Media Cymru Freelancer Focus: Innovation

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Executive Summary

There are a multitude of interpretations of the concept of ‘innovation’ amongst screen sector freelancers. The concept is not always fully understood, but it is largely interpreted as both a product and a process.

Screen sector freelancers have limited capacity to engage in the development of innovative products and Research and Development (R&D) activity and often have little autonomy to instigate innovative processes working within a project-based working environment.

The introduction of innovative products often facilitates adjustments in workflows, allowing for small-scale, day-to-day innovations in the form of problem solving but freelancers are seldom the innovators themselves, rather the beneficiaries of innovations originating in the tech sector.

The introduction of innovative products and processes can have both intended and unintended consequences, and these consequences are not always positive. Concerns include the lowering of production quality, a shift in the desirable skillsets in the advent of generative AI, issues related to Intellectual Property and the automation of existing roles.

These findings have implications for skills and training for freelancers within the sector, and the need to better equip the region's freelancers with the absorptive capacity to manage the introduction of such innovations.

A recognition is needed of the possible contribution of the freelance proportion of the TV and Film workforce, both in the Cardiff Capital Region and more widely, as a skilled workforce able to effectively apply innovative products, rather than the source of substantive R&D activity.

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Introduction

The creative industries are a vital engine of economic growth, recognised as such at both the UK [1] and Wales national levels [2]. Nationally, the screen sectors [3] stand out as one of the largest contributors to Gross Value Added (GVA) [4] as well as driving technological innovation [5], and economic clustering [6]. These characteristics have led to initiatives like the Creative Industries Clusters Programme (Clwstwr) [7] and, more recently, Media Cymru [8], which aims to harness the potential of the creative industries to foster sustainable and inclusive growth in Wales.

South Wales is home to an expanding screen sector. With a total GVA of £622 million in 2023, representing a growth of 15.8% compared to 2021, the wider media sector in South Wales grew almost twice as fast as the rest of the Cardiff Capital Region's (CCR) economy during the period 2021-23, contributing 1.3% of the CCR's total business turnover - up from 0.8% in 2021 [9]. This is propelled primarily by a globally recognised Film and TV sector. With that in mind, while there is a presence of other screen subsectors (notably video games, animation and VFX), we focus this study on freelancers working primarily in television production and post-production.

Despite its strengths, the screen sector's reliance on freelance labour [10] and project-based work [11] presents unique challenges. Fodor, Komorowski and Lewis conservatively estimate that more than 1800 freelancers make up around a quarter of

[1] Department for Culture, Media and Sport, Creative Industries Sector Vision. (London: UK Gov, 2023). Available at: https://assets.publishing.service.gov.uk/media/64898de2b32b9e000ca96712/Creative_Industries_Sector_Vision__accessible_version_.pdf
[2] Senedd/Welsh Parliament, Behind the Scenes: The Creative Industries Workforce: October 2023. Welsh Parliament: Culture, Communications, Welsh Language, Sport and International Relations Committee (Cardiff, Senedd, 2023)
[3] British Screen Forum, UK Screen Sectors: A Prospectus for Growth in an Age of Change. July 2022. (London: British Screen Forum, 2022). Available at: https://britishscreenforum.co.uk/wp-content/uploads/2022/07/UK-Screen-Sectors-A-Prospectus-for-Growth-in-an-Age-of-Change.pdf
[4] Department for Culture, Media and Sport, Creative Industries Sector Vision. (London: UK Gov, 2023). Available at: https://assets.publishing.service.gov.uk/media/64898de2b32b9e000ca96712/Creative_Industries_Sector_Vision__accessible_version_.pdf
[5] Office for National Statistics: Expenditure on research and development performed in UK businesses in the Creative Industries sector. (2022) Available at: https://tinyurl.com/thn5jus3
[6] Lyons, M.S., and Connolly, K. Improving Economic Statistics in the Creative Industries: Towards multi-regional creative industries satellite accounts (2024). Creative Industries Policy and Evidence Centre.
[7] https://creativeindustriesclusters.com/
[8] https://media.cymru/about/
[9] Mate M Fodor, Marlen Komorowski and Justin Lewis, Industry Insights: Cardiff Capital Region's Media Sector in 2023 (Cardiff: Media Cymru, 2025)
[10] Banks, Mark. *The Politics of Cultural Work*. (2007) Basingstoke: Palgrave
[11] Shirley Dex, Janet Willis, Richard Paterson, and Elaine Sheppard, Freelance workers and Contract Uncertainty: The effects of Contractual Changes in the Television Industry, *Work, Employment and Society* 14, no.2 (2000): 283-305

the media industry workforce in South Wales [12]. It is salient to consider the place of freelancers within this ecosystem more specifically, as 96% of creative businesses in Wales are small (very close to the UK average) [13], supported by a large freelance workforce [14]. Additionally, within the 85 funded lead businesses that collaborated during Clwstwr, the wider innovation network in Wales included 273 individual freelancers hired to specifically conduct Research and Development (R&D) [14], rather than expected to undertake it as part of their general workflow.

One of the foundational tenets of Clwstwr was to create an ecosystem that provided a network of independent companies and freelancers with the capacity to innovate and develop new IP, but for most, innovation methodologies were mysterious or elusive. Introducing the creative industries to the world of R&D and innovation would be a key challenge, and require a significant sectoral culture change [14]. To foster innovation effectively, it is crucial to understand how freelancers perceive and engage with innovative practices, their capacity to innovate, and the broader implications for workforce skills and training. By addressing these needs, Wales can strengthen its absorptive capacity, and enhance the resilience and competitiveness of its screen sector in a rapidly evolving global landscape.

This report adopts the following structure. Initially, it provides context for screen sector production in the UK, particularly TV and film, and the antecedents for the rise of freelance labour, before providing some discussion on existing definitions of innovation, including those used by organisations like the OECD and the UK Government. We briefly set out our research aims and research design, before presenting the findings of our qualitative research on two broad themes; freelancers' attitudes and approaches to innovation in various forms, and the implications for future skills and training.

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[12] Mate M Fodor, Marlen Komorowski and Justin Lewis, Industry Insights: Cardiff Capital Region's Media Sector in 2023 (Cardiff: Media Cymru, 2025)
[13] Marlen Komorowski, Ruxandra Lupu, Justin Lewis and Sara Pepper, Joining the dots—understanding the value generation of creative networks for sustainability in local creative ecosystems. *Sustainability* 13, 22 (2021b)
[14] Justin Lewis, The cultural, economic and social value of the creative industries. In: Ruxandra Lupu, Marlen Komorowski, Justin Lewis and Maté Fodor (eds.), *Research, Development and Innovation in the Creative Industries.* (Routledge: Oxford, 2025)

Freelancers and UK Television

Over the past 30 years, UK television has transformed significantly, due to policy changes and technological advancements, altering workflows, production, distribution, and organisational structures [15]. Since the 1990s, the UK TV industry has shifted towards a predominantly freelance workforce [16][17][18]. This shift, alongside organisational change and cost-cutting pressures, has undermined skills development and fragmented training infrastructure [19].

Freelancers face exploitation, heavy workloads, insecurity, low or unpaid work, and limited career prospects [20][21]. Project-based production is unstable, intensified by the proliferation of freelance employment, transferring risks like insurance and maternity pay to workers [22][23]. Freelance work remains precarious, with workers facing intense competition [24]. Digital technology has further disrupted the industry, reshaping work processes with smaller crews and less reliance on specialised skills [25][26]. Recent developments, such as generative AI, continue to create volatility. In June 2024, BECTU [27] reported nearly half of UK TV freelancers struggled to find work.

