Agenda Supplement – Culture, Communications, Welsh Language, Sport, and International Relations Committee

Meeting Venue:	For further information contact:
Committee Room 1&2 – Senedd	**Lleu Williams**
Meeting date: 14 June 2023	Committee Clerk
Meeting time: 09.30	0300 200 6565
	SeneddCulture@senedd.wales

Hybrid – Clwstwr report – A model for research, development and innovation in the creative industries – 2023

Please note the documents below are in addition to those published in the main Agenda and Reports pack for this Meeting

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5   Clwstwr: summary of the 5-year programme

(09.40 – 10.20)   (Pages 1 – 80)

- Professor Justin Lewis, Director, Clwstwr
- Sara Pepper, Chief Operating Officer, Clwstwr

Attached Documents:

- Clwstwr report: A model for research, development and innovation in the creative industries – 2023

**Senedd Cymru
Welsh Parliament**

clwstwr

A model for research, development and innovation in the creative industries

Final Report 2023

Imprint

Where ideas thrive through:

Cyfnewid gwybodaeth

Knowledge exchange

Amgylchedd arloesol

An innovative environment

Seilwaith Y&D

R&D infrastructure

Tîm deinamig

A dynamic team

clwstwr

Ymchwil Research

Digwyddiadau Events

Arbenigedd proffesiynol

Professional expertise

Adnoddau Resources

Cyllid Funding

Rhwydweithio Networking

Preface

In 2019, the Arts and Humanities Research Council (AHRC) launched the Creative Industries Clusters Programme (CICP), creating nine Research, Development and Innovation (RD&I) clusters across the UK. This move was, in some ways, a standard part of an industrial strategy - investing in innovation to promote sectoral dynamism and growth. But there was an important difference. This was the first time the creative industries had been included in a significant RD&I programme.

It was a long overdue intervention. Although the terms 'culture' and 'industry' first collided in the 1940s, a range of policy instruments have kept the terms 'culture' and 'economy' at arm's length. The idea of the creative industries as an industrial sector only began to emerge in the UK in the 1980s, and only at UK governmental levels from the late 1990s. The place of the creative industries in an industrial strategy was finally confirmed by Peter Bazalgette's independent review in 2017. The review stressed the centrality of the creative economy to social and economic life in Britain and ushered in a new era - a shift from STEM to STEAM.

Having been outcasts for so long, the admission of the creative industries to the world of RD&I funding was both exciting and challenging. R&D was, for many creatives, another country: a patriarchy populated by men in white coats, with its own practices and language. The CICP initiative was, therefore, an R&D project in its own right. The nine clusters were blazing a trail for the importance of R&D in boosting creative innovation and addressing a fundamental question: what is R&D in the creative industries and how might it lead to successful innovation?

This report is an answer to that question, alongside a reflection on what Clwstwr - our own CICP project - has accomplished over the past few years. We describe how our understanding of R&D in the creative industries has evolved, as well as some of the many collaborations and partnerships formed, innovative ideas brought to life, and a wealth of knowledge and expertise shared among our participants.

We hope that this final report will showcase the work that has been done and document some of its impact, as well as being useful to policymakers and practitioners in the many places where culture and the economy collide.

Clwstwr was always a co-production, so there are many people to thank. Our funders at the AHRC and Welsh Government, who as critical friends, shared our goals and ambitions and were with us throughout. Our partners at BBC Wales, Arts Council Wales and Cardiff City Council, who gave Clwstwr expertise, wise counsel on our Management Team and vital resources. Our academic partners and Co-Investigators at the University of South Wales and Cardiff Metropolitan University, who were such an intrinsic part of Clwstwr.

Thanks also to our Steering Board and Finance Committee, both led by Ann Beynon, who kept us focused and made us raise our game when we needed to, and to the many, many people who came to us with ideas, advice and support. Finally, thanks to the fantastic Clwstwr team and to our colleagues across Cardiff University who have inspired and helped us along the way.

Prof Justin Lewis, Director of Clwstwr

Executive summary

The Clwstwr programme (2018-2023) aimed to put innovation at the core of media production in South Wales - moving the Welsh media sector from strength to leadership. Clwstwr built a number of activities and interventions, investing in and supporting 118 innovation projects in the Welsh creative industries. Clwstwr's experience and record, detailed in this report, provides clear evidence for policymakers to support investment in R&D as a route to innovation in the creative industries. Our headline findings are:

R&D is still a new concept for many creatives: investment needs to be backed by an innovation ecosystem that provides support and expertise. This takes time and resources. Clwstwr's outreach involved 1,233 one-to-one meetings with creative businesses across every stage in the process. Each project had academic input and an R&D Producer, and the programme's R&D specialists - PDR – held a total of 155 workshops. Most projects (77%) reported that Clwstwr changed their understanding of R&D.

This helped embed an innovation culture: as a result, average annual R&D spending for Clwstwr-funded businesses more than doubled (up by 107% to £91,577) between the beginning and the end of Clwstwr. Clwstwr-funded businesses spent 13.6% of their turnover on R&D at the start of the programme and 24.8% by the end.

We need to rethink: both what R&D is and how it works for effective investment in the creative industries. Current definitions are too techno-centric: nearly 40% of Clwstwr project innovation involved new forms of storytelling rather than new technology. Too technical a focus can also create gendered perceptions of R&D: in Clwstwr's first funding round only 22% projects were led by women. By repositioning and rearticulating what R&D can mean, look like and achieve, Clwstwr changed this perception and by the third funding round 51% of applications and 59% of funded projects were led by women.

Time is money: the creative industries are made up of small independent companies and freelancers who need support to develop innovative ideas. The funded businesses used the funding to buy dedicated time for R&D: 83% of the total investment (funding and match-funding) was spent on working days for their projects.

Small is bountiful: targeted R&D funding encourages small businesses to contribute significant resources to R&D. Clwstwr's £3.42 million direct investment into funded projects generated an immediate £2.47 million company investment through match-funding. Subsequent additional investment worth more than £5 million has been received by Clwstwr-funded businesses - a figure that will rise as more projects move closer to market.

Collaboration is crucial: two thirds of the 118 funded projects were collaborative projects. While 85 companies received Clwstwr funding, 190 companies were involved in their R&D projects, backed by 273 individual freelancers brought in to support the R&D.

R&D means sector growth: at a time when COVID-19 meant declines in average creative company turnover (-3%) and employment (-11%), Clwstwr-funded companies grew by 14.6% in turnover and 21.3% in employment. By 2022, Clwstwr funding had already created £20,446,443 in additional turnover and 446 additional jobs in the creative industries in Wales. Every £1 of direct Clwstwr funding to businesses has already generated £5.98 in turnover and £4.55 of GVA, with more to come as companies commercialise. Between 2019 and 2022, Clwstwr directly contributed £1 in £13 of annual turnover growth, and created 1 of every 17 new jobs in the Welsh creative industries.

R&D means rewards and dividends: more than a third of Clwstwr-funded R&D projects - 37% - had reached TRL levels 7-9 (the Deployment Stage). Clwstwr-funded businesses grew the number of their copyrights, patents, trademarks and registered designs by 650% between the start and the end of Clwstwr.

R&D means richness and diversity: Clwstwr's dual focus on the economic and societal benefits of R&D was transformative. At the start of the programme, only 19% of all Clwstwr-funded projects reported undertaking innovations with societal goals. By the end of the programme, this proportion more than doubled to 41%.

Backing green innovation: Clwstwr supported a range of initiatives to increase media sector environmental sustainability in production technology, content and awareness. At the start of the programme less than one fifth (19.%) of Clwstwr-funded businesses reported innovations which had an environmental impact. By the end of the programme, nearly half (49%) linked innovation to environmental goals.

Successful R&D needs support: The Clwstwr projects reported that their R&D activities had long-term benefits for the business (these included enhanced business performance, productivity, innovativeness and improved project management process). To support R&D in the creative industries, Clwstwr found that it was important to give businesses experience or theoretical knowledge of R&D and to give the freedom to explore while having guiding principles (specialistic mentorship). R&D facilitates a proactive rather than a reactive approach.

Barriers for R&D need to be overcome: The Clwstwr projects reported that the biggest barriers to conduct R&D are the lack of resources (time & funding), unclear process for claiming R&D tax, slow commercial turnaround and insecurity around suitable forms of IP protection. The Clwstwr programme enabled them to overcome barriers by supporting them through the complexity of the process - by offering multiple exploration avenues, dealing with failure and accepting drawbacks/dips as a natural way of progressing in R&D, and by avoiding alienating technocratic language.

ABOUT THE CLWSTWR PROGRAMME

The five-year Clwstwr programme launched in 2018 aimed to put innovation at the core of media production in South Wales - moving Cardiff's thriving screen sector from strength to leadership.

With a focus on
Funding and R&D
Community building
Knowledge sharing

Funding and R&D

9 funding calls

£3.4m funding directly to the local creative industries

£2.47m investment through businesses' match-funding

118 R&D projects

550 Expression of Interest and Applications

£5 million further investment received by funded businesses following Clwstwr funding

85 businesses and freelancers directly funded involving
190 companies
700 project team members and freelancers

Community building

Creation of a wider Clwstwr network with:

2,600+ contacts

52 events

1,449 unique event and workshop attendees

Knowledge sharing

Engagement and exchange through our 3 University partners:

14 academic experts engaging with projects

1,233 meetings with businesses

155 R&D workshops organised by PDR

10 academic publications

17 industry event presentations to promote engagement in R&D

15 published reports

20 Ideas Labs with up to participants each

THE IMPACT OF CLWSTWR

Clwstwr funding and support was designed to drive both economic and socio-cultural benefits in Wales' creative industries through innovation

Impact areas include:
Economic growth
Innovation capabilities
Equality, Diversity and Inclusion
Environmental sustainability

Economic growth

Clwstwr funding has directly contributed to:

> £20m in additional turnover

400+ additional jobs in the local creative industries

£1.00 of direct funding spent by Clwstwr created a return of **£5.98**

Innovation capabilities

After Clwstwr funding, businesses experienced:

100% increase of average R&D spending

650% increase of copyrights, patents, trademarks and registered designs

32.5% increase on number of innovation outputs

Equality, Diversity and Inclusion (EDI) and Environmental Sustainability

17 EDI projects funded

8 environmental sustainability projects funded

Clwstwr: A model for research, development and innovation in the creative industries

Contents

Introduction

Cynefin: from coal and iron to creativity and innovation

Wales was the first country to employ more people in industry than agriculture – making it the world's first industrial nation. By the early 19th century, South Wales was the globe's biggest producer of iron. By the early 20th century, a third of the world's coal was mined in Wales, and Cardiff, the busiest coal port on the planet, was transformed from one of its smallest towns into its largest.

In Wales, cynefin means a sense of place – its history and identity, its landscape, statues and street names. In South Wales, cynefin has long been defined by mining, metal manufacture and Methodist non-conformity. Most of that has now gone. The mines are closed, many of the chapels are empty and less than 10% of Welsh jobs are in manufacturing.

But there is another history. Bubbling up from its bucolic, scarred landscape is the Wales of the Mabinogion and the Eisteddfod, of Ivor Novello and Roald Dahl, Jan Morris and the Manic Street Preachers, Dylan and RS Thomas, Catatonia and Charlotte Church, Richard Burton and Shirley Bassey. In 1897, two miles west of Cardiff Bay, the first ever radio message was sent, an audible sign of a different kind of future - one that would have voices and storytellers at its centre.

IVOR NOVELLO
(DAVID IVOR DAVIES)

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Today, more than 15% of Cardiff's enterprises are in the creative industries. South Wales has more TV studios than anywhere in the UK outside London and is the UK's third largest film and TV industry employer (after London and Manchester). This is our new cynefin: a place where economic activity can have wit, heart, and soul. But the success of the creative industries is fragile: about 98% of creative businesses in Wales are small, supported by a large freelance workforce, a composition that is typical of most creative clusters.

These small businesses are full of creative energy: they have a strong desire but little capacity to innovate. They lack the time and resources enjoyed by global media and digital companies to do research and development (R&D) or to exploit their intellectual property (IP) across genres. This makes their businesses precarious. In a fast-moving digital landscape, creative companies must innovate and collaborate to survive and thrive.

Towards an R&D ecosystem in the creative industries

The Clwstwr programme – funded by the AHRC and Welsh Government - was designed to level the playing field: to provide small companies with the time and resources for R&D, and as a result to embed innovation in the Welsh media sector.

For Clwstwr, step one was to create a cultural shift, forging a common culture of innovation. This meant a wholesale effort to collectively reimagine R&D: what it was, how it worked and the words used to describe it. But a broad appreciation of the value and purpose of R&D needs careful curation, and Clwstwr adapted its engagement accordingly.

Throughout the programme we began to see a gradual embrace of the disciplined creativity that enables innovation, underpinned by a series of collaborations.

Step two was to create an R&D system that works for small creative businesses. All our projects included wraparound support: regular R&D sessions based on User Centred Design, an R&D Producer and academic Co-Investigator assigned to each project, alongside a series of regular advice workshops.

In this report, we also turn our attention to step three, to answer the question: what does a successful R&D programme look like in the creative industries, and what impact does it have on sustainable economic growth?

This report provides, through a combination of statistics and storytelling, an overview of Clwstwr's achievements and impacts. The first section describes how Clwstwr built an innovation community and how the programme fostered collaboration and engagement of the sector with academia and policy.

We assess Clwstwr's impact, reporting key data on economic growth, innovation output, social inclusion, diversity and environmental impact.

The final section highlights the lessons learned from Clwstwr and how the programme helps to develop our understanding of innovation and R&D processes in the creative industries.

The Methodological Note provides more information on the applied methodologies and data sources used throughout the report.

Building an innovation ecosystem

Launched in 2018, the five-year Clwstwr programme built a number of activities and interventions, investing in and supporting innovation and collaboration in the Welsh creative industries. This section focuses on three key aspects of the Clwstwr programme:

1. Funding and R&D

Clwstwr's series of financial interventions coupled with wraparound support.

2. Community building

Clwstwr's engagement with creative businesses and freelancers in Wales and beyond, leading to new connections, partnerships and skills development.

3. Knowledge sharing

Clwstwr's research, collaboration, and engagement activities with a broad range of stakeholders from industry, academia and policymakers.

Funding and R&D: Investing in innovation

Clwstwr's funding calls and R&D support have been a key mechanism for supporting innovation and growth in the Welsh creative industries.

Clwstwr's funding calls

Clwstwr designed and delivered nine funding rounds between 2019 and 2022, funding and curating a total of 118 projects These included Seed Funding awards up to £10K, Open Funding awards up to £50K, and Challenge Funding awards up to £50K, co-created with partners. The series of funding rounds were designed to support R&D projects from experimental development and feasibility studies to industrial research (see Figure 1). The 118 funded projects came from a pool of 550 applications. The programme also aimed to address social and cultural challenges facing the region, promoting diversity, inclusivity, environmental sustainability, and community engagement. As such, project applications were evaluated based on both their potential economic impact and the need for a positive social, cultural, or environmental impact

DATA HIGHLIGHTS

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Over the programme Clwstwr delivered:
2 Seed Funding Calls (and 1 additional funding call for seed projects)
3 Open Funding Calls
3 Challenge Funding Partnership Calls
118 funded projects, following 550 Expressions of Interests and Applications across all funding streams
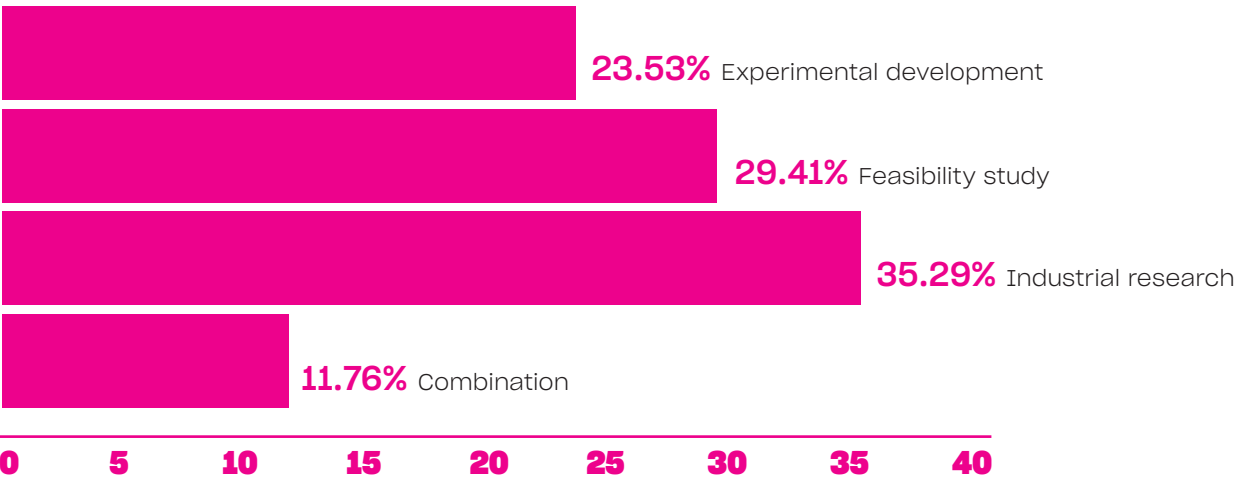**£3.42** million direct investment into R&D projects

23.53% Experimental development
29.41% Feasibility study
35.29% Industrial research
11.76% Combination

Figure 1: Share of projects funded in terms of type of R&D.

Clwstwr-funded businesses and the wider network

Clwstwr's 118 R&D projects were led by 85 different companies and freelancers. All funded businesses had a base in Wales (see Figure 2), with a predictable clustering in the Cardiff region.

While the largest category of funded companies and freelancers came from the Film and TV sector (see Figure 3), Clwstwr supported innovation in a wide range of creative sectors. This is illustrative of the importance of screen-based technologies across the creative industries and other sectors.

