

SKILLS FOR IMMERSIVE EXPERIENCE CREATION

Barriers to Growth in the UK's Immersive Economy

By Prof. James Bennett and Amanda Murphy





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ABOUT

This report was written by StoryFutures Academy: The National Centre for Immersive Storytelling run by the National Film and Television School and Royal Holloway, University of London. Funded as part of UK Research and Innovation's Audience of the Future Industrial Strategy Challenge Fund, StoryFutures Academy provides cutting-edge creative training and research programmes to ensure the UK creative workforce is the most skilled in the world in immersive storytelling.

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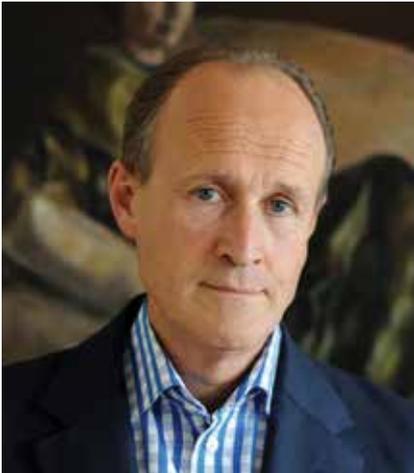
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www.storyfutures.com/academy

FOREWORD



The British have a demonstrable genius for content. Our worldwide reputation is for compelling video games, music, TV and film, radio and podcasts. We don't make much of the globe's hardware, but we're the creators of much of the software that runs on it. So, when a new category emerges we should make absolutely sure we lead it. 'Immersive' (virtual and augmented reality) is indeed a novel category and I commend this new report. It pinpoints what UK plc needs to do to make sure we're developing the necessary skills to dominate the immersive market. If we succeed there will be a considerable reward, both economic and cultural.

I wrote a report for the government in 2017 recommending ways of further growing our already world class Creative Industries. I saw that, as AI destroys jobs in many sectors, Creative Industries will go on growing employment: you need people for ideas. I proposed an investment in Immersive because many of us could see its potential. AR is already becoming essential to digital consumer products and VR is developing as a powerful professional tool in R&D, training and education.

I'm pleased that my proposals were accepted and became part of our nation's Industrial Strategy: hence StoryFutures Academy and their valuable inquiry into immersive skills.

We often talk about the importance of STEM skills – science, technology, engineering and maths. But we'd have no thriving video games sector unless we'd gone a step further and combined creative arts with computer science. We call this STEAM – a useful slogan with the canny insertion of A for Arts. But not just a slogan: art and design make all the difference, as they will for great Immersive content as well. Where in our higher education and our schools will the brilliant creators of the future acquire these necessary crossover skills? Read this report.

Sir Peter Bazalgette, author of the Independent Review of the Creative Industries (2017), non-executive board member of UK Research & Innovation.

INTRODUCTION

Whichever way you look at it, the immersive economy promises to be big business: Price Waterhouse Cooper predict that £1.39 trillion will be added to the global economy through immersive technologies, whilst IDC forecasts that worldwide spending will reach approx. £130 billion in 2023.¹

The UK is already assuming a healthy share of this global market (around 9%) with over 1250 specialist immersive companies, and over 500 immersive technology projects identified since 2018 (either ongoing, open or completed) worth £220 million. Predictions indicate that this market share will rise significantly in the next decade with **£62.5 billion added to the UK economy and over 400,000 jobs** enhanced by immersive technologies by 2030.²

The 2019 *Immersive Economy in the UK Report* confirms that immersive companies are scaling up, and that 'investors see immersive [in the UK] as a hot sector', with increasing levels of investment. Over 22% of companies operating in the economy are focused on Media and Arts, making the sub-sector a key player in the 13,000 jobs currently engaged with immersive technologies.³ The size of this supply market is being met with increasing consumer appetite: IDC estimate that consumer spending on AR/VR/XR is expected to rise by 52.2% in the next five years.⁴

And yet, there is a problem; a clear skills gap has emerged:

97% of companies in our survey indicated skills were missing in this sub-sector.

At a time of unprecedented growth, this report sets out a comprehensive understanding of the skills, the gaps and the ways to address these that are vital to the growth of the immersive experience production sector. The report is the first of its kind in the UK and is for businesses in the creative industries, for investors, educators and policy makers to help make informed decisions about the way the current and future UK workforce are trained and educated.

The report is in five chapters, each looking at a key issue in the role skills play in the emerging immersive experience production sector and the gaps and challenges that currently exist. It also includes profiles of those who exemplify key roles as well as case studies on emergent team structures and models adopted by immersive production companies.

If the opportunity for growth of the immersive experience production sector is to be grasped, a range of skills need urgent attention in terms of training and professional development for the UK to retain its status as a global leader. The fear is that the gap will not only widen, but the pipeline will run dry.



¹PwC. (2019). *Seeing Is believing: How VR and AR will transform business and the economy*. Available at: <https://www.pwc.com/gx/en/industries/technology/publications/economic-impact-of-vr-ar.html>

²Ibid.

³Immerse UK. (2019). *Immersive Economy in the UK Report*, 'media and arts' sub-sector, p. 23. Available at: <https://www.immerseuk.org/resources/immersive-economy-report-2019/>

⁴International Data Corporation (2019). *Worldwide Semiannual Augmented and Virtual Reality Spending Guide*. Available at: <https://www.idc.com/getdoc.jsp?containerId=prUS45123819>



Scope and definitions

We focus on immersive experience production for audiences – what Immerse UK’s 2019 report defines as ‘entertainment’ or ‘media and arts’, whilst PwC incorporate this as part of the ‘retail and consumer’ sector estimated to boost GDP to £183.9bn by 2030. As is evident from the varying approaches of three different reports in the area of the immersive economy, sub-sector boundaries are not hard and fast, with companies often operating across sub-sectors.

Our focus is on the skills required by those companies that use immersive technologies to bring new experiences to audiences that entertain, educate and engage. Throughout the report we use the term ‘immersive experience production sector’ to refer to this category. The term ‘immersive economy’ is used to refer to the wider use of immersive across, for example, engineering and manufacture, training, healthcare and architecture.

We use the term ‘immersive’ as an overarching category for virtual, augmented and mixed reality technologies – making explicit reference to how these increasingly incorporate other technologies such as Artificial Intelligence (AI) where relevant.

Aims

This report responds to *Immersive UK’s Immersive Economy Report’s* (2018) key finding that skills were one of the major concerns and barriers to growth. With this catalyst in mind, the report aims to:

- Identify and describe key skills and roles required for immersive experience production (see figure 1.1);
- Understand the role these play in companies’ business development and the growth of the immersive economy more widely;
- Pinpoint and analyse the key skills gaps experienced by immersive experience producers and the extent to which current and future training provision addresses these;
- Contribute to recommendations to help create a more coherent, responsive skills infrastructure, as identified by the BFI.⁵

⁵The Work Foundation. (2017). *A Skills Audit of the UK Film and Screen Industries, Report for the British Film Institute*. Available at: http://www.theworkfoundation.com/wp-content/uploads/2016/10/420_A-Skills-Audit-of-the-UK-Film-and-Screen-Industries.pdf

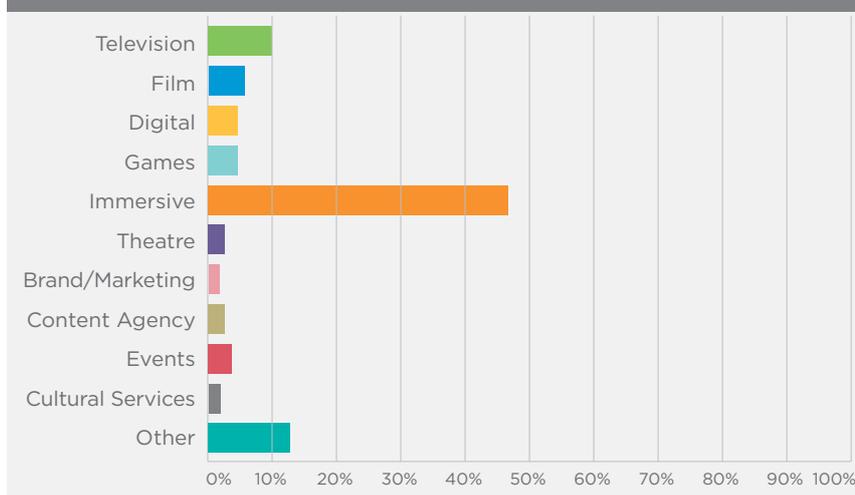
Methodology

Our findings draw on four key sources:

- **Literature Review:** Given that the skills required fall into a variety of overlapping industrial classifications, this involved a wide search of databases of leading publishers and academic papers, and of government and industry reports spanning the broader media sectors.
- **Skills survey:** 100 companies from across the creative industries responded to the first survey to focus on skills for immersive experience production. With support from Immerse UK in the survey design, it was distributed by all creative industry leading trade bodies Pact, Ukie, British Screen Forum (formerly BSAC) and UK Screen Alliance. Survey responses are made up predominantly of immersive specialists.
- **Interviews:** Twenty five semi-structured interviews with key players in the immersive experience sector, spanning the various disciplines that immersive draws upon, from immersive specialists, to those in adjacent creative disciplines including games, film, television and theatre.
- **Focus group:** A focus group with 8 leaders in immersive production (members of Immerse UK's Content Group) was held in May 2019 to interrogate early findings from our survey, interviews and desk research.



Figure 1.1: Survey Q6: main focus area of company



EXECUTIVE SUMMARY AND RECOMMENDATIONS

The rapid emergence and growth of the immersive experience production sector has developed an equally rapid skills gap that is set to widen if left unaddressed. It is clear that the skills needed for success and growth are complicated, interdisciplinary, hybrid, new and in short supply:

1. THE SKILLS GAP IS CRITICAL:

65% of companies identify a lack of skills as a significant barrier to their individual growth as a business.

2. IT IS TECHNICAL AND CREATIVE: Whilst 80% of those who identified skills as a barrier to growth highlighted a lack of technical roles within their own company and the wider talent pool as a barrier to growth, over half (51%) highlighted creative and managerial roles as a similar barrier.

3. A LACK OF EXPERIENCE: 73% of those working in immersive have worked on fewer than five projects. The pace of change and emergent nature of business models, which places a reliance on freelancers, makes it difficult to predict, scope and build up experience: a lack of experience is particularly acute in senior leadership roles.

4. IT'S CONFUSING: New entrants face a bewildering array of technologies, workflows and terminology that need de-mystifying rapidly in order to develop the talent base.

5. IT'S INTERDISCIPLINARY: Companies rely on building teams that can work across a range of technical and creative disciplines. Creativity and great communication skills are therefore crucial to success.

6. THE NEW HYBRIDS: Interdisciplinary teams combined with relatively tight budgets and talent shortages lead to the emergence of 'slash' roles, such as producer/designer which require workers to master a diverse array of skills and enable companies to respond flexibly to new demands.

7. SKILLED USE OF REAL TIME GAME ENGINES IS A SECTOR WIDE GAP: Understanding the content creation and workflow processes of Real Time Game Engines is widely considered to be **the** single-most important skill for successful production. However, it is also in short supply: 52% of respondents identify proficiency with Unity (28%) or Unreal (24%) as a gap in their teams.

8. THE FIGHT FOR SPECIALIST TALENT: The games sector has not only become a leader in immersive content production, but also a 'hunting ground' for recruiting talent, thanks to their transferable expertise in areas such as Real Time Game Engines, and interaction design.

9. A BROKEN SKILLS PIPELINE: 44% of respondents were worried about the lack of graduates with relevant skills to keep up with demand. Competition for graduates is fierce amongst not only immersive experience producers but also more traditional engineering disciplines like automotive.

10. LACK OF PROFESSIONAL TRAINING: With training not in the culture of most creative sector companies and resources tight, funding and infrastructure for training is critical.





Recommendations

- **Literacy classes:** Developing literacy in the language, workflows, technologies and skills required for immersive content production will drive innovation and growth. More extensive work to develop creative industries' understanding of these technologies will truly open up the potential of this nascent sector.
- **New cross-disciplinary courses in immersive experience production:** Degree level courses need to facilitate interdisciplinary teamwork and build future capacity by developing skills across subjects such as computer science, media production, art and design and engineering.
- **STEAM not STEM:** Creativity is a major driver of growth in the UK economy. Allied to the sciences, it will be a major driver of growth in this sector. At present STEM subjects are too quickly de-coupled from the arts which are, in turn, deprioritised. A successful talent pipeline will rely on cross-fertilisation between the arts and traditional sciences: Science, Technology, Engineering, Arts and Mathematics.
- **Professional skills training:** Nearly all screen sectors suffer from a lack of professional level training,⁶ but this is especially acute in immersive where there is an urgent need for skills as well as experience. Courses that help established professionals translate their skills to this landscape, and to share and develop best practice will be vital to retaining the UK's status as an industry leader.
- **Real Time Game Engines:** There is a need to develop and integrate training in these tools in courses at all levels and across a much wider array of disciplines than its current home in games, including wider creative industry courses like film and television, theatre, architecture and fashion.
- **Skills mapping:** Developing robust, up-to-date labour market intelligence on skills in order to forecast demand and identify pinch points across the immersive economy will be crucial to developing a talent pipeline. This should include comparative work with overseas approaches to skills development at tertiary and secondary level.

⁶The Work Foundation's 2017 review of skills and training for screen industries highlighted 'a lack of clarity of the training and qualifications required for career progression and a shortage of professional, business and leadership skills'. The Work Foundation, (2017). *A Skills Audit of the UK Film and Screen Industries. Report for the British Film Institute*. Available at: http://www.theworkfoundation.com/wp-content/uploads/2016/10/420_A-Skills-Audit-of-the-UK-Film-and-Screen-Industries.pdf

CHAPTER ONE

NEW SECTOR, NEW SKILLS, NEW GAPS

“It’s not clear what the skills are because things are changing so fast, it’s a train that people are trying to jump on”

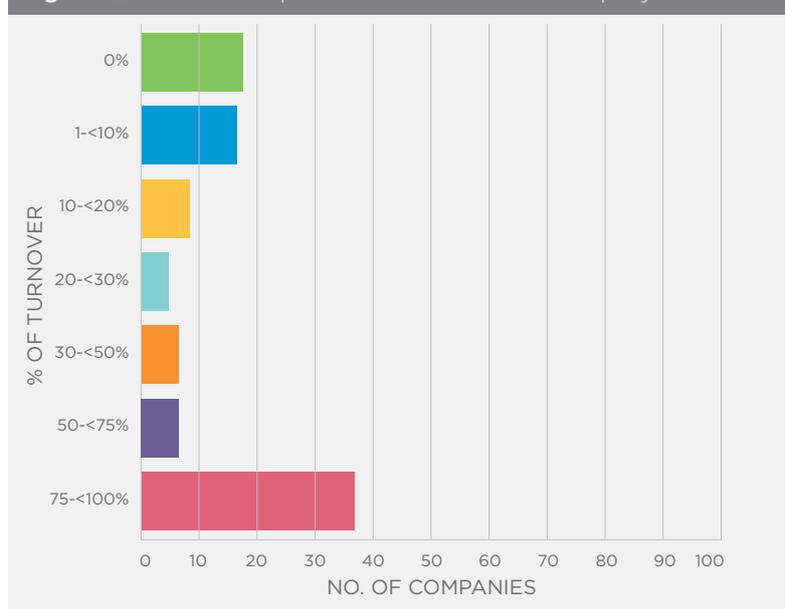
(Mark Grimmer, Director, 59 Productions).