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[15] Richard Saundry, Mark Stuart, and Valerie Antcliff, Broadcasting discontent—freelancers, trade unions and the Internet. *New Technology, Work & Employment* 22, (2007): 178-191.
[16] Shirley Dex, Janet Willis, Richard Paterson, and Elaine Sheppard, Freelance workers and Contract Uncertainty: The effects of Contractual Changes in the Television Industry, *Work, Employment and Society* 14, no.2 (2000): 283-305
[17] David Hesmondhalgh, Normativity and Social Justice in the Analysis of Creative Labour. *Journal of Cultural Research* 14, no. 3 (2010): 231-249.
[18] Irena Grugulis and Dimitrinka Stoyanova, The missing middle: communities of practice in a freelance labour market. *Work, Employment and Society* 25, no.2 (2011): 342-351.
[19] Neil Percival and David Hesmondhalgh, Unpaid work in the UK television and film industries: Resistance and changing attitudes. *European Journal of Communication* 29, no.2 (2014): 188-203.
[20] Dimitrinka Stoyanova and Irena Grugulis, Tournament Careers: Working in UK Television. In: Chris Mathieu, (eds.). *Careers in Creative Industries.* (London: Routledge, 2011).
[21] Sabina Siebert and Fiona Wilson, All work and no pay: consequences of unpaid work in the creative industries. *Work, Employment and Society* 27, no.4 (2013): 711-721.
[22] Ulrich Beck, *The Risk Society: Towards a new Modernity* (London: Sage, 1992).
[23] Rosalind Gill, Cool, creative and egalitarian? Exploring gender in project-based new media work. *Information and Communication Studies* 5, (2002): 70-89
[24] Irena Grugulis, and Dimitrinka Stoyanova, Social Capital and Networks in Film and TV: Jobs for the Boys? *Organisation Studies* 33, no.10 (2012): 1311-1331.
[25] James Bennett, Claude P.R. Heath, Fiona Kilkelly and Peter Richardson, Virtual Production Skills Report 2023. (StoryFutures, 2023). Available at: https://legacy.storyfutures.com/resources/storyfutures-academy-virtual-production-skills-report-2021/
[26] Mike Noon, Control, technology and the management offensive in newspapers. *New Technology, Work and Employment* 8, no.2 (1993): 102–10.
[27] BECTU. UK film industry in crisis Bectu Report Feb 2024. Available at: https://members.bectu.org.uk/advice-resources/library/3182

Freelancers bear the burden of self-funded skills development, favouring those with resources, while disadvantaging others reliant on secondary jobs [28] but also have little control over recruitment, or career progression [29]. Additionally, freelancers in television can attach great meaning to the artistic value of the work they undertake, resulting in high levels of exploitation/self-exploitation [30]. With that in mind, it seems salient to explore the relationship between innovation, emergent technologies and freelance employment in television. With Media Cymru's focus on developing South Wales as an international R&D and innovation hub, we seek to explore freelancers' interpretations of, and attitudes towards, the concept of innovation, examples of innovative practices and their experience of working with emerging technologies, as well as the implications for skills and training infrastructure within the sector, both at a regional level and more widely.

[28] David Hesmondhalgh and Sarah Baker, 'A very complicated version of freedom': Conditions and experiences of creative labour in three cultural industries, *Poetics* 38, no.1 (2009): 4-20.
[29] Doris Ruth Eikhof, Analysing decisions on diversity and opportunity in the cultural and creative industries: A new framework. *Organization* 24, no.3 (2017): 289-307.
[30] Jonathan Morris, Gazi Islam and James Davies, The search for meaningful work under neo-bureaucracy: Work precarity in freelance TV. Organization 0, no.0 (2024): https://doi.org/10.1177/13505084241236454

Innovation

The most widely used definition of innovation, and that used by the UK Government [31] is from the Organisation for Economic Co-operation and Development (OECD) which describes innovation as: *"a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)"* [32].

Importantly, the OECD definition makes explicit the link between "*both an activity and the outcome of the activity*" [32], that is, the process of innovating and the innovative outcome. Indeed, as Robert F. Bruner [33] points out, one may well lead to the other, with innovative products being followed by incremental then radical innovative processes (Figure 1).

Figure 1: The interaction between product innovation and process innovation [33]

[31]United Kingdom Innovation Survey Report 2023. Available at: https://www.gov.uk/government/statistics/uk-innovation-survey-2023-report/united-kingdom-innovation-survey-2023-report
[32] OECD, Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition, The Measurement of Scientific, Technological and Innovation Activities. (OECD Publishing, Paris/Eurostat, Luxembourg 2018), 20. Available at: https://doi.org/10.1787/9789264304604-en
[33] Robert F. Bruner, Sean D. Carr and Asif Mehedi, Financial innovation and the consequences of complexity: insights from major US banking crises. In: Matthew Hollow, Folarin Akinbami and Ranald Mihie (eds.) Complexity and Crisis in the Financial System (Cheltenham: Edward Elgar Publishing, 2016).

The latter part of the OECD definition explicitly links innovation to value creation, *"value creation or preservation [being] the presumed goal of innovation"* [32]. As such, the creation of a new product or process on its own is an invention rather than an innovation, innovation being *"the first commercialization of the idea"* [34]. Innovation is not necessarily something which is completely new or radical, despite the OECD making a distinction between "*new and improved*" and "*insignificant or minor*" [35]. As Kahn notes, this can be problematic *"as radical innovation is very challenging, may require special resources, and reflects substantial risk – certainly more risk than incremental innovation"* [36]. Minor improvements during the observation period that results in "*a significant difference in the final product or business process*" can lead to an innovation, however, highlighting the subjective nature of innovation as "*it is relative to each firm's context, capabilities and requirements.*" [36]

Innovation is an important part of an organisation's ability to grow, both financially and in terms of capacity. Companies that had high levels of innovation activity over previous time periods grew faster, and young firms which survived their first 2 or 3 years experienced the fastest growth by developing innovative ways of outperforming their rivals [37]. Innovation also benefits these rival companies, knowledge and technology flowing beyond the boundaries of the innovative company, driving innovation elsewhere [38], promoting further employment growth and other outputs as new companies are created [39]. The quantity and quality of innovative activity is closely associated with economic growth [40]. Creative industries can be economic growth drivers and play an even more strategic role in the innovation system, as catalysts of variety creation, and facilitators of systemic evolution [41].

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[34] Jan Fagerberg, Innovation: A Guide to the Literature. In: Jan Fagerberg, David Mowery and Richard R. Nelson (eds.), *The Oxford Handbook of Innovation* (Oxford: Oxford University Press, 2005), 4.
[35] Mark Rogers, The Definition and Measurement of Innovation. Melbourne Institute Working Paper No. 10.98. (1998) (Unpublished). Available at: https://melbourneinstitute.unimelb.edu.au/publications/working-papers/search/result?paper=2155929
[36] Kenneth B. Kahn, Understanding innovation. *Business Horizons* 61, no.3 (2018): 453-460. https://doi.org/10.1016/j.bushor.2018.01.011
[37] Geoff Mason, Kate Bishop and Catherine Robinson, Business Growth and Innovation The wider impact of rapidly-growing firms in UK city-regions, (London, NESTA, 2009). Available at: https://media.nesta.org.uk/documents/business_growth_and_innovation.pdf.
[38] Zvi Griliches, The search for R&D spillovers. *Scandinavian Journal of Economics*, 94 (Suppl.), (1992): 29-47.
[39] Sander Wennekers and Roy Thurik. Linking entrepreneurship and economic growth. *Small Business Economics* 13, no.1 (1999): 27-55.
[40] Iftekhar Hasan and Christopher L. Tucci, The innovation–economic growth nexus: Global evidence. *Research Policy 39,* no.10 (2010): 1264-1276.
[41] Jason Potts and Stuart Cunningham, Four Models of the Creative Industries. *International Journal of Cultural Policy* 14, no.3 (2008): 233-247.

Innovation in the Creative and Cultural Industries

The Cultural and Creative Industries (CCIs) play an important role in fostering innovation, productivity and employment growth [42][43], and have been identified as a priority sector by each of the UK nations' governments. Innovation in the CCIs becomes more complicated than innovation in other sectors, given the clustering of creative employers, the often-smaller scale of industry businesses and the high proportion of freelance workers. Rather than innovation taking place in one organisation, *"resources and production capabilities that support firm-level learning and innovation are distributed in the firm's geographically proximate industrial, institutional, and social environment"* [44], including other media organisations and the education sector [45][46].

Current forms of language around R&D, innovation support and processes are often a barrier for the creative industries, rooted in scientific and technical contexts derived from STEM skill sets and related product markets [47][48], and do not translate neatly to creative workflows, where such adaptions are often viewed more organically, as problem solving. Additionally, the current understanding of R&D tends to over-emphasise a linear conception of novelty, whereas creative industries often thrive on more iterative processes; creators can refine and adapt their work based on feedback, trends and evolving cultural contexts.

[42] Andrew Grantham and Raphael Kaplinsky, Getting the Measure of the Electronic Games Industry: Developers and the Management of Innovation. *International Journal of Innovation Management* 9, no.2 (2005): 183–213.
[43] Erik Stam, Jeren P.J. De Jong, and Gerard Marlet, Creative industries in the Netherlands: Structure, development, innovativeness and effects on urban growth. *Geografiska Annaler: Series B, Human Geography* 90, no.2 (2008): 119-132.
[44] Charles H. Davis, Tijs Creutzberg, and David Arthurs, Applying an innovation cluster framework to a creative industry: The case of screen-based media in Ontario. *Innovation Management, Policy & Practice* 1, no.2 (2009): 201-214.
[45] Henry Chesbrough and Adrienne Kardon Crowther, Beyond high-tech: Early adopters of open innovation in other industries. *R&D Management* 36, no.3 (2006): 229–236.
[46] Mikhail Fiadotau, Martin Sillaots and Indrek Ibrus, Education on screens: Histories of co-innovation and convergence between audiovisual media and education sectors. In Indrek Ibrus (ed.) *Emergence of Cross-innovation Systems: Audiovisual Industries Co-innovating with Education, Health Care and Tourism.* (Emerald Publishing Limited, 2019)
[47] OECD, Frascati Manual 2015: Guidelines for collecting and reporting data on research and experimental development. (OECD Publishing: Paris, 2015) Available at: https://www.oecd.org/en/publications/2015/10/frascati-manual-2015_g1g57dcb.html
[48] Justin Lewis, The cultural, economic and social value of the creative industries. In: Ruxandra Lupu, Marlen Komorowski, Justin Lewis and Maté Fodor (eds.), *Research, Development and Innovation in the Creative Industries.* (Routledge: Oxford, 2025)

This iterative approach, fundamental to creative practices [49], needs to be incorporated within R&D frameworks in the creative industries [50]. This adds further difficulties for freelancers not specifically hired to engage with innovative activity, as the temporary nature of television and film projects can prevent this iteration from taking place [51].

