

Alliances for Research Challenges: Expression of Interest

Transformation by Design: Creatively Enhancing the Scottish Economy

Partners and contact details

The University of St Andrews, School of Management (Lead Partner)

Professor Paul Hibbert, ph24@st-andrews.ac.uk

Dr Shiona Chillas, sac30@st-andrews.ac.uk

Abertay University, School of Design & Informatics

Professor Gregor White, g.white@abertay.ac.uk

Professor Jim Bown, j.bown@abertay.ac.uk

Creative Informatics (Edinburgh & Edinburgh Napier Universities)

Professor Chris Speed, c.speed@ed.ac.uk

InGAME

Mr Sean Taylor, sean.taylor@abertay.ac.uk

Queen Margaret University, Centre for Communication, Cultural and Media Studies

Professor David Stevenson, [dstevenson@gmu.ac.uk](mailto:d Stevenson@gmu.ac.uk)

Royal Conservatoire of Scotland, Research and Knowledge Exchange

Professor Stephen Broad, s.broad@rsc.ac.uk

Robert Gordon University, Immersive Scotland

Ms Josie Steed, j.steed@rgu.ac.uk

Challenge area, outline response and balance between breadth and specificity

To deliver focussed impact through this ARC we have sharpened our focus to two of Scotland's National Strategy for Economic Transformation (NSET) challenges. However, our collaborative processes and technical resources readily extend to other Scottish priorities including initiatives to enable new venture creation, social entrepreneurship, improved health outcomes, and support for wellbeing. From the specific NSET challenges, we focus on the need to:

- strengthen Scotland's position in new markets and industries, generating new, well-paid jobs from a just transition to net zero
- make Scotland's businesses, industries, regions, communities and public services more productive and innovative.

We respond to these linked challenges through an inclusive structure that has three core Strands, leading to (1) increased collaborative R&D, with the opportunity to gain and leverage UK funding schemes, (2) a pipeline of Digital Twins that can provide resources to accelerate R&D in sustainable ways, and (3) focussed development of Scotland's creative and cultural industries which are active in all of our regions and a key target for new digital industries.

In Strand 1, St Andrews and InGAME will lead on the catalysing processes to stimulate new projects, bringing together members of the alliance and a broader range of HEI partners to develop demand and supply-side responsive solutions. Abertay, Edinburgh and Edinburgh Napier will build on their design and technical expertise from InGAME and Creative Informatics to lead Strand 2, combining games technology and data-driven modelling that can provide resources to accelerate R&D in sustainable ways. Strand 3 will engage the creative industries beyond games and data in processes of innovation and transformation. St Andrews will coordinate the leadership of this strand with Queen Margaret, the Royal Conservatoire of Scotland and Robert Gordon to provide engagement opportunities across Scotland's creative and cultural industries. However, collaboration and cross-fertilisation across all three strands will be integral to our creative approach.

Strand 1: Collaborative R&D experiences, practices and processes.

The collaborative processes and expertise in working with industry and public sector partners, involving St Andrews and developed by InGAME, can be transformative for other sectors of Scotland's economy. Enabling this reach through open engagement with all of Scotland's HEIs and interested partner organizations will be a core strand of activity. The catalysation of such partnerships will also allow Scottish organizations to increase their share of UKRI research funding and tap into the UK's emerging innovation support schemes. Our activity will be structured around a series of Creative and Challenge workshops, which will involve and enable experienced and early-career researchers to participate in the development and enhancement of an impact-driven research culture. Creative workshops provide a demand-side element by showing problem stakeholders from outside the creative industries pathfinder projects that evidence the successful application of design thinking and games and media technologies to industry and third-sector challenges and providing the space for ideas for adaptation and application to develop. Challenge workshops are a supply-side element to complement the demand side process. In these workshops, the ARC will be agile and dynamic by responding to policy and funder led challenges as they come into focus, such as specific new Scottish Government programmes, high-risk/high-reward cross-sector challenges, or significant UKRI funding opportunities.

The alliance will seek to provide small-scale seed funding and mobilise and engage participants for mutual benefit, including advanced research students and early-career researchers, to support the development of outline solutions or project opportunities that are developed through these processes. This will include the use of seed funding, brokering support from an industry partner (in the creative, design or technology sectors). This collaborative approach has proved successful in the past, for

example in leveraging a £5K scoping project to attract £250K from Innovate UK for a project focused on the crossover of games, AI and veterinary practice.

