a non-real-time system. Seeing changes made updating in real-time has the crucial artistic benefit of foregrounding creative vision over such technical constraints.

The collaboration between W.E. and the University of Plymouth focused on whether this accelerated technical functionality could allow creative technologists to operate at the speed of, and thus be incorporated into, the devising process. This would seem to be the promise made by advocates of virtual production which, relying on engines like Unreal, ‘encourages a more iterative, nonlinear, and collaborative process [empowering teams] to collaboratively iterate on visual details in the moment, not deferring all of these decisions to post’. [18] But this claim also elides something significant: that real-time rendering does not equate to real-time modelling, animation or other production processes: it is simply a temporal redistribution of labour, that front loads production to bring together assets, actors and production crew into momentary synchrony. As Jantje Friese, the creator of Netflix’s 1899, [19] points out: ‘when you work in a virtual production you have to create content beforehand, you’re pulling post-production up front before shooting’. [20] In this context, labour becomes uniquely fractured, asynchronous and networked. Through services like Quixel’s Bridge and Mixer (which Epic purchased in 2019), or Adobe’s Mixamo, vast libraries of photorealistic 3D-scans, motion captures, textures and so on, are—in a Heideggerian sense—‘ready-at-hand,’ [21] available for immediate, general use at little or no cost. So, while rendering is much quicker, the ability to ‘iterate on visual details in the moment’ depends just as much upon the slow processes like modelling and animation as they always did. Undoubtedly, the workflows of Unreal are vastly quicker than those of traditional 3D modelling and rendering pipelines, but this was still significantly slower than devising. Moreover, in some ways the fragmentation of development is even more antithetical to devising than slowness, since devising emphasises the importance of face-to-face collaboration, especially in order for participants to actively respond to one another and reflect on the narrative elements as they emerge. Thus, the clashing temporalities of devising and development are not only about speed differential but also synchronicity or its absence. We had to more deeply reflect on how media development might

be introduced into the devising process, reframing our approach: coming to think of it as neither as creating ‘completed’ production assets, nor yet ‘pre-visualisations’ – since this latter concept is so embedded within a goal-oriented and linear conception of ‘workflow’. The industry practice of pre-visualisation suggests the visualisation of a predetermined narrative, and its role is to iron out the challenges of production before this phase is entered, rather than create prompts that might change the narrative altogether, or provocation to reflect on, critique or challenge our assumptions around the whole process - narrative, performance and workflows. If media assets derived from Quixel Bridge or similar are understood as ‘ready-at-hand’—that is, easy for creatives to access but not necessarily reflect upon, nor consider the implications of—a key benefit of collaborating with W.E. was in learning to share their commitment to reflecting on all elements within the process, seeking to keep them present-at-hand. As such, we took an approach to media creation that acknowledged its status within devising as a two-way, impressionistic proxy, subject to change and with the potential to exert change on all other elements within the play (see Figure 2).

Not only were assets imbued with meaning and potential in striking ways, but so too were wider elements of the production process: including media glitches, user interface elements of authoring software and operating systems, scanning artefacts and so on. Foregrounding these within the performance became strategies to reflexively counteract readiness at hand; creating a Brechtian alienation effect rather than allow audiences to always remain within spectacle of immersion.

‘for alienation is a call to halt: alienation is cutting, interrupting, holding something up to the light, making us look again. Alienation is above all an appeal to the spectator to work for himself, so to become more and more responsible for accepting what he sees only if it is convincing to him in an adult way.’ [22]