Until recently, the OECD has excluded the creative sector from innovation, the innovations in these sectors being 'hidden' [52]. While innovation in the creative industries is now included in the OECD definition, what innovation looks like in the sector, especially the film and TV industries, is malleable. Pratt and Gornostaeva [53] argue that innovation activity covers technology, regulation, organisation and location while Davis, Creutzberg and Arthurs [54] suggest innovation takes place across three 'layers', physical infrastructure, software and content.

The inclusion of content, which "*does not easily fit into conventional innovation policy frameworks",* has ultimately led to theories of how *"technological improvements increase the efficiency of economic production"* [55], and highlight the issues surrounding innovation within the screen sector, particularly as it is more likely to occur in the margins [56], through newer, smaller organisations, or through consortia such as Media Cymru, which exist to support innovation activity. Unlike the Soho film cluster, in which universities did not play a role in the innovation dynamic [57], consortia like Media Cymru, MyWorld [58] and XR Network+ [59] are based in, or led by, higher education institutions, who can both support and undertake R&D work, which leads to economic growth, particularly in countries at the *"technological frontier"* [60].

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[49] Anja Wölbling, Kira Krämer, Clemens N. Buss, Katrin Dribbisch, Peter LoBue and Abraham Taherivand. Design Thinking: An Innovative Concept for Developing User-Centered Software. In: Alexander Maedche, Achim Botzenhardt and Ludwig Neer (eds.), *Software for People: Fundamentals, Trends and Best Practices,* (Springer, 2012).
[50] Justin Lewis, The cultural, economic and social value of the creative industries. In: Ruxandra Lupu, Marlen Komorowski, Justin Lewis and Maté Fodor (eds.), Research, Development and Innovation in the Creative Industries. (Routledge: Oxford, 2025)
[51] Ruxandra Lupu, Rethinking R&D in the creative industries. In: Ruxandra Lupu, Marlen Komorowski, Justin Lewis and Maté Fodor (eds.), Research, Development and Innovation in the Creative Industries. (Routledge: Oxford, 2025)
[52] Ian Miles and Lawrence Green, Hidden Innovation in the Creative Industries. Project Report. (London: NESTA, 2008). Available at: https://e-space.mmu.ac.uk/624532/1/hidden_innovation_creative_industries_report.pdf
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[55] Charles H. Davis, Tijs Creutzberg, and David Arthurs, Applying an innovation cluster framework to a creative industry: The case of screen-based media in Ontario. *Innovation Management, Policy & Practice* 1, no.2 (2009): 207.
[56] Terry Flew, Heidi Anna-Maria Lenffer, and Georgie McClean, User-generated content and the future of public broadcasting: a case study of the Special Broadcasting Service. In *Media, Communication and Public Speech, 2008 Conference of the Centre for Media and Communications Law*. (2008). (Unpublished). Available at: https://eprints.qut.edu.au/17009/1/c17009.pdf.
[57] Caroline Chapain and Krzysztof Stachowiak, Innovation dynamics in the film industry: The case of the Soho cluster in London. In: Caroline Chapain and Tadeusz Stryjakiewicz (eds), *Creative industries in Europe: Drivers of new sectoral and spatial dynamics.* (Springer, 2017).
[58] https://www.myworld-creates.com
[59] https://xrnetworkplus.xrstories.co.uk
[60] Kevin Sylwester, R&D and economic growth. *Knowledge, Technology & Policy 13,* no.4 (2001): 71-84.

Supplying the Skills for Successful Innovation

Despite the importance of innovation for economic growth, research has identified a lack of skills as the single most important obstacle to innovation [61]. Skills and training have long been a source of contention in the screen industries, for a range of reasons. From retaining skilled workers as they age, the freelance nature of many roles, or promoting early career workers before they are ready, skills gaps and shortages pose real issues to the success of the UK CCIs [62]. Skills are an important component of absorptive capacity [63] and as Leiponen [64] points out, complement both internal and collaborative R&D.

However, the need for skilled employees is not limited to R&D, particularly in the screen industries. A high level of general skills is linked to the positive effect of research skills on profits [65] and given the link between innovation and economic growth, skills and innovation must interact when determining economic performance [65]. The BFI Future Film Skills Action Plan [66] highlighted that changes in technology were continuing to drive skills gaps, a point restated in the 2022 BFI review, and as innovative developments continue to take place within the screen industry, additional skills will need to be developed [67][68].

Davenport suggests that given the freelance nature of much of the UK's screen industries, *"it might be reasonable to expect a high degree of innovation in terms of organization, management and the application and development of skills"* given the

[61] Pierre Mohnen and Lars-Hendrick Röller, Complementarities in innovation policy. *European Economic Review* 49, no.6 (2005):1431-1450.
[62] British Film Institute, BFI Skills Review 2022 (London: BFI, 2022). Available at: https://core-cms.bfi.org.uk/media/22344/download
[63] Wesley M. Cohen and Daniel A. Levinthal, Innovation and Learning: The Two Faces of R&D, *The Economic Journal* 99, no.397 (1989): 569 –596.
[64] Aija Leiponen, Skills and innovation. *International journal of industrial organization* 23, no.5-6 (2005): 303-323.
[65] Aija Leiponen, Competencies, innovation and profitability of firms. Economics of Innovation and New Technology 9, no.1 (2000): 1 – 24.
[66] British Film Institute, Future Film Skills: An Action Plan (London: BFI, 2017). Available at: https://www2.bfi.org.uk/sites/bfi.org.uk/files/downloads/future-film-skills-an-action-plan-2017.pdf
[67] Peter Richardson, James Bennett, Claude. P.R. Heath and Fiona Kilkelly, Virtual Production. A Global Innovation Opportunity for the UK. (StoryFutures, 2021). Available at: https://pure.royalholloway.ac.uk/en/publications/virtual-production-a-global-innovation-opportunity-for-the-uk
[68] Nina Willment, Bethan Jones, Jon Swords and Jude Brereton, The importance of professional skills within the changing media landscape of the UK screen industries: a case study of the 'disruptive' phenomenon of virtual production. *Media Practice and Education* 26 (2024):1-19.

informal networks that many freelancers are a part of [69]. The short-term nature of many roles necessitates the need to multi-task, and the lack of in-house training and changing nature of both technology and production processes [68][69][70] mean freelancers often have a highly specialised skillset, enabling them to work together at short notice but preventing them from developing skills in other, cross-departmental areas [69]. As innovation becomes a key concept for the screen industries, more attention needs to be paid to how freelancers conceptualise it, if and how they are able to be innovative, and the wider implications this has on skills and training in the industry.

[69] John Davenport, UK film companies: project-based organizations lacking entrepreneurship and innovativeness? *Creativity and Innovation management* 15, no.3 (2006): 250-257.
[70] Sue Tempest, Alan McKinlay and Ken Starkey, Careering alone: Careers and social capital in the financial services and television industries. *Human Relations 57,* no.12 (2004):1523-1545.

Methodology

We adopt a qualitative approach, as such an approach is particularly beneficial in offering policy makers a picture grounded in the experiences of those most likely to be affected by any policy decisions [71], as well as affording sufficient room for a range of perspectives and interpretations [72].

Narrative accounts are of great value in understanding the lived experiences of individuals, in a specific context, in this case the perspectives of freelancers working in the Welsh screen sector, offering insights, explanations and theories of social behaviour [73]. We adopt such an approach to address the following research questions:

- How do screen sector freelancers working in Wales understand the concept of innovation?
- What capacity and capability for the adoption of innovative products and process do freelancers have as part of their workflow?
- What are the opportunities and challenges perceived by freelancers as a result of the adoption of innovative products and processes?
- What are the wider implications for the skill levels of the freelancer workforce in Wales?

