Dr Dominic Lees, Associate Professor in Filmmaking, University of Reading—written evidence (CRF0008)

House of Lords Communications and Digital Committee inquiry "A creative future"

An introduction to you or your organisation and your reason for submitting:

Dominic Lees' research expertise is in AI and the creative industries, with a focus on deepfakes and machine learning and their impact on screen production and audiences. He teaches students in advanced skills for screen production. Dr Lees worked in UK television and film production for 21 years, chiefly in creative leadership roles as a director of broadcast drama, before moving into academia. At the University of Reading, he co-leads an interdisciplinary project to research AI and the creative industries together with Professor James Ferryman of the department of computer science. His research has been supported by the British Film Institute and The Alan Turing Institute, and in 2022 Dr Lees established a new network of academics and industry practitioners exploring how developments in AI can support the creative industries.

The University of Reading has made a significant decision to support the UK's screen industry, by dedicating part of its Thames Valley Science Park to create 'CineValley', a major hub for production, training and research. One of the country's largest film studio complexes, Shinfield Studios, is currently under construction; alongside this, the university is developing a 'Skills Hub' that will help train the next generation of screen industry professionals.

Summary.
This submission focuses on developments in Artificial Intelligence and how new processes will have a profound impact on film and television production, postproduction, and audiences over the next ten years. It makes proposals for training the advanced skills required to support the development of the UK's digital screen economy.

Background.
Manipulation of moving images in digital film through advanced Visual Effects (VFX) processes has become a significant part of the UK's creative industry, with Hollywood outsourcing major projects to London-based postproduction houses[1], generating employment for highly skilled UK image technicians. However, the creative opportunities of VFX have been limited to the high-end production sector due to cost.

Developments in AI systems based on machine learning will soon make high-quality digital image manipulation widely available. Prominent among these is 'deepfakes', a process capable of swapping the face of a character in a film, or the 'digital resurrection' of deceased actors and public figures to feature in new

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[1]   Framestore, The Moving Picture Company

content production. Impact will be felt on multiple sectors of the UK's screen economy.

Inquiry Question 1:
Which areas of the creative industries face the greatest potential for disruption and change in the next 5–10 years, and what impact could this have? a) What changes are expected in the way creative/cultural content is produced; the way audiences are engaged (for example through digital or immersive experiences); and the way business models operate?

1. The Visual Effects industry

Machine learning (ML) raises the prospect of cheaper and more accessible VFX, the democratisation of access to the creation of remarkable moving image effects that has hitherto only been available to high-budget screen productions. The disruption of working practices and business models in this sector will be considerable. Machine learning will replace certain human-directed tasks in VFX creation, undermining employment and remuneration for digital designers. The greater accessibility of VFX due to lower prices gives the potential for an expansion of the sector, which may offset the impact on employment. The UK's VFX businesses will face increased competition due to the increased accessibility of ML-based image generation.

2. Deepfakes in Creative Content Production

The widespread use of deepfakes will have a profound impact on screen production. The practice of replacing the face of filmed characters began in 2017 as a low-resolution gimmick restricted to handheld devices and online content, but recent research leads towards the creation of high-resolution deepfakes that can be used in mainstream television and film. The first broadcast of a television programme featuring high definition deepfakes was on Channel Four (26.12.2020), when the annual *Alternative Christmas Message* featured a deepfaked Queen speaking to the nation. BritBox is currently streaming a documentary, *Gerry Anderson: A Life Uncharted,* in which the creator of *Thunderbirds* is digitally resurrected for an interview using deepfakes. Over the next five years, we can expect a proliferation of deepfakes in television and film production, accompanying a parallel expansion of deepfaked content online.

Profound ethical issues surround this new technology: deepfakes began in the pornography industry in 2017 and malign uses of the process persist; major concerns around the image rights of individuals, and performance rights for actors, are yet to be addressed.