The 85 funded businesses collaborated with a wider innovation network in Wales: more than 700 team members and freelancers, and more than 190 companies were working on R&D projects (including 273 individual freelancers hired to conduct R&D). Project team members and freelancers worked on Clwstwr R&D projects for a total 19,730 working days (the equivalent of 54 years). About two thirds of the 118 funded projects were collaborative projects, where the lead businesses collaborated with at least one other business or freelancer. On average Clwstwr projects were a collaboration of three businesses.

"I'd characterise Clwstwr as one of the best things I've ever done. Everything that Clwstwr has touched, that they put my way, turned to gold. I feel incredibly lucky. I can't I believe that I got a chance to get funded to do something that's totally transformational, with my business, that's brilliant."

— Andy Taylor, BWBL

DATA HIGHLIGHTS

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85 businesses and freelancers funded
2/3 of the 118 funded projects were collaborative
Clwstwr R&D projects involved:
190 companies
273 individual freelancers hired to conduct R&D (included in 190 companies)
700 project team members and freelancers
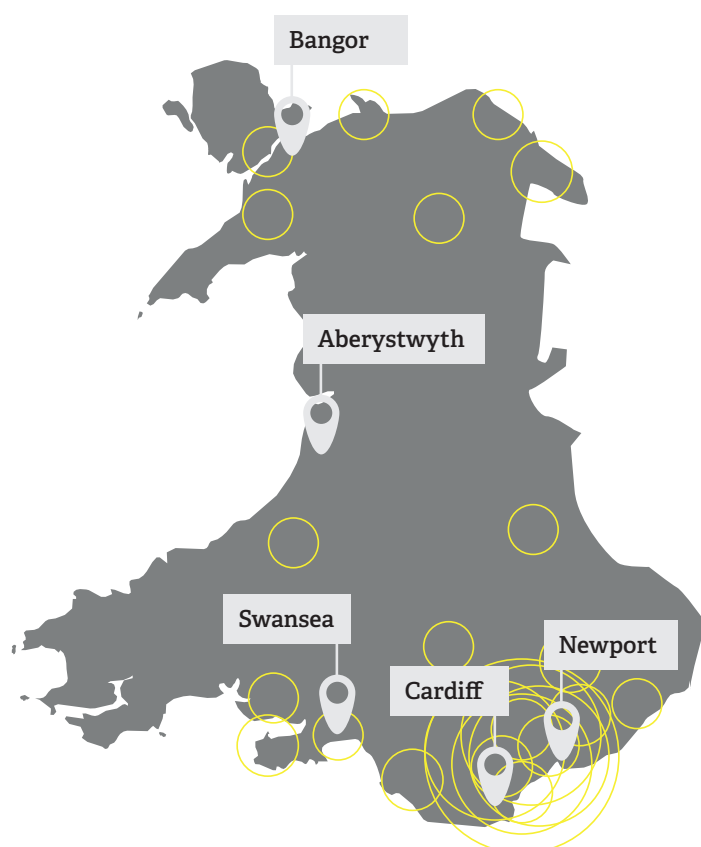
Figure 2: Map of locations of funded businesses.

7%
Publishing (e.g. newspapers, journals)

4%
Advertising and marketing

44%
Film, video, radio and photography

8%
IT, software and computer services

18%
Music, performing and visual arts

19%
Other
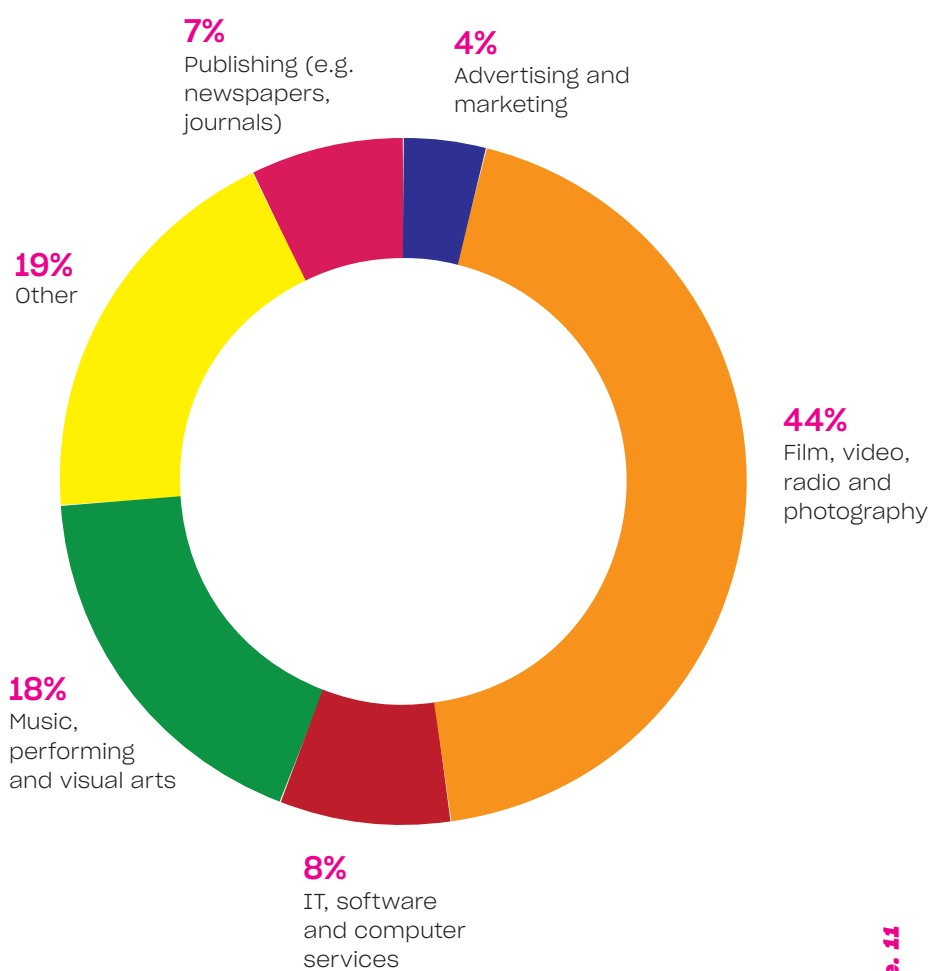
Figure 3: Sector distribution of funded businesses.

Case study

Clwstwr's Challenge Partnerships - prioritising socio-cultural impacts

Clwstwr's Challenge Partnerships were jointly funded calls which gave small and medium sized enterprises (SMEs) the opportunity to work on thematic R&D projects in collaboration with Challenge Partners. These included:

The **Green Cymru Challenge Fund** - a partnership between Clwstwr and Ffilm Cymru Wales, which made available £75,000 in funding for individuals, organisations, and collaborations across sectors (including media, academia, technology, transportation, energy, water and waste management) to R&D new, more sustainable ways of working in film and TV. Three innovative environmental projects were funded across different stages of the media production cycle.

The **Amgueddfa Cymru Challenge Fund** was based on a partnership between Clwstwr and Amgueddfa Cymru – National Museum Wales - to look at innovative and creative ways to re-think the museum experience and attract new audiences. £50,000 was made available to support the R&D of innovative ways to experience and interact with Amgueddfa Cymru's collections on a local and global scale.

The **People's Newsroom Initiative** was a Clwstwr partnership with the Bureau of Investigative Journalism, the Ethnic Minorities and Youth Support Team Wales (EYST) and Lankelly Chase. It was designed to develop a new pipeline for media production, involving hands-on business and startup support to design innovative new journalism initiatives and invest in communities traditionally marginalised in media output.

Clwstwr-funded projects

Clwstwr's R&D projects focused on one of three main themes (see Figure 4): creating new ways of working to build sustainable business models; building and engaging audiences and markets in new ways, and exploring new ways of telling stories.

Clwstwr R&D projects have been wide-ranging: developing new forms and formats for storytelling across a range of genres (from news to podcasts to interactive film); and adapting digital technologies to create new products (such as immersive technology to manage pain-relief, artificial intelligence technologies to enhance journalism, and geolocation to create new forms of media-based tourism), or using innovation to adapt and enhance production processes (from virtual set-building to remote editing).

The projects led to a wide range of outcomes in terms of the stages reached - from idea generation to prototype development all the way to market-ready solutions. Applying the technology readiness levels (TRL) 1-9, based on our interview data, (recognising that the word technology also applies to non-technical forms of innovation in the creative industries), Clwstwr-funded projects reached a range of different innovation stages (see Figure 5), with 36% remaining at the research stage (TRL 1-3), 27% reaching the development stage (stages 4-6) and 37% reaching the deployment stage (TRL 7-9), with 15% of Clwstwr projects reaching market readiness (TRL 9).

30% Create new ways of working to build sustainable business models

32% Engage and build audiences and markets in new ways

38% Explore new ways of telling our stories
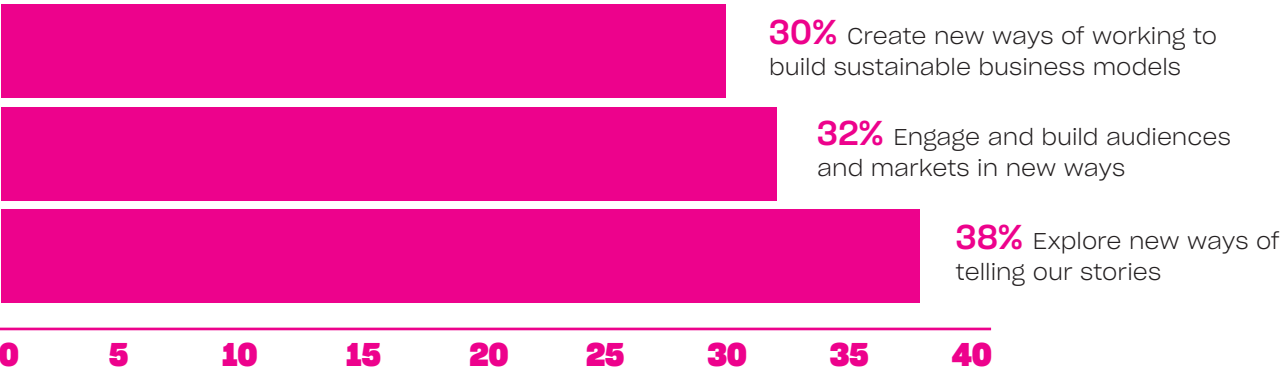
Figure 4: The distribution of Clwstwr projects across key themes.

36%
Research stage

27%
Development stage

37%
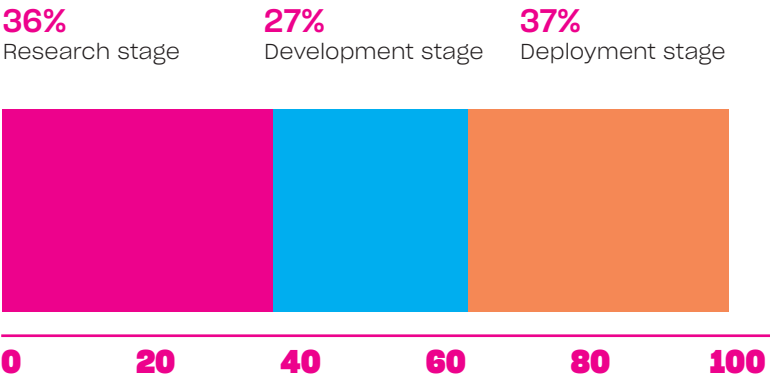Deployment stage

Figure 5: Technology readiness levels achieved by Clwstwr-funded projects.

Clwstwr's R&D investment

Clwstwr's £3.42 million direct investment into funded projects generated a further £2.47 million investment by the funded businesses through match-funding. To date, projects that have been supported through Clwstwr have also received further investment of more than £5 million, a figure that is expected to rise as projects complete and move closer to market. So even at this comparatively early stage in the R&D cycle, Clwstwr's investment of £3.42 million has generated a further direct investment of £7.47 million.

"If you're creating a new product, especially if you're looking to raise £1 million to build the product and you're saying there's a potential audience and revenue streams of £5 million a year, you have to have some methodology, you have to have some insight, you have to have some R&D."

— Daniel Harris, Focus Shift Films

The most substantial component - 83% - of the total investment (funding and match-funding) was spent on working days for the projects. The other 17% of Clwstwr funding enabled investment to support R&D, including investments in space, IT, technical equipment, licenses, user testing and other R&D relevant products and services.

Of the time spent working on projects, 75% was related directly to R&D (the other 25% was spent on for example management or communication activities of the project). On average R&D projects took around seven months, with each hour spent on R&D projects involving an average of £21.60 of Clwstwr investment funding.

DATA HIGHLIGHTS

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£3.42 million direct investment into funded projects, generated further
£2.47 million investment through businesses' match-funding
>£5 million further investment received by funded businesses following Clwstwr funding
83% of the total investment (funding and match-funding) was spent on working days
1 hour spent on R&D projects required £21.60 Clwstwr investment funding

"We have to keep developing, keep researching and Clwstwr has been a major enabler in that kind of area that we maybe couldn't have done if we hadn't had the money at that stage, to enable us to make our plans work."

— Jonathan Morgan, Object Matrix

2,600
Contacts engaged within the Clwstwr network

1,400
Individuals attending Clwstwr events and trainings

85
Clwstwr funded creative businesses and freelancers

200+
Companies and freelancers working on Clwstwr projects

5
Challenge Funding and International Partnerships

Networking and engagement

Training and knowledge sharing

Direct investment

Collaborations

Indirect investment

clwstwr

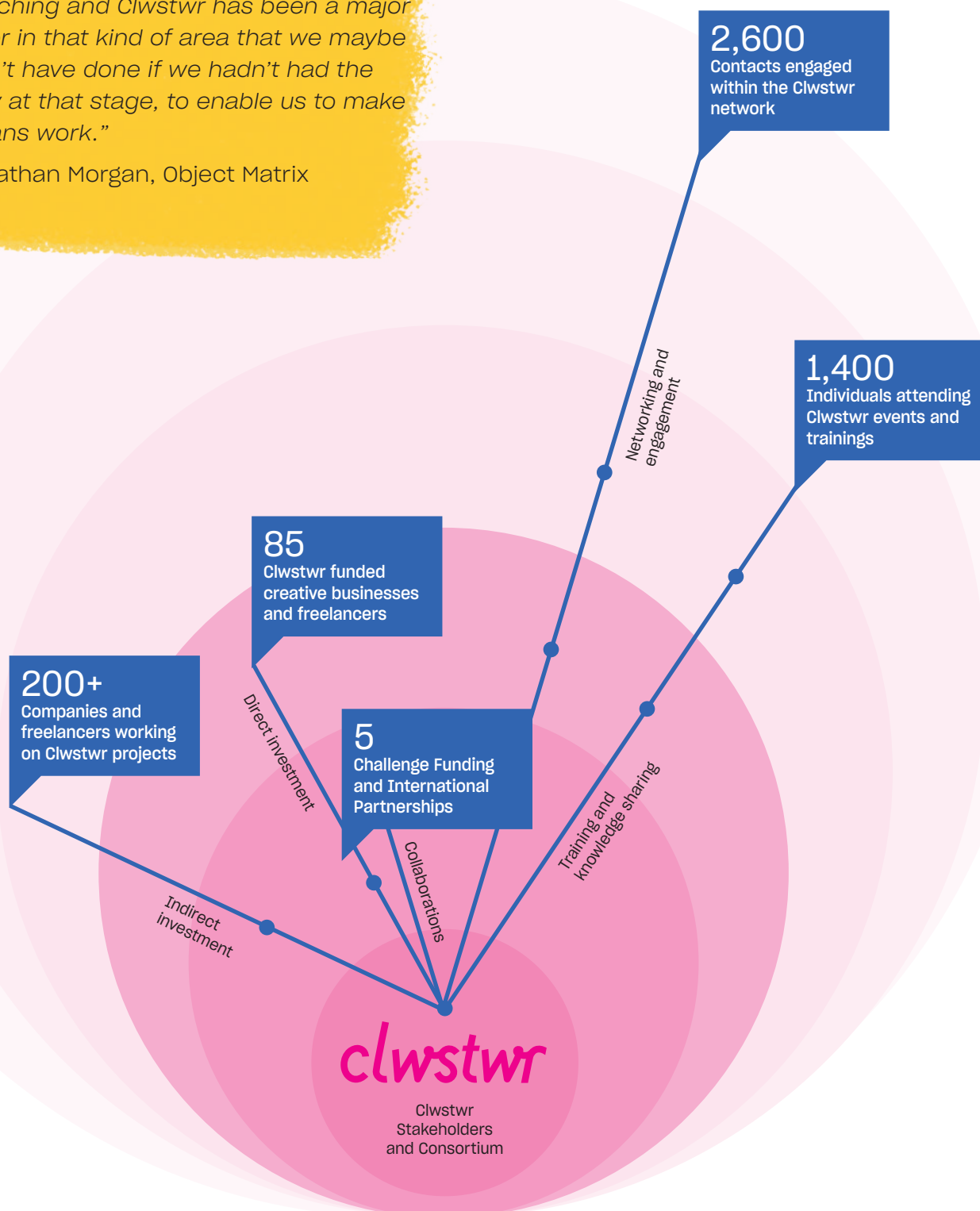Clwstwr Stakeholders and Consortium

Figure 6: Clwstwr's community – building a network collaborations

Community building: Networking and outreach

Clwstwr provided a platform for creative businesses and freelancers in Wales (and beyond) to network, leading to new connections and partnerships. The programme's events and knowledge sharing initiatives fostered a strong sense of community among Clwstwr participants – particularly around certain areas or themes (for example, the cluster of projects around news and democracy collaborated and shared knowledge with one another to enhance their own R&D). Clwstwr's communications activities raised awareness about the importance of the creative industries in Wales, which played an important role in positioning the region locally and internationally as a hub for innovation and creativity.