**Figure 2 - Viewing and discussing assets within a devising workshop.**

## 2 T(h)inking in Unreal

Combining the words ‘thinking’ with ‘tinkering’, the concept of t(h)inking—hereafter used without brackets—came to provide a useful way to understand this approach. The term simultaneously frames making practices as a space for reflection and thinking practices as a mode of making. Erkki Huhtamo made early use of this concept to explore the work of media-archaeological artist, Paul DeMarinis, who brings together technologies, audiovisual and material elements into an almost theatrical ‘*technologia povera*’. [23] Like Claude Levi-Strauss’ concept of ‘bricolage’ [24] (French for tinkering), tinkering implies working with the manipulation, interrogation, and reconfiguration of extant sources (such as 3D scans, motion captures and *Mixamo* animations) in an ad-hoc form of remix, reflecting upon the implications of technologies and materials through working practically with them. The importance of tinkering within this concept also emphasises playfulness and, like bricolage, a ‘do-it-yourself’ sensibility. Working with low fidelity glitchy assets and low commitment to specific production outcomes allowed a fast turnaround. This reframes media production as a responsive and nonlinear process involving fluid reciprocation between actors, writers, directors, and developers. A scan might become an inspirational point for a script, which in turn changes the plot, which in turn requires changes to dramaturgy - creating a dynamic dialogue between theatre and creative technologists. Models, motion capture and scenes were quickly included into the project in a variety of ways: projected into the performance space, shown via monitor feedback in Unreal, or even shown, discussed and played with by writers, directors and performers on computers in the development space. The whole thing worked organically and in dialogue.

Unreal Engine’s marketplace and the Quixel *Bridge* became a kind of “prop store” where, without always the time to create bespoke content for a given sequence of environment, we could load-in or drag and drop content to explore narrative provocations. Just like an idea, these scenes, sometimes bereft of anything other than ‘just enough’—or ‘just in time’—symbolism, bubbled into existence alongside the script, before (fairly regularly) withering away with an edit, redaction, or a wholesale act of deletion. But this sense of churn is also at the heart of devising, and common to the other modulations and redactions of plot ideas, script elements and dramaturgy. Understanding our approach to media in this way—low-fidelity or glitchy tinkering with otherwise extremely high-tech soft- and hard-ware—was also useful in opening up the possibility of an enhanced, synthetic or mediated form of devising that includes virtual dramaturgy as an active element along with the traditional elements of narrative, dialogue, character, actions etc.

### 2.1 Narrative and Aesthetic Resonance

This section will explore the ways in which tinkering enabled us to collectively develop the shared thematic concerns of human agency, social connection and technological critiques signaled at the outset. Perhaps these concerns even arose out of the collaborative team being co-located within a motion capture suite, in turn leading to observations on bodies, skeletons and joints as semiotic devices. Such signifiers became manifest within 3D modelled skeletons or photogrammetric scans of bodies, motion captured to trip, dance, hug, fly, flail and swim; in turn evoking plot-points around health, confidence, connection and frailty. Each of these things led to one another, though not necessarily in this (or any linear) order. Along the way we decided to include user interface designs, software - including the Vicon wireframes, and operating systems as signifiers within the narrative; as well as the process of 3D scanning itself.

In an early version of the script, the younger of the two protagonists, a game designer called Robbie, helps Margot, who is older and less mobile, take off her shoes. With successive edits and workshopping, this moment of vulnerability and humanity has Robbie LiDAR scanning Margot, to include her in the game she is developing. This sense of scanning as a humane activity is narratively poignant and came about precisely through the shared experience of developers and devisers working together and within an environment populated by vision technologies.

Reflections on technology and humanity that appeared in various ways through the narrative and dramaturgy—such as notions of radiography, x-rays, health, frailty, and medical technologies—were directly inspired by the user interface of Vicon’s motion capture suite that foregrounds its skeletal rig. Indeed, in this methodology of tinkering, tools and technologies quickly morph into semiotic devices, and narrative or performance ideas just as quickly informed visual and technical approaches. In short, distinctions between the different perspectives of theatre and creative technologies evaporated. W.E. providing animation and creative tech suggestions; University of Plymouth creative technologists providing narrative notes. It was a dialogue, and a levelling up in which we began to incorporate the Vicon wireframes as a semiotic device, signifying game design, motion capture itself, radiography, bodies, embodiment and humanity.