The global race is on to exploit the potential offered by immersive media, to rapidly develop the technology, content, business models and distribution platforms and reach mass audiences. Fuelled by private and public sector investment, the consumer-facing market has felt the virtual become ever more real each year as Augmented Reality kits have become standard in smart phones, Virtual Reality headset prices have steadily declined and become more user-friendly. At the cutting edge of these technologies, current and future developments include the growth of web-based AR, cloud computing to further enable untethered VR experiences and the much-anticipated entry of Apple into the market during 2021. Alongside the anticipated launch of a 2nd generation of Magic Leap and HoloLens Mixed Reality devices as well as the success of the Oculus Quest in 2019, there is every indication that immersive audience experiences are about to really take off.⁷

The UK is at the forefront of this race, supported by the Government’s £33 million Audience of the Future investment to bring creative businesses, researchers and technology experts together to create striking new experiences that captivate the public. Launched as part of the 2017 UK Industrial Strategy, ‘Building a Britain Fit for the Future’,⁸ the Audience of the Future challenge aims to bring ‘creative businesses, researchers and technologists together to develop products, services and experiences that can be made accessible to the general public’. The challenge is to position the UK as the global leader in not just immersive technologies, but specifically audience facing experiences that bring the possibilities of these new technologies into the homes and lives of citizens and consumers.

Whilst the immersive economy and use of immersive technologies is much wider than this, the emphasis on audience facing content speaks to the UK’s particular strength in creative industries and its storytelling talent. The creative industries already contribute year on year increases to the UK economy, having broken the £100 billion barrier in 2018.⁹ With its storytelling heritage, there are high hopes of drawing on the importance of the screen sector’s role to promote growth in immersive. There are already indications this is paying dividends: our 2019 survey of 100 companies working in immersive experience production revealed that over a third are now making between 75-100% of their turnover from immersive audience facing content, with 44% of companies deriving more than half their turnover from immersive. In line with the *Immersive Economy Report 2019*, we see evidence that the sector is beginning to scale up, with 53% of respondent companies in our survey now having a dedicated in-house production unit for immersive audience experiences.

Figure 1.2: Immersive experience creation as % of company turnover



⁷By Q3 2019, 400,000 Oculus Quests had shipped globally, ‘nearly double the combined sales figures for the Oculus Rift S and Oculus Go’, according to Nielsen’s Super Data research. Available at: <https://www.superdataresearch.com/superdata-xr-update/>

⁸HMRC. (2017.) *Industrial Strategy: Building a Britain fit for the future*. Available at: <https://www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future>

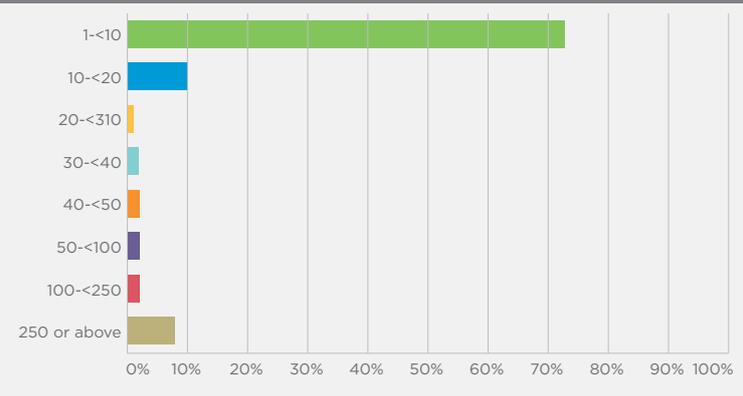
⁹Department for Digital, Media, Culture and Sport. (2018.) *DCMS Sectors Economic Estimates 2017: GVA*. Available at: <https://www.gov.uk/government/statistics/dcms-sectors-economic-estimates-2017-gva>



According to the Bazalgette review of the creative industries in 2017, the sector has a much higher than average growth rate of jobs in the creative industries, with the report's findings implying that roughly one million new creative jobs will be created by 2030.¹⁰ The importance of creative jobs in the growth of the immersive economy is likely to be significant. At present the immersive economy enables or enhances an estimated 13,000 jobs that are enabled or enhanced through immersive technologies. If the number of companies operating within entertainment and audience facing experiences is reflective of the sub-sectors share of immersive economy's jobs, then the significance of this sector can't be underestimated: it makes up a quarter of immersive companies, whilst this sub-sector is predicted to grow thirty-fold by PwC¹¹

Our own survey suggests that the majority of companies are small or start-ups with fewer than 10 staff, but ten per cent of companies are much larger, supporting over 100 jobs.

Figure 1.3: : How many permanent employees (including directors) in company?



¹⁰Bazalgette, P. (2017.) *Independent Review of the Creative Industries*. Available at: <https://www.gov.uk/government/publications/independent-review-of-the-creative-industries>

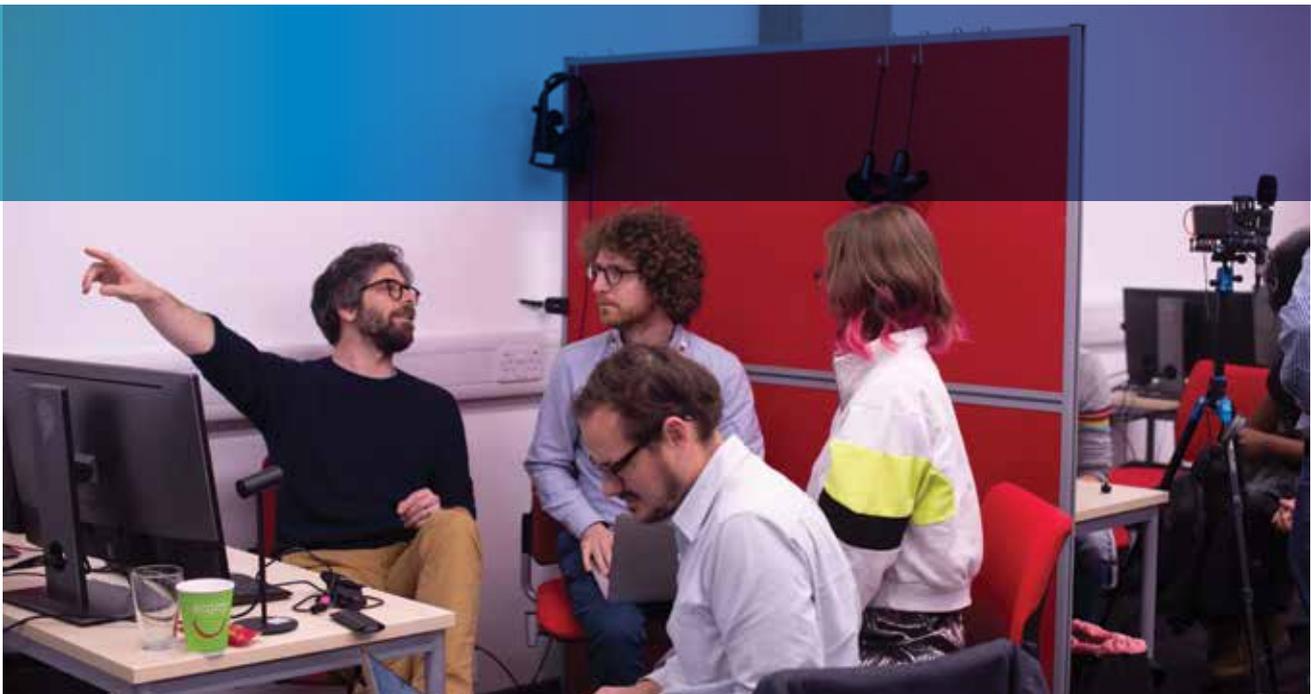
¹¹Based on estimates from PwC employment figures and Immerse UK's analysis of sub-sector companies. Of course, jobs may not be distributed evenly with companies and will vary according to the size of companies in the sector. This figure should therefore be treated with caution and as a proxy in the absence of more detailed evidence.

The immersive sector therefore has high potential to add significant further economic and cultural value to the existing creative industries. However, such growth will only be possible if the skills needed to fill key jobs and roles can be mapped and understood so that the training and talent pipeline can be developed and invested in. Without this intervention, there is a risk that a significant skills shortage may emerge, that will limit this growth potential. Indeed, 97% of survey respondents already say that skills are missing in the immersive sector and that skills gaps are at a critical level.

While rapid investment from the Audience of the Future programme is welcome, it also further exposes an emerging skills gap in this sector. It is arguably this unprecedented wave of investment that makes the need to understand and plug the skills gaps so pressing with companies struggling to keep up with not only opportunity but also demand. Audience appetite for immersive experiences is only going to grow. StoryFutures' early stage research on audience appetite for immersive experience suggests this is already high, with over **85% of 766 immersive**

experience users indicating a high desire to try more immersive experiences.¹² As demand grows, the pool of talent with the skills and experience to develop world class content must grow with it, if the UK is to remain at the forefront of this new creative industry.

Moreover, the skills required are inter-disciplinary, meaning no single current creative industry sector can fill the gap. Across the report we point out how creativity is the crucial, transferable ingredient for success. Indeed, our findings confirm those of the Creative Industries Policy and Evidence Centre's more wide-ranging analysis of 35 million UK job adverts between 2013-2017, which found that creativity is consistently identified as the most sought-after skill for jobs that are likely to grow in size and importance in the UK economy between now and 2030.¹³ That creativity is a key skill for a creative industries job may hardly seem surprising: yet an over-emphasis on the technical knowledge required to work with the new technology in this sector would arguably impede growth. We need great creative ideas reaching audiences along with compelling storytelling that brings this exciting new technology to life.



¹²StoryFutures (2020) *Immersive Audiences: Insight Report 2020*. Forthcoming.

¹³Eaton, E. and Djumalieva, J. (2018). *Creativity and the Future of Skills*. Creative Industries Policy & Evidence Centre. Available at: https://pec.ac.uk/assets/publications/Creativity_and_the_Future_of_Skills_v6.pdf

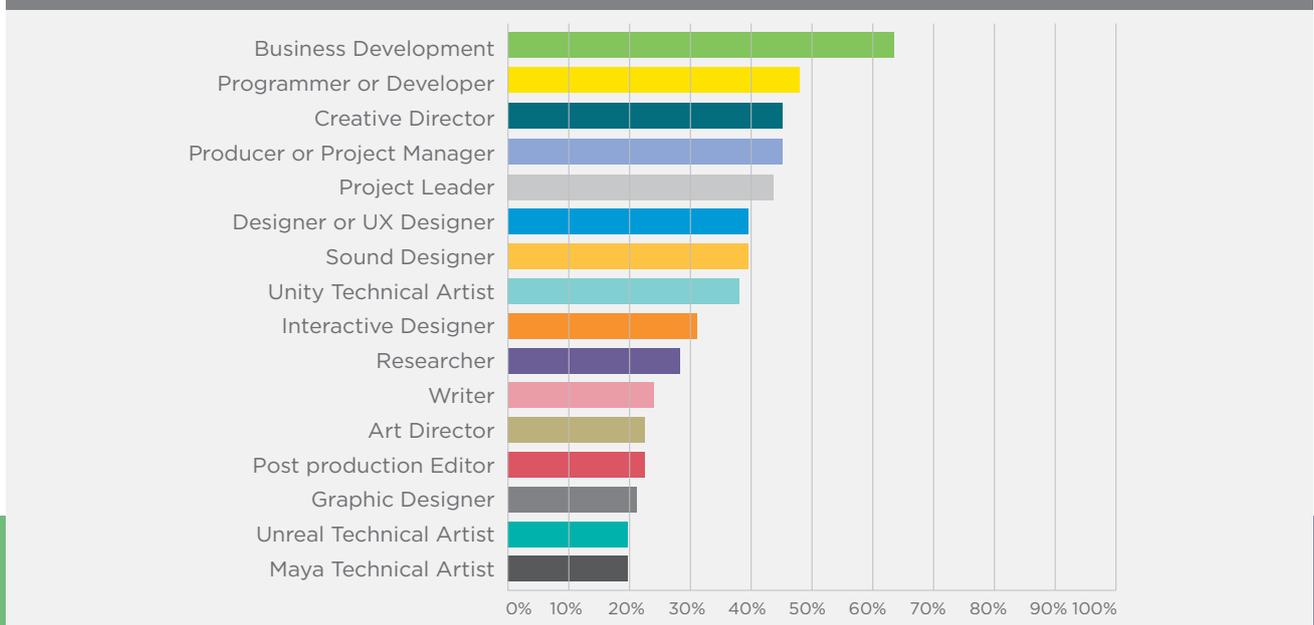
Key roles and key skills gaps

There is a distinct lack of knowledge about the skills required in this sector partly due to the 2017 closure of the UK Commission for Employment and Skills, the main body responsible for producing strategic information on skills supply. This has created a vacuum in terms of labour market intelligence that impacts not just creative industries or the immersive experience production sector, but the immersive economy more widely. This knowledge gap is exacerbated by both the nascent and fast-growing nature of the sector. But it is a picture that is also replicated *inside* the industry: interviewees paint a picture of a young industry that hasn't yet quite worked out its key roles or skills requirements:

“With every production we know how to do about 50% or maybe 70% if we are lucky, but the rest we have to figure out ... It's hard to determine how one person can complement the skills of others”
 (Richard Nockles, Creative Director Sky VR Studios, Founder & CEO Surround Vision).

Survey respondents identified 43 roles that they saw as 'central' to carrying out their work. The top 15 key roles are presented in figure 1.4, and were all identified by at least 20% of survey participants as a key role. That such a dizzying array of roles could be identified as 'central' to the 100 companies surveyed is suggestive of the complexity of this new landscape. Roles including business development to sound designer, Unity artist to interactive writer, and lead UX designer to producer were all seen as crucial to the delivery of company's core business.

Figure 1.4: Key roles for immersive experience production



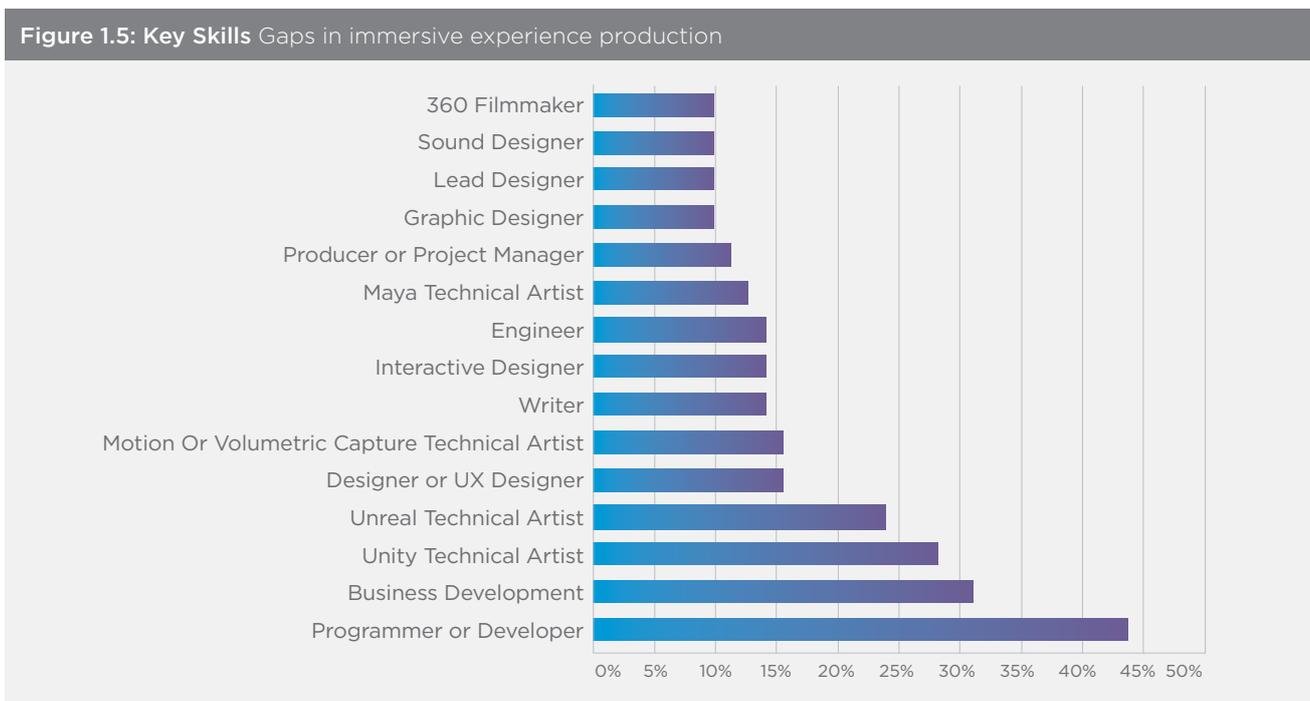


Figure 1.5 sets out the extent to which survey respondents felt these central skills were missing in their current business. Crucially **73% of the top 15 roles** that are imperative to immersive experience production appear to be suffering from notable gaps.