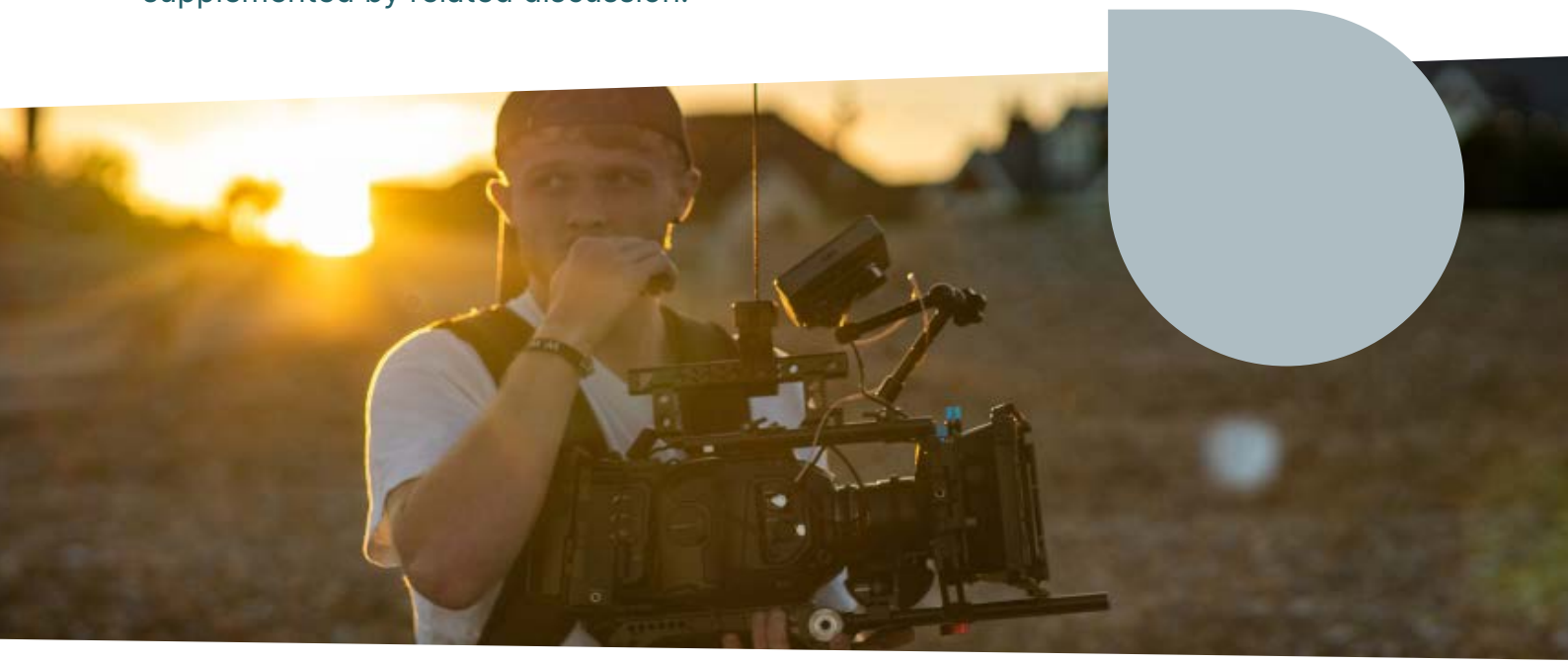
This research offers policymakers a picture grounded in the experiences of those most likely to be affected by any policy decisions. Data was collected through February to October 2024. In total 18 participants took part in semi-structured qualitative interviews, between 45 minutes to 1 hour 30 minutes in duration. Twelve interviewees identified as male, and six as female. Participants included representatives from camera, production, lighting and editing and scenic art departments, as well as a producer, one executive producer, one director and two directors of photography.

[71] Robert Walker, Applied Qualitative Research. (Aldershot: Gower, 1985)
[72] Catherine Cassell, Gillian Symon, Anna Buehring and Phil Johnson, The role and status of qualitative methods in management research: an empirical account. Management Decision 44, no.2 (2006): 290-303.
[73] Jane Ritchie and Liz Spencer, Qualitative data analysis for applied policy research. In: Alan Bryman and Bob Burgess, H (eds.). Analysing Qualitative Data. (London: Routledge, 2002)

An initial purposive sampling process was employed via contact with previous respondents to the Media Cymru Screen Workforce Survey [74] who identified themselves as freelancers and indicated that they would be prepared to take part in further research. A secondary snowball sampling was employed to gain further contacts from initial interviews. An interview schedule was prepared based on conclusions from a review of the literature and was iterated upon as data collection progressed. A copy of the interview schedule is available in the appendices.

Data was collected via audio and video recordings, supplemented by additional notes. All interviews were conducted online, via Microsoft Teams. Recordings were transcribed then analysed using the NVivo qualitative data analysis software. Emergent themes were identified via keyword text searches and grouped together. A secondary data pass on both overarching themes (see below) allowed salient quotes to be identified, lifted from their original context [75] and coded together to develop a more structured thematic analysis.

Participants were originally identified and invited to talk on two topics, future technology (FUTn.) and environmental sustainability (SUSn.). The more substantive theme of environmental sustainability will be covered in a separate report. Data is presented as direct quotations, anonymised via alpha-numeric codes. In the following sections, findings are presented categorised in terms of two overarching themes: Innovation and Skills & Training, with further sub-themes explored within each, and supplemented by related discussion.



[74] Helen Davies, James Davies and Richard Hurford. Wales Screen Workforce Survey 2022 (Cardiff: Media Cymru, 2024).
[75] Margaret Anzul, Maryann Downing, Margot Ely and Ruth Vinz. On Writing Qualitative Research: Living by Words. (London: Routledge, 2003).

Findings
Innovation

What is Innovation to screen sector freelancers?

The UK government uses a specific definition of innovation yet, as Rogers [76] notes, 'innovation' is problematic to precisely define, and this was evident among our respondents. FUT006, for example, stated that:

> ***"I wouldn't say that's in my vocabulary, probably because I don't really know the true definition of it [...] for me it's something trying to make something bigger better and maybe, and in a new way". (FUT006)***

This idea of innovation being related to the new, whether that was related to working or creating, was also mentioned by other respondents. SUS003, for example, felt that innovation was:

> ***"How to work in new ways I guess, is it? [...] to me, innovation is how can we work in a new way or how can new ideas be brought in or what new ideas can be brought in to help? That's how I see innovation" (SUS003)***

While FUT004 stated that it was:

> ***"Just coming up with something new. Pushing boundaries. Finding new ways of doing things. Better ways of doing things, cheaper ways of doing things. More creatively interesting ways of doing things." (FUT004)***

For both of these, innovation seemed to be related to success which, as Kahn [77] notes, is strongly associated with innovation. Yet for others innovation appeared to be more closely linked to a mindset of not accepting the status quo. SUS002 suggested that innovation was:

> ***"Thinking creatively. That's what I think innovation is. It is taking something, not accepting what you're being told, necessarily, and thinking, 'OK, how can I do that better? How can it be more efficient?'" (SUS002)***

Rather than being based on a successful outcome, innovation was seen as a thought process and spoke, to some extent, to the internalisation of innovation by this

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[76] Mark Rogers, The Definition and Measurement of Innovation. Melbourne Institute Working Paper No. 10.98. (1998) (Unpublished). Available at: https://melbourneinstitute.unimelb.edu.au/publications/working-papers/search/result?paper=2155929
[77] Kenneth B. Kahn, Understanding innovation. Business Horizons 61, no.3 (2018): 453-460. https://doi.org/10.1016/j.bushor.2018.01.011.

freelancer, despite some of the issues freelancers face in terms of autonomy in their working life. For other respondents, however, innovation had lost its meaning because of the variety of ways in which it has been used. Discussing how they understand the word, FUT007 stated:

> ***"I've no idea. I try to avoid it whenever I can [...] innovation is a word that comes up on almost every single company's brand guidelines [...] it starts to almost become like a regular feature on bullsh*t bingo [...] So I'm a little bit sort of, perhaps justifiably, cynical around that particular word". (FUT007)***

This response demonstrates how the screen sector, and more widely the government, needs to define innovation in relation to specific sectors and be clear about what they are referring to in that sectoral context. Taking this a step further, FUT005 criticised the OECD definition, saying:

> ***"Do you know what that's absolute bullsh*t? Because what that describes is the outcome of innovation and not the process". (FUT005)***

Kahn suggests that innovation should be thought of as both an outcome and process, and that: "*organizations defining innovation as only one of these will fall short in its pursuit. Those organizations focusing strictly on outcome will minimize process, leading to inefficiencies such as duplication of effort and resource overconsumption; those organizations preoccupied with process often create organization bureaucracies that make it too difficult to manifest outcomes*." [77]

When asked to elaborate on their earlier response, FUT007 suggested that:

> ***"If we're talking about defining terms of reference for defined words within the industry, innovation could relate to those processes and products that are concrete, definable and scalable for the masses, where on an individual level or a daily level, I suppose you could refer to it as ingenuity". (FUT007)***

FUT007 recognised the complexity of innovation when understood in relation to industry *and* individual, and also highlighted its importance to products and processes, which SUS005 also noted:

> ***"[It's] the process and product. I think you have to have the process, because you can't change the product, because it's being used at that minute. [...] And then once you've got the process, and people get used to doing it like this, then you can change the products." (SUS005)***

These distinct ways of viewing innovation were discussed by several respondents, aligning with what Edquist et al. [78] refer to as "*technological process innovations*", which are related to new types of machinery, and "*organizational process innovations*", related to new ways to organize work. It is, however, important to note the stage at which product innovation and process innovation are adopted and used in the screen sector.