DATA HIGHLIGHTS

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52 events
1,449 unique event attendees
PDR ran 150 R&D workshops

Clwstwr engagement activity

Clwstwr sought to widen engagement with the local creative industries in RD&I, organising a total of 52 events between 2019 and 2022 focusing on skills development, networking, knowledge transfer and the promotion of R&D projects (see Figure 7). These involved more than 1,300 attendees, focused on a variety of audiences and stakeholders and encompassing both public-facing events and cohort-only sessions.

As Clwstwr evolved, thematic sessions were introduced around commercialisation, IP exploitation and protection as well as wider business support with experts Landsker, Upstarter and commercial/IP lawyer Angharad Evans. A series of knowledge sharing and training events were also developed on key Clwstwr themes such as environmental sustainability and equality, diversity and inclusion.

12
Collaboration
and networking

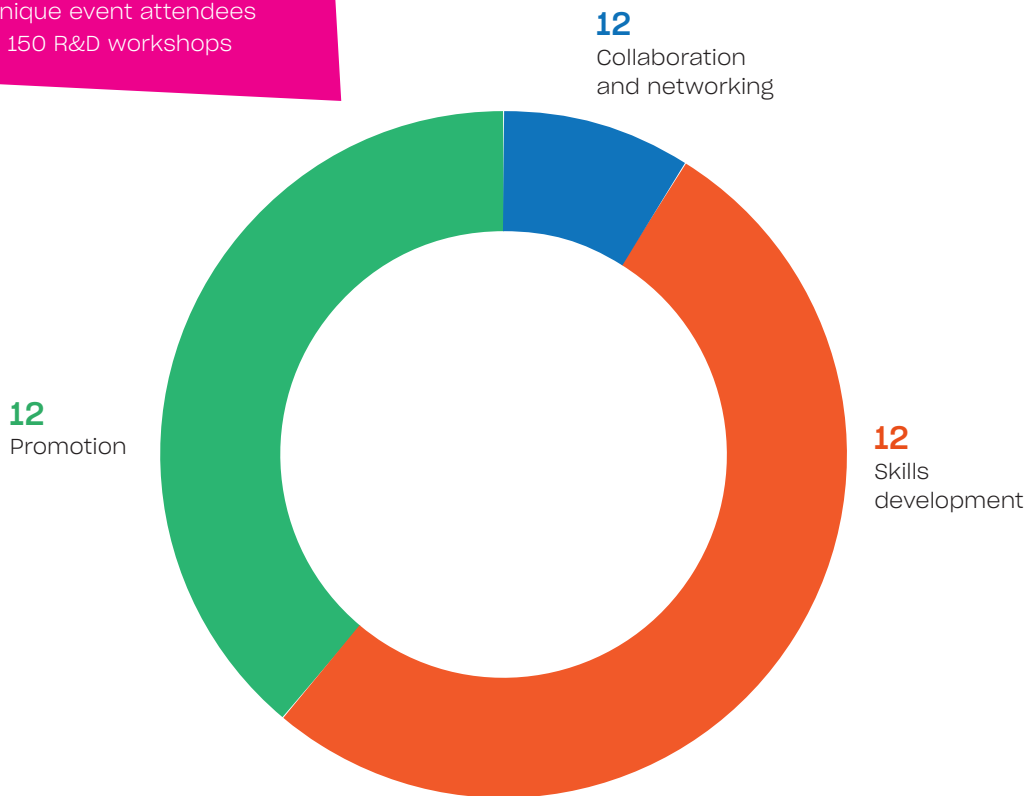**12**
Skills
development

12
Promotion

Figure 7: Number of different Clwstwr events organised.

Case study

ClwstwrVerse – showcasing a world where ideas thrive

ClwstwrVerse was Clwstwr's largest event and was the culmination of the Clwstwr programme. Held at City Hall and sbarc|spark in July 2022, the two-day showcase shone a spotlight on Welsh media innovation, celebrating the projects, connections and advances made throughout the Clwstwr programme. More than 580 people – including leaders of five European creative clusters - experienced groundbreaking R&D in the screen and news sector. Opened by First Minister of Wales, Mark Drakeford, ClwstwrVerse featured a showcase space, talks, demos, experiences, and experiments as well as investor sessions, panels and workshops, and an accompanying app.
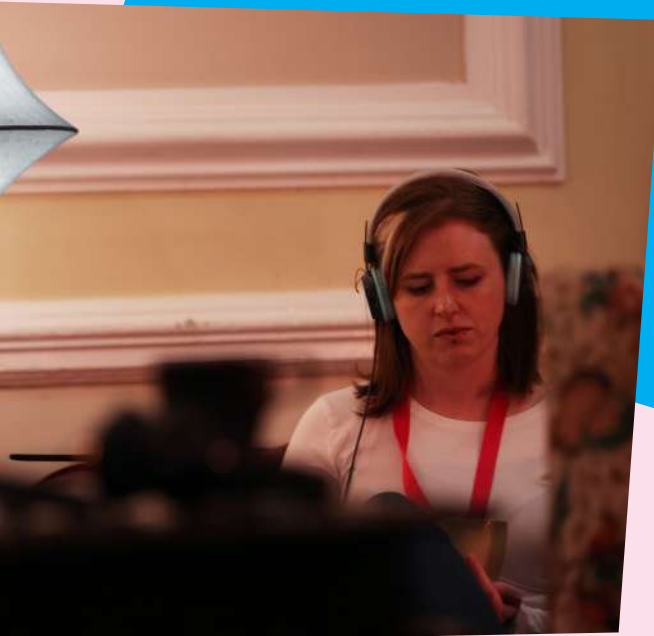
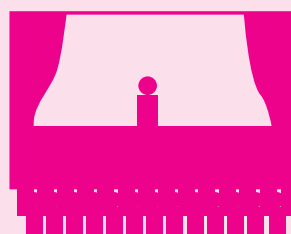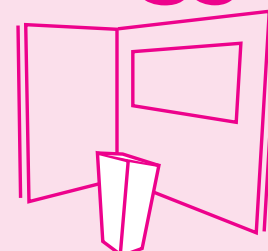# ClwstwrVerse key numbers

Number of Speakers
65+

Number of Talks/ Sessions
42

Number of Exhibitors 39

15 Total Press Coverage

13,576 Pack Page 22 (across all channels)

580 attendees

Clwstwr's communications strategy

Given the unfamiliarity of R&D for many in the creative industries, communications and engagement was at the heart of Clwstwr's activities. The Clwstwr communications strategy aimed to:

— increase R&D activity resulting in new products, services and experiences,

— raise awareness and engagement with innovation – from a diversity of groups - in the cluster,

— promote economic growth for the region, and

— amplify Wales's international profile.

Clwstwr adopted a user-focused approach to communications, marketing and engagement. All activity was informed by the Clwstwr's user journey and subject to robust measurement and evaluation. The strategy was rooted in clarity and connectivity; it was inclusive, multi-layered and digital first.

The main communications challenge was to convert multiple audiences from their varying levels of R&D understanding (many of the target audience having little to none) to a position of not only understanding, but actively engaging with R&D. This required changing perceptions and then influencing behaviour change. This was achieved by: showcasing best practice, communicating without much of the jargon associated with R&D and innovation, iterating our language throughout to ensure it was landing with audiences, and widely sharing expertise, guidance, and learning (from both academia and industry).

"
The Conversation

Research from Wales shows creative industry's concern at leaving EU (January 2020)

"
Business Mondays

Wales' largest post-production house unveils remote working toolkit to bring business to the region (May 2020)

"
Business News Wales

Cardiff has third largest Film and TV cluster in the UK (March 2021)

"
Cardiff Life

Businesses in Wales benefit from £1 million to develop new ideas (September 2019)

DATA HIGHLIGHTS

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306,008 pageviews (233,506 unique pageviews) and
73,679 unique users of our website
2,351 Twitter followers
214 Facebook followers
568 LinkedIn followers
813 Instagram followers
40 e-newsletters disseminated
593 e-newsletter subscribers
Media coverage:
35+ online and print articles focused on Clwstwr research and funding
25+ online and print articles mentioning Clwstwr as a programme
Mention of Clwstwr on BBC 6Music, BAFTA Cymru Awards, The Guardian, gov.uk, Sveriges Radio (Sweden's national publicly funded broadcaster), Welsh Parliament Culture, Welsh Language and Communications Committee among others.

Clwstwr's international strategy

Clwstwr established international partnerships and networks to facilitate connections and collaborations – between both the local cluster and international companies – for long-term impact.

Clwstwr focused on:

— Supporting collaborations between businesses, HEIs and other clusters to encourage engagement, knowledge exchange, showcasing and collaboration,

— Disseminating the results of Clwstwr's activities at international conferences, events and meetings.

"We created a new program after this project which was called Laboratory and which has grown every year. Laboratory is about creating space and time for R&D, not only for our staff and dancers, but for dance artists from across Wales. We've spent time connecting with people from around the globe in a way that we never have before."

— Paul Kaynes, National Dance Company Wales

Clwstwr built partnerships with, engaged with, or took delegations to:

Hollywood, Los Angeles to meet with studios, innovators and universities

Department of
International Trade, UK
Government (in Wales)

Media City Bergen,
Norway

Welsh Government
International Trade
Bureau

MFG, Baden Württemberg,
Germany

Welsh Government trade
mission to Tokoyo, Japan

EU funded
Stars4Media, Brussels

British Council Creative
Forum, Tbilisi, Georgia

Barcelona Media /AV
Cluster Catalunya

Connect for Creativity
Programme, Turkey

Minalogic Global Innovation
Cluster for Digital
Technologies, Auvergne-
Rhones-Alpes, France

Case study

Media City Bergen - building international collaborations

In 2021, Clwstwr and Media City Bergen formed a strategic partnership with the aim of fostering new collaborations between the two clusters and their businesses, to share skills, expertise and knowledge. The clusters connected due to their complementary strengths after first meeting in Cardiff in 2019.

The Norwegian media cluster is a world leader in AR, graphics, AI, virtual studios, broadcast and IP based video, robotics and tools for workflow and visual storytelling. They also work to ensure an informed population and strengthen democracy, leading to the first Clwstwr Media City Bergen event – Innovation in News and Democracy in Media Clusters – featuring two speakers from Wales and two speakers from Norway.

Following this online event, Clwstwr then took a range of Cardiff-based innovators to Bergen for Future Week, delivered by Media City Bergen. Across the week, delegates attended workshops, talks and seminars looking at the future of media and mediatech. Delegates and members of the Clwstwr team also gave a presentation on Accelerating Media Innovation in Cardiff.

"The connections that I made during the conference in Norway will be vital to pursuing future opportunities. Combined with the innovative atmosphere of the conference, many a creative conversation was had - some of which have strong potential for collaborations in the near future."

— Delegate Lucy Young,
Head of SaaS Delivery, AMPLYFI

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Knowledge sharing: academic and policy engagement

Clwstwr adopted a quadruple helix model of innovation: curating interactions and engagement between academia, industry, government and civil society; working with a range stakeholder in the cluster and identifying the relationships and value flows between those involved.

Supporting industry innovation

Clwstwr established a network of expertise – a core group of 14 academics (Co-Investigators) - from the three partner universities: Cardiff University, Cardiff Metropolitan University and University of South Wales - to support funded projects, alongside Clwstwr's team of four R&D producers.

Clwstwr created wraparound innovation support for funded creative companies and freelancers, from idea generation to R&D development.

"I think one of the other broader skillsets that Clwstwr has really helped us with is that rigour of exploring things, taking it step by step and analysing it. We've approached it because of Clwstwr in a structured way, with time for reflection, lots of discussion, lots of trying things out."

— Dan McGowan, Hijinx

Every funded Clwstwr project was supported by a Co-Investigator and an R&D Producer to help navigation through R&D stages. Over the programme, this involved 1,233 one-to-one meetings with companies. User Centred innovation academics - from partner PDR at Cardiff Metropolitan University - further guided projects through the R&D process. PDR held 155 workshops at both the cohort level and bespoke company level. This was supplemented by academic subject matter experts and by sustainability, business and equality, diversity, and inclusivity advisors.

DATA HIGHLIGHTS

3 University partners

14 Co-investigators, which are leading academic experts in various fields

1,233 121 meetings of Producers with businesses (funded projects and pre-application engagement)

17 industry event presentations to promote engagement in R&D

155 workshops with 73 different funded projects organised by PDR

7 of the Clwstwr funded businesses went onto have projects involving local or international universities

Clwstwr Ideas Labs

Clwstwr worked with PDR to run Ideas Labs that introduced creative companies and freelancers to the concept and practice of R&D. The two-day Labs were designed for freelancers and micro-businesses working in Wales who had the skills and potential to develop innovative ideas for a new screen or news related product, service, or experience. The Labs provided an opportunity to explore, develop and refine new ideas with the support of the Clwstwr team, taking participants through a user design process.

Attendees for these workshops were selected via an application process and received a stipend of £500 on completion, with support available for those with caring responsibilities to widen access to those able to engage in R&D.

At the end of the Clwstwr Ideas Lab, participants had the opportunity to apply for Clwstwr seed funding to further develop their idea over a three-month period.

"Clwstwr Ideas Lab has been brilliant in terms of supporting us as individuals to develop our research strategy. We're actually thinking about the opportunities and gaps in the market, and how our research could lead to a possible solution for that. It's definitely been fun, thought-provoking and challenging as well. It is a fantastic opportunity for us as freelancers to really nurture our artistic practice and our ideas."

— Rebecca Hardy, participant
Clwstwr Ideas Lab 2020.

DATA HIGHLIGHTS

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3 Ideas Labs with up to **20** participants each (February 2020 and two online sessions in December 2020)
109 applications to attend Ideas Labs
50 funded attendees
43 resulting applications for Clwstwr seed funding
17 Clwstwr seed funding awards to Ideas Lab participants

Clwstwr research projects

Clwstwr supported a range of research projects conducted at Cardiff University, University of South Wales and Cardiff Metropolitan's PDR, with a strong focus on local creative industries and policymakers. Some examples of research included:

Screen Work 2020, a comprehensive survey of workforce, training and education needs for Film, Television, Animation, Games, VFX and Post-Production in the Cardiff Capital Region conducted by Clwstwr Co-Investigators at the University of South Wales (Faye Hannah and Professor Ruth McElroy). The research found that the industry was at risk of being unsustainable, exclusive, and lacking a clear skills strategy to secure a Welsh talent pipeline. It showed that the drive to leverage inward investment for the screen sector was not aligned to a skills and workforce development strategy for Wales.

It identified key skills shortages and demonstrated how opportunities were being lost to create a more inclusive sector.

"Screen Work 2020 argues that to ensure that the screen sector in the Cardiff Capital Region is both sustainable and reflects Wales to itself and the rest of the world we now require a cohesive and ambitious skills strategy, encouraging collaboration between industry, education and training providers working with government to deliver on this."

— Screen Work 2020 co-author Professor Ruth McElroy

The **Clwstwr Creative Industries Report Series** mapped, for the first time, the overall strength of the creative industries in Wales. The reports (written by the Clwstwr research team) highlight the size, scale and economic contribution of the creative industries and media sector in Wales and the Cardiff Capital Region. After a decade of strong growth, Cardiff now has the third largest film and TV cluster in the UK, after London and Manchester, and by some measures South Wales has been the best performing UK media cluster outside London.

The findings of the reports have been used by Clwstwr, policy and industry stakeholders to begin to tell the story of a creative nation and an emerging and significant media cluster in its capital city.

"Estimating the size and scale of the creative industries is a difficult endeavor due to the characteristics of the sector with many freelancers and micro-businesses. But it is crucial to have key sector data for policy makers to make the right decision and for the industry players to understand their sector. The Clwstwr publication series aimed to fill this gap and is now highly cited across Wales by different organisations."

— Clwstwr Creative Industries Report Series co-author, Dr Marlen Komorowski

Clwstwr Games Survey Wales was published in 2022 written by University of South Wales academics and Clwstwr Co-Investigators Richard Hurford and Professor Ruth McElroy. The aim of this report was to produce a detailed systematic mapping of the video games sector in Wales, highlighting the skills challenges and training needs of the industry.

The work provided informed insights into a sector which is less well understood than the film and TV sectors in the region.

"Establishing sustainable growth in the games community is crucial to helping create a successful, robust industry, and with the right support and training in place, the future looks bright."

— Clwstwr Games Survey Wales co-author, Richard Hurford

Academic and policy impact

Clwstwr has also delivered a series of policy and industry-facing reports - alongside more traditional academic journal articles - on areas like the impact of Brexit, COVID-19 and policy measures on the local creative industries.

Clwstwr's engagement with Welsh Government has been a key element of the programme. Creative industries policy began to evolve in 2004 with the Welsh Assembly Government's Creative Industries Strategy. The following two decades saw several developments (including specific funds, advisory panels and business development services) to further support the creative industries in Wales. This led to the formation of Creative Wales in 2020, a Welsh Government agency set up to support the creative industries.

The Welsh Government, through Creative Wales, were a key funder and partner of Clwstwr. Consequently, Cwstwr was aligned from the outset to distinct Welsh policy, including the Wellbeing of Future Generations Act (2016), Welsh Government's Prosperity for All (2017), Creative Wales (2019), and integrating creativity into the Curriculum for Wales (from 2022).

DATA HIGHLIGHTS

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10 academic publications
15 published reports
8 academic conference presentations
1 industry / academia collaborative article (see case study on next page)
9 participations in policy events
2 participations in policy advisory committees
2 memberships in Welsh Government Working Groups

Three key academic articles and publications
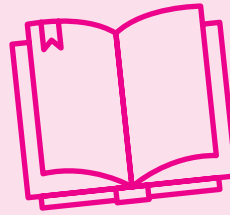
Lupu R, Komorowski M, Lewis J, Mothersdale G, Pepper S. (2023). Greening the Audiovisual Sector: Towards a New Understanding through Innovation Practices in Wales and Beyond. *Sustainability*, (4), doi: 10.3390/su15042975

Kulkarni S, Thomas R, Komorowski M, Lewis J. (2022). Innovating Online Journalism: New Ways of Storytelling. *Journalism Practice*, doi: 10.1080/17512786.2021.2020675

Komorowski M, Lupu R, Pepper S, Lewis J. (2021). Joining the Dots—Understanding the Value Generation of Creative Networks for Sustainability in Local Creative Ecosystems. *Sustainability*, (22), doi: 10.3390/su132212352

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Case study

Modular Journalism - combining academics and practitioners for research with impact

Shirish Kulkarni, the award-winning journalist, researcher and community organiser behind Monnow Media, used Clwstwr's support to develop novel approaches to storytelling in journalism, with a focus on new formats and audience engagement. After working with storytellers from a range of backgrounds and in consultation with academic researchers, he developed and tested a series of prototypes for new news formats. This led to a collaborative research article with Cardiff University, which was published in Journalism Practice and is already in their top ten most read articles.