Within companies' current operations, the most challenged areas are in Business Development, and sourcing enough Programmers, Technical Artists, particularly in Unity (see chapter four), UX Designers and Interactive Designers. Closely behind are shortages of both Producers and Writers.

These skills gaps threaten the potential for growth in this sector. Immerse UK's 2019 report found that across the immersive economy 45% of respondents experienced difficulty in finding and recruiting talented individuals with the right skills¹⁴ Our research suggests

that for those working in immersive experience production the skills pressure was more acute with 65% of companies identifying skills as a barrier to growth. Toby Allen, the London-based founder of JobsInXR.com, the largest job board for immersive tech, argues, "There simply aren't enough qualified applicants for 85% of the jobs we list".¹⁵

However, whilst the large majority of our survey respondents, focus group and interviewees agree that skills gaps are a barrier to growth, identifying the exact skills and roles that each company needs to produce successful projects and grow is much more complicated:

“We don't really know what the titles of jobs are yet!” (John Cassy, Chief Executive and Co-Founder, Factory 42).

¹⁴Immerse UK. (2019.) *Immersive Economy in the UK Report*.

¹⁵Forbes Media. (2019.) *Lack Of Talent Is Throttling Growth in XR Says Jobs Board Founder*. Available at: <https://www.forbes.com/sites/barrywhyte/2019/02/12/lack-of-talent-is-throttling-growth-in-xr-says-jobs-board-founder/>

“We can’t recruit people with the skills of things we haven’t yet done, or for things where the solution hasn’t yet been realised”

(Stephen Brown, Talent Acquisition Manager, REWIND).

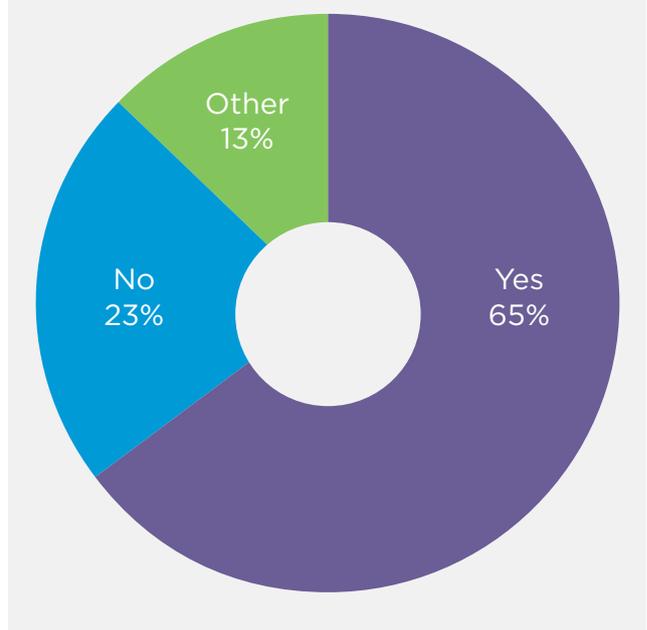
Such explanations of the current skills shortage are echoed across our findings, with the sector seeing itself as trying to rapidly grow to keep up with demand, whilst still being in an experimental research and development phase in terms of creative possibilities, technological constraints and opportunities, workflows, business models, job roles and the skills to operate all of the above. As a result, 68% of survey respondents said that it is either ‘mostly difficult’ or ‘difficult’ to find people with the right skills for their businesses.¹⁶ Moreover, the gaps identified span the entire spectrum of production departments: creative, technical, management and administrative.

- **77% of companies identified lack of technical skills** within their own company and wider talent pool as a barrier to growth. In particular, there is a concern with a lack of programming skills in Real Time Games Engines that we explore in chapter four.
- **Creative and management roles were also highlighted by 51% of respondents:** 28% were specifically concerned about a lack of creatives such as writers, directors, designers, whilst 23% focused on the need for senior leaders who understand both tech and creative.

This final point is a particular paradox for immersive production: in a nascent sector, where do companies find senior leaders with enough experience to lead and develop projects, win new business and handle the step up to larger budgets that will enable a scale-up of ambition to reach mass audiences? In this new economy, experience is at a premium.

Profiles of a range of people who exemplify some of the core roles discussed in this chapter are included across the report, setting out a more detailed understanding of the day to day tasks involved in roles that have emerged as central to immersive production. As is evident across the profiles, each individual role has specialised skills that must work in dialogue with other roles, operating in interdisciplinary teams where communication is key and the one common denominator is creativity (see chapter three).

Figure 1.6 Are skills gaps a barrier to the business growth of your company?



¹⁶This rises to 71% for those who come from film.



PROFILE: Creative Interaction Director
Kim-Leigh Pontin, Sky VR

Sky VR is a leading production house, working across 360 video, real time game engines and post-production to create experiences for brands and entertainment. Founded by award-winning directors, producers and technologists the SKY VR team pride themselves in developing dynamic storytelling and technology.

Job Description: The Creative Interaction Director oversees a team of designers across all phases of production: from identifying new projects and the implications of emerging technologies for each project, through to early stage experimentation and initial interaction design prototypes, through to final delivery. Throughout the process, the role keeps the project team focused on ensuring the best possible user experience.

Responsibilities: The majority of the work is in team management, working with visual developers, technical artists, designers and front-end developers to ensure all project needs are communicated and met. Working on the interactive elements of the delivery specification (interactive flows, environment

maps, choice mechanics, storyboards, ideally an interactive script); planning and overseeing the making of prototypes; as well as involvement with live shoots such as motion capture or volumetric capture.

Skillset: Creative team management and communication underpin the role, with specialised skills required in interactive and UI design, motion and volumetric capture and direction, conceptual innovation and keeping abreast of the technological landscape.

Background: Kim is from a TV design background, having also worked across game development. She was able to transfer many of the skills from TV production to immersive as a result of her Information Architecture studies at university. This developed an understanding of how to design a system that can work across lots of different modes and deliver to different media.

“It’s the same mindset from UX to interactive design to game design as directing storytelling to scriptwriting. It’s all story and it’s all game design.”



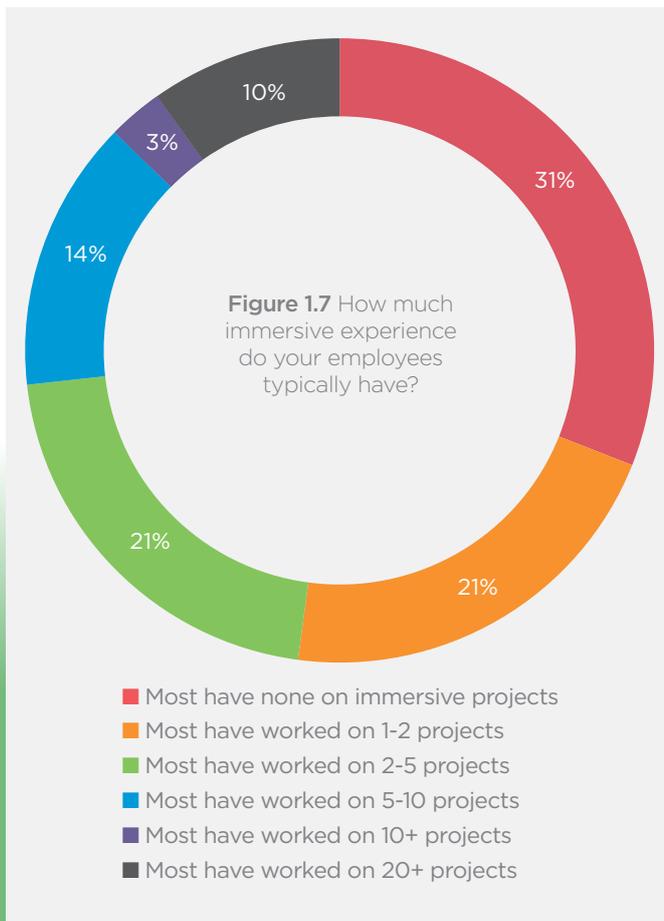
Experience matters

In such a landscape, all projects have new components and often involve pulling together teams for the first time, with companies hiring staff who are entirely new to their role or sector. Perhaps one of the most startling findings of our survey was the lack of experience across the sector:

- 37% of companies have fewer than two years' experience, with over half having less than three years' experience (see chapter three).
- **73% of employees working in immersive have worked on fewer than 5 projects**, with 31% of those employees having no immersive experience at all (see Figure 1.7).

For those companies coming to immersive from a Film background, this rises to 75%, whilst no respondent from a film and TV background had worked on more than 5 projects. Even in the games sector, which is widely perceived to be the most experienced, only 15% have worked on more than 10 projects. As one leading senior creative surmises:

“The medium is so young that there aren't any experts yet!” (Mohén Leo, Director of Experience Development, ILMxLAB).



With experience so thin on the ground, it is no surprise that finding skilled people to crew up a production or grow a company is difficult. This can lead to outsourcing parts of production overseas, which is harmful to the development of skilled teams and companies as well as the UK economy. Head of Passion Experience Passion Pictures, Katie Grayson explains that the decision to place the production of *Doctor Who: The Runaway VR* in their Paris studio was driven by a number of factors - practically, in terms of having a French director on the project, and financially in terms of tax breaks, but a lack of UK-based talent was also a significant contributing factor. Whilst this kept revenues within the overall parent company, it was counter-productive for building a skilled talent base and is not sustainable for the long-term growth of their immersive division. As Grayson puts it, "from a learning perspective, and in terms of building on the knowledge you gain from each project you make in the immersive space, the more you can do in-house the better."

If there is no building on the knowledge and experience of the team, it means starting from scratch every time and relying on those few at the top to be knowledge bearers. As a range of senior company executives outlined, they are desperate for senior creatives to join the company in order to win business and grow, but in a nascent sector, substantial experience is hard to find. Such roles are crucial to linking creative aspirations with technological limitations:

“Being able to just break down what was needed on a brief without kind of crying, without breaking down themselves ... [because it] becomes twenty headed hydra”

(Katie Grayson, Head of Passion Experience, Passion Pictures).

PROFILE: Creative Director Lysander Ashton, 59 Productions



59 Productions is an award-winning design studio and production company that includes designers, writers, directors, architects, animators, visual artists and technologists working on projects that range from architectural projection mapping to exhibition design; from VR experiences to events; from theatrical design to technical consultancy.

Job Description: The Creative Director has ultimate responsibility for the creative output of a project, including final accountability for budget, delivery and team structure. The role involves winning and managing clients, setting out a vision and communicating this to clients, and leading creatives internally.

Responsibilities: Managing and overseeing team leaders, typically a Producer, Senior Video Designer, Architectural Designer, Lead Developer, Composer and Writer; editorial review; budget, schedule and quality assurance for final delivery.

Skillset: Most important are creative and conceptual skills to develop an idea and then communication skills in order to articulate this to funders, stakeholders and key team members. The role doesn't require hands on technical skills but you must be able to understand the technology in terms of what is achievable within the time and budget. Project and team management skills, including budgeting and scheduling, are crucial.

Background: Lysander has no formal training in immersive content creation, hailing from a video design for theatre and filmmaking background. Prior to that he studied Physics at university and has primarily undertaken 'on-the-job training'.

“The fundamental skill is the ability to be agile and multi-skilled”

As we set out in chapter two, this ability of senior leaders to help translate and understand the different technical, creative and audience demands of this new sector is a crucial skill. Immersive leaders worry particularly about this skill in order to keep pace and respond to demand. As Mark Grimmer, Director at 59 Productions, explains, “It’s interesting, the fundamental skill is the ability to be agile and multi skill.” In our focus group, participants discussed how senior leaders must ingrain agility into their teams and business models as productions and their requirements are continually shifting sands that get greenlit, stood down, changed last minute, scaled up, scaled down or postponed. This lack of a definitive ‘green light’ moment for a creative project with sliding dates and no set ‘go’ point means that if creative directors and company heads wait for the client to confirm the job before they start recruiting, they are too late to find anyone available. In such a landscape, interdisciplinary approaches are crucial to understanding the exact nature of the skills shortage, as well as addressing it. As we discuss in chapter three, an increase in ‘slash’ or hybrid roles has been another response of the sector.

Our focus group emphasised that it was cross-pollination between disciplines that was most likely to help solve the skills shortage. As Michael Ogden, Former Creative Director of VR at The Third Floor, explains:

“I think any cross pollination of knowledge there between the interactive and linear storytelling is super, super useful. ... We need people who can understand ‘what film can bring, what theatre can bring, what games can bring’”.

The call for deep interdisciplinary, as well as specialised, skill sets and the ability to translate between them is explored further in chapter two. In the following case study, we profile how ‘placements’ of senior creatives into established immersive companies looks to address the need for cross-pollination and experience by drawing on established creative talent from our world-leading creative industries.



CASE STUDY | REWIND Placement

StoryFutures Academy runs two-day intensive Bootcamps to upskill professionals from film, TV, games and theatre to bring them into the world of immersive. The Bootcamps lead to paid placement opportunities for 'on-the-job training' with immersive production companies.

The first placement focused on the role of the 'Producers and Creative leads' from which Steve Shannon, an established Creative Director with extensive television, advertising, and marketing experience, was selected to work with leading immersive studio, REWIND. Shannon worked for six weeks with REWIND's in-house Producer Aimee Melmoth-Bennett.

Drawing on Steve's extensive knowledge of multi-camera live filming, REWIND was able to position him as lead on a complex 18-camera 360-degree shoot that was an exciting first for its client, *Top Gear*: a venture into immersive that put the audience 'virtually' behind the wheel as a stunt driver in *Buckle Up!* for the BBC's *Top Gear* channel on YouTube. As Duncan Gray, Commercial Director for *Top Gear*, explains, "It was something we've never done before. The results, as you will see, are smashing!"



Shannon reflects: "I have gained so much more knowledge about 360 filming and the complexities of immersive shooting. I also learnt a lot from Aimee and the team about AR workflow on a second project for Samsung. Overall, I feel pretty confident now pitching myself out as an Immersive Director or Producer."

