Northern Bridge Consortium
Collaborative Doctoral Awards
Competition (Staff-led)

NORTHERN BRIDGE CONSORTIUM DOCTORAL TRAINING PARTNERSHIP

Project Proposal Application

To be completed by the lead proposed supervisor, with input from the non-HE Partner Organisation(s).

UKRI Arts and Humanities Research Council

SECTION 1: PROJECT SUMMARY AND APPLICANT DETAILS			
Proposed Project Title:	Constructed, Virtual and Real-Time Integration of Artefact and Environments: Achieving Seamless Digital Spatial Registry in Cinematic Production		
Project Summary: *(Maximum 100 words)*	This applied research will investigate 3D/4D artefact and environment scanning/printing at the nexus with Virtual Production for film and screen industries through real-world use cases. The academic supervision team have relevant experience across the research dimensions and the industry partner provides outstanding and relevant contexts. Poli's creative output has global recognition including Emmy awards, and they lead technology innovation in the seamless integration of crafted artefacts and VP. Ulster Screen Academy, Belfast School of Art, CoSTAR, Studio Ulster and Poli provide unmatched research environment and industry-leading resources. Impact will encompass technical, economic and cultural contributions through theory and practice.		
Host University:	Ulster University		
Name of Non-HE Partner Organisation(s): *(Add more lines if needed)*			
1. **Poli Productions Ltd.**			
2.			
Contact(s) at Non-HE Partner Organisation(s): *(Add more lines if needed)*			
Name:	Elsa Carlisle	Email:	Elsa@poliproductions.co.uk
Name:		Email:	
Primary AHRC Subject Area: *Select one subject area from the list here. Please do not add or amend subjects, as there will not be a corresponding Subject Area Review Panel to assess your nomination.*	Digital Arts: History, Theory and Practice		
Does the project include a Creative Practice component?	YES ☒	NO ☐	

Do you consider the project to be interdisciplinary?	YES ☒	NO ☐
If you consider the project to be interdisciplinary, please state why: *(Maximum 100 words. Please note that your application will be assessed by the relevant **primary AHRC subject area review panel**. However, in this space you should indicate which other subject areas your proposal covers and how your methodology is genuinely interdisciplinary.)*		
The project's utilisation of digital technologies and the development of new digital and analogue processes and outcomes will make practical contributions to the field of screen disciplines, game and animation, craft, design, and the wider creative industries. The research builds on academic attention to small object scanning for cultural and heritage purposes including preservation, replication and remote access and the research may contribute to cultural engagement with objects in fields including history, museum studies, game design.		

SECTION 2: PROJECT PROPOSAL AND CASE FOR SUPPORT

Please provide full details of the proposal and make your case for support below:
(Maximum 750 words)

Context

Crafted artefact and set integration with virtual production (VP) sits within the broad digital design research landscape and aligns to future design challenges (Whicher2020). Sustainability is critical to productivity and competitiveness.

The digitisation of objects has been significant in academic research e.g. 3D Lidar, for cultural heritage, digital replication and heritage preservation aims. Academic attention has focused on the digitisation of small museum exhibits and at-risk locations with perceived generation of authentic and stable digital replicas (Schindling, Gibbes 2014). However, the use of active and passive sensors and structured light scanner or hybrid apparatus has led to diverse final outcomes for several purposes (Patrucco et al 2023). Applied to the Screen industries, there remain glitches in the integration of analogue and virtual objects on-set and live action that present significant cost and quality challenges. This research will benefit from Poli's world leading expertise in artifact construction and digital integration. The combination of 3D printing technologies with materials that can transform and possess shape memory and self-healing capabilities realises the manufacturing dynamic structures for a myriad of applications. 4D-printing's additive manufacturing of time responsive programmable materials creates opportunities for solutions in demanding environments where human intervention is not possible. (Ryan et al 2021). The carbon footprint of VP requires attention to enable accurate estimation (Keeney 2024).

Therefore, the **Research Aims** to establish enhanced and innovative protocols, technologies and practices to integrate constructed artifact and set with VP in real industry contexts.