Innovating Online Journalism: New Ways of Storytelling

His development of new forms of news narrative has had global impact in newsrooms, including at the Financial Times and the Times of India, and he is now a central part of a Media Cymru partnership with the BBC to use new storytelling approaches to reach new audiences.

Since undertaking his Clwstwr R&D, he has been invited to address conferences and businesses all over the world. He's also been appointed a member of the Welsh Government's Working Group on Public Interest Journalism and Expert Panel on the Devolution of Broadcasting and Communications.

He has since founded Inclusive Journalism Cymru, a network aimed at fostering and supporting a more inclusive journalism sector. The network counts over 175 members and has received over £200,000 in funding to pilot an Inclusive Journalism Development Lab and other projects.

> *"It's been genuinely life changing for me. Having the support of Clwstwr has opened up an incredible range of opportunities and connections. Most importantly though, it's helped drive crucial transformation across the journalism industry in the UK and beyond."*
>
> — Shirish Kulkarni, Modular Journalism

The Impact of the Clwstwr programme

Although most businesses involved in Clwstwr are still at an early stage in the R&D to market cycle, we can begin to assess the programme's impact. This section will outline four key impact areas:

1. **Strengthening economic growth**

The impact of the Clwstwr programme on turnover, GVA, jobs and return of investment in the creative industries in Wales.

2. **Enabling innovation**

The impact of the programme on R&D spending, incentives and innovation outputs in the creative industries in Wales.

3. **Building a more diverse and inclusive sector**

Clwstwr's strategy and record in developing policies and practices to support EDI across the programme.

4. **Moving towards an an environmentally friendly sector**

Achievements of the programme supporting innovation leading to a greener screen sector.

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Our quantitative impact assessment in the following sections is based on industry sector data and surveys conducted at the beginning and at the end of the programme. We collected data from every Clwstwr-funded business at the start of funding rounds, alongside samples of creative businesses without Clwstwr funding. We repeated the data collection process at the end of the programme, giving us responses from more than 500 businesses.

See the Methodological Note for more information on the applied methodologies and data sources used in the following sections.

Strengthening Economic growth

For all its benefits as a pathway to innovation, R&D has built-in uncertainty and can take several years to reap economic

benefits. Nonetheless, our survey data indicates that Clwstwr's support of innovative creative businesses has already had tangible and significant economic impacts, directly contributing to a boost in Clwstwr-funded businesses' performance.

The economic impact of Clwstwr on funded businesses

Clwstwr-funded businesses grew by 14.6% in turnover and 21.3% in employment in a period that saw an average decline of 3.2% in turnover and 11.3% in employment in the Welsh creative industries. Clwstwr-funded companies thus experienced strong rates of growth during a time period directly impacted by the COVID-19 pandemic (see Table 1).

		Clwstwr-funded companies		Companies without Clwstwr funding	
Turnover	Average per-company growth (in GBP) between the start and end of Clwstwr funding	£91,242		-£8,990	
	Average per-company growth (%) between the start and end of Clwstwr funding	14.6%		-3.2%	
Number of full-time employees	Average per-company growth (in Full Time Equivalent (FTE)) between the start and end of Clwstwr funding	1.38		-0.54	
	Average per-company growth (%) between the start and end of Clwstwr funding	21.3%		-11.3%	
Number of respondents		At the start of funding	At the end of Clwstwr	At the start of funding	At the end of Clwstwr
		85	38	305	116

Table 1: The impact of Clwstwr on turnover and employee growth rates.

Applying these average growth numbers, Clwstwr funding has at this stage, directly contributed to £7,755,570 in additional turnover and 137 additional jobs, and, through indirect and induced effects, to a total of £20,446,443 in additional turnover and 446 additional jobs in the local creative industries (see Table 2). We have only assigned the observed growth of Clwstwr-funded companies at this stage in the R&D cycle to Clwstwr's direct impact. These figures do not take into account further employment creation through the engagement of freelancers on short-term research projects. It is, in this sense, a conservative employment creation measure, counting only full-time, long-term employment.

"We were really grateful for the opportunity from Clwstwr to explore new formats, business models and new ways of working. We haven't been able to access a fund that would allow us to research and develop our business in this way before and we have found it an invaluable experience."

— Alison John, yello brick

Additional Turnover/ Gross Value Added (GVA)/Full time jobs directly attributable to Clwstwr	Total	… of which [...] directly generated within the Clwstwr-funded companies, or within the Clwstwr delivery team.	A further [...] generated through indirect and induced effects
Turnover	£ 20,446,443	£ 7,755,570	£ 12,690,873
GVA	£ 15,576,757	£ 6,566,231	£ 9,010,526
Full time jobs	446	137	309

Table 2: The impact of Clwstwr on turnover, full-time jobs and GVA growth rates of funded businesses.

Clwstwr funding: return on investment

By calculating the total GVA and total turnover increments we can calculate the return on investment of Clwstwr funding. We have defined Clwstwr investment in two ways: the money given in grants to Clwstwr projects, and the total value of support provided to projects (which includes grant funding) (see Table 3). Every £1 of direct funding spent by Clwstwr created returns of £5.98 in turnover and £4.55 in GVA. These are strong returns (a 2019 Science|Business report, for example suggests the long-term payback of R&D investment is around 20% a year). We expect more significant returns in the years that follow, when funded projects mature.

Clwstwr's impact on Wales' creative industries

While it is difficult to calculate the indirect impact of Clwstwr's broad engagement with the Welsh creative industries (through events, workshops and meetings with businesses who did not receive funding), we can chart Clwstwr's direct contribution to the growth of the Welsh creative industries as a whole. We estimate that between 2019 and 2022 the number of full time employees in Welsh creative industries grew from 41,979 to 44,548, and overall annual turnover grew from £3,951,909,000 to £4,236,598,000 during the same period. While these figures are more positive than we observed in our sample of (non Clwstwr-funded) businesses, they are congruent with them (see methodological annex). On the basis of these overall growth estimates, between 2019 and 2022 Clwstwr contributed £1 in every £13 of annual turnover growth, £1 in every £27 of annual total GVA growth and created 1 of every 17 new jobs (see Table 4) in the growth of the Welsh creative industries.

	Funding directly for projects	Funding and support for projects
Total spending	£ 3,420,000	£ 4,790,000
Gross return in terms of turnover on every £ spent	£ 5.98	£ 4.26
Gross return in terms of GVA on every £ spent	£ 4.55	£ 3.25

Table 3: Clwstwr return on investment.

	Growth of the annual figures between 2019 and 2022	Clwstwr's direct contribution as a percentage of total growth
Turnover in the Welsh Creative and Cultural Industries (CCIs)	£ 284,869,000	7.17%
Total GVA in the Welsh CCIs	£ 426,846,000	3.70%
Full time employment in the Welsh CCIs	2,569	5.91%

Table 4: The impact of Clwstwr on turnover, full-time employment and GVA in Wales' creative industry.

Case study

G, boosting employment and economic growth

Founder Azize Naji reported that Clwstwr enabled his company Goggleminds to develop new technology that is unlike anything on the market, creating IP which they are commercialising to support the future development of the business.

As a direct result of their Clwstwr project, Goggleminds' inhouse team has grown from one member of staff to a team of 10. They are looking to continue developing and growing the team as revenue is generated, in order to scale nationally and internationally.

Since Clwstwr, Goggleminds has gone on to receive substantial investment from Oxford University Hospitals and work with healthcare providers and medical schools. They have also started a Future Minds initiative which provides schoolchildren in socially deprived areas of Wales with the experience of being a medic in virtual reality, to inspire them to consider a career in healthcare.

"I approached Clwstwr after seeing a post on social media by pure chance. I spoke to one of the team about what I was thinking about, and they were very supportive and encouraged me to apply for funding. Clwstwr's been a great kick-start for us. I'll forever remember the support we had from Clwstwr. I'm still in contact with some of the team there. It's been a real privilege."

— Azize Naji, Goggleminds

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Enabling innovation

Clwstwr's aim was two-fold: to use innovation to stimulate growth within and across creative businesses in Wales, and more broadly, to embed innovative practices across the Welsh ecosystem. A key component of this work was to encourage innovation in a wide variety of forms. This meant tackling the widespread assumption that innovation was necessarily about technology: and promoting a range of creative innovations – such as new ways of working, new forms of storytelling and new forms of content – so that technological innovation is seen as one of a series of possibilities.

Clwstwr's impact on R&D spending, incentives and outputs

Our surveys of Clwstwr-funded companies before and after the programme suggest that Clwstwr has had a notable impact in stimulating innovation, embedding innovative cultures and practices. Average annual R&D spending of Clwstwr-funded businesses more than doubled (up by 107% to £91,577) between the beginning and the end of the programme. Clwstwr-funded companies spent 13.6% of their turnover on R&D at the start of the programme and 24.8% of turnover by the end. This growth is significantly greater than the average funding per business in Clwstwr grants (£40,000), and is close to the average overall company turnover growth of £91,242.

Clwstwr funded projects also make more use of public incentives to conduct R&D. The proportion of Clwstwr-funded companies claiming R&D tax credits almost quadrupled between the beginning and the end of the programme (growing from 6% to 23.5%).

"Our final product that we have right now would look very, very different. It wouldn't have had certain nuances in terms of language and character styles and characteristics that we just wouldn't have included if we hadn't done R&D with Clwstwr."

— Hannah Vaughan Jones, Lewnah

This shift in R&D capacity has already produced changes in outputs. Clwstwr-funded companies have grown the number of their copyrights, patents, trademarks and registered designs by 650% between the start and the end of Clwstwr. Before Clwstwr, companies registered, on average, only 0.6 copyrights, trademarks, designs or patents. Post-Clwstwr, this grew substantially to an average of 4.5 per business.

The number of innovations in products, services, processes and experiences introduced by Clwstwr-funded businesses increased from 2.77 per company at the start of the programme to 3.67 new innovations by the end. This represents a 32.5% increase, with each company undertaking one additional major R&D project annually.

DATA HIGHLIGHTS

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Clwstwr funded businesses have seen after the Clwstwr programme:
100% increase in average R&D spending
400% increase in businesses claiming R&D tax credits
650% increase in copyrights, patents, trademarks and registered designs
32.5% increase in number of innovation outputs across range products, services, processes, and experiences

Clwstwr's impact on socio-cultural innovation

Clwstwr funding and wraparound support was designed to produce both economic and socio-cultural benefits, with both given equal weighting in the evaluation and monitoring of applications. Social and cultural benefits include promoting inclusion, equality and diversity, decreasing negative environmental impacts (particularly around climate change) and enhancing cultural and democratic understanding and participation.

Our survey of Clwstwr-funded businesses shows that socio-cultural forms of innovation have become central in their R&D efforts. At the start of the programme, only 19% of all Clwstwr-funded projects reported undertaking innovations with societal goals. By the end of the programme, this proportion more than doubled to 41%.

Building a more diverse and inclusive sector

The need for diversity and equality of access to opportunities are global concerns. Inclusivity and fairness are built into the United Nation's Sustainable Development Goals, and, in Wales, are foregrounded in the Well-being of Future Generations Act of 2015. Our survey of 388 creative businesses in Wales found that only 45% of our respondents agree that the composition of their business or of their business network reflects the demographics of Wales, confirming research suggesting a lack of diversity in the UK's creative industries. Clwstwr has sought to create diverse and inclusive growth, making the programme more inclusive and supporting R&D projects in this area.

"R&D is much more approachable than I would have thought. I have much more capacity to do it and I've seen bits of it done in various ways. I think I'm much more skilled now at being able to be part of R&D."

— Grace Quantock, Trauma Toggle

More information can be found in the Clwstwr Policy Brief: Innovation for an inclusive and diverse media sector:

Clwstwr's Equality, Diversity and Inclusion strategy

Inclusive practices bring both a commercial and social value to the economy. The programme therefore aimed to develop an R&D community which is both inclusive and representative by developing several policies and practices to support EDI across the programme. These included:

— Employing an EDI Officer to work with the delivery team, partners, funded projects and wider community,

— Ensuring that both language and approach portrayed creative industries R&D as open to all,

— Introducing EDI monitoring for the team and any project applications or commissions,

— Holding a series of training sessions for the team, partners and funded projects. Sessions included Anti-racism, Compassionate Design, Disability Equality Action Training, Trauma Informed Practice, Unconscious Bias, and Understanding Autism,

— Creating accessible routes into funding by offering Ideas Labs with stipends and carer support for freelancers,

— Developing partnerships with advisors and EDI-related organisations in Wales.

Clwstwr's diversity of funded businesses

As the programme developed understanding of good practice around EDI and innovation, there was a significant increase in the diversity of funded cohorts. Overall, the diversity monitoring survey results suggest our funded cohorts were representative of Wales and the Cardiff Capital Region (CCR) in terms of gender, ethnicity, age, sexual orientation and trans identity, and generally more diverse in comparison to analysis of the UK creative industries workforce.

More details are available in our monitoring reports via

"I think the benefit of taking the time to do R&D is proven and we don't want to lose it and just go back and be totally focused on the delivery of what we're doing. I think it's important to continue to look and have that time out to ask: What if?"

— Grant Vidgen, The Festivals Company

The gender make-up of those leading applications and receiving funding from Clwstwr shifted significantly during the programme (see Figure 8). In the first Open Call funding round, 28% of applications and only 22% of funded projects were led by women. This is illustrative of the gendered nature of both the language and assumptions around R&D, which often stresses technology over ideas. After working with organisations like Chwarae Teg to change Clwstwr's language and style of engagement (introducing and emphasising, for example, the availability of childcare/carer costs for those attending workshops and Ideas Labs), Clwstwr saw a steady and significant shift. The last Open Call saw 51% of applications and 59% of funded projects being led by women, and in the last Seed funding call, 61% applications and 66% of projects were female-led.
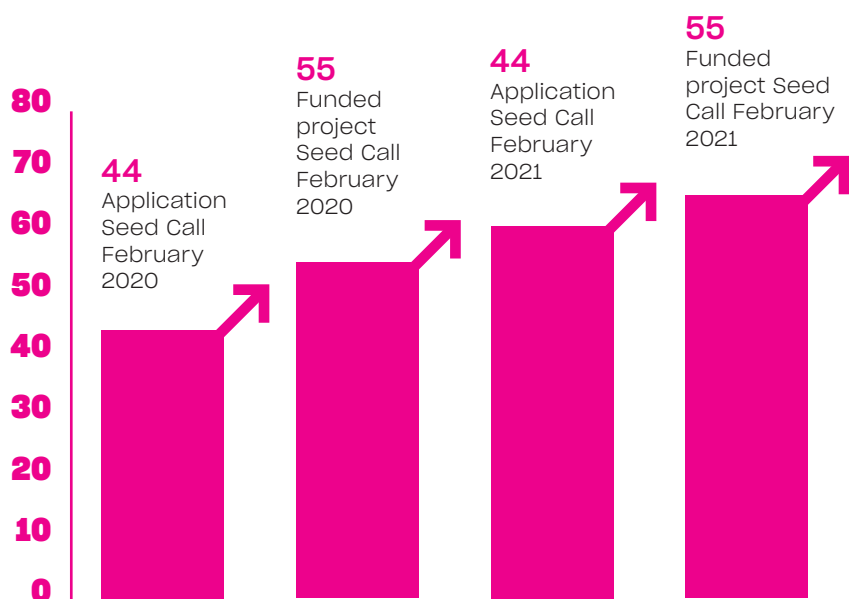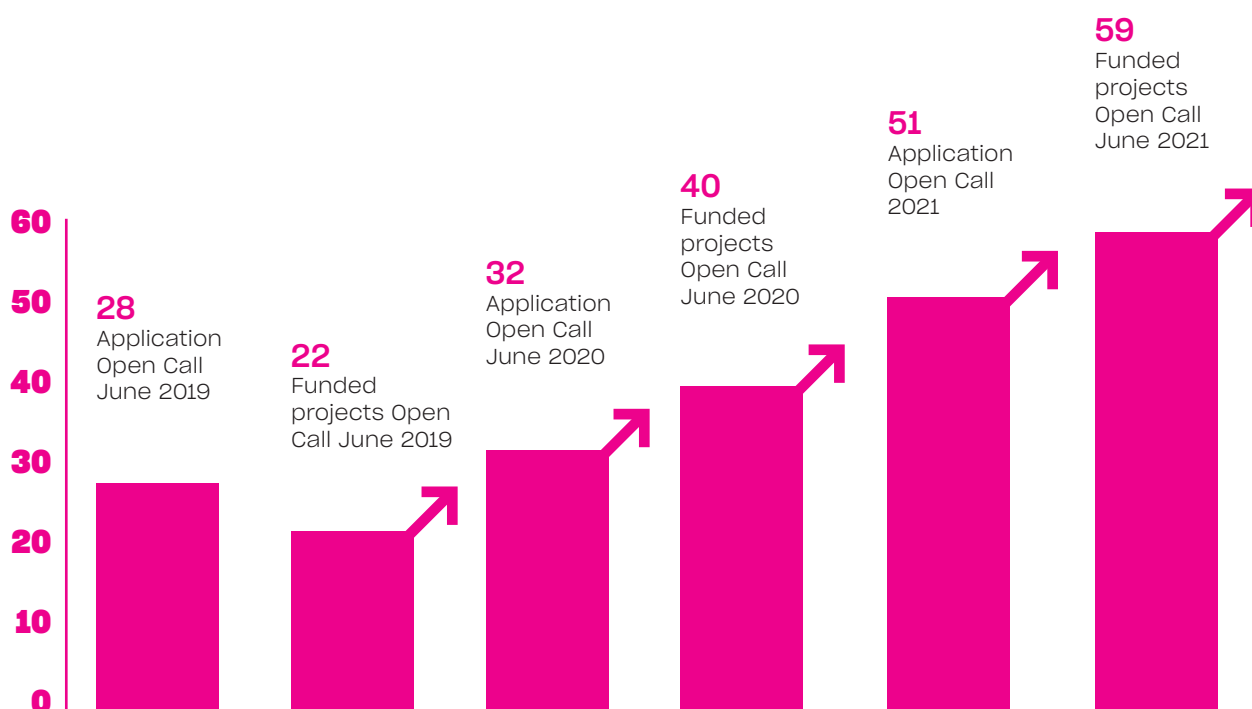
Top chart (scale 0–60):

- **28** Application Open Call June 2019
- **22** Funded projects Open Call June 2019
- **32** Application Open Call June 2020
- **40** Funded projects Open Call June 2020
- **51** Application Open Call 2021
- **59** Funded projects Open Call June 2021

Bottom chart (scale 0–80):

- **44** Application Seed Call February 2020
- **55** Funded project Seed Call February 2020
- **44** Application Seed Call February 2021
- **55** Funded project Seed Call February 2021

Figure 8: Percent of female leads on Clwstwr projects throughout Clwstwr funding calls.