REWIND's Stephen Brown states, "From our point of view it was highly successful - having a producer with this new knowledge was really beneficial to us, hard to put a value on."



Sol Rogers, CEO and Founder of REWIND explains the value of a hands-on training model that develops professional level talent:

“The talent supply chain will not change and the industry will not progress unless initiatives like StoryFutures Academy are adopted. Enabling skilled people from the traditional TV, film, and theatre industries to have access to immersive companies and vice versa leads to accelerated learning and development on both sides, plus helps to further cement the UK's position as a leader in immersive content creation. This cross-sector approach is not only innovative but highly valuable.”

In 2019, eight film and television professionals were funded on placements with immersive production companies. It is a placement model unique to StoryFutures Academy.

CHAPTER TWO

THE VR/AR/MR/XR SOUP

“It’s daunting ... because we are smashing between the three worlds, of web, broadcast and gaming. You have to have a knowledge of all three.”

(Richard Nockles, Sky VR, CEO Surround Vision).

In this new frontier, lack of experience also equates to a gap in literacy – with entrants needing to quickly master new technologies, terminologies and ways of working. As Nockles’ comment indicates, the new technologies, workflows and production practices of immersive bring together different approaches that are hard to find skilled and experienced staff for. If immersive is really smashing together ‘three worlds’, then finding the ‘highly experienced specialist with a rare or broad skill set’ is often described as the hunt for the ‘so called “unicorn”’.¹⁷ Moreover, the bringing together of three worlds has generated a growing vocabulary of terms that are a bewildering barrier

to new entrants – including experienced creatives coming from other screen industries. ‘Immersive’ covers such a vast spectrum of technologies and experiences that the array of immersive R’s – VR/AR/MR/XR – are often referred to as a ‘soup’. Few new entrants know what they stand for or where the boundaries lie between each technology and their relationship to the physical, ‘real’ world and the experience of the user themselves.

In such a landscape it is therefore hardly surprising that there is wide confusion that creates a barrier to entry and growth:

“There is no guide, no clear brief for teams and so many fundamentals like language barriers to overcome before new pipelines and workflows can be understood” (Michael Ogden, Former Creative Director of VR at The Third Floor).

Part of the problem that Ogden and others here point to is that language gaps are intimately bound up with production processes and workflows. For



¹⁷Aleksandrova, M. (2019.) 3-in-1 Developer: A Jack of All Trades or a Unicorn? Available at: <https://easternpeak.com/blog/3-in-1-developer-a-jack-of-all-trades-or-a-unicorn/>



many companies approaching immersive experience production there is a significant shift from their background in producing *content* to an environment where they must produce software. Indeed, the ‘gaps’ in knowledge and language vary according to which sector from which a company ventures into immersive. As Digital Catapult’s 2018 *Creative Tools and Workflows for Immersive* report makes clear, the challenge is particularly acute for Film and TV where the techniques developed through many years of experience, such as directing attention via camera angles and post-production edit protocols, are not effective when the viewer is not forced into a single viewpoint and where transitions between scenes require careful consideration of users’ current physical orientation.¹⁸

As we detail in this chapter, the lack of shared language is a significant barrier to growth in this industry affecting the ability to build effective teams, workflows and production models. What emerges is the importance of creativity, as a problem solving and communication skill, as a shared and transferable skill that can help bind teams and successful productions together.

Workflows: A shift in mindset and skillset

“I often get asked when post [-production] is starting. And even I don’t know which bit I’m doing and if it’s in post or not. It’s kind of almost all post”

(Dan Stankowski, Head of Interactive, Surround Vision).

Fundamentally the workflows of immersive experience production are more akin to delivering software than other forms of content, such as film or television. This requires a shift in both mindset and skillset for those from the traditional screen sectors to be able to work in a more agile and iterative way in immersive production. For immersive, a development and proof of concept/prototyping phase typically comes first, followed by agile (typically) weekly sprint cycles of creating, iterating and delivering elements that all come together in a game engine where final build and further iteration takes place. Throughout the process user testing, beta launches and continual software updates are a necessary part of the process.

¹⁸Digital Catapult. (2018.) *Creative Tools and Workflows for Immersive Content Creation Report*. Available at: <https://www.digicatapult.org.uk/news-and-views/publication/workflows-immersive-report>

Such a challenge is not entirely new to those in the film and television industries looking to exploit the potential of new forms of digital media: from the era of multiplatform and interactive television in the early 2000s, through to growth of social television, many in these industries have struggled to adapt to the new ways of working and production required by interactive media.¹⁹ Whilst the 'linear legacies' of these institutions contribute to the lack of adaptation to new ways of working for digital and interactive media, they also have storytelling heritages and intellectual property rights that have huge potential to drive growth in immersive. The caricature of these industries as 'legacy media' or 'dinosaurs' is therefore largely unhelpful, and is likely to impede growth.

Perhaps more important, therefore, is to understand the workflows of immersive experience production are often experimental and unproven. Our interviewees talked of the lack of clearly defined and shared workflows which, as with lack of shared language, have a detrimental impact on the winning of business and growth of the sector:

"Immersive has this gap. Of kind of ...Unknowns. You know [clients want to know] 'what's it going to look like?'. [And the answer is] 'we don't know yet' ... You have to understand what the points are where your client or your commissioner is twitchy about and face it full on: you can't bluff and bluster your way through this. You have to [tell the client] right from the outset, 'this is going to be hard'. Or 'this is the bit you won't see until the

very end, or, this is the bit we actually need to do some R&D on to know if it's even possible"

(Katie Grayson, Head of Passion Experience, Passion Pictures).

As more specialised technologies, such as volumetric capture and hologram experiences are developed, the possibilities open up and workflows are only likely to become more complicated. New issues are constantly raised that challenge not just technical capability but budgetary considerations:

"I will give you an example: We want to capture an artist in a hologram. How do we capture, do we volumetrically capture ... or do we capture a motion capture? ... do we need to worry about the lighting before? Or what can we achieve in post? All of those conversations you have to totally have so it is not left to the poor bastard who comes into that job! ... And if we can't get away with it in post, that is again a huge learning curve"

(Richard Nockles, Sky VR Studios and Surround Vision).

Digital Catapult's 2018 report on creative tools and workflows²⁰ echoes the concern that workflows and production pipelines are a hugely complicated area, with each individual company and sub-sector of the immersive economy bringing overlapping and interdisciplinary techniques leading to nascent workflows largely driven by previous experience. These workflows often pull in outside skills and adaptations made on-the-fly to overcome creative challenges. The convergence of many different roles and industry backgrounds to solve problems with



¹⁹Bennett, J., Strange, N., Kerr, P. & Medrado, A. (2012.) *Multiplatforming Public Service Broadcasting, The economic and cultural role of UK Digital and TV Independents*. Available at: https://pure.royalholloway.ac.uk/portal/files/26368179/Bennett_Strange_Kerr_Medrado_2012_Multiplatforming_PSB_Industry_report.pdf

²⁰Digital Catapult. (2018.) *Creative Tools and Workflows for Immersive Content Creation Report*.

few standard practices, as well as a lack of education and professional training, is surfacing as a challenge in a number of immersive content production areas. The Digital Catapult report suggested that the immersive industry will need to develop methods of coping with this, leading to faster workflows and new tools that will encourage more people to create and consume immersive experiences over the next decade. In particular, they emphasised that cinematic VR, computer graphics, visual effects, animation and computer software development will be crucial industries to import and adapt workflows from.

Ultimately, understandings of workflow have a profound impact on both story realisation and managing budget and schedule. As Angela Crago (Senior Project Manager, BBC VR) explains about outsourcing work to a VR company, “You have to understand their quotes and how they break down [and ask] ‘is this reasonable for 8K rendering?’ ... [or] do you feel they have factored in enough time for animation or programming?” For future growth, our focus group discussed how greater integration and knowledge sharing is vital to reduce confusion on production workflows. For many, this was as much a communication issue as a technical one:

“The sharing knowledge about how you might approach an interactive work an interactive drama or something like that is still quite siloed. I have my way. And then other people have other ways. You know sometimes you write down your 75 steps towards making interactive but there’s no standard about that” (Focus Group participant).

This rang true for many interviewees as well, who had developed their own ‘rule book’ and templates. For example, Katie Grayson discusses how coming from a television background she had to develop her own and company’s understanding of where user interaction fits into storytelling, leading to the development of a workflow model to include ‘logic’ to understand the role that user interaction plays in the company’s experience design. Similarly, Claire Cook (Executive Producer, Interactive Arts), describes how she has devised a hybrid model that is part Waterfall (drawing from film and TV) and part Agile (using games and digital methods). In this approach the conceptual, contracting and preparation phases follow a Waterfall model, being led from the top by the Creative Director or Producer. The production phase is agile, which includes design and build and is where an iterative approach and multiple skills are needed. Even though the model is hybrid, she emphasises that it needs to be clear, so it is repeatable, and scalable.

“For us it’s concept development/contracting then straight into interactive design and user journey. We might build an interactive demo early on as our proof of concept if needed. User journey and storyboarding are key at the beginning. Then gameplay, then design phase when you create assets. And then build, with multiple rounds of testing as you go” (Claire Cook, Interactive Arts).

Early prototyping or accessing R&D monies via Innovate UK or similar schemes can help provide a visual proof of concept that can build confidence in a product or project and help teams to gel:

“I’m a big believer in prototyping. I’m a big believer in understanding of the audience, and a big believer in being able to speak a very clear language about what it is we’re trying to make and then getting a coherent experience out of that and then building layers on top of that. So you’re bringing the team along with you”

(Focus Group participant).

Others in the focus group suggest there is much to be learnt from immersive theatre where audiences can participate in live productions, and the user experience can be rather different. Here, the interconnected nature of roles and importance of communication are underlined:

“There is a process of decision-making cascading things which especially on the scale of detail we are working on just means that there is a level of communication which I think goes beyond what you might find in traditional theatre. Because no skill set sits in isolation. Everything impacts everything else and everybody needs to talk. Which is often why it is quite expensive to do the work because of the resource needed and the time needed and the thought needed. But what you ultimately get is good user experience because you have got quality control and care” (Peter Higgin, Director of Enrichment and Joint CEO, Punchdrunk).

Punchdrunk’s outlining of the importance of communication within their internal teams can be thought to apply more widely: the issue for many of the producers we interviewed was that each team or company was figuring out for themselves, without the opportunity for sharing best (and worst) practice.

Whilst an emphasis on technical skills and specialisms will help develop the sector’s understanding of the technology’s possibilities, creativity and communication are therefore the glue that binds together the disparate teams required to build successful productions that speak to audiences. The challenge is not only to emphasise training in soft skills for individual workers but also to provide forums for this nascent industry to better communicate and share knowledge to develop best practice.

Language: Lost in translation

“I think that you know so much of it [immersive production] is language”

(Focus Group participant).

Perhaps the most significant impact of a lack of clear and shared language protocols for immersive production is the barrier it creates for companies





PROFILE: Producer
Michelle Feuerlicht, Royal Shakespeare Company

The RSC is one of the £16m Audience of The Future Demonstrator programme projects.

It sets out to discover the next stage of immersive performance experiences for audiences. The project brings together 15 specialist organisations and pioneers in immersive technology across theatre, music, video production, gaming and the research sector.

Job Description: Producing a live performance using emergent technologies for a multiplatform, multi-partner project. The role is both creative and delivery focused, requiring the ability to pull together ideas for the project, feasibility scoping as well as to hire and manage a team to ensure the project delivers the creative vision, is to budget, and is on time.

Responsibilities: Scoping early work, including creative ideas, user experience (UX) and prototyping; communicating with all internal and external stakeholders to ensure shared vision; agile and iterative workflow management; quality assurance management; budget, schedule and delivery.

Skillset: The producer must have storytelling skills and the ability to translate creative vision into final delivery via a clear understanding of the technology involved, its limitations and the desired user experience. A key skill is user experience design and/or testing, including audience research and the ability to oversee the designing of experiences from onboarding through to offboarding. Understanding how to budget and schedule interactive projects.

Background: Prior to working at the RSC, Michelle was Head of Digital in a TV production company and had also worked in a range of digital content and design agencies. Graduating from a BA in Documentary Filmmaking, she gained interactive project producing experience on games and an audio documentary.

“I’m not highly technical but I understand the possibilities, understand the language and I’m not scared of the unknown, of working out how to push the technology to create new experiences. The key to all of this is collaboration.”

to convince clients to spend budget in this new territory. As Katie Hudson (VR Producer, formerly at BBC VR Hub) laments, “50% of my life is spent explaining it!” Similarly, Richard Wormwell (Head of Production Innovation, Dock 10) outlines how, whilst his team may now have great technical competencies, this knowledge needs to be shared effectively to enable client-facing staff members to sell immersive productions to clients:

“... technically we are very competent now, we understand best shooting practices for lighting and immersive sound and all those technical things we needed to understand before we could sell it effectively ... And now the next phase is trying to put some of that knowledge on a high level [to] some of the team that deal directly more with clients.”

Guy Gadney (Co-Founder and CEO, To Play For), approaching the landscape from a games and Artificial Intelligence standpoint, agrees that the focus should be on communication at the level of winning new business:

“... sales is motivating, pitching an idea is sales, pitching an idea is motivating. And so the language is important because ultimately that’s how we communicate ... I think an understanding of that, the ability to communicate [is key].”

Interviewees and focus groups highlighted the ‘pitch stage’ as a tension point where the lack of a common language hinders their ability to get funders and commissioners on board with a project. Here the importance of a creative idea, clearly communicated to a wide range of stakeholders, is the difference between greenlight and a stop sign. As Katie Grayson (Passion Pictures) explains:

[The] creative producer role becomes quite vital in this hard messy business of selling and green lighting and getting some funds ... because there's so many factors to consider and quite often, there might be an agency and an end client and a director and maybe a writer and all these people that we have to kind of manage."

However, the lack of shared language can be exploited for immediate profit. Interviewees and focus group members termed the immersive production a 'wild west' whereby lack of shared understandings within the sector, let alone pitching to commissioners or clients from other sectors, can be used to hide or inflate production costs, reducing confidence in the sector and leading to a longer-term detrimental impact. The ability to translate between worlds is therefore highly prized. As Angela Crago (Senior Project Manager, BBC VR) explains, "If any of my team left me I think I would struggle to fill their role ... there are not that many people who have got an overarching understanding of TV and how VR works."

The few who do have that knowledge, says Kim-Leigh Pontin (Creative Interaction Director at Sky VR), "must be the 'glue' that pulls these worlds and teams together". Translation skills are crucial to not only creating successful internal teams but also in developing effective workflows and production pipelines.

Our focus group found the connection between good communication and effective workflows inextricable, often finding workshops that mapped pipelines from end to end to understand different roles, responsibilities and key terms invaluable. As one focus group participant explains:

"It has nothing to do with skills of artists because people get this wrong all the time, there's just misunderstandings. I did stuff a few years ago (on a project) they had big artists and had money and the money went in, but it just went wrong. There was no language. I didn't speak it so there were hugely talented people around but no way of communicating properly"

(Focus Group participant).

As Peter Higgin (Punchdrunk) explains, it is often the creative producer or project manager (see chapter three) who becomes the lynchpin to a successful production because of their ability to translate between creative vision, technological possibilities and dependencies:

"The good project manager and producers [are] good because they talk to the artist or client and go 'What are we trying to achieve here? What do we actually need?' They translate the idea into something that works with the budget and is realisable but does what you want to do and does it in a way that you didn't think you wanted to do. It is collaborative that conversation."