The products used in the industry are high on the Technology Readiness Levels (TRL) [79], a framework which identifies the maturity level of technology from the very early stages of the research process (TRL1) to its successful use (TRL9). While the technology discussed by respondents is high on the TRL index and is available for consumers to use, rather than being developed by the sector, freelancers tend to be innovators or early adopters on the technology adoption cycle [80], eager to try new products or utilise new processes. The specificities of innovative products and processes are discussed further in the following sections.

[78] Charles Edquist, Leif Hommen and Maureen D. McKelvey, Innovation and employment: Process versus product innovation. (Edward Elgar Publishing, 2001).
[79] Catherine G. Manning, Technology Readiness Levels, NASA. Available at: https://www.nasa.gov/directorates/somd/space-communications-navigation-program/technology-readiness-levels/
[80] Everett M. Rogers. Diffusion of Innovation. (New York: Free Press, 1962)

Innovation as a Product

Television and film are ever-evolving industries which have seen incredible growth over a relatively short period of time, led by changing technologies, from the development of sound to the creation of immersive media experiences [81][82]. A variety of products were identified by freelancers in this study as being either inherently innovative, allowing for new approaches to working practices, or entirely new methods of working, particularly in camera and post-production departments.

This more traditional conceptualisation of innovative products was, perhaps unsurprisingly, particularly prevalent in those more tech-focused departments, more reliant on advances in technology, such as drone photography, facilitating new cinematographic approaches:

> ***"[...] in the last [...] three years an awful lot of very advanced and complicated drone videography has taken place. To the extent where you're seeing it being used in big TV shows, you're seeing it being used in big movies."***
> ***(FUT004)***

Or the evolution of solid-state drives making data storage far more reliable:

> ***[...] Solid-state drives are relatively new, and they're even more reliable than external hard drives over the last 10 years. Massively expensive, though."***
> ***(FUT008)***

There was also the sentiment among camera operators that this 'arms race' form of innovation within camera technology is missing the opportunity to improve things beyond just the aesthetic, whether making the technology greener or more ethical, and innovating in other ways beyond just better image fidelity:

> ***"Innovation just always seems to be about like the latest camera tech. I don't know [...] I guess it shouldn't be the same, it should be better. We should be innovating to try things, to make things better, not just prettier."***
> ***(FUT006)***

Some product innovations are introduced primarily because they are seen to save time and costs in the mid to long term, such as improved battery plates for providing

[81] William I. Greenwald, The impact of sound upon the film industry: a case study in innovation. Explorations in Economic History 4, no.4 (1952): 178.
[82] Emma Pett, Experiencing Cinema: Participatory Film Cultures, Immersive Media and the Experience Economy. (Bloomsbury Publishing, 2021).

power on set. These are considered more as an iteration of existing technology with improved efficiency, rather than an entirely new way of working:

> ***"they're [the new battery plates] not doing anything the other one wasn't doing, but they're doing what they were doing better and quicker [...] If there's a cheaper, quicker way of doing that, people are gonna do it."***
> ***(FUT001)***

It was unlikely any conversation around innovation with regards to technology could ignore the potential impact of Artificial Intelligence (AI), and so it proved. Freelancers provided a variety of perspectives on both the threat and potential of AI, and what it can possibly provide to the screen industry, seeing the advances as something both 'radically different' and 'innovative':

> ***"...if you're talking about like 3D cameras and that kind of stuff, things like Sora [...] I would say that that is radically different, that's like literally putting something that's from somebody's brain and typing in stuff and making it like that. Yeah, that kind of stuff I'd say was innovative."***
> ***(FUT006)***

But remaining defiant that no amount of artificial intelligence can currently fully replicate the full complexity of human creativity:

> ***"One of the reasons I don't worry too much about AI is the AI is artificial INTELLIGENCE. We are so much more than our intelligence. You know, we have emotions, and we have memories, and we have dreams and everything. The human experience is more than just intelligence. It's more than cognition."***
> ***(FUT005)***

This section has explored a variety of innovative products that freelancers have highlighted when asked to think about innovations in their workflows. The products discussed by interviewees in this section are all commercially or professionally available, therefore would have a high Technology Readiness Level (TRL). The key distinction for freelancers is that they are not the innovators when it comes to products, largely lacking the autonomy and agency to develop innovative products themselves, and rather utilising products that have been developed elsewhere.

They can, however, utilise those products to adapt their workflow process to enhance efficiency, or even create entirely new methods of working and types of content. What emerges is the mechanisms through which innovative products (internet video call technology, generative AI etc), lead to innovations in processes (remote work and

automation, respectively) [83]. This flow from product to process can be both intended and unintended, but is not necessarily always a good thing, as the next section will explore in more detail.

[83] Robert F. Bruner, Sean D. Carr and Asif Mehedi, Financial innovation and the consequences of complexity: insights from major US banking crises. In: Matthew Hollow, Folarin Akinbami and Ranald Mihie (eds.) Complexity and Crisis in the Financial System (Cheltenham: Edward Elgar Publishing, 2016).

Innovation as a Process

In such a fast-moving industry, it is perhaps no surprise that processes which enabled better time management were highlighted as being innovative, enabling freelancers to get on with other aspects of the job, or firefighting issues. However, innovative processes were evidenced across a range of departments, not just those aligned with pre- or post-production, areas of the production process where innovative processes may be considered the most prominent. For some interviewees, such as FUT008, work processes were where innovation was most likely to occur:

> ***"You included processes, which I think certainly in my day-to-day is probably where there's more innovation. I think just time management and [...] stuff like that, that frees you up to spend that portion of your time doing another element of your job, or having time to deal with the things that you hadn't necessarily expected to be dealing with that day." (FUT008)***

Elsewhere, automation was raised by camera operators who were able to automate parts of their role. FUT001 noted that he would rely on auto focus "all the time because I was doing three or four different things" and when auto focus wasn't used:

> ***"[...] the job became harder and you are always gonna drop the ball on something, because you're concentrating and trying to keep somebody in focus, you're not necessarily listening to what they're saying." (FUT001)***

While such processes were recognised for making the job easier, there was also a risk attached to them, as FUT004 recognised:

> ***"I'm aware that I am enabling tools which is one of the beginnings of the future of tools where more stuff gets automated and takes more skills away from people, who do jobs like what I do." (FUT004)***

Innovative processes are enabled by innovative products, they're intertwined, rather than separate concepts, and AI is a good example of this. Tools like Sora [84] and Dall-E [85] offer huge creative potential, but remain beholden to the skills and emotional intelligence of a human to prompt them effectively:

[84] https://openai.com/sora/
[85] https://ai-pro.org/start-dall-e/

"[...] the weird thing that we've got is this division between 'assistive' and 'generative' AI ... If you've got a graphic designer who is, let's say making titles for a film, if they use generative AI to generate those titles, that is assisting them to do their job. So that's actually assistive AI. Generative AI and assistive AI, very grey area, right? And it's not gonna be easy to just go, 'this is good AI, this is bad AI', because we're all gonna have different concepts of it." (FUT005)

One participant highlighted the potential danger AI poses to production quality, where those financing productions will see the inferior work AI can do, in the place of human editors, as 'good enough' to justify saving costs:

"The bigger worry for me with AI is that the effect it might have on the industry is that the money people will say 'that's good enough'. [...] the old BBC system used to be [that] the director would go through the rushes, cut and paste the interviews [...] You'd be given time codes of shots in and out, etc. So now, if you fed all that into a computer these days, you could get the rushes with the pictures, you could get a computer that would put something together. At what point does that thing become good enough that a producer will say 'that's okay, we'll go with that?' So therefore, you don't have an editor." (FUT003)

And others were concerned about being 'caught between the two stools' of not wanting to fight against progress, but fearing for the long-term precarity of their jobs, something screen sector freelancers have been dealing with for decades [86][87]:

"I think there's also the concern that it will just do everything eventually, because it can. [...] as much as I love my job and I'd like to keep doing it for as long as I can, you can't fight progress either. If I can use it and it's useful, I will, I won't not use it just to spite it [...]in an ideal world, it just sits alongside what you do, and it helps with those repetitive tasks within the role." (FUT008)

Other respondents see innovative products enabling new *processes*, that transform the way existing areas of the production process are conducted. A good example of this is the impact of remote video calling technology on casting, particularly in interviewees for documentaries:

"For me Zoom is invaluable for that [casting], or like Teams or whatever, because [...] A phone call's fine as a first step to say, 'what we're doing, will you talk to me?', and then for people to get to see your face is so valuable. [...] it's like in a safe space, if they get to sit at home and they can talk to me from like a safe space at home, it's another great step." (FUT002)

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[86] Irena Grugulis and Dimitrinka Stoyanova, The missing middle: communities of practice in a freelance labour market. Work, Employment and Society 25, no.2 (2011): 342-351.
[87] Sabina Siebert and Fiona Wilson, All work and no pay: consequences of unpaid work in the creative industries. Work, Employment and Society 27, no.4 (2013): 711-721.