Research Questions

RQ1 What is the potential to utilise knowledge and practices of small object 3D scanning for cultural heritage purposes in large scale 3D:4D and VP Environments?
RQ2 What technical interventions or developments will overcome latency/uncanny when analogue objects and sets are integrated in VR/VP?
RQ3 What are the sustainable impacts of construction and VP practices and innovation?

Research Objectives

The research will address known and emerging industry glitches. It will inform interdisciplinary protocols to enhance accountability, traceability, and sustainability essential to national competitiveness. RQ1 will develop agency for multiple tracked 3D/4D volumetric scanning beyond game contexts to include potential for image/real object feature matching through parallax. RQ2 takes advantage of research co-location in industry studios to research live action use cases spanning conventional set and artifact construction, large scale VP and live action. The 5G closed network will enable ground-breaking research of latency specifically in relation to artefact integrity and set towards potential for real-time scan and craft object integration. RQ3 will develop measurable data to inform industry carbon calculation required to meet Paris Agreement and surpass Albert. IP governance, routine asset destruction and new historical archive practices are also relevant to RQ3.

Methodology and Timeline

1. Qualitative practice and literature review. Depending on existing skills/experience, the researcher will train and gain insights into industry pipeline by collaboratively working Ulster academics and industry experts at Poli to investigate and analyse practices and technology integration. Identification of pilot research subjects (people) and case studies (projects) and practices (technology/pipeline) [Y1 Q1-2 and periodically revisited]
2. Initial assessment- problem definition refined, work and training plan [Y1:Q2].
3. Training and practice to map advanced techniques at Ulster, Poli and across CoSTAR Network.

4. Refine project protocols and approvals for ethics, NDA, IP. (Y1:Q3-4)
5. Practice and action research- Pilot practice interventions and demonstrators. Triangulating of research subject experiences and interdisciplinary perspectives within the pipeline. Creative and technology practice in lab and on live projects to build use case data and engage participants in analogue and VR construction. Research and make contribution to useable carbon calculation methodologies. [Y1:Q3-4 and onwards, periodically reviewed].
6. Annual review each April; Confirmation Assessment [Y1Q3].
7. Placements are anticipated to be 1-2 month long in Y2-Y4=6 months throughout 4 years. These will include personal and professional development in wider industry and short international or on-location placement, placement with a global technology/software provider. [Y2-Y4]
8. Develop, test and modify a model of practice research through live projects with Poli. Sense checked for maintain leading edge at CoSTAR weekly online researcher meetings and network lab events. Impact pathway initiated through national dissemination and regular interim engagement activities with key stakeholders [Y2-3] which provide evidence for Final Assessment [Y4:Q1]
9. Revisit state of play in the industry; validate research insights, refine protocols and technology interventions; 'writing-up' and development of demonstrator /reel/software showcase. Disseminate research in international academic and industry contexts and develop national and global impact through dissemination of practice, technology and policy insights [Y4]. Submit full draft/mock viva Y4Q2-3. Submit Y4Q3.

Provide details of any resources and facilities, including equipment, fieldwork, training, etc., that will be required to complete the project successfully. NBC has limited Research Training Support Grant funding, which may affect the feasibility of high-cost projects. Please note where you might also secure additional funding, (e.g. partner organisations; department or school). Include estimated costs:
(Maximum 200 words)

Commute to Poli / Studio Ulster affordable within CDA.
Artifact fieldwork to conventional sources such as archives, museums, PRONI (affordable mileage)
Doctoral College Training and Ulster Screen Academy technical training if required is free; UU licenses for Unreal Engine, etc.
Ulster CoSTAR Lab fully operational in January 2025 and other labs will come on stream thereafter.
Researcher may participate in CoSTAR Screen Lab exchanges to Ulster and outward lab exchanges.
There may be opportunities for involvement in funded demonstrator projects.
The Researcher will gain training and experience through joining working groups relevant to their research.
RTSG plan in priority order:

- Consumable construction material, small tools (estimated £1000).
- Scan and 3D 4D costs estimated £1000
- CoSTAR workshops at other UK COSTAR Labs (small grant £500).
- One National Conference or Industry showcase (small grant £500).
- This project has local global-standard case study opportunities on our doorstep however there may be some requirement to travel to technology exemplars so one trip for this purpose is estimated. (Large grant circa £1000).
- One International Conference or presentation at Industry showcase (large grant £1200).