'Soft skills' of creativity and communication are therefore crucial to success because, as our focus group discussed, in a landscape where so many challenges are new and experience is limited, there can be a lot of assumptions about what people's backgrounds are on every team. This can lead to scenarios where 'you can get 30 percent into a project and realize that you don't have all the right skills there's so much just soft skills of people management" (Focus group participant). The group emphasised a need to use 'little jargon', to 'listen', to 'know what the question is' and to 'understand what 'the audience need' as crucial to successful productions. Ultimately, thinking about the final end user was crucial for ensuring language did not become too complicated: "understanding of the audience ... speaking in a very clear language about what it is we're trying to make and then getting a coherent experience ... [that's] when it's working".

Even in the games industry where highly established team structures exist, it is creativity, communication and flexibility that remain the key transferable skills:

“So what we would be looking for, actually is fairly transferable, anybody who works in the VFX, the movies or TV, anybody who creates 3D models or 3D characters for movies, it could be an animated film, it could just be special effects ... TV art, or are good at sketching, good at drawing, good at concepting, storyboarding even ... So I think there is quite a lot of crossover in terms of art. There is quite a lot of crossover in terms of design”

(Patrick O’Luanaigh, CEO, nDreams).

As the sector grows, expectations of what can be achieved in immersive technologies rise. Our interviewees and focus group identified an increasing reliance on specialisms for immersive content creation like volumetric capture, photogrammetry, motion capture, real time game engine specialists and other technical artists. It can be a huge mountain of knowledge to climb with ever more specialised languages emerging.

Despite the problems caused by specific and opaque languages, many interviewees felt that it was important not to dive down the rabbit hole of technical specialism and remember that the exciting part of immersive is the opportunity for new, innovative forms of storytelling. Companies operating in the immersive experience economy often positioned themselves as pioneering risk takers who placed great stock in their storytelling skills and heritage. Claire Cook (Interactive Arts) who hails from a background in film before moving to digital, declares:

“You shouldn’t be scared of it ... I used my skills as a starting point ... never forget it’s all storytelling and with an audience in mind”

(Claire Cook, Interactive Arts).

The focus group spoke of a need for a shift in both mindset and skillset in terms of the way content is delivered. George Rowe (Senior Producer, Aardman) describes how their Interactive Department works hard to capitalise on the skills of company workers from a traditional film and animation background and to ‘plug them in to the interactive pipeline’.

Whilst such companies may be happy to position themselves as pioneers, the lack of experts and agreed definitions, rules, standards and processes are also problematic for wider sector growth. There is a compelling need to address the literacy and translation issues of the sector and how it interfaces with traditional screen industries in order to develop sector norms and skills for budget, schedule, workflow and delivery: ultimately, these terms and specialisms end up on the balance sheet as lines that can confuse or scare clients, commissioners or new entrants to the field.



CHAPTER THREE

BUILDING CREATIVE TEAMS



Sitting in a landscape filled with the promise of unprecedented growth and opportunity, success for the immersive production sector lies in its ability to build skilled teams.

Creativity and communication reside at the heart of this. They are at the heart of building successful teams, providing a solid foundation for bringing together the diverse array of skills that are necessary for immersive experience delivery. This chapter examines how companies build teams and innovate in those structures to enable new skills to enter their pipeline that respond to the challenges of figuring it out as they go along:

“We sort of make it up as we go along ... technologies change and evolve as do the skills base we need”

(Survey respondent).

In this landscape, creative thinking is often most valued by employers. The significance of creativity cannot be underplayed: in a sector of fast-paced change where specialist skills are job roles are emergent, the ability to think creatively and communicate across disciplines was one of the few skills that might prove to be universal to the immersive experience production sector. As one leading VR games company, having listed a range of different design and technical skills needed, ultimately surmised:

“... So it is more about being creative, being able to sit down and brainstorm with other people”

(Patrick O’Luanaigh, CEO, nDreams).

“Aligning technical skills with the creative is vital... otherwise it is just sort of destined to fail to be honest”

(Richard Wormwell, Dock 10).

In 2018, Digital Catapult found the VR sector required individuals that possess a ‘fusion’ of technology, business, creative and interpersonal skills.²¹ Technologists need to good communication and team skills whilst artists need to develop technical skills to enable them to realise their designs within a technology platform.

Underpinning such fusion is creativity. ‘Creativity’ has been consistently identified as the most significant predictor for the likelihood of growth for an occupation between now and 2030. The World Economic Forum’s recent *Future of Jobs* report noted that the Media, Entertainment and Information sector had the ‘highest expected level of skills stability over the 2015–2020 period’, precisely because it had ‘already [been] profoundly transformed in recent years’ and was underpinned by creativity as a core sector skill. Nesta’s 2017 analysis of online job adverts, although reliant on a methodology that relies on AI deciphering marketing spin from reality, nevertheless offers a proxy for what combinations of skills are in demand. It showed that creative and design skills are most often demanded in combination with tech support and teaching skills.²²

This chapter looks at the importance of creativity and communication in building successful teams, exploring a number of emergent models and

²¹Digital Catapult. (2018.) *Creative Tools and Workflows for Immersive Content Creation Report*.

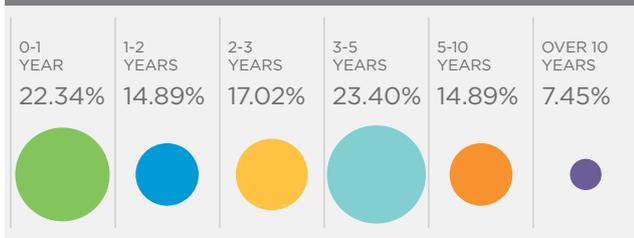
²²Nesta. (2017.) A closer look at creatives: Using job adverts to identify the skill needs of creative talent. Available at: <https://www.nesta.org.uk/blog/a-closer-look-at-creatives/>

the hybrid roles that rely on a fusion of skills to successfully deliver projects. Whilst most of companies operating in this sector are small, we also look at some larger organisations to understand a variety of possible team structures.

Team building: Emergent models

Crucial to emergent business models is the lack of experience outlined in chapter one as well as a lack of company size. Our research indicates that it is predominantly small companies operating in the immersive production space: 73% of companies creating audience facing immersive experiences have between 1 and 10 employees. Immerse UK also estimates that, by turnover, over 30% of companies are either pre-revenue or derive less than £50,000 in company turnover from the sector.²³ These companies are also young in terms of the business and team models: **53% of our survey respondents have been working in immersive for fewer than 3 years** and over half of employees have worked in immersive for fewer than 3 years.

Figure 3.1: How long has the company/business been working in immersive?



In such a new landscape, successful immersive production relies on the skills of many and the ability to be collaborative and flexible:

“I’ve been doing VR storytelling for 10 years Everyone is still learning how to do it and so it’s actually been more successful to let different people contribute rather than say: ‘we’re all just executing this one person’s vision’” (Mohen Leo, Director of Experience Development, ILMxLAB).

Collaborative team structures and great communication skills are therefore key. As Guy Gadney (Co-Founder and CEO, To Play For) outlines, all members of his team: ‘need to be creative ... They need to be collaborative. They need to understand how to communicate with technical and design teams’. Building collaborative teams, however, requires a flexible approach to hiring and defining team roles and adapting these into new team structures. As Richard Nockles (Surround Vision and Sky VR Studios) explains, the problem is not just availability of talent, but understanding where they fit in the team: “It’s hard to determine how one person can complement the skills of others”. Our skills survey showed:

- **48% of companies had employed people in new roles and job titles that had not existed before working in immersive production.**

Interviewees described a landscape where new roles emerge almost weekly, listing examples such as a VR set developer, VR VFX Artist, VR Level Designer, Backend Immersive Archiving Specialist, VR Rides Producer, Stitcher, VR Optimisation Coder, Cinematic VR Producer/Editor and V-learning Author.

²³Immerse UK. (2019.) *Immersive Economy in the UK Report*.

Such highly specialised roles sit in tension with the need to build small, highly adaptable and flexible teams. Like other screen industries, the immersive sector is heavily reliant on the use of freelance staff to access specialised skills, enabling companies to grow and shrink with the demands of business. However, as one survey respondent highlighted, reliance on freelancers and established screen sector traditional business models does not work for immersive:

“They (the screen industries) are built to crew up and down, which doesn’t work in a new medium - you end up always starting from scratch and not building on prior experience. So key people need to be full time or long-term contract staff”

(Survey Respondent).

Indeed, our focus group feared this tension may grow as demand for more interactive content rises

requiring greater emphasis on “specialist skills like motion capture, volumetric capture, photogrammetry and high-end Real Time Game Engine skills these are more and more required” (Focus Group participant). In such a landscape, keeping an in-house team comprised of all the relevant specialisms is impossible. Even established Immersive content makers, like REWIND who have a team of 35, can’t cover all these specialist needs:

“If we had literally everything covered we would have a studio about 300 and a lot of people wouldn’t be very busy. So, we have a relatively small agile team” (Stephen Brown, Talent Acquisition Manager, REWIND).

This has resulted in a number of hybrid roles and team models that allow for a fusion approach to team-building and skills development.



PROFILE:
Sound Designer
Henrik Opperman,
Visualise

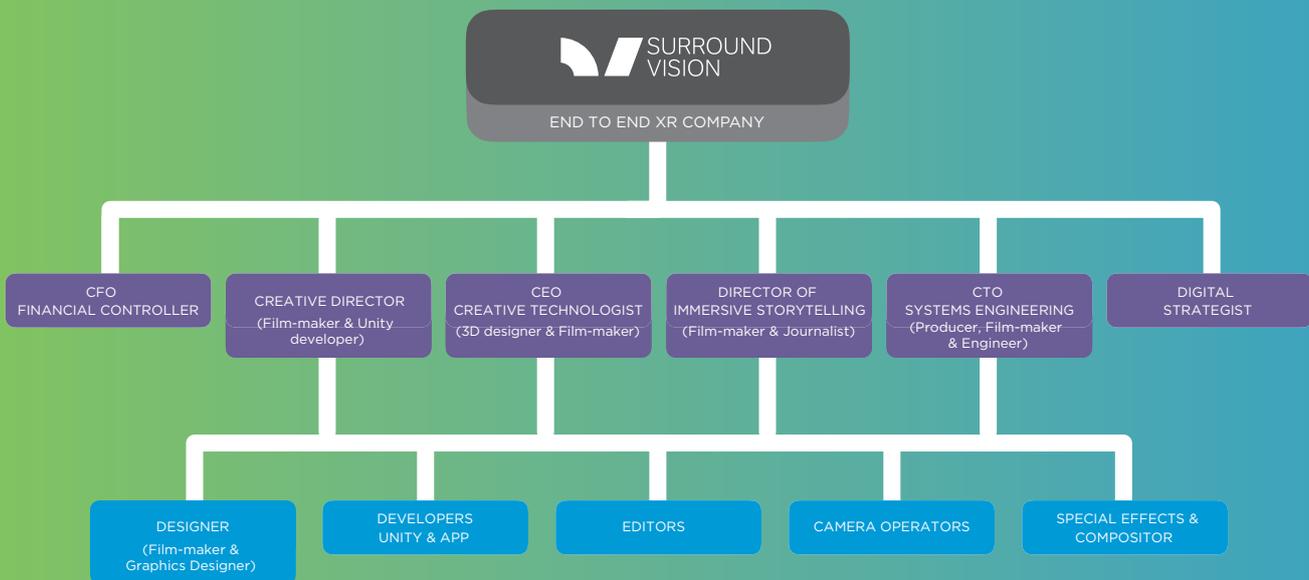
Job description: Sound Designers for immersive audio must be ‘Sound generalists’ covering all aspects, including directing sound capture, audio processing, audio conforming, audio editing, audio mix and delivery.

Responsibilities: The role requires flexibility and dealing with a variety of responsibilities, from researching and planning how to capture/create different types of audio, such as ambisonic or object based audio, through to working with developers to implement new audio specifications for a project. The role extends to processing and editing, mixing 3D sound and working on final delivery in different file formats for the varied outputs and platforms.

Skillset: Both technical and creative, a basic understanding of Unity is required alongside a commitment to researching best practice. The core skillset is in audio technologies with an interest in coding a useful extra.

Background: Henrik studied a BA in Digital Media Sound before undertaking a Masters in Music Creative Practice. Prior to working in immersive, he had worked in surround sound and as a stereo based sound designer in advertising. Experience as a sound professional in theatre, film, TV or other media is highly transferable.

“The issue with 3D sound was always the delivery, there was no way people could actually listen to it, but now they can. And it is exciting.”



The Hybrid

A hybrid model has been established by a number of smaller companies like Surround Vision. Set up in 2012, they believe hybrid roles are pivotal to their success.

Head of Interactive at Surround Vision, Dan Stankowski, describes how they have established a series of 'slash' roles that ensure key members of their team can respond flexibly to last minute commissions and on the fly production demands. These are:

- **CEO / 3D Artist/ Film-Maker**
- **Director / Journalist / Film-Maker**
- **Producer / Engineer / Film-Maker**
- **Developer / Artist / Film-Maker**
- **Developer / Programmer / Film-Maker**
- **3D Generalist / CGI Artist / Film-Maker**

The roles innovatively fuse creative and technical skills, allowing for development of both. At its best, this model encourages team members to contribute to conceptual, narrative, artistic and/or technical aspects of a project. This eliminates any working in siloes, instead promoting a non-hierarchical structure where team work and communication skills ultimately make for a more coherent approach.

By employing two very differently skilled producers, one from a design (producer-designer), the other from a technical background (producer-artist), Surround

have a suite of skills that are beneficial to a broad range of projects, including the ability to win work. Two team members operate in hybrid developer roles, which means that one can switch flexibly from Real Time Game Engine asset building to a wider array of coding languages, whilst the other can carry out specialist developer work and programming. With an in-house 3D generalist, the company have all core skillsets covered and can move as an agile coherent team to deliver projects fast and efficiently.

Alongside the core team, the company rely on a range of freelance staff. As former Head of Production Craig Tuohy elaborates:

"... when you get into specialist areas such as character animation rigging or advanced system modelling like smoke or fire or liquid or hair or character animation, those are areas where we need to sort of go out to tender and find people in the market".

While encouraging an interdisciplinary approach, the hybrid model places a high value on a small highly skilled team working to maximum capacity, relying heavily on outsourcing and freelancers if more than one or two projects land at the same time. In such a landscape, emergent structures are perhaps almost always hybrid in smaller companies taking a wide variety of forms as production teams are fashioned in response to a company's ongoing and anticipated workload.



The hub and spoke model

A second emergent model for larger organisations is the hub and spoke model. Adopted by the BBC for its 'VR Hub' before its closure in late 2019, this structure has also been utilised by larger creative companies such as Passion Pictures, Aardman Studios and Sky VR. Each have a specialised hub that houses a core immersive team – Passion Experience, Aardman Interactive respectively – but all draw on the spokes of talent from other departments within their company structures in order to pitch for a broad range of work, and to expand and contract as projects land. This access to a much broader set of skills enables them to both innovate and to capitalise on transferable skills, thus upskilling their workforce as they pull professionals into the immersive production circle. It also enables them to expand and contract as projects land whilst keeping knowledge in-house.

Whilst such economies of scale are unachievable for smaller companies, they allow for larger players to experiment in this new landscape by drawing on digital and creative skills across the organisation. For example, the BBC's VR Hub brought in a UX designer from the Corporation's web team, sharing the role between the two departments.