These processes could become a double-edged sword, affecting the skills required for future jobs. Remote working, using tools like Zoom, was highlighted by several respondents, all of whom had experience of using these products to make their working processes easier:

> ***"...since the beginning of COVID, I have had several experiences of clients in other countries requesting live play out from video shoots, so they can remotely monitor it while the shoot's happening, or the footage that's recorded to be uploaded to a cloud platform immediately after the shoot." (FUT004)***

Rather than being limited to using editors in their own geographical location, clients are able to work with their preferred editors through use of remote technology tools and provide immediate feedback on shoots as they take place. Although this can, at times, cause issues:

> ***"by the time they sent us the feedback, we'd fixed half of the problems already, because we were doing more iterations and more and more practice." (FUT001)***

Freelancers were increasingly able to take on more work beyond Wales, which was seen as a positive thing, particularly given the precariousness of the industry. In the same vein, this shift also creates risk, however, as productions shooting in Wales may overlook hiring Welsh talent by hiring remotely.

Surprisingly, one recent change in the sector which has been touted as highly innovative was only referred to by two respondents. Virtual Production (VP) adapts technologies from other sectors, like games, for use in film and TV, thus changing the process of making television [88]. The discussion of VP by FUT007, however, focused on what it would not allow for, rather than what it would:

> ***"[...] with virtual production, unfortunately I think what it would not allow for is the happy accidents that happen when you get on location and you really see what it's like, like shots through the trees." (FUT007)***

FUT007 also had concerns regarding the responsible use of virtual production, noting that, along with AI, it is a useful tool, but shouldn't be used to replace people, their skills or their jobs:

> ***"[...] that would be the main thing that's concerning me, is how those technologies may undervalue people and undercut the value of serendipity in the filmmaking process, which is so important." (FUT007)***

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[88] Jon Swords and Nina Willment, The emergence of virtual production–a research agenda. Convergence: The International Journal of Research into New Media Technologies 30, no.5 (2024): 1557–1574

While innovative products and processes were used by freelancers working across a range of departments, there were also differences in the ways that freelancers conceptualised innovation, depending on the department in which they worked. Kahn suggests that cross-functional thinking is important because innovation, *"must connect across departmental lines and represent an organization-wide effort"* [89], yet freelancers highlighted the need for innovation relevant to specific departments. This was especially the case with innovative products. Discussing auto focus, for example, FUT001 pointed out that on a drama set the decision of what to focus on is an artistic choice:

> ***"you're discussing with the director where do you want to focus? Where would you like me to draw attention? Just because this person is the nearest and biggest thing in frame, doesn't mean that that's the thing I wanna focus." (FUT001)***

The use of innovative products like autofocus is less likely to impact jobs outside of scripted, live action drama, but FUT003 offered a different analysis in relation to AI:

> ***"AI will affect animation, probably earlier than live action, [...] So the job of somebody who at the moment might be working in graphics, and their job is to get the green screen and composite all the shots and whenever, [...] AI will have a big, big impact there. The music, even, you can get programmes where you can describe a mood now, and it'll write you a bit of music. And you can define the beat, you can define the key, it's how it's gonna be. As with all these things, it's how we use it, is going to be more important than what it is." (FUT003)***

The use of AI tools in the creative process is an ongoing discussion and negotiation, not least because of the ethical indeterminacy with regards to Intellectual Property (IP) [90], and freelancers reiterate the wider unease towards what may be the most disruptive new technology in the history of humanity. One participant presented a rather sanguine position on the AI debate, founded in cautious optimism:

> ***"My general attitude to life is progress is good. And at each major shift or improvement in an industry related to technology, there are always gonna be people who think it's the end of that industry as we know it. And it probably is, but I think we're - we all of us - have to be ready to adapt. So, I'm not overly concerned about Gen AI. I don't think it can replace the whole industry, certainly not in one generation." (FUT007)***

[89] Kenneth B. Kahn, Understanding innovation. Business Horizons 61, no.3 (2018): 453-460. https://doi.org/10.1016/j.bushor.2018.01.011
[90] Gil Appel, Juliana Neelbauer and David A. Schweidel. Generative AI has an Intellectual Property Problem. (Harvard Business Review, 2023). Available at: https://hbr.org/2023/04/generative-ai-has-an-intellectual-property-problem

As evidenced throughout this section, innovative approaches to workflow processes are increasingly enabled by innovative products. The creation of software like Teams or Zoom has allowed for remote working to be practiced across the sector and enable co-productions beyond companies solely based in Wales, while the integration of auto-focus into cameras enables operators to multi-task more efficiently. Despite this, however, there are concerns that innovation may be carried out for the sake of it, rather than with the aim to make the sector – or its products – better in a meaningful way, and in fact have the opposite effect, and actually a deleterious impact on production quality.

As noted in the final quote, above, such concerns about the impact of technology are not new [91][92][93]. The data also provided examples of where the introduction of new technologies – considered here as examples of innovative products – could provoke unintended consequences. Differences in innovation practices between departments also has the potential to consolidate the siloed thinking already evident in the sector, leading to questions about skills and training, which the following section will explore.

[91] Robin Mansell, Political economy, power and new media. New Media and Society 6, no.1 (2004): 96-105.
[92] John Thornton Caldwell, Worker Blowback: User-Generated, Worker-Generated and Producer-Generated Content within Collapsing Production Workflows. In: James Bennett, and Niki Strange, (eds.) Television as Digital Media. (Durham/London: Duke University Press, 2011).
[93] Stuart R. Clegg and Steven Burdon, Exploring creativity and innovation in broadcasting. Human Relations 74, no.6 (2019): 1-23.

Findings
Skills & Training

What are the implications for Skills and Training?

The focus on innovation in the UK film and television industries, coupled with both the intentional and unintentional results of this, clearly has implications for skills and training in the sector. Emerging technology is one contributing factor to skills gaps, as demand for talent and training outstrips supply [94]. While prior research has highlighted the need for interpersonal skills in the industry [95] one of the most frequently discussed issues among participants was the need to 'keep up' with new kit in order to remain competitive:

> ***"I think it's also quite important to keep up to speed with the latest gadgets and gizmos and stuff, because certain things become buzzwords. You get clients, producers, saying, 'we're looking for someone who can do XYZ'. And if you've been lazy and you haven't been technically innovative and you're like, 'oh, I don't have that thing' or 'I don't know how to do that thing', they'll give the job to someone else. I think it's important to stay on top of that sort of thing." (FUT004)***

Being 'interested' in the changes taking place was also described as important by one interviewee who noted that it was possible someone younger than them, and presumably more up to date with the technological innovations, could make something better than them soon. Linked to this was the idea that it is not enough to:

> ***"just know your job anymore; you have to know all of the technology as a whole and how it's implemented and how different manufacturers implement different technology in different ways." (FUT001)***

As more innovative technology becomes employed by the sector, freelancers have to understand not only how to technically use it, as different manufacturers produce technology that functions in slightly different ways, but also how it is implemented

[94] James Bennett, Claude P.R. Heath, Fiona Kilkelly and Peter Richardson, Virtual Production Skills Report 2023. (StoryFutures, 2023). Available at: https://legacy.storyfutures.com/resources/storyfutures-academy-virtual-production-skills-report-2021/
[95] Gideon Barker, High-End Television in the UK: 2021/2022 Workforce Research, (London: ScreenSkills, 2022). Available at: https://www.screenskills.com/media/5258/high-end-television-workforce-research-2021-22.pdf

across different departments. This requires a far broader knowledge base than perhaps has been the case more recently in the sector, where new entrants have had a narrower focus which has led to what one interviewee referred to as a 'false economy':

> ***"there's a big issue on drama with camera trainees being very quick to run the video village. […] then you don't have a camera trainee anymore because they're busy doing something else, and the whole point of a trainee is they don't know anything. So, you've got somebody who doesn't know anything running quite a technical section and if you got a trainee who's in like week one, you're gonna cost yourself an absolute ton of money, cos this person's gonna be absolutely swamped." (FUT001)***

One interviewee argued that new technology, and the skills that are required for it, offered opportunities to those in the sector:

> ***"the tech very much isn't at a stage where it is fully autonomous, so there's always going to need to be people who operate these things, programme these things, design these things, build these things […] [but] if there's more mundane roles that the tech can do, that freeing the people up to do the more interesting and creative stuff in some situations, might apply." (FUT004).***

As in the previous section, the use of generative AI to provide creative outputs is a delicate balancing act, with participants seeing it as a threat to any number of areas of production, both above and below the line, fundamentally changing the desirable skillset for TV workers to those who can successfully navigate and direct the AI generation process:

> ***"It's getting to the point now where with certain AI, you can even put it into [a] description and it will create a moving shot. Therefore, you wouldn't need an actor, you wouldn't need a camera, you wouldn't need sound, you wouldn't need a production crew – anything - you just write down. So, the people who would then become the hot property of the future would be the people who can describe things that produce the best AI images." (FUT003)***

Interestingly, despite some of the concerns regarding AI described above, many respondents felt that it wasn't the technology that would replace their jobs, at least in the short term, but skilled workers able to use it:

> ***"a thought that's been on my mind is, Gen AI is not gonna take your job, but somebody who knows how to use it might. Right? That seems to be the general 'use it or lose it' mentality, which I think is really sensible." (FUT007)***

Rather than ignoring these changing technologies then, interviewees felt that learning how to use them was the way to ensure their job security. This inevitably raised issues regarding who is responsible for ensuring staff are trained in these emerging products and technologies.

The Responsibility for Training

As the nature of the industry has changed, and traditional training infrastructures within organisations have declined [96], freelancers have increasingly become responsible for their own training [97][98], as FUT002 noted:

> ***"if I was inhouse at the BBC, that would all be paid for me. But even the BBC don't do that anymore." (FUT002)***

Although some training schemes aimed at freelancers – such as Media Cymru's Freelancer Development Fund – were referred to, there were still issues around funding the training:

> ***"it's the same with NFTS. They have a base in Wales and they have all these training things which sound great in practice, but if I wanted to do a shooting course with them it's £1500. I don't have that, and no freelancer does have that spare to do. And so, it's just really inaccessible training [...] freelancers, you're meant to bring all these skills to the board. And somehow, you're meant to have learned them somewhere, I don't know where." (FUT002)***

The movement away from training with institutions has also come with more on-the-job training, which was identified as being useful. However, being a freelancer rather than a contracted worker again raised issues:

> ***"But equally, again, as a freelancer, you might have a time when you're not working for a few months. And as much as I always say to myself, I'm going to keep my hand in and check in with the software every week, I don't always do that. It's a lot easier when you're working to keep up with things than when you're not, usually." (FUT008)***

[96] Neil Percival and David Hesmondhalgh, Unpaid work in the UK television and film industries: Resistance and changing attitudes. European Journal of Communication 29, no.2 (2014): 188-203.
[97] Rosalind Gill, Cool, creative and egalitarian? Exploring gender in project-based new media work. Information and Communication Studies 5, (2002): 70-89
[98] Gillian Ursell, Television production: issues of exploitation, commodification and subjectivity in UK television labour markets. Media, Culture and Society 22, no.6 (2000): 805-825.

There was also some debate about the speed of change, and how this related to skills development, especially when freelancers are responsible for their own training [99][100]:

> ***"I feel like we're at a point in time where things are changing so rapidly it's almost like it's a case of 'what's the point of learning this thing because the next thing will be here tomorrow?' [...] how do you know where to start and what to learn and, is this thing actually going to be a benefit to me in the future? [...] it takes investment to try these things in the first place [...] I've spent probably hundreds on subscriptions for tech now that I don't use anymore, and it's just because the next thing's come out and that's better." (FUT006)***

Introducing cheap, or free, training on new technologies and processes could be one way to address these costs, but where training schemes were available, they were criticised for offering a one-dimensional approach to making film or television, which prioritised the technical over the creative:

> ***"You learned how programmes were made, with somebody else. These days, training schemes tend to just teach you which buttons to press. How an Avid or [...] whatever you're using, how the buttons work. But [...] nobody teaches film language." (FUT003)***

Some participants did note that new technologies and processes did make it easier to carry out training. The internet allowed access to a wider production community with whom knowledge and skills could be shared:

> ***"And the software companies themselves as well are really good at putting out tutorials and stuff, because they do want their users to know what they're doing." (FUT008)***

The option to Zoom in to online training exists, but this doesn't reflect the kind of environment that exists in the sector and, as one participant noted:

> ***"You can get all the training you like, but until you're in the pressurised environment and suddenly being asked 10 questions from 10 different departments and prioritising and all that kind of stuff, that's where you really learn the ropes." (FUT008)***

The introduction of a variety of innovative products may facilitate the adoption of more efficient workflows, and technologies such as remote video calls even enable a

[99] David Hesmondhalgh and Sarah Baker, 'A very complicated version of freedom': Conditions and experiences of creative labour in three cultural industries, Poetics 38, no.1 (2009): 4-20.
[100] Gillian Ursell, Television production: issues of exploitation, commodification and subjectivity in UK television labour markets. Media, Culture and Society 22, no.6 (2000): 805-825.

greater degree of training, while simultaneously placing a greater strain on the freelance workforce to keep on top of their own training provision, especially without an established infrastructure to support that training over the longer term.

The provision of a sufficient level of training support, and the infrastructure that underpins that support, is vital in order for freelancers to possess the absorptive capacity to utilise the introduction of innovative product and processes, and maximise the potential of creative R&D. While the freelancers interviewed were passionate in their need for such support, where that might come from, and how that support might be funded, was less clear. Additionally, having such demands placed solely on the shoulders of freelancers has implications for professional development, as the next section will explore in more detail.

Professional Development and the Pace of Change

Skills gaps and training needs were also identified by some participants as being needed beyond their role, particularly when it comes to technology. Continuing professional development has been highlighted as an issue within the sector [101][102] and this is a pertinent issue when it comes to implementing new technologies which professionals at a more senior level may have less experience with:

> ***"My biggest issue a lot of the time is the people making the decision about whether something is implemented aren't necessarily the people that are having to do it or have the knowledge of what it is and why. So, they're either relying on somebody else telling them something, which may not be accurate, or promising them something that is unrealistic." (FUT001)***

There are also issues to consider beyond the immediate need to train and upskill freelance members of the workforce, and there are also unintended capacity issues when it comes to pursuing innovation. One of the tensions, identified by several respondents, was the democratisation of the industry due to emerging technology, in opposition to the oversaturation of the industry, as:

> ***"people might be able to afford the kit, but they might not necessarily be good enough." (FUT004)***

to deliver the finished product to a high standard. Participants talked about their own journeys into the sector and the way that technology had enabled them to find work:

> ***"I think maybe technology becoming cheaper has allowed me to keep up with people that would traditionally have to spend tens of thousands, like hundreds of thousands of pounds on making something. I make something of a very high standard with something for not even a tenth of that price." (FUT006)***

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[101] Amy Armstrong and Natasha Page, Creativity and constraint: Leadership and management in the UK creative industries (London: Creative Skill Set, 2015).
[102] Bethan Jones, Jude Brereton, and Jon Swords, Skills and Training Provision in The UK Film and TV Industries. (Screen Industries Growth Network: University of York, 2022). Available at: https://screen-network.org.uk/wp-content/uploads/2023/01/ST-report-final2.pdf

These new technologies were also enabling new entrants from other sectors to join the film and TV industry, pushing the boundaries of the sector and creating more innovative products:

> ***"Some of the people who are doing that [using drones] best and really pioneered some of the most complex stuff with that are very young people, who don't have any background in the industry and any other sector. And in some cases, they came from the video game world. [...] they're big gamers and they move to that because it's basically the same thing, looking at screen and using a remote control to control this object." (FUT004)***

However, the same interviewee went on to say that the industry had become 'oversaturated' because of the ease of access to these tools:

> ***"I really do value the fact that the industry's democratised and anyone can afford a tool to do good creative work and get themselves into the industry [...] if I'm really honest, I wouldn't be in this industry if it wasn't because of that. [...] So it's not fair for me to say, 'Oh well, it can't happen now' it absolutely should happen. [...] but I think there's a difference between the good quality entry level stuff, and the middle ground becoming diminished, I think. It's my personal opinion that the middle ground of camera equipment has become too good for too cheap." (FUT004)***

Another aspect of this increase in the number of people wanting to work in the sector relates to the working culture and the knowledge and skills needed to work and manage people in the industry. The idea of responsible or ethical film making was raised by one interviewee who noted that:

> ***"what that burst in technological innovation created was this huge - we're gonna loosely call it a talent pool of people - who suddenly have the means to be able to do this, but not the know-how, not the knowledge, and certainly not the mindset that actually we have to do it responsibly [...] our morals and ethics haven't caught up as an industry, and it is a morally and ethically grey industry, in many aspects. [...] there's a huge skills base now, but what it means is people are being taken advantage of now." (FUT005)***

While perhaps not considered skills in the traditional sense, this understanding of the need to work in a morally responsible manner applied not just to people but also to new technologies and processes, including AI and automation. The pace of technology has contributed to tensions at the boundaries of the screen sector's workforce, incumbents who had benefitted from more accessible equipment now

concerned for repercussions of allowing newer entrants in via the same benefits. This links to the following section, which looks at the generational impact of the technological pace of change.