Clwstwr's EDI projects

Clwstwr supported several projects that use innovation with specific societal impacts, that strengthened equality, inclusiveness, diversity in the creative industries while also making content and services more accessible to audiences. Funded Clwstwr projects included:

— **Six projects that focused on empowering users.** For example, Trauma Toggle led by Grace Quantock, explored the development of a more trauma informed experience of news. Trauma Toggle allows users to titrate language and trigger material to control their media consumption.

— **Six projects that aimed to create practical ways to diversify the sector.** For example, Inclusive Film led by Hijinx, developed a suite of products and resources to assist the screen industries in working more inclusively with neurodivergent actors, leading to significant change in casting lead roles for Severn Screen's third BBC TV series of Craith/Hidden.

— **Six projects that used the power of storytelling to promote inclusivity.** For example, Presenting Individual Identities led by Krystal Lowe, produced a set of new media tools that share authentic, accessible and relevant stories which engage currently under-served and under-represented audiences.

— **Five projects that used R&D to make the sector and creative services more accessible.** For example Meddwl Mawr led by Taking Flight Theatre, explored and developed new ways of building live, interactive and sensorily stimulating virtual theatre content which can be accessed by the most marginalised and neglected audiences. This involved seeking new ways of using existing software to ensure access is embedded within content, and developing a menu of tools, methods and approaches.

"The legacy of my Clwstwr-funded R&D is how it has and will continue to impact my work. I now see my practice from a new perspective, and I'm able to see how new contexts can support me to learn more and develop things in my own practice. I'm consistently ensuring to present the identities of others as individuals and not collectives, as well as sharing this learning and exploration through all of my work as a performer, creative and practitioner."

— Krystal Lowe

Towards a greener sector

Environmental sustainability remains challenging for an energy-intensive and travel-intensive sector like Film and TV. In 2018, the UK audiovisual sector accounted for 9.2% of EU's total greenhouse gases production. One hour of TV in the UK generates 5.7 tCO2e and one blockbuster generates the amount of CO2 absorbed by 3,700 acres of forest in a year. A series of measures such as reducing energy consumption, optimising resources and encouraging green investment are clearly needed to address the sector's negative impact.

More information can be found in the Clwstwr Policy Brief: Green innovation for the screen sector via

Supporting green innovation

Clwstwr developed a green innovation approach (see Figure 9), supporting an innovative, sustainable ecosystem that included but went beyond the development of green technologies. This approach aimed to minimize environmental damage and degradation, improve the quality and accessibility of green resources, increase the affordability of green media production and have a positive impact on businesses sense of green identity.

The green innovation approach was highlighted through a series of communication activities and workshops. For example, PDR ran a sustainability-focused Ideas Lab for Green Cymru partnership applicants, encouraging them to embed sustainability in their early ideas. They also provided sustainable design innovation support to the funded projects. By the end of the programme, nearly half (49%) Clwstwr funded projects linked innovation to environmental goals.
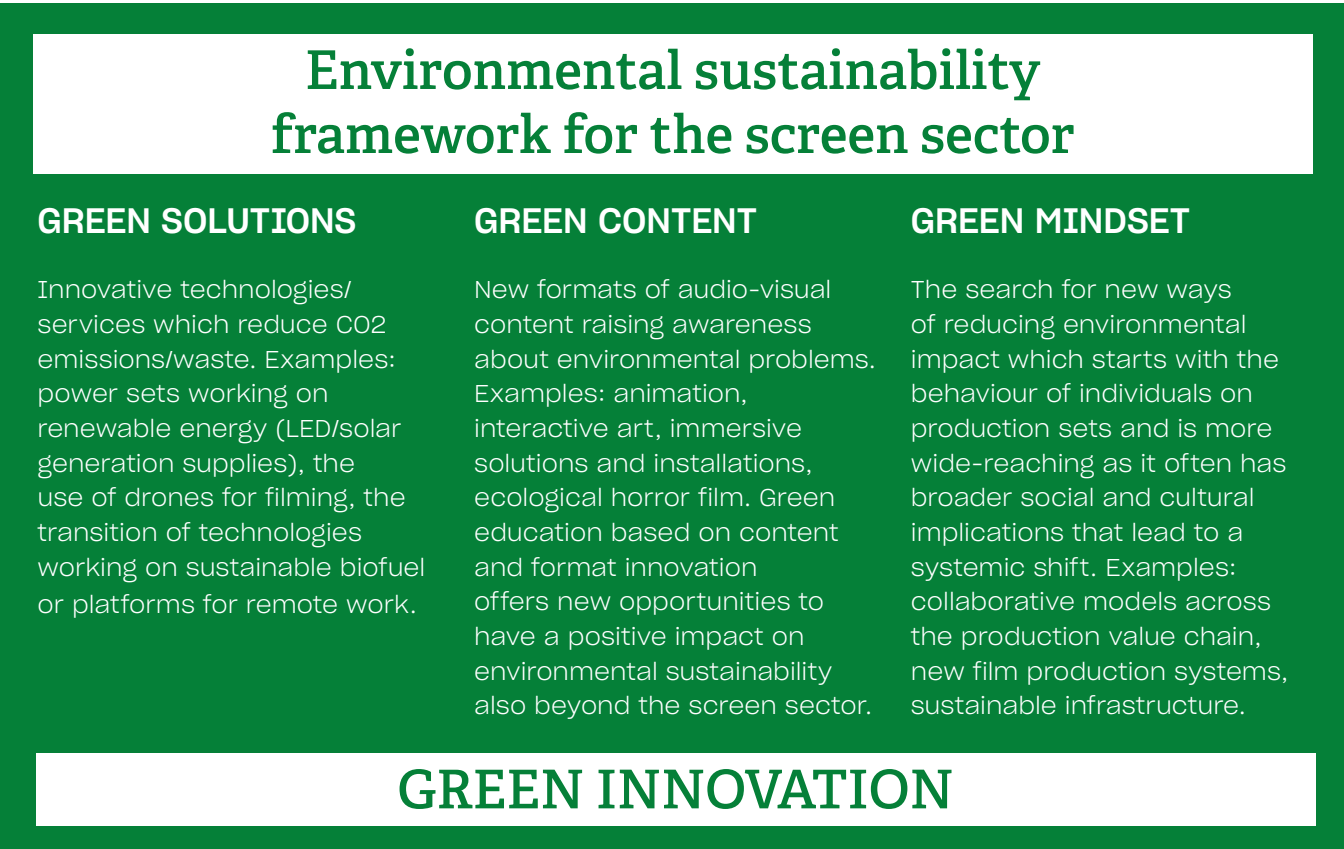
Environmental sustainability framework for the screen sector

GREEN SOLUTIONS

Innovative technologies/ services which reduce CO2 emissions/waste. Examples: power sets working on renewable energy (LED/solar generation supplies), the use of drones for filming, the transition of technologies working on sustainable biofuel or platforms for remote work.

GREEN CONTENT

New formats of audio-visual content raising awareness about environmental problems. Examples: animation, interactive art, immersive solutions and installations, ecological horror film. Green education based on content and format innovation offers new opportunities to have a positive impact on environmental sustainability also beyond the screen sector.

GREEN MINDSET

The search for new ways of reducing environmental impact which starts with the behaviour of individuals on production sets and is more wide-reaching as it often has broader social and cultural implications that lead to a systemic shift. Examples: collaborative models across the production value chain, new film production systems, sustainable infrastructure.

GREEN INNOVATION

Figure 9: Clwstwr's green innovation approach

Clwstwr's green innovation projects

Clwstwr funded eight projects that foregrounded green innovation goals (three of them through the Green Cymru Challenge Fund developed in partnership with Ffilm Cymru Wales), and 20% of all 118 Clwstwr projects registered a positive environmental impact as an outcome of their innovation.

The three examples below reflect different aspects of a green innovation approach: Gorilla's project focused on green solutions to reduce resources spent on travel in post-production; the RIFACAF event organised in collaboration with the Cardiff Animation Festival profiled and discussed innovative forms of green content, while Severn Screen's project explored a range of changes in the TV/film production to reduce its carbon impact.

Green solutions

Gorilla developed a new toolkit for post-production editing for remote work that enabled teams operating from different locations to work on the same material without the need of physical travel.

"Clwstwr has helped us rethink a few projects in the future, and actually see what's possible. It's definitely having an impact on the way we think about our future projects."
— Mathew Talfan, Severn Screen

Green content

In 2022, Clwstwr partnered with Cardiff Animation Festival and AHRC Research in Film Awards to produce an all-day event (RIFACAF: Animation and the Climate Emergency) exploring audio-visual content as a powerful medium for raising awareness about environmental challenges.

Green mindset

Severn Screen developed a sustainable and collaborative infrastructure model to support the future of film and TV production. The process combined carbon footprint analysis with reporting on sustainability success stories and concept development for new apps/platforms.

Case study

Screen New Deal: A partnership to decarbonise Film and TV production

Clwstwr is a partner in the Screen New Deal, a major 18-month transformation plan to decarbonise Film and TV production in Wales.

This initiative brings together the BFI, BAFTA albert, Arup, Creative Wales, Ffilm Cymru Wales and Clwstwr to conduct data collection and mapping to support the creation of a location-based transformation plan for reaching a zero-carbon, zero-waste future for the screen industry.

The Screen New Deal promises to catalyse collective efforts, such as The Green Cymru initiative (Ffilm Cymru), BAFTA's albert carbon calculator and training programme, BFI research reports (Green Matters report) and Clwstwr's environmental sustainability projects.

More information can be found here:

SCREEN NEW DEAL

BE PART OF THE CHANGE

Cymru Greadigol Creative Wales   clwstwr   ffilm

TRANSFORMATION PLAN

Developing creative industries R&D

R&D is broadly understood as the generation and systematic use of new knowledge and a key pathway to innovation. Clwstwr was based on the principle that the creative industries need to engage in R&D to expand their sources of cultural, commercial, and public value – while acknowledging that the language and practice of R&D are unfamiliar territory to many in the creative industries. This section focuses on three major lessons learned during Clwstwr:

1. **Understanding R&D in the creative industries**

Outlining the perception and practices, models and characteristics of RD&I in the creative industries.

2. **Re-thinking R&D processes**

Understanding the journey of creative businesses in the R&D process and how interventions like Clwstwr can have a positive impact.

3. **The Clwstwr projects**

The Clwstwr projects: showcasing the diverse R&D projects of the Clwstwr programme.

In this section we draw on interviews conducted with 68 of the 85 businesses funded by Clwstwr to begin the process of mapping what creative industries R&D looks like. See the Methodological Note for more information on the applied methodologies and data sources used in the following sections.

Understanding R&D in the creative industries

The continuing unfamiliarity of R&D in the creative industries means that there is an ongoing requirement for the understanding of R&D to evolve. At the same time policymakers need to understand the specific needs of the creative industries and the most successful pathways to innovation.

Clwstwr adopted User Centred Design (UCD) as their working framework for R&D, and both applicants and funded projects took part in UCD workshops overseen by PDR, UCD specialists at Cardiff Metropolitan University. This led to the development of the Clwstwr innovation model, which highlights types of activity, pathways to innovation and innovation outcomes (see Figure 10).

"We have seen projects go from seeing R&D and innovation as something of an intimidating unknown concept to feeling like they have permission and confidence in using terms and processes that they have experienced during sessions with us. For me, that's our biggest success."

— Jo Ward, Senior Designer Researcher at PDR
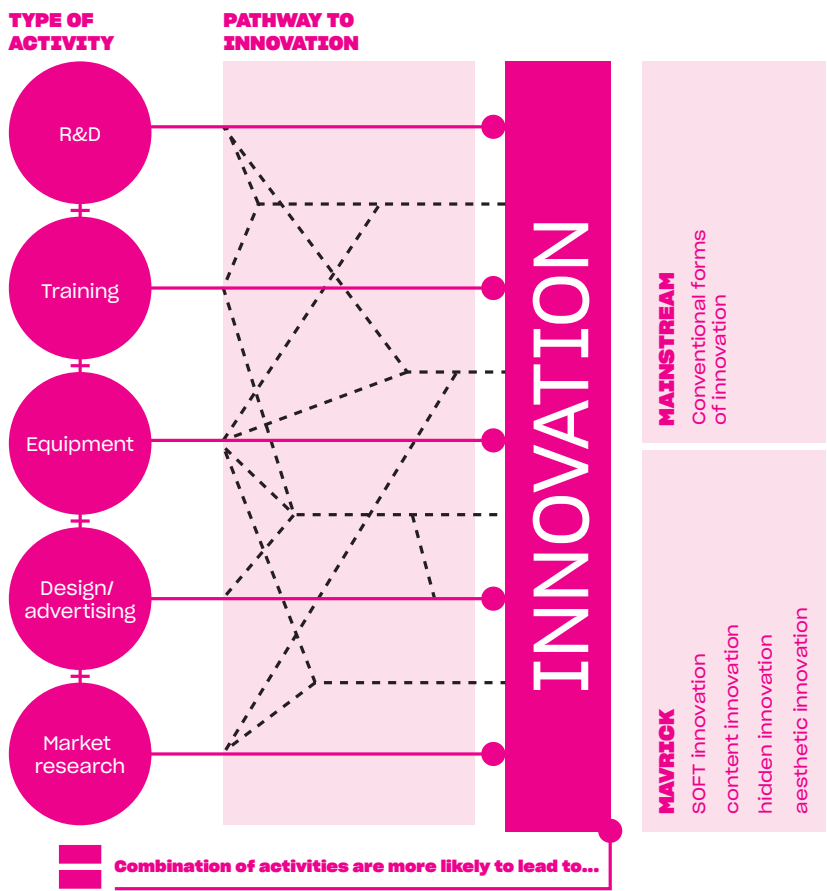
Figure 10: Clwstwr innovation model for the creative industries.

"It's hard to get your head around what R&D is in the creative sector. Even when we were applying for funding, some of us didn't quite know what we should be asking for. Now that we've been through it, I can see how the time we spent looking under the hood of the business and analysing the industry has made a huge difference. At the start, it is hard to see the intangible positives that can come from these things, but we've definitely shifted our collective mindsets. It has reminded me that thinking time is really important."

— Pete Rogers, Bait Studio

R&D perception in the creative industries

The perception of R&D from Clwstwr projects suggest that, for most, investment of time and resources into R&D was valuable and productive. Less than 10% - six out of 68 - of businesses interviewed were unsure if the time invested in R&D was worthwhile. For many respondents, the experience of doing R&D was new, with 77% of respondents reporting that their understanding of R&D has changed after their Clwstwr project.

Many businesses perceived their R&D journeys as uncertain and complex. Others commented on a range of traits to describe their R&D experience, using words/phrases like 'flexible', 'open-ended', 'freeing', 'offering a gateway to new possibilities', 'iterative', 'instructive' and 'hands-on'. We can divide these experiences into primary and secondary traits (see Figure 11). The first set of traits – in the inner circle - is fundamental to all R&D processes, while the secondary traits vary based on the nature of the challenge.
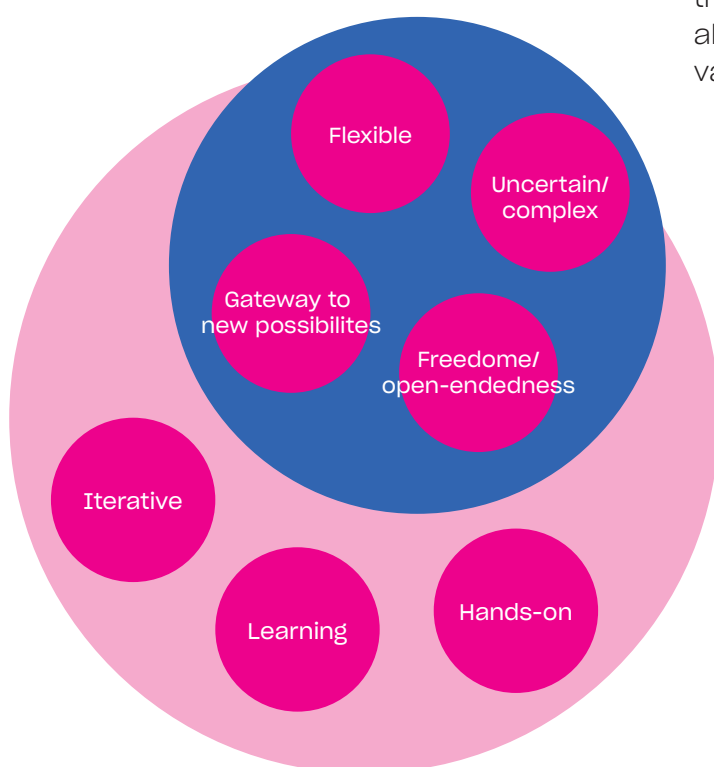

Figure 11: Primary and secondary traits of R&D projects as perceived by the creative industries.