"It really changed how we look at stuff actually... . For example: how do subtitles sit in a 360 space? where do they look; what makes you look in that direction? ... what happens if you miss it?"

(Angela Crago, Senior Project Manager, BBC VR).

For the BBC VR Hub, the ability to draw on talent across the organisation and capitalise on transferable skills is the model's greatest strength. But this

still required slash roles for the team, including a 'camera/director/editor' drawn in from the BBC's R&D department and an immersive producer/project leader who came from television.

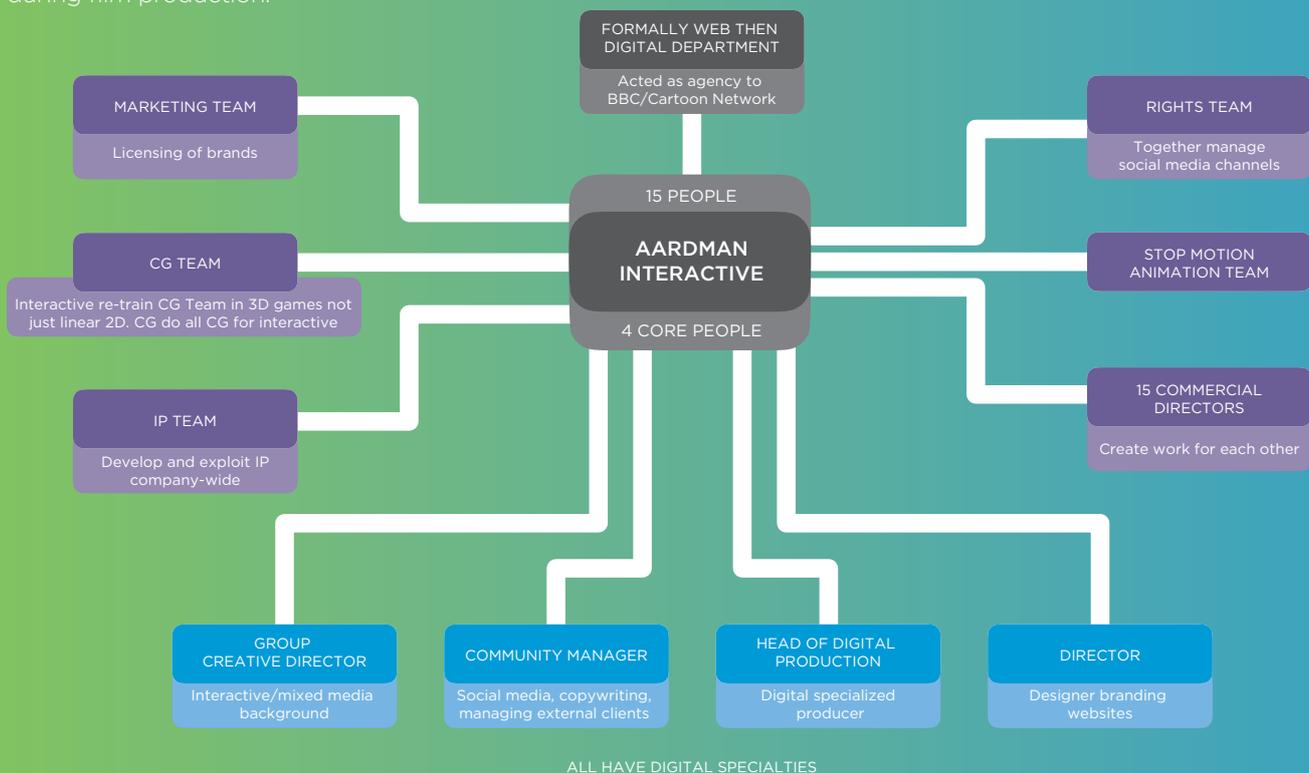
Whilst the BBC may have almost unparalleled internal resource to draw upon compared to creative companies, the hub and spoke model has been adopted at smaller scale at Passion Experience. Here the immersive hub sits within the wider Passion Pictures company and is able to draw on the company's core strength in animation, enabling a small core of 3D artists to internally upskill and draw in 2D artists for small stints at a time. The immersive work is supported by the wider company having fifteen commercial directors able to win work across a slate that encompasses film, animation, television and immersive with offices in the UK, France and Australia.

Similarly, Aardman's move into immersive builds on a core company focus in animation. As Senior Producer George Rowe explains, their move into immersive came through first learning to work in 3D Real Time Game Engines, gradually transitioning skillsets across to immersive:

"About five or six years ago we started realising we could use our more traditional teams ... to start doing 3D games and things like that. It was probably what culminated in our first ever console game which we released at the end of last year [2018]. Which was basically managed by interactive but then using some people from our Computer Graphics teams and then sort of retraining them a bit to do CG but for games rather than for linear animation" (George Rowe, Aardman).

Aardman

Animation studio with a core of around 150 people rising to 300 during film production.



The downside of this seemingly flexible model is that it falls to the Creative Director or Creative Producer to manage both the business development side and a group of relatively specialised team members who need to quickly grasp the needs of a VR production. Moving forward, Aardman are looking at dissolving department lines and creating a 'One Aardman' model. In such a model a production department will run across everything and talent will be pulled together in a 'purpose-built project led' way using a shared talent base.

Future models

The greatest challenge for the sector lies in creating sustainable models that draw on the many emergent models that companies have developed in response to immersive opportunities, as well as being based

on skills available or known team structures from their past. There is an urgent need for a deep understanding of the skillsets of each role and for knowledge share around successful models so that standards are established, models are replicable and there can be growth.

Whilst future models will continue to be written and adapted, developing a successful immersive experience production economy will rely on a fusion of skills that come from mixing different sectors together. As we examine in the next chapter, too heavy a reliance on one sector is likely to diminish not only the skills pipeline but also the potential of immersive experiences as an art and cultural form - not to mention as the economic powerhouse so many hope it will become.

CHAPTER FOUR

REAL TIME GAME ENGINES: 'THE TOOL OF THE FUTURE'

This chapter looks at the rapid adoption of Real Time Game Engines (RTGE), particularly Unity and Unreal, what they are, and why they have become the tools of choice in immersive storytelling. It also examines the significant gap in RTGE skills and the impact this is having on not only the emergent industry, but also the games industry, which has been heavily poached for technical artists with these skills.

“Within 5 years it has gone from just the games industry using Real Time Game Engines to everyone fighting over it! The entire infrastructure is changing ... It's all Game Engine!”

(Sol Rogers, CEO and Founder, REWIND).

52% of survey respondents identify RTGE technical artists specialising in Unity (28%) or Unreal (24%) as a skill currently lacking in their business. This demand is only likely to grow, with job market data analytics in the US indicating that across all sectors dealing in 3D graphics, those requiring RTGE skills have grown 137% between 2013 and 2018.²⁴

As Mohen Leo (ILMxLab) puts it simply: “They are the tool of the future”. The challenge is to ensure enough creative companies and individual world-class storytellers are trained in how to understand, use and adapt these powerful tools.

Our research suggests a talent drought is likely to emerge, as it is not only the wider screen industries looking to incorporate RTGE into their workflows and infrastructures, but these skills are also increasingly in demand within engineering, IT, construction, architecture and an array of training environments from medicine to aerospace. However, as we discuss, there are important responses and mitigations that can be adopted within the industry, particularly through knowledge exchange between disciplines that can promote cross-pollination of ideas and skills. In so doing, we may reduce the level of current talent raiding from the games industry until this ‘tool of the future’ is a tool far more people are trained in.



²⁴Burning Glass Technologies. (2019.) *Visualizing the Future: Demand for 3D Graphics and Real-Time 3D Across the Economy*. Available at: https://www.burning-glass.com/wp-content/uploads/Visualizing_future_3D_skills.pdf

CASE STUDY |The real time game engine (Roderick Morgan)

A Real Time Game Engine (RTGE) is a software-development environment that allows a user to create 2D and 3D experiences for several different hardware platforms. Originally designed for making computer games, these environments have many uses including TV and Film production, data visualisation, interactive media and sound installations. This flexibility means that Real Time Game Engines are the end point of most immersive workflows.

There are many different RTGEs. This includes proprietary software used by large development studios such as RAGE (Rockstar Advanced Game Engine) used by Rockstar Games in familiar titles like *Grand Theft Auto* and *Red Dead Redemption*. There are also RTGEs tailored to specific audience, like Notch, whose simple what-you-see-is-what-you-get interface is targeted at artists rather than developers.

The two most popular game engines in immersive creation are Unity and Unreal. These two competing engines are relatively similar and a popular feature on one soon appears on the other. Choosing between them is anything but arbitrary and you should look closely at your planned outcomes, the skillset of your team, other software or hardware you plan to engage in making your choice. Anyone with a computer can download one of these two engines and get started making immersive content, as they are both available for free and only leverage license fees for commercial use. Thanks to visual scripting tools it is possible to do this even without any coding experience. You can also access 3rd party assets (both free and premium) which are premade models, tools, textures and packages that can be instantly integrated into your project.

In essence, the RTGE is a tool for building worlds. As with most computing tools the restrictions on what can be achieved sit with the hardware and time scales involved but ultimately the bounds of what game engines can do are defined by the imagination of the maker.

History: Real Time Game Engines became a prominent feature of the games industry during the 1990s, though early systems across the 1980s began to replace the traditional approach of hard coding each new game from scratch. The success of first-person shooters, such as *Doom* and *Quake*, convinced studios of the importance of developing toolsets that can be used across multiple releases. Epic's 1998 First Person Shooter Unreal was developed specifically with this concept in mind and spawned the Unreal Engine, which has been used for a range of games by Epic and third-party studios, including the 2017 smash hit *Fortnite*. The applications of RTGEs have broadened over the last decade as they allow for new innovations across the media industry and replace specialist tools in manufacturing, engineering, medicine, architecture and design. Both the flexibility and availability of RTGEs has increased greatly in the last few years, creating space for revolutionary practices in many sectors.



Real Time Game Engines: What's the fuss?

As outlined in BAFTA's 2017 report, whilst there are a wide array of Real Time Game Engines, such as Crytek and Amazon's Lumberyard, Unreal and Unity have become the key authoring tools for VR.²⁵ Creatives working in one of these environments have millions of lines of pre-written code at their disposal. RTGEs require skilled technical artists with programming languages in C# and C++. This is a significant barrier to entry to companies moving into immersive from outside the games industry, where developers and programmers are not a traditional part of in-house teams or even the wider freelance economy of those industries. As Digital Catapult reports, 'RTGE tools themselves are graphics-based and allow models and images to be placed in scenes with animations and other behaviours added either graphically or using code ...'.²⁶ RTGEs not only allow for 3D environments that enable users to explore six degrees of freedom (see chapter two), but also construct a soundscape that makes full use of 360° and spatial audio.

The ability to view and change creative content in real time, and its high-speed processing, has driven the rapid adoption of these powerful new tools. As Unreal's General Manager, Marc Petit explains,

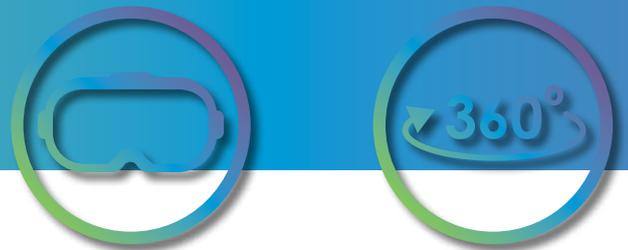
"Virtual sets eliminate high costs associated with physical sets, and the real-time production power means that complex scenes can be shot live, without requiring extensive post-production, further driving down costs. Special effects and CG elements can be added to a scene instantly and can interact with characters in real time, allowing for greater flexibility with creative decision-making".²⁷

As Petit goes on to explain, these RTGEs have been 'battle tested for years by game developers' and are now fast being adopted into the workflows and infrastructure of the screen industries – not just for immersive storytelling, but throughout the linear film production process, from pre-visualisation to post-production, for the creation of virtual sets, props, avatars and actors. High profile examples of such adoption of RTGEs include Stephen Spielberg's use of VR on the set of *Ready Player One* for pre-visualisation to view virtual set options, and motion capture technology to create 'avatars' for the film. Reporting on the emerging trend, *Variety Magazine* dubbed the use of RTGEs as a 'new production paradigm'. As ILM head and executive creative director Rob Bredow explains, "Real-time is a fundamental change to the workflow ... Visual effects and digital techniques are being included much, much earlier in the process".²⁸

The wide array of potential applications for RTGE, makes it a real 'game changer' according to our focus group:

“Tim Sweeney the CEO of Epic Games [Unreal's owners] basically said ... He thinks that the game engine will be to this century what the camera was to the last century which means ... the same way that you couldn't expect to be a director without knowing how to use a camera” (Mohen Leo, Director of

Experience Development, ILMxLAB).



²⁵BAFTA. (2017.) *Virtual Reality In Entertainment: The State Of The Industry*. Available at: <http://www.bafta.org/sites/default/files/uploads/vrpaperbaftasept2017.pdf>

²⁶Digital Catapult. (2018.) *Creative Tools and Workflows for Immersive Content Creation*.

²⁷Media Business Insight Limited. (2017.) *How real-time game engines are enhancing production*. Available at: <https://www.broadcastnow.co.uk/tech/how-real-time-game-engines-are-enhancing-production/5124990.article>

²⁸Variety Media LLC. (2019.) *How Video-Game Engines Help Create Visual Effects on Movie Sets in Real Time*. Available at: <https://variety.com/2019/biz/features/video-game-engines-visual-effects-real-time-1203214992/>

Whilst leading industry professionals and companies recognise the importance of RTGEs to the future of immersive storytelling, they also point to this being the most significant gap in the current skills market. Our survey revealed that **skills shortage in Unity and Unreal RTGE combined is the highest of all technical skills gaps for immersive content creation**, even greater than the shortage of programmer/developers. If, as we indicated in the chapter one, it was difficult for companies to find experienced immersive technical and creative staff, finding people with immersive experience **and** skills in RTGE is like looking for unicorns. As one survey respondent stated, there are simply 'not enough experienced game engine developers'. Importantly, this is a trend that has remained stable in this nascent industry, with Digital Catapult finding a similar concern in 2017, noting that 'staff skilled at real-time VR with project experience are hard to find.'²⁹

This poses different problems for the cross disciplinary immersive content-makers' market: for those coming from screen and theatre backgrounds, this game engine skill and knowledge gap leaves them vulnerable and dependent on outside agencies. On the other hand, those from games companies are constantly threatened by poaching and talent

raids. Angela Crago (Senior Project Manager, BBC VR), explains the difficulty this poses to those from a broadcast heritage:

“... Because we don't have in house developers... we don't have enough of an understanding of how it works and what the limitations are, for example on one of our projects that was going to be in Unity. It ended up being on Unreal because the agency thought that Unreal could just deliver the interaction that we wanted better than Unity which is fine and we are happy to take that. But understanding their reasons why is useful”.

Similarly, 59 Productions argue that whilst the creative transition to VR from theatre was not an issue, the technical aspect or RTGE was much more problematic:

“The leap from the theatre to VR was not big for us at all. The people who were good in our studio at making content for a 3-dimensional space took to making VR very quickly, because it was the same sort of skills ... the biggest change and challenge for us [has been the] game engine side of things. So we've been partnering with other organisations ... We do need to recruit those roles”

(Mark Grimmer, Co-Founder and Director, 59 Productions).



²⁹Digital Catapult. (2018.) *Creative Tools and Workflows for Immersive Content Creation*.