Strand 2 Digital Twins: Constructing a pipeline to support product and policy development.

Building on the design, technical and R&D expertise of InGAME, Creative Informatics and additional design and technical capabilities at Abertay, Edinburgh and Edinburgh Napier we will support a programme for the development of *Digital Twins* (functional digital replicas of real objects or processes) to enable businesses, communities and stakeholder organisations to:

- Test new products, services and business models, innovate new technologies and disrupt system and service models.
- Create opportunities for new businesses and enterprise in new markets.
- Offer enhanced levels of service accessibility and personalisation to excluded communities.
- Create data driven simulations to improve policy/decision making and optimise service delivery.

Specifically, we see the possibility to mobilise: games technologies, systems and designs to render data-driven simulations; digital twins of challenge spaces such as social care, sustainable transport and energy management. The increasing integration of the digital and the real – a mixed metaverse – leading to the convergence of product, service, events, culture and commerce will create new markets, new industries, new economies and new careers. Key industry trends and predictions suggest that three emerging technology trends will transform business across all sectors^[1], each underpinned and powered by game engines, platforms, and technologies:

- Digital twins will reduce the impact of supply chain shocks (£48.2bn projected global market size for digital twins by 2026 - CAGR 58%).
- The rise of the metaverse, spatial computing and AR Cloud will dominate the next decade (£143bn projected global market size for spatial computing by 2026 (CAGR 41%).
- Remote and autonomous machines will require better accuracy, reliability and security (£53.8bn projected global market size for robotics by 2026 (CAGR 17.45%).

We anticipate that developments in Digital Twins, catalysed by the ARC, will be highly attractive to a range of funders and commercial interest and provide opportunities for early-career researchers. There are also spillover effects from the development of these technologies which can support other Scottish Government priorities, in relation to health and wellbeing and cultural and social outcomes.

Strand 3: Digital enabling and transformation of Scotland's creative and cultural industries

Through the leadership of partners with expertise in Scotland's creative and cultural industries (QMU, RCS and RGU), we seek to enable digital enhancement and transformation for our most widely distributed and culturally distinctive sector, through the mobilisation of the collaborative R&D processes and digital technologies outlined in Strands 1 and 2. As the Culture Strategy for Scotland notes, "Technology has the potential to increase access to culture for a broader range of audiences, to support new and interesting forms of cultural and creative expression, production and activity and demonstrate what can be achieved through creative uses of technology." The traffic here will, however, be two-way. The creative edge that comes from engagement with the Arts and cultural organizations will add an extra dimension to the shape and potential of collaborative R&D projects that emerge and provide an impetus for the development of outcomes that extend beyond economic benefits and contribute to a rich interdisciplinary research culture. We will thereby advance economic and improve social and cultural outcomes through mobilising and transforming the cultural and creative sector, as a key group of producers and custodians of Scotland's cultural assets. Projects in this strand would be likely to attract funding from agencies such as the AHRC, the British Academy and the Leverhulme Trust, amongst others.

Spillover effects: Balancing specificity and breadth

We have developed an integrated focus with sufficient specificity to prevent dilution of effort but in doing so, will mobilise and extend collaborative processes and technical resources which have much wider potential, while supporting a productive and impact-oriented research culture. This could lead to potential downstream impacts on other Scottish priorities. For example, we anticipate three spillover effects from the core focus: (i) Enabling entrepreneurship and social entrepreneurship through fostering collaborative innovation and partnerships for scale, and connection to facilities within the Eden Campus entrepreneurial infrastructure. (ii) Improved health outcomes through innovation-boosting collaborative projects and the policy optimisation potential afforded by Digital Twins. (iii) Support for wellbeing through productive and meaningful employment and just transitions, more effective public service provision and an enriched and equitably accessible cultural landscape.

Likely funding targets

This alliance has good prospects for catalysing and constructing competitive bids from a range of funding schemes, some of which have been alluded to earlier. These also include (inter alia):

- UKRI programmes (there is specific interest from AHRC in the creative sector, but broader possibilities in relation to the technological and organizational scope of the alliance).
- UK government innovation programs, especially through enabling and mobilising industry partners in collaborative R&D projects at significant scale.
- Future city deals or other economic development programmes that emerge from developments in government policy in Edinburgh and Westminster.
- As the funding situation stabilises and becomes clear, access to relevant European funding programmes.