R&D delivery stages in the creative industries

Our analysis indicates there are three recurrent stages in the delivery of R&D projects (see Figure 12).

1. DISCOVERY: The initial phase involves adopting the R&D mentality (e.g. defining the research question/ identifying methods for investigation). For some, this level of immersion in a systemic process was entirely new, while for others it allowed them to rethink existing ways of working.

2. EXPLORATION: The central stage of R&D is a messy and uneven process, with movement back-and-forth. This involves discovering what doesn't work as well as what does. The fact that failure is part of the process meant that many respondents reported a feeling of not doing any 'real work', and finding it difficult to grasp a sense of progress.

3. DISTILLING: Translating data into 'sensible' pieces of information that can indicate the pathway towards potential solutions is a delicate process. It can be followed by rapid prototyping.

"If you're doing real R&D and you learn things as you go along, then you need to be able to change the plan and Clwstwr let us do that. With Clwstwr, it was more flexible, so we were able to go where the research took us a lot more easily, which was great."

— Peter Bishop, Agile Kinetic
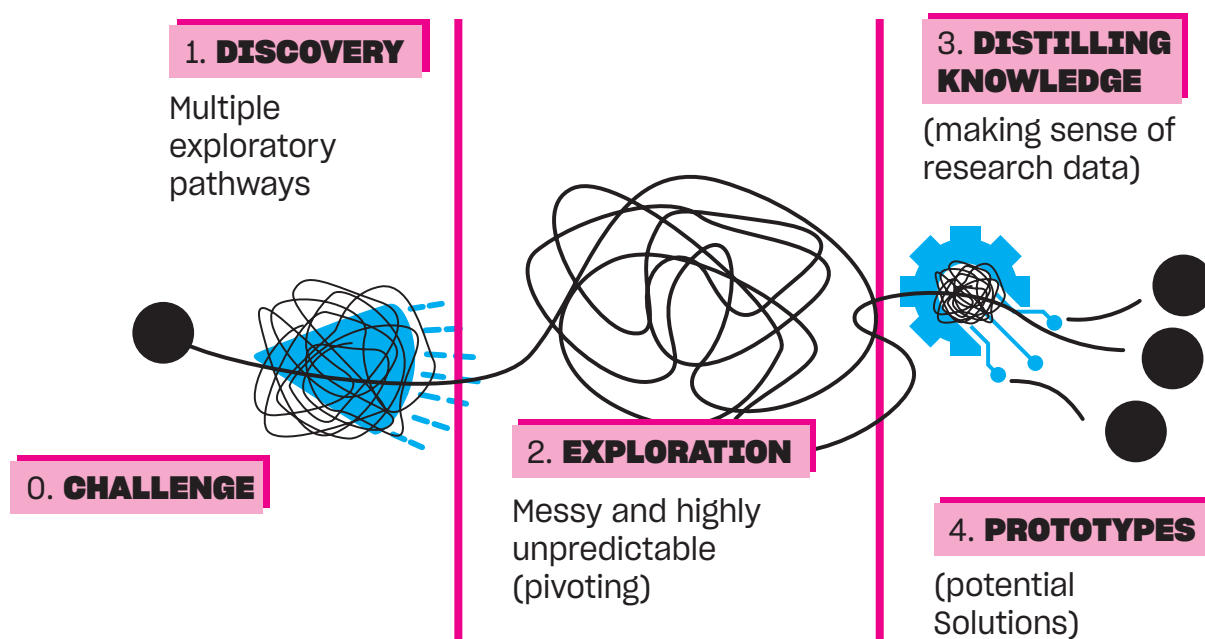
Figure 12: The three stages of R&D in the creative industries.

R&D-driven innovators in the creative industries

Our respondents reported two determining factors in the R&D journey: the direction of R&D (either more organic and exploratory or more structured and disciplined) and the level of understanding/learning acquired throughout the process. These factors determine four archetypes for R&D-driven innovators in the creative industries (see Figure 13).

1. TECHNOCRATS: For technocratic innovators, the research process is disciplined, addressing a clear-cut challenge that offers only limited possibility for exploratory pathways. This form of R&D can produce, for example, new technology functionalities addressing the emerging needs of the creative sector.

2. INCREMENTORS: Although they can follow a technocratic approach, this form of R&D opens several exploratory pathways. These pathways can be related to the application of solutions to one or more new sectors, or they can be directed towards developing cross-sectoral approaches, or new forms of storytelling to engage specific audiences.

3. CONCEPTUALISERS: These innovators adopt a less technocratic and more knowledge-based form of investigation. This R&D form can foster new infrastructure, new ways of working or lead to new forms of content.

4. DISRUPTORS: This form of R&D is the most ambitious, dynamic and unpredictable. It often involves high levels of uncertainty but with the potential to bring about a paradigm shift for the business or the sector. Innovations in this area may adopt alternative business models which can be hard to protect by existing forms of IP.
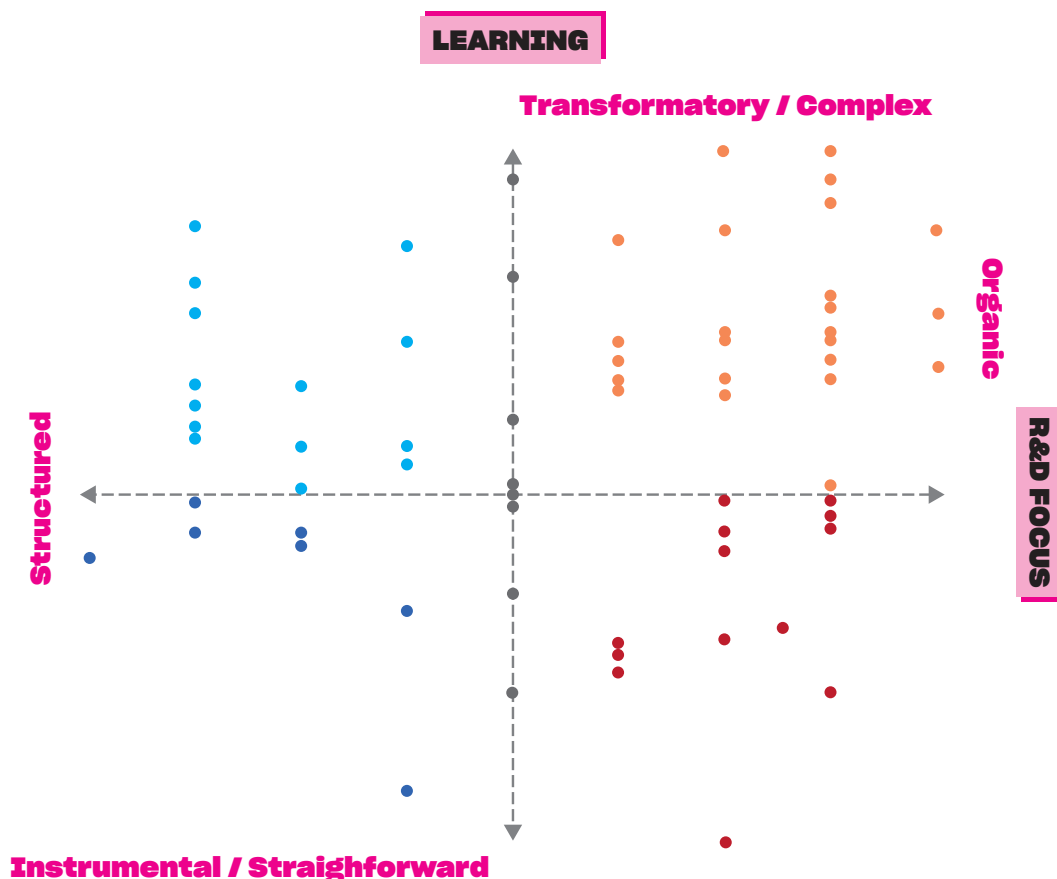

Figure 13: The four archetypes for R&D-driven innovators

Re-thinking R&D processes

As R&D is not common practice within the creative industries, the classic indicators for measuring R&D - such as the number of patents or size of research budgets – do not always translate well. For most of the Clwstwr funded projects, being immersed in an R&D process was quite distinct from business as usual, pushing them out of their comfort zone. Over half (55%) of our interviewees stressed both benefits and challenges of conducting R&D, suggesting an understanding that the benefits and challenges of undertaking R&D are an inseparable part of the process (around a quarter of our respondents stressed the benefits of conducting R&D, and around one fifth stressed the challenges).

"The term 'R&D' is typically associated with big technology companies. The creative industries often don't realise how relevant it is to them. We were able to help creative organisations look at themselves, look at the market and look at their users, and bring their insights together to create new products and services that are of real value."

— Professor Andy Walters, Director of Research at PDR

Barriers and enablers for R&D in the creative industries

Perhaps the most useful way of understanding the nature of challenges and benefits is to outline what our respondents saw as the enablers and barriers in and around the R&D process. Some of these speak to broader legal and policy issues.

Enablers

BUSINESS-RELATED: Spillover effects and long-term benefits for the business (enhanced business performance, productivity, innovativeness, improved project management process).

PROCESS-RELATED: Previous experience or theoretical knowledge of R&D; the freedom to explore but also having guiding principles (specialistic mentorship); R&D facilitates a proactive rather than a reactive approach.

Barriers

BUSINESS-RELATED: Lack of resources: time and fundingand human resources; unclear process for claiming R&D tax; slow commercial turnaround and insecurity around suitable forms of IP protection.

PROCESS-RELATED: Complexity of the process - offers multiple exploration avenues; dealing with failure and accepting drawbacks/dips as a natural way of progressing in R&D; alienating technocratic language; pre-conceived ideas such as: R&D is about developing new tech and needs to be disruptive.

"The problem is that Governments assume that companies are large and have infrastructure to support. In creative industries most companies are small. They don't have the time to train themselves and that's the whole point of Clwstwr: to give people the opportunity to not have to earn in order to do R&D, which is what we needed."

— Jon Rennie, Cloth Cat Animation

R&D journeys in the creative industries

For most creative businesses, their experience of R&D exceeded their expectations. When we asked respondents to map their R&D journeys, we found that the typical journey of R&D-driven projects began with high expectations, followed by a drop as they become immersed in the complexity of R&D processes, but then increasing again towards the end, and maintaining this level of satisfaction beyond the formal project completion (see Figure 14).
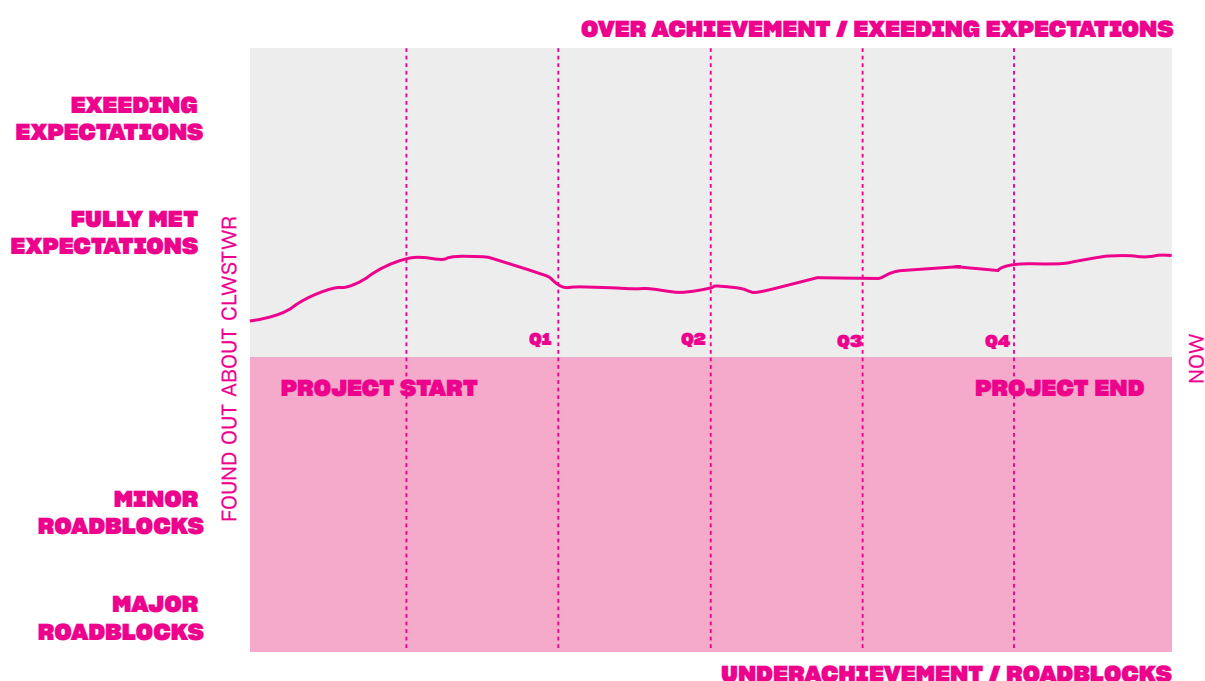
Our interviews with projects suggested that creative businesses who spent ample time and resources in developing and implementing R&D in the first half of the R&D process are significantly more successful later. This suggests a clear need for adequate support to enable creative businesses to dedicate sufficient staff and time to the early phases of R&D.

This support also needs to tread a careful line between interventions – such as guidance through the R&D process – and allowing businesses to work autonomously. In short, knowing when to be hands on (especially in the early stages) and when to be hands off (see Figure 15).

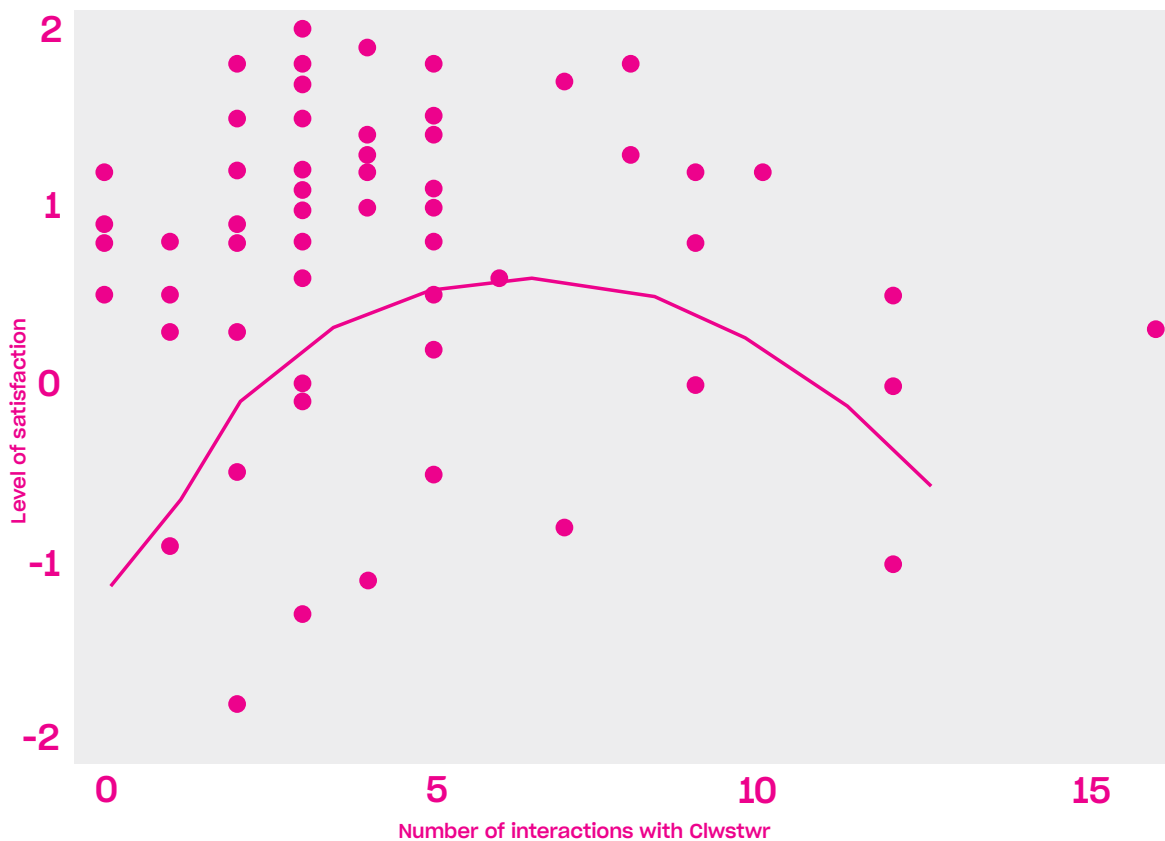Figure 14: The typical R&D journey of Clwstwr funded projects.

Figure 15: The level of engagement of Clwstwr in relation to success of the projects.

The Clwstwr projects

2019 Open Call projects

AMPLYFI: AI In the Newsroom. The machine-learning-enabled platform rapidly reads and analyses thousands of documents at a pace not humanly possible, enabling journalists to immediately get a digestible breakdown of complex topics and discover new angles and areas that are worth further investigation.

Bombastic: Bombastic Digi platform. A platform for creating and sharing interactive film sessions, with a focus on providing educational content for schools, helping teachers run classes that meet creative learning objectives.

Bomper Studio: Realtime 3D Configurator with Narrative. Created a real-time product configurator, elevating the retail industry benchmark for creative content and customer experience by combining storytelling, visualisation and real-time technology.