The Generation Game

The final unintended issue of pursuing innovation was the generational impact. As new technologies and processes are developed and implemented, more older freelancers decide to leave the sector:

> ***"Every time there's a technology change, mainly the older people, I suppose, tend to fall by the wayside. [...] You get to a point where you think am I too old for this, do I want to spend time learning this new piece of tech, can I do it well enough or should I leave it for the younger generation?" (FUT003)***

The sector already finds it difficult to retain older workers due to its long working hours, high pressure and the difficulty of maintaining a work-life balance, leading to a younger age profile than the general workforce [103]. This means that while skills gaps and shortages are already an issue, the introduction of new technology exacerbates this, as another interviewee noted:

> ***"there'll be a point where I'll just be too old to remember all the new innovations that are coming in." (FUT008)***

With the film and TV workforce already missing around 23,600 older workers [104] and losing the experience they bring, the quality and capacity of the sector is at very real risk if adequate and accessible skills and training are not introduced.

This section has examined the implications that innovation has on skills and training in the screen sector. As emerging technologies and processes are introduced across individual departments and the industry as a whole, skills will be required to change and training must be implemented to provide the workforce with the skills they need.

Existing training provision in the sector has been critiqued, and while participants noted that new technologies enabled training to be carried out remotely, there are still concerns about the quality of provision offered and the cost. Cost for training is typically shouldered by freelancers, and while funding exists – primarily through charities or clusters/consortia like Media Cymru – the application process is hugely competitive, with more freelancers than places available.

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[103] David Steele, Absent Friends: Scaling the film and TV industry's retention problem. (Film & TV Charity, 2022). Available at: https://filmtvcharity.org.uk/assets/documents/Reports/Absent-Friends-Film-and-TV-Charity-Retention-Report.pdf
[104] David Steele, Absent Friends: Scaling the film and TV industry's retention problem. (Film & TV Charity, 2022). Available at: https://filmtvcharity.org.uk/assets/documents/Reports/Absent-Friends-Film-and-TV-Charity-Retention-Report.pdf

Pursuing innovation also has unintended consequences which can lead to a decrease in quality, including the oversaturation of the entry-level workforce due to cheaper, high-quality technology and the loss of older workers, who feel unable to keep up with new technologies and processes.

Conclusion

It has been the intention of this report to explore the varying ways in which screen sector freelancers in Wales, primarily those working in TV and film production, approach the concept of 'innovation.' A key aim of the Media Cymru programme is developing the capacity for innovation in the sector, therefore recognising how it is understood and operationalised is key, for both identifying appropriate training needs, and for optimising any R&D investment in emerging technologies. Freelancers are such a substantial proportion of the TV and film workforce that their interpretation of what constitutes 'innovation', and capacity to engage with innovative products and processes requires a nuanced understanding.

Our findings reflect that innovation is seen by freelancers to come in a variety of forms, as new technologies and products, such as camera tech, drones, AI, battery and storage technology, as well as virtual production technologies. However, perceptions of innovation are highly subjective, and dependent on departments; camera operators will naturally focus on technologies that relate to their equipment, whereas freelancers from production departments tend more to focus on technologies that specifically enable new processes. Understanding the interplay of innovation as both a product and process that are interrelated rather than as being separate forms of innovative activity, is thus key to understanding innovation in the film and TV industry.

This relationship between innovative products and innovative processes is multifaceted and complex. It can have positive consequences, such as facilitating remote working and casting in the form of video calling technology or drones allowing for new angles of photography, but there are also negative implications of innovations in product and process. The most obvious is the ongoing development of AI, which offers potential benefits to workflow simplification, while simultaneously threatening the obsolescence of many job roles.

Elsewhere, rapid advancements in camera technology place further pressures on freelancers who often provide their own equipment, to match the pace of technology, intensifying competition and expediting the rate at which technology gets superseded, particularly with the streamers and major broadcasters locked in an arms race and demanding ever-increasing standards. Freelancers are often very limited in their capacity to innovate based on their short-lived roles within hierarchical departments and simultaneously locked into exacting technological standards that are beyond their control, especially when the technology required is their own to supply.

Finally, such a nuanced understanding of the impact of innovation on a freelance workforce has implications for skills and training needs. Firstly, the cost benefits provided by a number of innovative products have had the knock-on effect of shrinking crews, requiring one person to perform multiple roles and leading to both the loss of skilled crew and the need for a broader, albeit less specialised, skills base. The sector also needs to ensure that freelancers have the absorptive capacity to deal with any innovations that emerge. This is particularly true when it comes to older, more experienced workers, who report feelings of obsolescence and exhaustion with keeping their skillset up to date. The ramifications of this are two-fold. Firstly, there needs to be an infrastructure to better link junior (predominantly younger) staff with those in more senior positions to ensure valuable experience is not lost between generations. Secondly, provision must be made to ensure more experienced workers are able to keep their skills suitably up to date.

Screen sector innovation is not just R&D, it is also about refining and adapting the entire production process. Innovations, both in the form of products and processes, are capable of providing huge benefits to all areas of that production process, but the pursuit of advances in technology for technology's sake can also have deleterious consequences, particularly on the skill sets of freelancers, responsible for keeping up with the pace of change themselves, without any robust training infrastructure to support them. It is, therefore, an important role of programmes like Media Cymru, and other consortia with a remit to develop innovative screen sector activity in the UK, to understand and look beyond a narrow idea of innovation as just universally good, especially on a workforce so reliant on freelancers and project-based work.

Appendix 1: Participants

Interviewee Code	Gender Identity	Job Role / Department / Genre (where applicable)
FUT001	M	Camera operator / Self-shooter / Lighting engineer
FUT002	F	Assistant producer, Documentary
FUT003	M	Editor, Producer, Director, Writer
FUT004	M	Director of Photography / Camera operator
FUT005	M	Writer / Producer
FUT006	M	Videographer
FUT007	F	Screen director
FUT008	F	Assistant Editor (Post-production)
FUT009	M	Scenic Artist
SUS001	M	Executive Producer / Filmmaker, Documentary
SUS002	F	Production Coordinator
SUS003	F	Assistant producer, Documentary
SUS004	M	Director of Photography / Camera operator
SUS005	M	Cinematographer
SUS006	M	Writer / Producer
SUS007	M	Videographer
SUS008	F	Assistant Editor (Post-production)
SUS009	M	Prop maker

Appendix 2: Interview Questions

Future Skilling and Emergent Tech (Innovation) (Global)

Recent Developments

What do you perceive as being the most important recent developments in relation to your role? (tech, skills needs, R&D, cultural shifts, working practices, legislation?)

(If R&D raised by respondent)

As a freelancer, are you able to engage in any R&D activities? How, where, when? If not, why not?

Where do you think R&D should come from? Whose responsibility is it?

What challenges (or opportunities) do these developments pose for you specifically, if any?

How has your skillset been required to change over the course of your career? Has this change been easy for you?

How have your working patterns changed over the past few years? (Remote working, virtual production methods, cloud services)

Has this shift in working patterns had an impact on you? Would you say that impact is positive or negative?

How do developments in technology impact the way you work? (This doesn't have to be just specific to your role)

Do you feel confident in embracing or utilising new technology in your role?

Innovation

What do you understand by the term ‘innovation?’ / What do you think of when we talk about innovation in the screen ‘industries?’

Do you only engage in this sort of activity when you are employed? Are you able to work on similar sorts of developments when you are not on a production?

What autonomy/ability do you have to be innovative, how much say do you have in what you do about these developments?

Do you think it’s important to be innovative? Why? Why not?

Are you able to innovative? Why? Why not? (Skills, funding, time, autonomy etc.)

OECD/UK Govt. definition here (Products, Services, Experiences, Processes) - An innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).
A product innovation is a new or improved good or service that differs significantly from the firm’s previous goods or services and that has been introduced on the market.

A business process innovation is a new or improved business process for one or more business functions that differs significantly from the firm’s previous business processes and that has been brought into use by the firm

How do you respond to that?

How do you feel it applies to your work?

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The Centre for the Study of Media and Culture in Small Nations at University of South Wales delivers high-quality collaborative research and innovation on the creative industries in Wales through the frame of small nations globally. It is based in the Faculty of Business and Creative Industries. The Centre has strong UK and international partnerships with research universities and creative industries organisations delivering a range of multidisciplinary grant-funded projects.

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