For many, the lack of in-house RTGE skills and the cost of outsourcing those skills means compromising or producing hybrid responses to projects:

“We’ve got a project ... that is about 50% traditional 360, 50% game engine environment in six degrees of freedom. We’d like to do 100% of it on Real Time Game Engine. But simply can’t”

(Craig Tuohy, CEO, The Flow State).

George Rowe (Senior Producer at Aardman) echoes the frustration, saying that whilst their 2D artists have been able to learn how to implement 3D animation within Real Time Game Engine environments, understanding the full potential of these tools for game design is not something as easily picked up:

“We do use our directors for things like character design and stuff like that ... but then to actually game design and stuff like that, that’s not something you can really just pick up from doing it as your first job. It’s something people need to have experience of already”.

The result, as Rowe concludes, is the need to turn to the games industry for talent able to work with these tools.

The great games industry raid

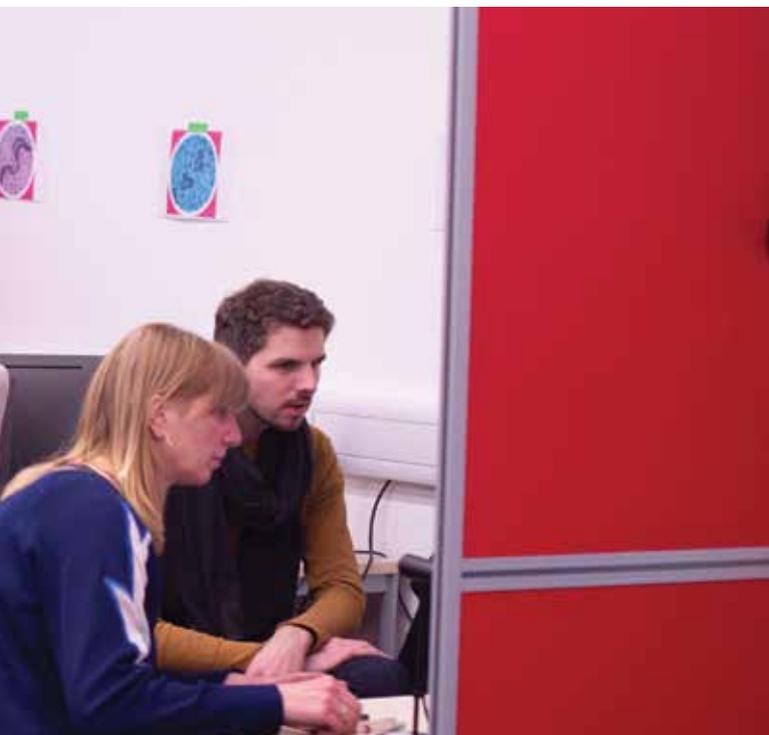
Flush with highly-experienced, much-needed technical and creative talent, the games industry has suddenly become not only a leader, but also a hunting ground. Technical artists, programmers and developers who have been coding, customising, and driving this technology for some years are clearly well ahead and have a high value and worth in this emergent landscape. Games is thus seen as the best recruitment pool for immersive production with everyone now chasing the same talent. Our skills survey confirmed that of the 100 respondents, 18% predominantly recruit new hires from within the immersive and interactive sector, whilst **17% saw games as their key recruitment** ground. For those companies coming from a film background or classifying themselves as already in the immersive sector, employment from the games sector rose to 20% and 21% respectively.



“So in games you typically have a whole load of very, very experienced twenty seven years olds who have been in the games industry and fighting in the trenches ... learning their craft So, we are looking at stealing effectively game developers and talent from the games industry”. (Richard Nockles, Surround Vision and Sky VR).

With experience so thin on the ground elsewhere (see chapter one), it is no small wonder so many are looking to games talent. For those in the games industry, this is a significant concern:

“It is getting pretty full on actually because there is a lot of, poaching is probably a bit harsh, but there is a lot of people after staff, particularly experienced staff. So it gets quite tough” (Patrick O’Luanaigh, CEO, nDreams).



As O’Luanaigh goes on, whilst there are a range of specialist roles across coders, programmers and artists, ‘[RTGE] is probably our biggest challenge out of all of them’. However, others argue that poaching talent from games is not straight forward – with skilled technical artists able to command a premium and demand job security. As Mohen Leo argues, the 6 figure salaries and security on offer in games make it hard for other companies and approach to immersive to break through:

“You know they’re used to working on a game for three years, used to being on staff [contracts]. They’re used to having lots and lots of like, you know, predictable job growth. And to say “hey, you want to try this thing. We don’t know if it’s gonna work or not”. ... Will they come? Or do they go ‘No I’m gonna stick with my safe job at my massive games company that guarantees like five figure bonuses every year’”. (Mohen Leo, Director of Experience Development, ILMxLAB).

Richard Wormwell concurs:

“what we found is that people that are in [games] industry are tied to projects, so they will just be starting to work on the next triple A title that is going to be three years in development and they will get a contract for three years and will stay on that project. So, it’s trying to prise them away from those projects that is quite difficult, particularly when you are saying ‘come and work in an industry that you don’t know anything about and we are dealing with sort of experimental work’. ... So, *it is interesting, trying to find those people I should say that*” (Richard Wormwell, Head of Production Innovation, Dock 10).

As O’Luanaigh reflects, the growing interest in RTGE from the emerging immersive content production marketplace has forced those in the games industry to work hard to lock down talent with salary boosts and benefits:

“So we work incredibly hard here on the culture, all the really important stuff to make sure people don’t want to leave and that works quite well... there is an awful lot of poaching between companies in the games industry”

(Patrick O’Luanaigh, nDreams).

For the growing immersive production sector reliance on such a small pool of talent, and battling over that talent, is clearly not a sustainable situation, particularly because the demand for such experienced technical artists comes from not just immersive content producers, but also enterprise markets. As Toby Allen, of JobsinXR explains, ‘Within the XR space, most demand is coming from the enterprise market: Automotive, Engineering, Manufacturing and Aerospace’.³⁰ He warns worse may be to come as immersive technologies hit tipping point: ‘the moment the consumer market hits and demand increases, this is when the industry will really start to struggle’. With 2020 set to be an important year for XR, as Nvidia’s cloud-based XR computing service for 5G and the UK Government’s £33m Audience of The Future Demonstrator programmes all potential tipping points for further consumer adoption of the technologies, the skills gap may soon become a crisis.

Moreover, the potential of Brexit to limit access to European talent could become a further significant concern. O’Luanaigh argues that nDreams are typical in their reliance on European talent within the games industry: “I think half of all our recent recruits come from Europe because we are struggling to get enough people from the UK”. (Patrick O’Luanaigh, nDreams).

For Aardman, where the difficulty of finding talent is compounded by the need to attract workers to outside of London, their response has been to set up an entirely new production base in Singapore where talent and resource were more readily available.



“I know we’re going to need a senior game designer ... and a senior programmer [soon] but I know that means I’m probably going to have to steal them away from a AAA games company and give them a good reason to move to Bristol. ... [For our] last console game production, we went specifically to people with games animation. But that meant I had to start the games animation team in Singapore based around a guy that we’d met because we couldn’t find the people here”

(George Rowe Senior Producer, Aardman).

With no guarantees of access to European talent in the future, new solutions for talent need to be found urgently if we are to grow the UK talent base.

Cross sector knowledge and talent sharing

Whilst urgent training in the use of Real Time Game Engines is unanimously called for, some suggest that looking at cross sector knowledge and talent sharing is one way forward to at least alleviate the looming skills crises. The majority of our focus group argued that such an approach would be critical to future growth of the industry as skilling up cannot rely on training alone. In particular, like most screen industries there remains little funding or time for training of existing professionals. Whilst initiatives like StoryFutures Academy exists to help creatives make the transition to immersive, it is a rare and short intervention – running from 2018-2021 – when the industry is crying out for a diverse set of skills and talent developments. As a result, one way of obviating the talent drain of RTGE technical artists

³⁰Forbes Media. (2019.) *Lack Of Talent Is Throttling Growth in XR Says Jobs Board Founder*. Available at <https://www.forbes.com/sites/barrywhyte/2019/02/12/lack-of-talent-is-throttling-growth-in-xr-says-jobs-board-founder/>



from games is the opportunity to create hybrid projects as well as facilitate other more informal types of knowledge exchange. One of the most successful titles on the Oculus Quest Store, *Vader Immortal: A Star Wars VR Series*, deliberately fuses gaming and film approaches to writing. As Vicki Dobbs Beck, Executive in Charge at ILMxLab, describe it:

“This is a new form of storytelling, not film or gaming, but what we call story living”

(Vicki Dobbs Beck, ILMxLab).

As Dobbs Beck goes on to explain, this approach deliberately avoided positioning their *Star Wars*

series as a game in order to better form part of the franchise’s universe: even if this meant alienating some gamers.³¹

The possibility of developing these new hybrid forms of ‘story living’ that might emerge in immersive was underscored by the need to promote knowledge and talent sharing. In particular, our focus group felt that whilst the film and television industry is flush with experienced writers, the crucial ingredient was to mix these with games companies who are keen to reach a new audience in VR, AR or XR. Such an approach could develop different approaches to immersive storytelling at the same time as avoiding the games industry talent raid and recognising the realities of the budgets available.

³¹Dobbs-Beck, V. (2019.) *Story Living*. Masterclass at Creative XR, London, 10th October 2019.

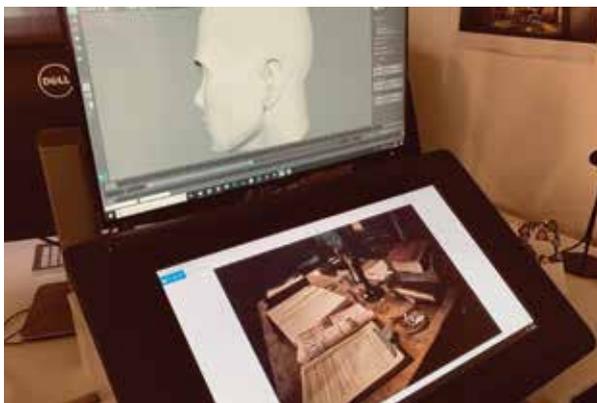
CASE STUDY | PEAKY BLINDERS VR On-Set Training



StoryFutures Academy run two-day Writers' Rooms to expose writers and content creators to new approaches to storytelling and the potential of immersive technologies. As part of the National Centre for Immersive Storytelling's remit to upskill current industry professionals, Writers' Rooms are run in collaboration with leading immersive production companies to provide 'graduates' from the programme with the chance to take paid on-set training placement on live projects.

One such Writers' Room was game-changing for both the company and talent involved.

Maze Theory had recently won the rights to create an interactive VR experience for BBC crime drama *Peaky Blinders*. They needed writers with established storytelling credentials for television and a willingness to explore interactive narrative. StoryFutures Academy curated a workshop of 10 participants and, working in collaboration with Maze Theory and Punchdrunk, took them on a deep dive in to the world of immersive storytelling.



From the Writers' Room, Kerry Kolbe was selected to take up a writer's placement on the *Peaky Blinders* project, and the impact for Maze Theory was incredible.

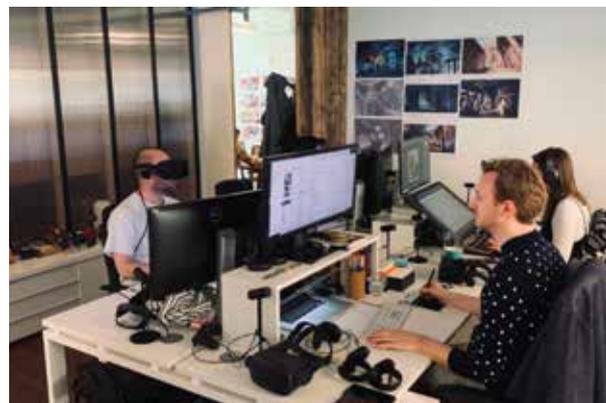
"This has been utterly invaluable for us. We have entirely re-thought the narrative design process and decided to use a Writers' Room model to create content which could be broken down at a beat level with the developers. It also enabled us to embed a writer (Kerry) into the team and develop a narrative pipeline for the project. Kerry has been brilliant - helping us get through twists and turns interactively without losing any of the story or player interest."

The success of taking established writers into immersive via this programme is best captured by Maze Theory's decision to hire Kerry full-time until the end of the project. For Kolbe, the opportunity to re-think her skills for an immersive environment has been invaluable:

“Working collaboratively in a Writers' Room and with games developers has just been amazing. I've learnt so much as writing for an interactive piece is so different: you are always thinking about the user and how to give them agency to influence the story outcome, so the power is in their hands”

(Kerry Kolbe, Writer).

Finding games companies like Maze Theory



(see case study) willing to take this risk is therefore crucial. Another such example is To Play For, whose founder Guy Gadney argues they are 'always looking for writers' in order to develop their Artificial Intelligence platform, Charisma.ai. For Gadney, writing for AI will be a critical factor in the creation of VR experiences that are truly immersive: able to read and respond to the user in real time to give personalised experiences. To Play For's current business model specifically aims to draw in experienced writers from as many sectors as possible, who can acquire interactive skills as they go. For Gadney, understanding Real Time Game Engines or other technical skills is secondary, the process of writing for Charisma.ai will train people through the creative process.

If Tim Sweeney's claim at the start of this chapter that Real Time Game Engine is this century's movie camera, our interviewees reminded us that in both cases this remains a tool for creative expression:

"I would simplify it and say, 'we want to tell stories using Unity or VR and AR'. ... If you use the analogy of the art world; from year dot to 1830 or whenever the camera was invented, the human race was obsessed with trying to get a painting looking as lifelike as possible. As soon as the camera came along you had a whole load of artists who had spent their entire lives trying to make things close to life and suddenly were out of a job. Then started the impressionist movement and modern art. ... I think, it is not exactly the same but if you look at the games industry... the higher-level stuff they have been obsessed with, trying to make their games look as realistic as possible, and the games nowadays are looking pretty good. ... My argument is we have got to that point now where we need to have some impressionists, we need different artists to come along and say: 'Let's take these game engines and let's twist it and look at storytelling'"

(Richard Wormwell, Dock 10).

As we go on to explore in chapter five, the possibility of such innovation and growth will only be possible with a strong supply chain that fuses creative artistic vision with technical ability, bringing together arts and humanities approaches with those from the sciences.

PROFILE: Writer Gavin Collinson, Maze Theory



Maze Theory hail from an animation, games development, film production and storytelling background to produce ground-breaking immersive experiences. The company focuses on redrawing the lines of storytelling, rather than technology, to create immersive entertainment.

Job description: The writer writes. This can be anything from script writing to ideas generation, voice direction to supplying copy for marketing.

Responsibilities: Overall the role is to understand a client's ambitions and intentions in terms of what they aim to create and to translate these into a practical (but gripping and vibrant) storyline. The job's main responsibility is then to evolve the initial storyline into a script, working through several iterations and responding to notes from all stakeholders. In addition, the writer will deliver ancillary content, from in-experience 'hints and tips' through to marketing and PR copy.

Skillset: Creativity, strong general knowledge and a solid grasp of narrative and the specific medium of gaming are pre-requisites. A writer must also be infinitely flexible: able to work alone or in a team, willing to turn scripts and revisions around quickly and able to assess a client's needs and translate these requirements into a workable story and script.

Background: Gavin feels that writing is the most versatile of careers, with writers able to emerge from any background. The key is to build up experience writing – wherever that may be.