The project can be achieved within the usual NBC RTSG large grant amounts.
There is potential to offer NBC cohort training.

Outline the arrangements for communication between the non-HE partner organisation and the academic host institution in regard to project management and monitoring academic progress:
(Maximum 200 words)

Ulster University and Poli have previously worked together, communication is already established.
The academic Supervisors are located on the same floor of a building on Belfast Campus. The off-campus commute is easily achieved within the CDA stipend uplift: Poli is 11 miles from Belfast campus and forms a triangle with Studio Ulster/Harbour Studios. Subject to room availability, supervisory meetings may be on campus and occasionally at Poli or Studio Ulster. Ulster promotes in-person teaching and supervision but there is access to TEAMS.
Chair of Supervision, Fleming initiated the collaboration and is responsible for PhD admin. She will advise on research ethics and discuss NDAs about Poli projects. Fleming will signpost to CoSTAR, and to working groups e.g. new research on sustainability and EDI and funding that may be relevant. McHugh will lead on artefact research, scanning, object biography and collaborate with Poli on construction. McKnight will lead VR software training and tracking sustainable digital enhancements. The Faculty runs intensive induction and essential training in Semester 1 and then supervisor meetings are regularly organised – at least monthly but more regularly in certain phases. Ulster's online PHD Manager system has all essential guides, forms, documents, records of meetings, training and assessment milestones.

What benefits will there be for the candidate and the non-HE partner organisation as a result of your collaboration?
(Maximum 200 words)

Candidate benefits:
Access to

- Poli creative professionals and technologists.
- construction resources.
- live projects user cases and research subjects.
- network of organisations and individuals in production pipeline.

Experience of

- pre-and post-production workflow, dialogue between virtual and real time artefact design and management.
- Object research and object biography in screen narrative.
- Real-world experience and deep insight.

Potential Credit lines on high quality projects
Placement opportunity.

Non-HEI Benefits:
Experience of

- academic research.
- Risk-taking, speculative future design.
- Dedicated R and D capacity in the form of the researcher
- Longitudinal R&D capacity spanning more than one project over 3 years.
- CoSTAR National Networks in addition to existing support for CoSTAR Screen Lab
- Enhanced rigour of research data and emerging research projects

Potential to

- address industry-relevant research imperatives
- Leverage research funding.
- Host placement and benefit from researcher's other placements.
- International academic publication
- The Project is aligned to Poli's construction activity and could provide insights for the production arm.

All collaborators will benefit from

- CoSTAR research colleagues including post-docs
- Studio Ulster/Ulster Screen Academy training

- established channels to impact international standards and UK policy including CoSTAR. Ulster's research (Keeney et al) has informed DCMS and NI DfE and is quoted back to industry by Netflix, Prime etc.

State what financial (if any) or in-kind contribution the non-HE partner organisation will be making over the duration of the award:

*(Maximum 200 words. A financial contribution is **not** a requirement. However, the AHRC expect that **non-HE partners based overseas** will make a financial contribution to the costs of the student's return travel and accommodation when visiting.)*

Non-Academic Supervisor time.
Costs of other Poli staff time such as interview subjects, staff time to train/supervise the researcher (agreed case-by-case)
Training and Induction for on-site and on-location presence and for specific processes as required.
Provision of any essential H&S clothing (or Researcher may use RTSG to purchase)
Assistance /advice to researcher planning fieldwork and placement.
Insurance for any work undertaken on Poli projects. (The researcher will have Ulster University Research Indemnity and fieldwork approval for their normal research activities)
Access to construction and VP technologies by agreement and subject to supervision/evidence of training.
Access to any staff comfort facilities that may exist e.g. canteen.
Access to archives of past project records and data by agreement case-by-case such as not subject year standard 5-year destruction.
Desk space and access to facilities at Poli when working there.
Advice on NDA and IP as required case-by-case.
Should the researcher be working directly on constructions for commercial projects their work will be credited as appropriate to the scale and nature of the contribution, by agreement case-by-case.