Caerphilly Media: CaseFinder. Software for Court lists and Registers that extracts and stores information in a searchable format to allow for effective planning.

Cloth Cat Animation: Reinventing Animation Production with Game Engine Technology. Integrated game engine, real-time rendering within the animation pipeline.

Core: Schools News. A regular news service pilot delivered to pupils within school hours, customisable by teachers to meet the needs of the curricula while creating a news habit among the next generation of viewers.

Film Hub Wales: Made in Wales. Delivered a clear message for the digital generation to increase the awareness and appeal of Welsh screen content.

Good Gate Media: Real Time Rendering and Interactive Promo. Developed a piece of IP into an interactive movie - an adaptation of Ian Livingstone's book, Deathtrap Dungeon - by mixing high-end VFX with real time computer rendering to greatly lower production costs by building photoreal sets within a computer as opposed to using physical artefacts.

BAIT: Production Management Platform. Standardised a production management platform for visual effects and motion design studios to allow collaborative and remote working.

Gorilla TV: Remote Creative Editing Facility. Developed software and hardware solutions to allow regional growth in post-production, specifically a remote working environment for creative editing with all main systems located elsewhere and accessed via a network connection - eliminating geographical boundaries.

Hidden Narratives: Interactive Documentary Format. Explored the role of content, format, marketing and distribution of the interactive documentary to reach a wider audience and become a viable career for documentary producers.

Martha Stone Productions: Life Lab. Created a socially transformative story-based game to address the impact of Adverse Childhood Experiences (ACEs) - one in which the player transforms their community by tackling a series of trauma-informed challenges - to explore online what a trauma informed, resilient community could look like.

Monnow Media: News Storytelling through Modular Journalism. Created and tested new and imaginative storytelling techniques with the aim of using innovative content management technology to build stories that reimagine how news might be presented to different audiences. Working with BBC News Labs and academics, Shirish Kulkarni used developments in "modular" journalism to explore how stories can be told most effectively, created most efficiently and understood more comprehensively.

NDC Wales: Moving Layers. Created and tested new ways to make and experience dance using layered-reality technologies, prototyping an experience that enables a diversity of people to witness and participate in dance stories that change the audience/performer relationship and that connect people to their own physicality.

Nimble Productions: Women's Football Content Hub. Aiming to create the world's first digital and social hub for women's football content - a platform to promote, discuss and drive this exponentially growing community.

Object Matrix: IMAGE VISION. Combined a set of video asset management tools, together with a unique framework, to enable multiple algorithms to be incorporated for intelligent search. Unlocking video archives with search tools so that clips and videos can be brought to the operator's attention using a deep level of intelligence while incorporating (much as an iPhone app store can) algorithms for search and analysis that come from a local hub of developers.

Painting Practice: Plan V. A virtual reality (VR) bespoke studio environment which can be used directly through a local and/or remote framework, allowing the user to experiment with lenses, storyboards, pre-visualisation and many other options - a new step between script writing and the physical set building, reducing costs while increasing production efficiency.

Rescape Innovation: Using VR to transform childbirth. Building on their work and learning with midwives, Rescape created and tested specific therapies and educational content to help mothers-to-be during labour.

Rondo Media: Space Scavengers. Galactig developed a new VR-based kids television format.

Severn Screen: TV/Film project and gaming. Adapted existing development processes to extend the reach of existing, and future, IP to include non-linear/interactive exploitation for gaming.

Tinopolis: FutureNews Labs. R&D of technologies and workflows to create a repeatable branded product and service to connect young people and industry partners.

Triongl: Taking Welsh back-to-back expertise to the international market. Consulted with producers and content creators to develop their ability to make back-to-back bilingual or multi-lingual television drama, and explored the viability of vehicles to export Welsh expertise to potential partners in Europe and beyond.

yello brick: Geolocated Fragmented Storytellling. A hybrid between film, television, theatre and alternate reality gaming; exploring new ways of telling stories in physical and digital spaces. Created fragmented narratives that enabled audiences to have agency within the story experience, challenging traditional formats and developing new ones.

2020 Seed projects

Andy Taylor: Smart Podcasts. Developed functioning prototypes to allow podcasts to expand or contract to the listener's available time while maintaining structure, tone and listenability.

Lauren Orme, Cardiff Animation Festival: CAF Climate Assembly. Developed approaches to greening animation production, creating much-needed expertise in South Wales for a global industry.

Rebecca Hardy: Reel Reality. Researched the feasibility and product development of mapping Film and TV locations using a range of immersive technologies.

Gruff Rhys: Hissing Currents. Hissing Currents reimagined the music concert experience, and album release cycle – getting away from the static staging of conventional touring by creating an immersive story telling experience through new technology in flexible spaces, while challenging recording industry norms about the album form.

Tara King, Kingshipp: Zero-Carbon Festival. Designed and adapted technology to reduce the environmental and carbon impact of location broadcasting sets and festivals, working closely with the Steelhouse Festival to test creative and technical forms of delivering low carbon music/screen events in outside locations.

Yvonne Murphy, Omidaze Productions: The Democracy Box. Worked alongside 16-24 year olds, including those from low turnout constituencies, to co-create and curate new forms of engagement with democracy, to produce the prototype of an approach to civic engagement which can be developed and replicated across the UK.

Richard King: Brittle With Relics - A People's History of Wales 1965-1995. Drew on an extensive interview archive and explored the use of audio visual installations, large canvas projections and audio sculptures to tell the story of late 20th century Wales.

Simon Clode Films: 360 degree film for Immersive Theatre. Worked with the 360 dome at CULTVR in Cardiff, to explore new forms of audience experience, integrating the live performer within the digital space to produce powerful, poignant and pioneering forms of performance.

The White Tent Company: AR Murder Mystery. Explored AR and VR technology's potential to enhance the quality and immersive nature of the murder mystery experience.

2020 Open Call projects

73 Degree Films: Making Vertical Video Multifunctional. Utilised vertical video to tell stories in new and exciting ways.

Agile Kinetic: Interactive Design for Healthcare. Increased user engagement by making interactions with an orthopedic surgery recovery app as user friendly as possible for all patients.

Bright Branch Media: The Live Drama Product. Developed a live scripted experience across multiple social platforms which audiences could be a part of in a meaningful and engaging way.

Bumpybox: Expanding IP and Brands through a virtual pipeline. Made a linear broadcast pipeline into a more diverse, virtual 'brand pipeline' allowing the creation of more content for different platforms at a lower cost, while simultaneously working on series production.

Bwlb: Accordion (SMART Podcasts). Developed an algorithm which automates the editing of podcasts to fit the listener's available time. Bwlb founder Andy Taylor was also successful in the European scheme, Stars4Media, and piloted Accordion with Belgian podcast company Europod.
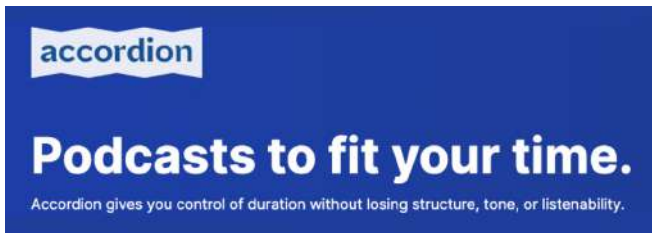
Cardiff Productions: Tunnel Vision. Explored how new and emerging technologies can enhance the public transport passenger experience, through the delivery of audio, video and text content that is geospatially and contextually aware of passengers' needs.

Caz Westwater: Heritage Walkers. Developed a proof of concept for a digital learning experience in partnership with National Slate Museum.

Dragon DI: ASC Smart Headphones. The development of Smart Headphones, moving beyond the current noise-reduction possibilities to reach a wide array of audience needs.

edge21 Studio: Reel Reality. Created an entertaining and engaging mobile platform for sharing screen content and mapping Film and TV locations using a range of immersive technologies. The Reel Reality app connects audiences with content in real locations, combining the potential of AR/GeoAR interactivity, location information and screen content so the user can develop their own film/TV location experience and collect and curate content.

Eisteddfod Genedlaethol Cymru: Cultural Portal. Explored the creation of an innovative online platform showcasing the best of Welsh poetry, music, literature and art, while providing new ways of bringing communities together to enjoy Welsh culture.

Fieldwork: From Here. Explored the potential for transposing a live gallery experience through digital means to promote original artworks.

FOR Cardiff: Rejuvenating Cardiff's tourism economy through a celebration of screen. Scoped the creation of a new bilingual tourism product that would use innovative digital and immersive technologies to showcase Cardiff's rich history and relationship with screen and help users explore the city.

Hijinx: Inclusive Film. Explored how screen content could be made in an authentically inclusive way for learning disabled and/or autistic (LD/A) actors, and what new processes might be needed to create inclusive storytelling.

ie ie productions: Candylion. Explored the possibilities of making an animated feature film and a game at the same time using the Candylion design artwork across both platforms, to potentially streamline costs, maximise efficiency, broaden reach and exploit the innovation in both the process and technology in an international, commercial context.

IJPR Cymru: Caru Hwn. Researched audience tastes and how they discover the breadth of content available across all streaming services, from mainstream to niche, using the results to develop a bespoke and data-driven experience to curate the viewing experience and accurately reflect individual tastes, as well as a community with which to share recommendations.

Interteller: The Journey. Built a fundraising platform in a video game style that offers several experiences, each highlighting a different cause. The Uprooted is the world first cause-agnostic, mobile, charity fundraising platform in a game style, supporting refugee, homelessness, health and mental health charities. It enables partner charities to tell the real-life stories of the people they seek to help, and makes it possible for players to take immediate action to assist through in-app purchases.

Lewnah: Kids News. Investigated how illustration, animation, AR and VR can help explain world events to younger audiences. Created news content for children to engage with, addressing the challenge of combining creative long-form storytelling techniques with the time constraints of a fast-paced news cycle.

Literature Wales: Welsh Lands and Lore: Video Game Adaptation of Land of Legends. Analysed the commercial viability of new video game content based on Welsh myths and legends, exploring the demand for new assets – artworks, animations, retellings - developed by Welsh writers, artists, and game developers.

Mission Digital: Origami. Created a prototype that proved the viability of a fast, simple, easy-to-use web app-based SAAS. The later-named Origami Phoenix, automates the delivery files from where you have them to where you need them worldwide, in the video format you want with rich metadata for VFX and postproduction in the high-end TV and film.

Omidaze Productions: The Democracy Box. Developed new ways to co-create and curate new forms of engagement with democracy with and for 16-24 year olds. This included BBC Bitesize videso from rapper Saskia Pay, a dedicated podcast (available on Spotify) and The Story of our UK Democracy That Everyone Should Know, in Seven Short Chapters written by Yvonne Murphy, which was fact-checked by the Electoral Commission. Yvonne designed The Democracy Box Creative Cascade programme to be used in educational settings which has been trialled in schools across Cardiff.
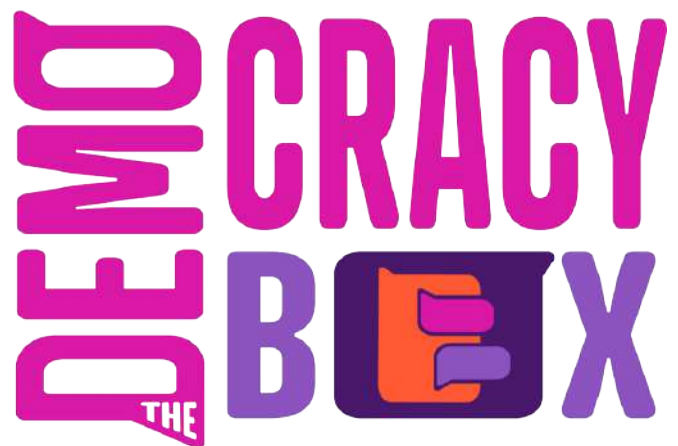

On-Set Facilities: OSFX StormCloud - Virtual Production Solution. Addressed the technical challenges of real-time virtual production, at the computing level through OSFX StormCloud - a multicast VPN for virtual production designed to provide accurate, low-latency transport of video and data.

Ric Bower and Rhiannon Lowe: AOMAME. Aomame.space created artist-themed online environments designed specifically for the artworld to host cultural content - an exploration of what art online looks like if it utilises existing technologies more imaginatively and avoided simply replicating the physical gallery experience. The pilot iteration, Doing Time, was held within a virtual purpose-designed prison, with galleries and artists showing their work in the cells.

Screen Streamer: Screen Streamer. Researched and developed longer recording times, increased storage space and new recording features for Screen Streamer - a web-browser based service for recording, sharing and streaming your screen - offering a real-time one-to-one screen-sharing call feature and incorporating multiple-party sessions.
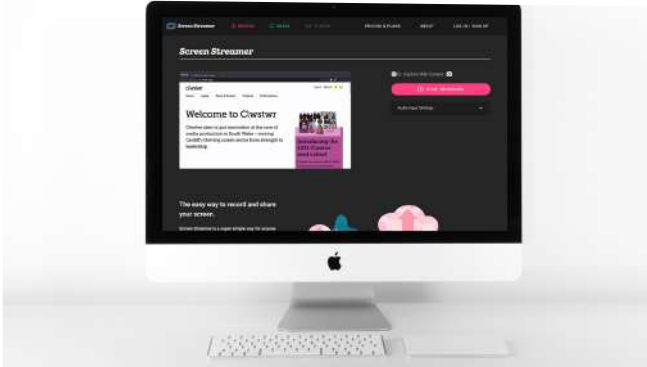
Johnny Campbell: Re-engaging with Our Urban Environments. Scoped innovative and economically sustainable platforms for two-way engagement between the public and those responsible for shaping our urban environment; with an emphasis on utilising emerging technologies to build and engage new audiences.

Taking Flight Theatre: Meddwl Mawr. Explored new ways of building live, interactive and sensorily stimulating virtual theatre content, which can be accessed by the most marginalised and neglected audiences.

Grace Quantock, Trailblazing Wellness: Trauma Toggle. Combined real world clinical experience with journalists working in the field, marginalised audiences and technological developers to create a news prototype that is trauma informed. Trauma Toggle will allow users to titrate language and triggering material to control their media consumption.

Linus Harrison: Mapped Out: Delivering News to Visual Thinkers. Researched and developed a prototype of news can be created and delivered to a more neurodiverse audience, making mainstream news more accessible and inclusive with a focus on visual thinkers.

Tredboy Pictures: Micro-Form Drama Across Multiple Platforms. Screenwriter Robert Evans researched and developed the creation of a platform enabling users to bring together the different storytelling elements of various social media platforms to create joined up stories on one dedicated app.

Wales Interactive: Interactive Movie HUB. Explored new pipelines and applications for creating and distributing interactive movies worldwide, making them more accessible and expanding the possible audience exponentially.

Y Pod: Minority Language Audio Journalism and Podcast Service. Increased the discoverability of audio journalism and news in Welsh through a range of innovative solutions and products.

Zap Concepts: Smart Power Plan- Interactive Tool for film, television and live events. Development of a tool to enable users to easily specify more sustainable temporary power systems to realise the vision of moving to zero or low emissions, with temporary power supplies more accurately specified and linked to renewable energy systems, grid power and energy storage systems.

Gruff Rhys: Hissing Currents. Worked with BBC Connected Studio MakerBox, Gruff applied the Audio Orchestrator tool to his album Seeking New Gods which created an immersive experience where everyday devices connect to become a web of speakers which envelop you in the music. Gruff Rhys credits this innovation with helping the album reach the UK top ten.

Richard King: Brittle with Relics. Explored ways of telling the story of late 20th century Wales to new and diverse audiences using audio visual installations, large canvas projections and audio sculptures.

2021 Seed projects

Joelle Rumbelow, Salt White Studio: Set the Story. A story-led platform that centralised the production design department and behind the scenes team. Syncing design intentions, managing drawings, collating visuals, automating reports and connecting things more quickly.

Little Bird Films: Green Screen. Explored ways to help production companies across Wales make the media production process as environmentally sustainable as possible.

Golwg: Fôtio am Fory. Developed the democracy section of Golwg360 news website, specifically targeting young people who are voting for the first time.

Tantrwm: REMOTE INTERVIEW SYSTEM. Developed an easily deployed and operated remote PTZ interview system, aimed at broadcast and corporate communicators, empowering people to get their stories heard.

Tiny City: Yn Y Golau / Invisible Light. Explored how access for blind and visually impaired people can be built into the creation process of live performance and creative digital work, rather than delivered in post-production, to contribute to the experience of all audiences.

Lab Class: Lab Grain Pro. Created a digital tool that will be a genuine emulation of film, making the tool accessible for everyone from students to leading industry professionals as a cost effective alternative to shooting on film.

Amy Taylor: Connect to Care. Developed a prototype - Prompts – an app that helps professional carers connect with the people they care for.

Focus Shift Films: Viewfinder for Sport. Researched how to combine sporting heritage, tourism and AR/VR experiences to develop unique content that engages with sports tourism market.

2021 Open Call projects

Interteller: The Journey. Built a fundraising platform in a video game style that offers several experiences, each highlighting a different cause. The Uprooted is the world first cause-agnostic, mobile, charity fundraising platform in a game style, supporting refugee, homelessness, health and mental health charities. It enables partner charities to tell the real-life stories of the people they seek to help, and makes it possible for players to take immediate action to assist through in-app purchases.

Frontgrid: Creating a virtual paradigm. Used gamification and storytelling within ParadropVR flying experiences to nudge people to drive a greater understanding, care, appreciation and participation in their real world environments.

Bumpybox: Expanding IP and Brands through asset management organised by metadata. Built an asset management system within its pipeline driven by metadata that is captured when an animation task or asset is published to collate all the useful materials into a database that can be organised and searched in a meaningful way.

73 Degree Films: Empowering Mobile Creators with Blockchain. Investigated the use of blockchain smart contract technology to create a transformative application.

Tiny Rebel Games: Tiny Rebel AR Pets. Conducted R&D around the placement and use of augmented reality virtual pets on both mobile and wearable devices, using a variety of advanced technologies to give these creatures intelligence and lifelike interactions within a user's space.