“Delivering a script is like getting into a long-term relationship. The other party will love your script and want it. Then want you to *change everything*. A writer must be able to remember it's never personal – both parties share the same ultimate goal – to create the best possible product. And oh yeah, it's the best job in the world.”

CHAPTER FIVE

TRAINING, FRAGILITY AND THE FUTURE

44% say there is not an adequate supply of graduates

“Everyone we employ has to learn on the job to adapt their skills to fit the new, and ever changing, XR industry”

(Focus Group participant).

While there has been significant growth in the number of companies and workforce creating immersive experiences, there is no evidence of growth in training provision, nor a sufficient supply of new entrants with relevant skills gained from university courses to service the growing industry. This is true not only in audience-facing immersive content, but more widely across the immersive economy. There is significant concern at the lack of a joined-up talent pipeline that develops the necessary skills at A Level, Further and Higher Education as well as at professional level. Whilst a lack of training at professional level is a relatively familiar story in screen industries – most recently recognised by the BFI’s and ScreenSkills’ £488,000 investment in professional skills training – it is particularly acute in the immersive content sector because of this lack of a talent pipeline.³² This is further complicated by the fact that the skills required for immersive are both highly specialised and often a fusion of different disciplines.

The rapid growth of the sector is also a contributory factor to the skills crises. There has been insufficient time for new university courses to emerge to plug the skills gap, leaving companies themselves to simultaneously grapple with how to develop a skilled workforce at the same time as consistently turn a profit. On-the-job training has thus become a necessary balancing act for as companies and workers ‘figure it out as they go along’. However, without clear structures or time for support, such an approach threatens the exponential growth potential and vitality of the sector. In this final chapter we set out the nature of the challenge for developing the skills pipeline.

Competition for new entrants is cut-throat: not only are those in the immersive experience economy competing with more established screen sectors like

games, film and television, but also more traditional engineering disciplines like automotive, nuclear and aerospace who draw from the same graduate pool. Many describe an environment where fierce competition leaves them not only scrabbling to secure a team, but also under increasing pressure to perform as both producers and trainers. Senior team members say they struggle to balance these competing demands: they are typically flat out working to win commissions or at the coal face of their current productions at the same time as they are tasked with having to provide on-the-job training, including diagnosing the necessary skills a new member of staff may need to develop. As our focus group explained, this leaves the ecosystem and individual companies within it ‘fragile’:

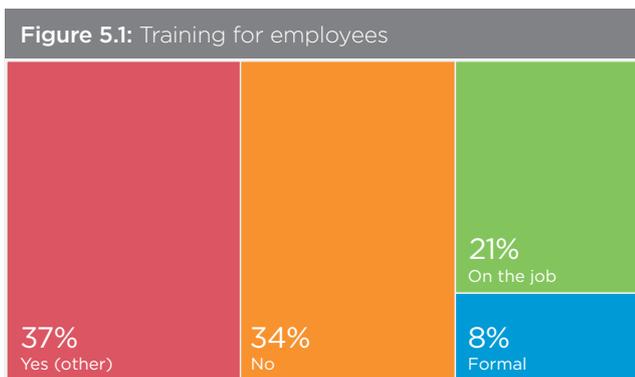
“... If you are now taking the best people out of delivery and into training to manage those people ... the interplay between those that can deliver and deliver well and those that are coming up is a balance which is incredibly difficult for [companies of a] certain size. I would say most of the emerging industry or independents are in this fragile place ... and just want amazing people who can deliver an idea” (Focus Group participant).

Whilst the idea of ‘amazing people who can deliver an idea’ might be a fantasy of any small or medium creative company working across the screen industries, our focus group emphasised how rare it was to find ‘amazing people’ with just relevant skills. Insiders joke about the search for ‘unicorns’ who have the prized skills of interaction design, UX design or are adept at the use of Real Time Game Engines and are creatively excellent: the ability to be artistically creative *and* be proficient in a range of coding languages is a much sought-after skillset.³³

As discussed in chapter three, the traditional freelance economy of screen industries acts as a further barrier here: whilst business models are still built on crewing up/down as work within a company scales, the development of relevant skills across a team needs cultivation. In particular, there is a need for training time in a research and development context for these new technologies: experimentation with tools and approaches that enable problems to be solved, skills to be developed and an overall company advantage to be gained.

³²<https://www.screenskills.com/about-us/press-releases/new-investment-in-training-to-tackle-skills-needs/>

³³See, for example, Nick Freedman’s story <https://www.invisionapp.com/inside-design/becoming-a-designer-who-codes/>



Professional training

66% of respondents indicated that they provided some kind of training for staff. Whilst the majority didn't indicate the kinds of training they offered, 21% identified on-the-job informal training mechanisms, whilst just 7% provided formal training, such as short or online courses. Such a low figure is not necessarily unusual in how screen industries respond to the introduction of a new technology or opportunity: for example, in 2017 a review of television companies adapting to social media found that only 46% provided relevant training in that (then) new medium.³⁴ As was the situation then, most creatives working in screen industries need help adapting their experience from the TV, film, games, VFX and animation and digital industries. However, whilst social media was often used as a training ground for junior staff in the television industry, immersive experience production requires highly specialised and technical skills.

One significant result in the immersive ecosystem is that most team members are largely self-taught.³⁵ As one of our interviewees outlines, whilst there are great materials available for professionals to learn

from, finding time to undertake such professional development is difficult:

“There’s so much good learning content out there ... and if it’s someone that we believe and entrust and the right attitude to learn, then it’s just about giving them enough time to learn the things on the job rather than necessarily sending them away to a training course”

(George Rowe, Senior Producer, Aardman).

Balancing the requirements of the day-job and the commercial pressures of production with training is therefore often haphazard, with opportunities far from clear.

The lack of training at professional level leaves a significant disjuncture between expectations and reality that is arguably at the heart of the skills gap: whilst only 37% provide some kind of training for staff, the same number want entry level workers to arrive with a professional accreditation or training. At the same time, experienced professionals need significant training to translate their skills to this new space, particularly in understanding the differences in delivering software rather than simply content. Lysander Ashton, Director at 59 productions, sums up the double-bind companies find themselves in:

“We’ve had a long period of educated people, who have come from traditional animation backgrounds, who used to work for the 16:9 screen and then having to relearn the way they make content, because it’s not going to be presented in that way. It’s going to be mapped onto a piece of physical scenery or projected on a building, so it’s interesting that we’ve not yet had a pipeline of people coming from any type of formal training.”

We turn to the question of formal training and the skills pipeline next.



³⁴Bennett and Strange, *Adapting to Social Media*.

³⁵Digital Catapult. (2018.) *Creative Tools and Workflows for Immersive Content Creation Report*.



PROFILE: Junior Motion Capture Artist
Meghan Elliott, The Imaginarium Studios

Job description: A Junior Motion Capture Artist assists in preparing shoots, overseeing smooth running of the stage and system to ensure accurate data is collected, liaising with animation teams or any outsourcing teams, taking notes and reference images on shoot days, building props and set pieces if necessary, building scenes, post-shoot clean-up of data, and always having a clear understanding of the pipeline and toolkit.

Responsibilities: Spanning pre-production, post-production and shoots, the role is hugely varied. During shoots marking up actors and assisting them through a range of motion, including face and hand

data, and then 'cooking': using a skeleton in various Real Time Game Engines to monitor movement. Pre- or post- shoot work includes tracking data and compiling scenes, often in Unreal, to client specification.

Skillset: Some coding skills but a basic knowledge of technology and processes used in game development are key. An eye for detail is crucial for successful data capture processes.

Background: Meghan completed a degree in Computing with Game Development, which included creating a 3D game. After researching all the options, she hired a Motion Capture stage for a day to get clean and accurate data: she's barely left the stage since.

“Working in a field where there is so much to learn every single day is what makes it really exciting.”

The skills pipeline: Higher Education and fused skills

Our focus here is on Higher Education as a key link in the supply chain for developing skills for a successful immersive economy: not just in immersive experience production, but more widely. This attention to Higher Education draws on important lessons from the computer games industry, widely regarded as the leading industry in immersive experience production. One of the most important lessons is the prominence that Higher Education degrees play in that sector: the computer games workforce is highly qualified, with 63% having a degree compared to 57% of the wider Creative Media workforce and 37% of the wider UK economy in 2011.

Degree programmes that cultivate the necessary skills are, therefore, vital. However, there is currently a lack of provision in, and knowledge about, degrees:

In **2017/8** there were only **6** providers of courses with 'immersive' or 'virtual' in the title

This statistic also points to the lack of market intelligence about educational provision and training: data provided by HESA (Higher Education Statistics

Agency) is almost 2 years old, whilst the closure of the Commission for Employment and Skills means there is a gap in skills mapping that needs filling urgently.

The lack of courses is due both to the rapid explosion of the immersive economy and also the difficulty in designing courses that bring together the range of disciplines necessary for creating immersive work. Whereas widespread access to cameras and social media via smartphones provides students entering Higher Education media courses a relative literacy in film-making and even distribution, the requirement for highly technical coding skills alongside creative ones in immersive make it difficult for universities to produce courses that blend the appropriate levels of science and arts.

This owes to both top-down and bottom-up pressures as well as the institutional structures of universities themselves, which collectively serve to separate sciences and humanities. At a top-down level, there has been an historic tendency to categorise workers within the digital and creative sector as either 'creative', 'technical' or 'management': reflected in how budgets distinguish between 'above the line' and 'below the line' staff.³⁶ This has been reinforced at a bottom-up level by an education system which often forces individuals to choose

between the arts or sciences. Those focusing on the former may not develop technical skills, while those selecting the latter path may not be given the chance to develop their creativity.³⁷

A recent report by the BFI described an educational backdrop in which arts and culture have lost ground in the curriculum, especially in England.³⁸ The increased focus on science, technology and maths, including a narrower scope for the study of English, has squeezed out time for the arts. A report published by the Warwick Commission described the resulting inequality in access to culture as 'bad for business and bad for society'. Indeed, despite the recognition that creative skills are predicted to be in high demand, there has been a continuing fall in the number of students taking creative subjects at GCSE level. Between 2010 and 2018, there was a fall of 154,000 (57%) in entries to Design and Technology GCSE and a reduction of 77,000 (20%) in entries in creative subjects.³⁹

Arguments for a shift in emphasis from the current prioritisation of 'STEM' (Science, Technology,

Engineering and Mathematics) to a more holistic STEAM strategy to education are well over a decade old. At a purely economic level, many have argued that a STEAM approach is 'rooted in economic need, ensuring more relevance with consumers' experiences ... [and improving scientists' and engineers'] ability to create relevant products and services'.⁴⁰ But the impact of STEAM thinking could be much wider by also introducing STEM subjects to those in the humanities. Nesta details the fact that the combination of arts and science skills within businesses, a key feature of many parts of the creative industries, is linked to 6% higher employment growth and 8% higher sales growth. Such companies are also 10% more productive than the average firm. The report finds evidence that the broader the set of skills a firm uses, the higher its level of innovative performance and future growth.⁴¹ Here more work to compare and collaborate with other countries' secondary and tertiary systems would be important; for example, examining the impact of North America's system for less early specialisation in 4 year degrees.



³⁶Stahl, Matt. (2009). Privilege and distinction in production worlds: Copyright, collective bargaining, and working conditions in media making. In Mayer, V. et. al. (eds). *Production Studies*. Routledge, 62-76.

³⁷Connor, A., Karmokar, S., & Whittington, C. (2015). From STEM to STEAM: Strategies for enhancing engineering & technology education. *International Journal of Engineering Pedagogy*, 5(2), 37-47.

³⁸BFI. (n.d.) BFI2022. *Supporting the future of UK film*. Available at: <https://www.bfi.org.uk/2022/>.

³⁹Creative Industries Federation & Nesta. (n.d.) *Creativity and the Future of Work*. Available at: https://media.nesta.org.uk/documents/creativity_and_the_future_of_work_11.pdf

⁴⁰Watson, A. D., & Watson, G. H. (2013). Transitioning STEM to STEAM: Reformation of engineering education. *Journal for Quality and Participation*, 36(3), 1-5.

⁴¹Nesta. (2016.) *The Fusion Effect: How firms gain from combining arts and science skills*. Available at: <https://www.nesta.org.uk/blog/the-fusion-effect-how-firms-gain-from-combining-arts-and-science-skills/>

As our interviewees and focus group make clear, the new world of immersive technologies makes this expanded role of creativity and forging interdisciplinary courses and skills all the more pressing. As Nesta outlines in relation to the separation of creative arts and humanities from science and technology, there is ‘no single cause for the persistence of the “Two Cultures” problem in British education. Rather, it is a consequence of complex interdependencies between what happens at schools, colleges and at universities’.⁴² Whilst there is not the space here to rehearse those arguments, it is clear that those in the sector are crying out for graduates with strong interdisciplinary skills. Our focus group unanimously called for a cross disciplinary approach at Higher Education level to drive the development of these much-needed fusion skills, drawing together typically siloed science and tech training with creative and communication skills development. 59 Productions outline how integral this is to their fundamental approach to combining media and science:

“no one has been trained to create content for an immersive theatre show that involves projection mapping. So, we’ve had a long period of educated people, who have come from traditional animation backgrounds and are used to work for the 16:9 screen, having to relearn the way they make content”

(Mark Grimmer, 59 Productions).

The technical skills required to deliver immersive content can lead to an over-reliance on the video games talent pipeline – not only at professional level – but also from new graduates: 31% of companies looked to games degrees for new talent, whilst 34% looked to computer science more widely. There are currently 49 different UK universities or colleges providing over 200 undergraduate and 40 taught

Figure 5.2: Degree programmes predominantly recruited from



⁴²Bakshi, H. & Mateos-Garcia, J. (2014) *Fix the pipeline for STEAM talent in the creative economy*. Available at: <https://www.nesta.org.uk/blog/fix-the-pipeline-for-steam-talent-in-the-creative-economy/>

postgraduate video game degrees in 2017/8. This means the total number of games students has more than doubled in 5 years: from 1014 in 2012/13 to 2625 in 2017/8⁴³. Such a healthy picture, however, raises two related concerns:

1. Firstly, that training provision outside of games is not keeping pace with the rate of change in the industry;
2. Secondly, that games courses need to also respond to the demand for fusion based skills that mix disciplines to exploit the opportunities of immersive.

As Angela Crago (BBC VR), argues that there is a need “for our industry and the games industry to work together because we have both got really good sets of skills, that if they come together would be brilliant”. As our focus group agreed, “it is vital to bring together games design with storytelling with a variety of approaches possible to meet the wide landscape of opportunities available. Do you introduce story to those with game design experience ... or start with the storytellers and develop the “how to make it (technical)” immersive skills’ (Focus Group).

The investment in the Audience of the Future programme outlined at the start of this report, combined with the Creative Industries Clusters Programme, offers an unparalleled moment for universities to re-shape curriculum based on a new kind of interaction between Higher Education and creative industries. Rather than producing ‘industry ready’ graduates or re-producing the ‘two cultures’ approach, the way in which these programmes encourage collaborative research, development and training might be a moment to produce graduates that mix the creative thinking, communication and technical skills this rapidly growing economy demands.

If the UK can grasp this moment and invest as much in the skills pipeline as it has directly in the creative industries, it can remain a world-leader in a market soon to be worth billions and offering audiences new forms of experience, culture, education and information opportunities.

We are virtually there.



⁴³Royal Holloway, University of London analysis of HESA data against JACS code of (I6) Games.

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