Describe the nature of the collaborative arrangement and the activities the candidate will be undertaking with the non-HE partner organisation:

(*Maximum 200 words*)

Poli Productions is a production company that design and build sets for film and television. With over 30 years of experience in the film and television industry, Poli built the Emmy award-winning sets for all 73 episodes of Game of Thrones and many other NI-based productions. Upcoming projects include relevant historic reconstruction, documentary, storytelling and artefact-centric work on high-value global productions. Poli's construction arm innovates both analogue artefact and set-build with integration into virtual production. Poli have experience in game changing innovative pre/post-production software configuration with sustainable dimensions. Seamless integration at the analogue:virtual nexus including lag-free real time action is what Poli Productions and the researcher will collaborate to investigate through observation, analysis and applied research including use cases.
The researcher will also investigate sustainable dimensions towards enhancing industry carbon calculation (Paris Agreement) and ensuring best practice beyond compliance with Albert.
Depending on the skillset of the recruited researcher and their required initial training, the researcher will observe and analyse and then engage in construction and processes with Poli on site, in studio and as lab-based experiments.
The collaboration respects that the researcher/supervisors may on occasion need to undertake NDA re projects under development (as is industry practice).

SECTION 3: SUPERVISION AND EXTERNAL ADVISORS	
Primary (or Co-) Supervisor:	Professor Karen Fleming
School or Department:	Belfast School of Art, Ulster University

Email Address:	k.fleming@ulster.ac.uk
Secondary (or Co-) Supervisor:	Dr Christopher McHugh
School or Department:	Belfast School of Art
Email Address:	c.mchugh@ulster.ac.uk
Advisor based at the Non-HE Partner Organisation:	Elsa Carlisle
Organisation/Institution:	Poli Productions LTD
Email Address:	elsa@poliproductions.co.uk
Advisor based at the Non-HE Partner Organisation:	
Organisation/Institution:	
Email Address:	
Additional Internal or External Advisors or <u>Academic Supervisors</u>, if any:	
Name:	Dr Michael McKnight
Organisation/Institution:	School of Communication and Media
Email Address:	m.mcknight@ulster.ac.uk

Explain how the expertise of the supervisory team and external advisor(s) will allow them to support the proposed project and the selected candidate:
(Maximum 500 words)

Professor Karen Fleming, Belfast School of Art, is an experienced supervisor, member of REF2020 Panel, AHRC PRC and is familiar with diverse research formats. Her design thinking experience will inform the project development. The project benefits from networks developed in AHRC Creative Economy hub (PI) AHRC Creative Cluster Future Screen NI (Co-I) and current AHRC Green Transitions Ecosystems and Co-I leading Sustainability and EDI work packages in CoSTAR Screen Lab, she will be a conduit to the CoSTAR network. With experience leading the University's silver Athena Swan award and chairing University ethics, she will oversee project EDI dimensions. Prior to full time academia Fleming was a maker, and her practice research includes crafting artefacts. Fleming is developing virtual fashion in the SURF project (Skills for Urban and Rural Futures). She was a founding director of Craft NI, of which McHugh is currently a director and 10+years Trustee of National Museums NI and CHEAD UK. McHugh and Fleming have extensive exhibition and event experience.

Dr Christopher McHugh, Lecturer in Ceramics, Belfast School of Art, studied archaeology at Durham and Cambridge, before receiving a MEXT Scholarship (Kyoto University). His experience in practice-led research that explores the relationship between artistic and archaeological methodologies, often focusing on archives, museum collections and communities is highly relevant. Having been AHRC Cultural Engagement Fellow at Sunderland, he is currently Visiting Research Fellow in the faculties of Health Sciences and Wellbeing and Arts and Creative Industries at the University of Sunderland and ensures relevance to NBC. His interdisciplinarity benefits the project- his research outputs span theory, practice and technology, for example the development of innovative 3D scanning printing and fabrication technologies for museum artefacts. Fleming and McHugh have supervised to completion (14), internally and externally examined doctoral awards and currently each supervise 6.