3. Voice morphing.

Machine learning systems can learn the exact speech characteristics of a person in order to generate synthetic dialogue that the individual has never themselves spoken. This will transform the way audio content is produced in the screen industry. The work of actors in dubbing films will be replaced by AI. The costs of creating multiple language versions of films and TV content for export will be dramatically reduced, enabling the better market exploitation of UK productions. The subtitling of films will wither away. Benefits will accrue to IP rights holders of earlier films. Cultural changes in the behaviour of audiences will develop, as the UK's familiar resistance to foreign-language content will be reduced due to

AI's delivery of perfectly-dubbed international screen content. Globally, film culture will be enriched by the increased accessibility of world screen content.

    4. Museums.
AI-based image production provides huge potential for the heritage sector. Extended Reality (VR, AR) approaches to presenting museum archives have already been introduced; the adoption of deepfakes as a tool to resurrect historical figures will provide audiences with a closer, more personal sense of contact with their heritage. The lower cost of creating machine learning-based heritage experiences will allow a broader range of institutions to engage in creative AI approaches to presenting their collections.

    5. Audiences.
Broadly, the disruption of screen media by AI will create a culture in which semi-synthetic media is the norm. Growing awareness of this phenomenon will undermine audiences' trust in the realism of what appears on their screens. A universal assumption that all media have been manipulated will develop (media literacy), undermining the trustworthiness of screen content as a means of communicating information, ideas and stories. The negative impact on political discourse and social communication will be profound. The positive impact on audiences will be the availability of extraordinary screen content created for all levels of the market.

Inquiry Question 2:
What skills will be required to meet these emerging opportunities and challenges?

    1. Advanced skills in digital creativity.
Machine learning offers opportunities for improving the productivity and speed of creation of VFX, and for innovative approaches to screen content production. However, the UK will need an expanded workforce that combines creativity with advanced digital skills.

    2. Ethical and legal management.
The huge potential of AI-fuelled screen production has already led to creative exploits that exceed common decency and the ethical standards of a tolerant society. The UK will need to develop the law around image rights, and the screen industries will need to develop self-regulatory frameworks to control the ways in which AI is used to create semi-synthesised content. Legal departments in screen industry companies will require new skills in managing the complex issues related to deepfake and semi-synthetic media content - image rights, copyright, performer rights.

    3. Cryptographic skills.
A major recent research focus has been on the development of automatic systems to identify deepfakes and the origins of other semi-synthetic media; further research has looked at potential systems for watermarking digital image files in order to establish verifiable records of the stages of manipulation of videos as they circulate online. In a future in which creative content producers are utilising video from varied sources, much of which will be semi-synthetic, advanced knowledge of cryptographic systems will be a requirement for all creative personnel involved in production and distribution.

Inquiry Question 3:

What actions are needed from the Government and local authorities to ensure there is an appropriate talent pipeline equipped with these skills? a) How can this be sufficiently flexible to take account of the pace of change in the sector?

The high level, applied digital skills that are required in next generation film and television production are not provided by current education and training. The vocational training approach cannot supply the screen industries with the advanced level of AI expertise that is required; the National Film and Television School (NFTS) does not have a department of computer science where groundbreaking machine learning techniques are taught or developed. The role of universities, with a pre-existing culture of applied research, will be crucial to support both the development of the talent pipeline and to innovate the next stages of technological development in the creative sector. Harnessing together the UK's training and research sectors can guarantee flexibility in response to changes in technology, ensuring the talent pipeline is equipped with up-to-date expertise in the latest systems. Future entrants into the screen industries will frequently require Masters-level training, not the simpler craft skills learning that has characterised the UK's education of new entrants. Government can play a role in enhancing the Higher Education's responsiveness to the challenges of AI and the creative industries. For instance:

- creating screen industry hubs that unite production studios, applied AI research, and Higher Education providers of training in digital creative skills;

- providing incentives and funding for universities to bring together teaching expertise in computer science and film departments;

- IT capital investment in those universities that are linked to screen industry production hubs. There will be significant start-up costs for new HE film/computer science units specialising in training advanced approaches to creating semi-synthetic media.