Motion capture is commonly perceived as dislocative and disembodied. In divorcing the body from space, and movement from the body, it may be argued ‘mocaps’ become distant and unaffectionate. But as Cisneros and Strutt argue, [25] they are more than this: movements become repeatable and malleable; mappable to different bodies, and locatable in different spaces. Importantly, the nuances of motion become recordable not in three-dimensional space, but in virtualised data, typically visualised spatially and within a (virtual) location. In one scene, Margot, a radiographer who is herself in poor health, trips during a talk delivered at a conference. A

sequence of multiple tripping bodies, captured originally with crash-matts in a motion capture suite, is back-projected behind the physical actor. Motion-as-data allows this ephemeral and frail moment to play back identically in a fugue of many repeated moments, from multiple angles and distances, emphasising her mental anguish. In another sequence, Margot's avatar executes a dizzying array of physically strenuous moves, made possible by mapping the motions of another, extremely fit and strong performer to the body of a more frail and older body. Not only was Margot's actor in reality older and less mobile, but the character they played in the performance suffered with an embodied limitation as their reality.

### 3 Tentative conclusions

While real-time rendering engines such as Unreal and fields like virtual production are relatively new, their use within hybrid theatre contexts is even newer – especially when part of the devising process. Thus, this paper offers conclusions on this topic tentatively. We note at the outset that the temporalities of devising and developing are at odds with one another. In many ways this project represents a low-tech response to the challenges of melding theatre and immersion, eschewing the big-ticket approaches of i-Design, Audience Lab, or the Immersive Storytelling Studio, for a slower and more integrated co-design between theatre and development teams. This approach gave agency to lo-fidelity aesthetics and glitches, with these elements operating variously as provocation, motif, and storytelling agent within the span of the project's development.

Although the real-time aspect of Unreal Engine played a useful role in allowing creative technology to interact with theatre devising, real-time rendering does not equate to real-time modelling or animation. On its own, the relative speed of working in Unreal does little to approximate the speed of creativity possible within the imagination and performance. The key insight was therefore to adopt a 'thinkering' approach to media as an appropriate methodology: to treat assets as proxies and provocations; working quickly and at low fidelity. The accessibility of quick ways to scan and capture motion, along with a vast array of publicly accessible assets from Quixel *Bridge*, the Unreal store, Adobe *Miximo* and elsewhere also helped enabled media to act as conditionals, proxies and placeholders within the emerging narrative. This is an approach to media creation that truly parallels the methods of devising narrative within theatre. Unreal Engine became a sandbox for play and reflection rather than a production tool. Not only were Quixel *Bridge* and the Market Place a toy box to play with; so were processes of mocap and photogrammetry.

Such virtual media assets, whether used in preproduction or the final performance, are qualitatively different from analogue dramaturgy, scenography, or props fundamentally because, as Katharine Hayles' argues, the informatic signifier 'can no longer be understood as a single marker [...] Rather it

exists as a flexible chain of markers bound together by the arbitrary relations specified by the relevant codes.' [26] As such, 'any single virtual model is to be understood as one of innumerable worlds perpetually in fluid motion.' [27] This ability for virtual assets to mutate fluidly from props to scenarios or whole worlds affords enormous creative possibility – but also makes demands upon the devising process, since the role of a given asset can quickly flip from prop, to animated counterpoint, cut-scene or extension of physical action. As such, these elements must be co-authored as script and performance emerge. Thinkering with media, using low fidelity materials and fast turnaround lead to novel solutions; and a more joined up way of working between narrative and media assets - the whole being more than the sum of its parts; symbolic, material, processual and performative registers opening up to one another. This change of perspective—understanding Unreal and other software not as points within a linear production process, but as nodes within a discursive field—was transformative for the devising of the play.

Thinkering is process based – espousing a flat ontology of co-design and an organic a-teleological approach of devising that eschews the notion of a 'production pipeline'. We took an approach to 3D animation that occupies what Alan Warburton refers to as the wilderness beyond the uncanny valley, to 'accept and embrace the materiality of CGI allowing it collapse under its own weight,' [28] where the end result is not to create something photorealistic but instead uses these tools without hiding the fingerprints of the designer, and the genetics of the technology.

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