The project develops supervisory capacity with **Dr Michael McKnight**, Lecturer in Screen, School of Communication and Media, who has over 17years professional experience in film and television industries, including head of department positions in production/post-production. His research is relevant in its exploration

of creative practice and the perceptual experience spanning film, arts, music and extended realities. His particular interest in emerging spatial technologies will ensure integration of the project with the sector pipeline. McKnight develops and delivers innovative screen and virtual production training in academia and to industry professionals in Ulster Screen Academy (>300 crew trained) that the researcher and Poli may access.

Rob Carlisle is co-owner/founder of Poli Productions Ltd. He has over 25 years of experience in audiovisual content production, including 10 years in TV and film construction and art direction. With personal credits for set, costume and make up, he has extensive experience in the E-manufacturing pipeline and seamless integration of built sets with VFX and In-Camera VFX. Poli built the Emmy award-winning sets for all 73 episodes of Game of Thrones and many other productions based in Northern Ireland. While upcoming projects are subject to NDA, they are anticipated to include relevant opportunities to research historic re-creation, fantasy and fiction for household name production companies.

SECTION 4: RESEARCH ENVIRONMENT

Please provide details about the research environment the selected candidate will be joining and its suitability:
(Maximum 500 words)

The distinguishing factor of the student's research environment is CoSTAR Screen Lab. The £75.6m Convergent Screen Technologies and Performance in Realtime (CoSTAR) is the biggest investment AHRC have made in creative economy infrastructure. CoSTAR will develop new technologies to maintain the UK's world-leading position in gaming, TV, film, performance, and digital entertainment. In addition to CoSTAR Screen (Belfast), the researcher will be plugged into CoSTAR National, CoSTAR Realtime, CoSTAR LIVE and CoSTAR Foresight Labs and to industry partners including BFI, NI SCREEN, BBC and leading production and technology companies, of which Poli productions is one example.

Opening in January 2025, CoSTAR Screen Lab will research world-leading and emerging virtual production and real-time technologies. The co-location of academic research with resources for advanced creative computing technologies, large-scale VR, motion capture, 5G-6G private network, and studio space for large budget productions within the Harbour Studio complex is unprecedented outside LA. CoSTAR Screen Lab research of world building, asset creation, automation, real-time processes and workflows will provide a unique context and resource for the doctoral project. The researcher will have access to purpose-built research space. CoSTAR has weekly online research exchange meetings. Such access to research infrastructure with inroads to emerging technology, national productivity and creative economy policy will undoubtedly benefit the researcher's post-doctoral career potential.

The researcher will also benefit from the environment of high performing research Units of Assessment 33 Music, Drama, Dance, Performing Arts, Film and Screen Studies and 32 Art and Design. The researcher will belong to the Creative Industries Institute that collaborates with industry, government and community partners- evidenced by recognition of screen industry in Assembly strategy (10X) and the partnership that secured COSTAR. They will benefit from seeing how applied research- including their doctoral data and insights -can contribute to evidence databases and help shape creative industries policy.

School of Art, School of communication, Research units, Ulster Screen Academy, CoSTAR organise regular activities to nurture researchers and innovation in creative industry relevant to this project. The faculty has other the ongoing research projects relevant to the proposal including Green Transitions Ecosystems (AHRC) which includes a VR technology WP; Belfast City Deal including Belfast Stories; 5G innovation research developing low latency audience experiences and research of real time feedback from real location; Future Screen NI organises monthly industry meet-ups; AHRC Doctoral Focal Awards applications have been submitted and are anticipated in the duration of this studentship. A Northern Ireland DTP Hub will launch later in 2025/6.

In this lively environment, the researcher will have a constant academic home in the Doctoral College (DC) HUB on the recently built Belfast campus, where they will benefit from purpose – built facilities, doctoral training and events including an annual conference. DC is managed with online PhD Manager, dedicated subject DC administrators, NBC administrator and Ulster NBC Academic Director. A faculty DC director ensures arts and humanities relevance and furthermore, a subject Tutor organises regular coffee meetups and ensures high quality cohort experience recognised as 4th in UK in PRES 2023.