Local authorities can have a key role in supporting the development of the talent pipeline, integrating training with industrial development. A strong example of this is the 'CineValley' project in Berkshire. Following a strategic decision by the University of Reading to dedicate land in its Thames Valley Science Park to the development of a major new film studio, Wokingham Borough Council is collaborating with the University, the film studio, the Local Enterprise Partnership and regional screen industry businesses to develop a 'CineValley Skills Hub', tasked with developing a regional workforce with the skills required for employment in the burgeoning production industry. This Skills Hub is a model for how the UK could develop the advanced digital skills required for AI-based creative content production, drawing trainees towards a centre that links a film production studio with university departments in film and computer science, and industry-focused skills training.

In a recent screen industry-facing event on deepfakes hosted by the University of Reading, smaller creative sector businesses commented that their resources to engage in value-adding activities such as collaboration with HE was restricted by the exigencies of operating intense production schedules with small teams.

Most creative sector businesses are sub-SME in scale. Government can assist by expanding tax relief for smaller creative industry companies, to support the participation costs of collaborative work with the HE sector in training and research.

Inquiry Question 4:
What actions are needed from industry to support the talent pipeline development?

As technological development continues, industry's needs from new entrants will become increasingly specific. Too often, business sits outside the education system while complaining that they are not getting the trained people that they need. Businesses need to collaborate with Higher Education in their regions on curriculum development, to ensure the design of degree programmes is matching the needs of their enterprise. A recent 'Employer Engagement Workshop' organised by the Department of Film, Theatre and Television at the University of Reading has led to new collaborations on the reframing of degree modules to better prepare graduates for employment in regional screen businesses. This model of co-curricular design requires active, long-term support from businesses.

At the high-end, advanced digital creative processes necessitate the cooperation of businesses in clusters of PhD programmes investigating machine learning and the screen industry. Larger enterprises need to develop ongoing collaborative relationships with HE research divisions, with students spending extended periods of research time embedded with the creative teams in the companies, thus allowing business leaders to develop working relationships with potential future employees.

a) What actions are needed from organisations in the creative industries to prepare for and accommodate the requirements of the future workforce?

Performers are a section of the creative workforce that will be most impacted by technological change and will require support from creative industry organisations over issues such as performer rights, image rights and the regulation of the future exploitation of captured performances. The governance of these issues should be represented by an organisation that sits between the interests of employers (represented by PACT) and the trade interests of actors (Equity) - an expansion of the responsibilities of the British Film Institute could serve this purpose, or the establishment of a new Office of Digital Rights.

Inquiry Question 5:
What role do innovation and research & development play in addressing the future challenges facing the creative industries? a) What actions are needed from the Government, funding bodies and sector organisations to support innovation, and research & development?

Research and development into the applications of machine learning are essential for UK companies to maintain a competitive edge in the screen sector. For our world-leading Visual Effects businesses, future innovation will include the integration of machine learning into existing processes, in order to accelerate and improve image production. Ongoing research into deepfakes will be

necessary to create more convincing face replacements. Audience research will be vital to monitor the response of viewers to the increasing volume of synthetic media.

A policy decision will be required on the subject of open source software. Most leading research is conducted and enriched through the availability of openly available code: does government want to encourage this open source culture, or allow companies to develop unique and closed systems?

Actions from government and sector organisations:

- Targeted funding for research into AI and moving image production;

- A specific brief to The Alan Turing Institute to focus applied AI research on the needs of the creative industries;

- A formal leadership role for the British Film Institute in researching audience responses to deepfakes and other forms of semi-synthetic media;

- Targeted investment to equip researchers and teachers with the appropriate computing tools - research into machine learning in screen production has been hampered by the lack of appropriate high-level IT hardware in some universities' computer science departments;

- Action to support deepfake detection and watermarking;

- Expanding R+D tax relief for smaller (sub-SME) creative industry companies, to cover participation costs of collaborative research with the HE sector.

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