Alliance Members

Transformation by Design will operate out of the Eden Campus at the University of St Andrews, which will be the lead partner. St Andrews will provide accommodation for a core team of up to four people, and access to simulation facilities, at no cost to the ARC. All of the core ARC members will contribute staff time to constitute a management group for the ARC. Our proposal focusses on the translation of creative practices into economic value beyond the creative industries. To do this, our consortium builds on two UKRI and SFC supported Creative Clusters: InGAME (Universities of Abertay, Dundee and St. Andrews) and Creative Informatics (Universities of Edinburgh, Edinburgh Napier) bring the necessary creative and technical expertise. In addition, we engage with the creative networks of other key partners.

InGAME provides a proven model for, and practical experience in, supporting collaborative R&D between HEIs and industry. InGAME has increased the scale and value of the Dundee games cluster by de-risking creative experimentation and commercialisation, developing scale-up capacity and driving diversification, growth, and innovation opportunities throughout the cluster and beyond. InGAME has funded 150 Collaborative R&D projects, leveraged £7.5m co-investment and supported upskilling of 1,500 industry professionals. The expertise gained from the InGAME engine affords the opportunity to accelerate R&D in collaborations with existing and future enterprises in a space where the possibilities afforded by a focus on digital transformation are yet to be realized.

Creative Informatics provides expertise in innovation in the creative industries, with a focus on developing new data-driven products and services to enhance audience engagement and create new modalities of experience. R&D projects have enabled the sector to experiment and explore technologies to inspire new uses and new product development.

Immersive Scotland (Robert Gordon University) facilitates multi-disciplinary knowledge exchange to enhance immersive technology development within Scotland across the creative industries including design and craft, gaming, education, tourism and the museums and galleries sector. Immersive Scotland has an established membership of 100+ stakeholders across Scottish HEIs, industry, cultural and government organisations. As a platform for networking, Immersive Scotland enables innovative R&D projects to be disseminated; provides a network of support for micro & SMEs in gaining access to immersive technology expertise and opportunities for collaboration, to share information, events and good practice.

Our consortium also incorporates key capabilities from Queen Margaret University, Centre for Communication, Cultural and Media Studies and the Royal Conservatoire of Scotland's Research and Knowledge Exchange group. QMU will bring their experience of professional and research collaborations across a wide range of the cultural and creative industries including the performing arts, film and media, museums and galleries, public relations, and festivals. They also bring specific expertise in relation to the role of culture and creativity in health, education, and placemaking that will help extend the reach and impact of this work into other Scottish Government priority areas. The RCS will enable the alliance to leverage innovative directions in art forms, fresh insights into their processes and practices, and new perspectives on their role in our economies, cultures and ecologies. It will also bring to the alliance a range of insights derived from its current *Innovation Studio* pilot project.

In addition to the HEIs and other partners in the core team, our consortium brings into the ARC a wide range of commercial, government, and third-sector partners, such as 4J Studios, Beano Studios, BBC, Creative Scotland, DCMS, Innovate UK KTN, Michelin Scotland Innovation Parc, Microsoft, Nesta, NHS Scotland, Outplay Entertainment, Roblox Corporation, Sony Interactive Entertainment Europe, Tay 5G, V&A Dundee, Ukie and Women in Games. In the collaborative R&D process the partners will seek to facilitate opportunities across the entire Scottish HEI sector according to expertise, through opening our activities to all institutions and facilitating focused connections.

The benefit that would be brought by SFC funding

SFC funding of £150K per annum will be critical since there is no alternative flexible funding source available to support the infrastructure for a programme on this scale, and alliance member budgets are already over-stretched. SFC support will therefore be essential in order to:

- Enable the maintenance and development of the tools, processes, expertise and networks established in InGAME's programme of 150 collaborative research projects. This is key capital that might otherwise be lost or be under-used.
- Provide stability to maintain an ambitious and wide-ranging programme that needs long-term development in order to deliver the maximum benefits, and ease the costs of collaboration.
- Provide the integrative scope and administrative support that can underpin the identification of funding opportunities and build teams to take advantage of them. Our aim is to enable collaboration between a range of Scottish university partners, in order to capture a larger proportion of research funds and industry capital.
- Solutions-focussed networking and learning, with spillover strategic outcome possibilities through the organic formation of new project-focussed partnerships designed to address societal challenges.

¹¹ <https://www.digicatapult.org.uk/news-and-insights/publications/post/digital-future-index-2021-2022/>