Triongl: Tri: A Digital Toolbox for Multi-language Productions. Used the first season of Y Golau / The Light in the Hall as a test ground to map the production process of back-to-back and bilingual productions working with digital developers.

Great Point Studios: GPS VP Innovation Lab. Researched how virtual production technology can be a relevant and sustainable service for the Welsh media sector.

Cloth Cat Animation: Next Generation 2D Animation. Changing the way 2D animation is made and also bridging the gap between animation software and game engines.

Hijinx: Inclusive Film. Developed a suite of products and resources to assist the screen industries in working more inclusively, with a focus on casting and developing work inclusively.

Painting Practice: PLAN V SUITE. Painting Practice has recently published Plan V Tools, a collection of virtual pre-production tools, as a plug-in. Plan V Suite continues this project by developing tools that help the transition from traditional to virtual production and more generally facilitate the use of Unreal Engine in Film and TV: it will encompass a family of instruments which mimic the real world filmmaking departments and allow enhanced creativity, lower costs and more efficient pipelines in virtual production.

Sugar Creative Studio: Project V – VR Storytelling Platform. A powerful next gen story engine for the creation of VR experiences from both new and existing narrative content. A combined modular tool for development of story structure and the efficient creation of interactive VR narrative experiences, allowing holders of IPs to work creatively with Sugar in the translation of narrative from the existing linear forms into beats and acts, which when combined with interactions and explorations, create immersive interactive versions of the content. The integration of a modular 3D engine pipeline and the harnessing of flexible animation rigs allow for these VR story structures to be developed efficiently, significantly reducing production time while not impacting the quality of the creative output.

Lewnah: Kids News. Created a technical prototype of an engaging children's news show combining animation and news footage.

edge21 studio: Evolvement. Intelligently connected augmented reality (AR) with film or television programmes. Worked with Sugar Creative to develop a creative framework and tech called Evolvement, which is now a licensable concept. To demonstrate how Evolvement works, After the Evidence was created - a new style of interactive film and game powered by the Evolvement engine. It's an immersive story experience combining film with investigation gameplay. Players gather the evidence while watching the film then use that evidence to investigate, make deductions and close the case.

SR Production Services: SR Immersive. Developed a variety of offerings to suit the changing needs of clients and audiences, integrating emerging technologies such as VR and XR with traditional theatrical techniques, to create experiences that blur the line between real and virtual.

Small and Clever Productions: Virtual Production for Comedy. Improved the quality, reliability and ease of use of virtual production (VP) techniques, so Small and Clever can offer VP as a standard tool for short-form comedy makers and other genres.

Little Bird Films: Green Wing. Developed a practical tool for simplifying and streamlining the process of becoming more environmentally sustainable, working with productions to design an app that can be used alongside their current workflows, whether in studio or on location, adaptable to different production sizes and schedules. From finding ways to engage the whole team while easily storing and managing evidence for Carbon Action Plans.

The Festivals Company: Satisfying cinema audiences in a post-COVID world. Explored how film festivals, like the Iris Prize, and exhibitors can balance in-person and online activity, creating an environment where audiences can feel engaged and included whether they are attending in-person or virtually.

Jonathan Campbell: Placemakers. Investigated how screen-based media might enable people to better engage with their built surroundings and meaningfully contribute to its design.

Iungo Solutions: A careers management platform for aspiring creative freelancers. Creative Careers Platform aimed to engage, inspire, and inform new, returning, and early career freelancers; helping them to grow their confidence, connections, and professional capabilities.

Yeti Media: Tiny Tour. Developed a package to film a life-sized person in a real tiny-scale world. Used technology to shrink down people to a size where they can seemingly wander around the tiniest of spaces - from a room in a doll's house to a crack in the pavement, pushing the boundaries of filming on a miniature scale.

Goggleminds: Exploring the utility of immersive technology to deliver training to the healthcare sector. Explored the gamification and accessibility of a training simulation using virtual reality (VR) to train healthcare professionals. Aiming to give organisations better access to high-quality training content, improving efficiencies and flexibility.

Voice.Wales: Voice.wales photo agency. Addressed a significant lack of quality images that document the people and politics of Wales by researching and developing a ground-breaking photo agency for the Welsh news industry, showcasing high-quality images that can be licensed or sold to other media outlets in Wales, the UK, and the world.

Krystal S. Lowe: Presenting Individual Identities. Created new tools developed directly with people from minority cultures and representatives of the screen and news sector to equip the media to share authentic, accessible and relevant stories to engage currently under-served and under-represented audiences.

Jonathan Dunn: Variations through Editing. Conducted deep collaboration with the blind/visually-impaired community to understand current lived experiences, engaging with them to shape an interactive tool to generate a personalised variation of a dance film - a unique edit collected from a shared library of footage.

Optimistic Trout Productions: Green Gathering Beyond the Festival. Researched the use of innovative screen-based technologies to effectively engage wider audiences with environmental, sustainability and climate change issues, creating a unique online festival experience that is designed to inspire sustainable lifestyle changes.

Laku Neg: Laku Library. Scoped a platform to gather and share African diaspora and indigenous stories on screen. This project aimed to better understand - through a series of interview prototypes - the ways in which care and agency can be interwoven in life storytelling, paying particular attention to form, content and sustainability.

VJ Appleton: Divergent Emergent. To bridge the employment gap for neurodivergent and disabled people through research and development of a neuro-inclusive and accessible application, creating multimedia access documents which enable users to talk about their strengths and skills, use their authentic 'voices' to communicate what their needs are and helping businesses be the best equipped they can be to meet needs from their first interactions.

Out of funding round projects

Cardiff Animation Festival: A Net Zero Animation Industry (Green Cymru Challenge Fund). Explored a service to help the Welsh animation, games and post-production industries achieve net zero by 2030 through in-depth interviews, carbon footprint analysis, co-creation workshops and consultation surveys. Resulting in a route map to reaching net zero through a new, economically sustainable service.

Chris Buxton: Hybrid Narrative (Green Cymru Challenge Fund). A new approach to making films that transforms the amount of resources they require and their potential impact on the environment. Combining green screen filming with motion design techniques and low-cost digital tools to reimagine how we tell stories on screen.

Severn Screen: Maximising Havoc (Green Cymru Challenge Fund). Developed indepth analysis of the sustainable filmmaking techniques developed while making Havoc, building on the momentum created by Gareth Evans' ground-breaking Netflix production, and helping to embed new learning and systems for future productions (large and small). Delivered extended analysis of the data captured on Havoc by the production's full-time Environmental Steward Tilly Ashton - recording key sustainability success stories, as well as identifying future challenges and opportunities.

Sugar Creative: Arrall (Amgueddfa Cymru Challenge Fund). Combined creative content with cutting edge immersive augmented reality to allow for visitors to see and engage with a range of personal interpretations and reactions to objects in the National Museum Wales collection.

The Bureau of Investigative Journalism, Ethnic Minorities and Youth Support Team Wales (EYST) and Lankelly Chase: The People's Newsroom. Explored a new pipeline into media ownership - hands-on business and startup support to design innovative new journalism initiatives and invest in community newsroom leaders traditionally marginalised in media production. The team researched, designed and built a new community journalism project in Swansea.

Gorilla: My Gorilla. Building of a secure, immediate and simple service to allow clients of Gorilla to gain remote access from anywhere in the world to view their footage without generating any new media.

Where next?

Clwstwr's success – in proving the importance of bespoke RD&I programmes for creative industry growth and resilience – enabled the Centre for the Creative Economy at Cardiff University to take this work to the next level. Collaborations made and knowledge gained during the Clwstwr programme (in industry, academia and policy) allowed the Centre to bring together a 23-partner Consortium – Media Cymru - and successfully secure UK Government Industrial Strategy funding in 2022. Media Cymru is funded through £22 million from UK Research and Innovation's (UKRI) flagship Strength in Places Fund, £3 million from Cardiff Capital Region (CCR), £1 million from Welsh Government, through Creative Wales, and £23 million match funding from industry and university partners.

Media Cymru is one of the first major UKRI investments in RD&I to be awarded outside the STEM disciplinary domains. It is, we hope, the first of many, and is undoubtedly a validation of the CICP investment. The CICP developed emerging expertise in creative industries RD&I, supercharged collaborative partnership building, and rewrote the rules around investment in the creative industries. Before Clwstwr, raising more than £20 million in match funding from a regional creative sector dominated by small independent companies would have been unimaginable. Clwstwr's experience — one repeated across the CICP programme — made it (almost) an expectation.

Media Cymru advances the work that Clwstwr started. It allows the team to recreate, modify and refine the innovation pipeline developed during the Clwstwr programme, incorporating the many lessons learned about effective forms of R&D. It also allows the cluster to scale it's RD&I ambitions and activity through 18 challenge led projects across every stage of media production – reimagining infrastructure, content and audience engagement. It combines – as Clwstwr began to - economic growth with positive social, cultural and environmental outcomes: its activities around EDI and greening the media sector are ambitious and wide-ranging.

Media Cymru also allows us to continue to learn from the inventive companies whose work is highlighted in this report. We will follow their progress with much curiosity and more than a little pride. Our heartfelt thanks to them for their ideas, ingenuity and dedication.

Diolch o galon and Ymlaen!

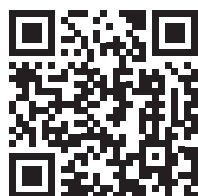Find out more about Media Cymru here
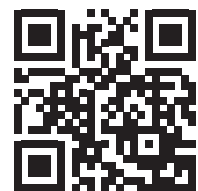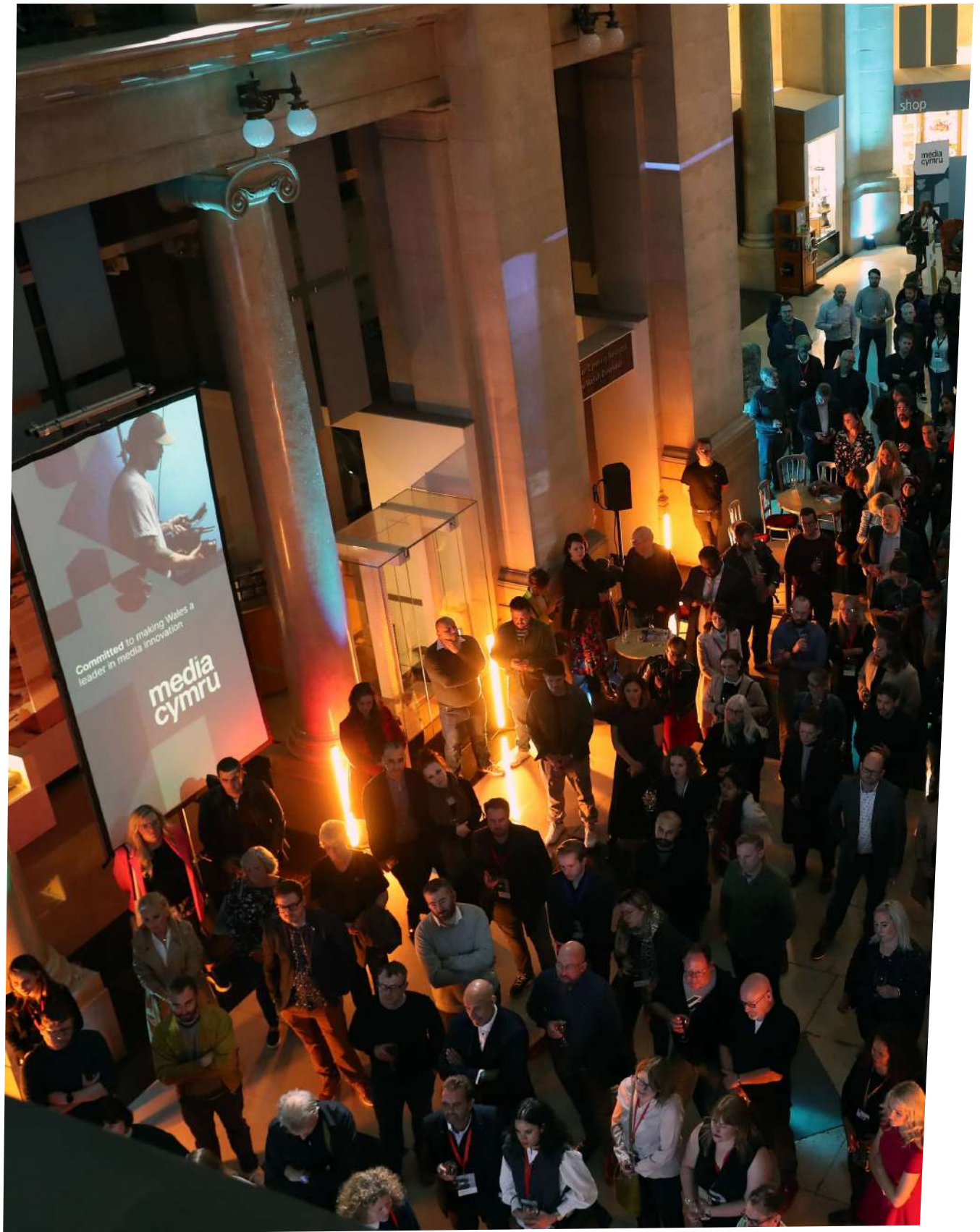
Methodological notes

The data and analysis in this report stem from various data sources. Where applicable we have linked to Clwstwr Research Reports, Programme Reports and Policy Briefs published by Clwstwr, which outline methods, insights and data in more detail.

More information can be found on the Clwstwr website:

1.Programme data gathering

Throughout the Clwstwr programme, we collected various forms of data, including:

— Expressions of Interest and Application forms

— Final report forms for Clwstwr funded projects

— Diversity monitoring forms collected from project lead applicants, our stakeholders and members of Clwstwr funded projects

— Event and workshop registration forms

— Newsletter sign up forms

— Payment claim forms

— The Hubspot CRM system

For more information how we collect and processed data within the Clwstwr programme see https://clwstwr.org.uk/privacy-policy

2. Clwstwr funded project interviews

Between November 2021 and January 2023, we conducted 68 interviews with businesses and sole traders engaging in R&D through the Clwstwr programme. The interviews lasted around one hour and used a tailored framework building on cultural theory and value creation processes. The approach was based on the conceptual framework developed by Fuller et al (2011), which looks at how value emerges in the cultural and creative industries. We adapted this model to Clwstwr, by considering the programme's three focus areas (environmental sustainability, EDI and R&D leadership). The resulting model informed the structure of the interview, and enabled us to collect in-depth data for R&D on all three levels of value generation established by Fuller et al. (reflexivity, operability and sensitivity).

In the first phase of the interview, we used Miro, a live collaboration tool, to explore projects' R&D journeys. Using graphic elicitation as a main approach, we asked interviewees to draw their R&D journey chronologically against their expectations and challenges, and to walk us through

their drawings to provide a more detailed narrative of their R&D experience. Finally, we provided them with a list of key performance indicators for R&D projects and asked them to select and position the relevant indicators for their project. In the second half of the interview, we explored a series of pre-established questions. The collected data was analysed using a combination of statistical and qualitative analysis.

For the quantitative analysis of the interview drawings, we have encoded all drawings recording the R&D journeys of Clwstwr projects following uniform criteria. We have split all timelines up into four quarters of their time spans. We have also included a pre-funding and a post-funding phase. We measured manually the level of progress compared to expectations for each project and for each temporal delineation. This metric was a score between –2 and 2, with –2 denoting "not meeting expectations at all" and 2 standing for "fully meeting expectations" (of progress at any point in time). We have taken the simple average of these measured scores for each period to construct the typical R&D journey of Clwstwr- funded projects. We have split the sample into single- and double-funded projects to assess the progress differentials across them. In addition, we have counted and classified the number and nature of R&D milestones that each project has hit at various points in time. These milestones include R&D strategies, implementation actions, commercial and economic progress (or results), collaboration milestones, interactions with Clwstwr's Producers or events, etc. We have used this data together with the satisfaction (as described above) to proceed with correlation and regression analysis. We have carried this strand of the research out in STATA 16. This step of the research process allowed us to find the "sweet spot" of Clwstwr support in terms of the metric on meeting R&D expectations (see

the body of the text). This was obtained by plotting satisfaction scores at the end of the project with the total number of interactions that Clwstwr's fundees have had with the Clwstwr team and events. This type of analysis has also allowed us to establish the findings that we communicate in the body of the text.

For the qualitative analysis we coded answers using Nvivo software, following an inductive reasoning approach. This approach supported an in-depth exploration of different R&D pathways undertaken by projects.

3. Economic and innovation impact analysis

3.1. Data collection on individual companies

The results on economic growth in the body of the report rely on a baseline survey conducted both on Clwstwr-funded businesses alongside a large sample of other Welsh creative firms. The survey included questions on numerous economic attributes, including turnover, profits, exports, employment, and R&D tax credits. All of the Clwstwr-funded businesses filled out the questionnaire at the start of their projects, and 38 of them (45%) responded to the survey again after finishing their projects, allowing us to match their pre-Clwstwr responses to their post-Clwstwr answers. We extrapolated their responses to the remaining 47 Clwstwr-funded businesses that did not fill out the second wave of the survey. This was sense checked by looking at the businesses in more detail. 421 other creative businesses without Clwstwr funding completed the baseline survey. There is very little overlap

across the before- and after-Clwstwr samples, which is why we compare averages across them for creative businesses without Clwstwr funding. In order to eliminate sample selection effects, we have removed extreme outliers from the pre-Clwstwr baseline of companies without Clwstwr funding (a standard intervention in statistical analyses). This cleaning step is a cautious move that – if anything – limits the measured impact of Clwstwr.

3.2. Calculating Clwstwr's direct impact

As noted in the body of the text, each Clwstwr-funded company has generated an average of £91,242 in surplus turnover during their projects. Multiplying this figure by 85 (which corresponds to the number of companies that Clwstwr funded) results in a total turnover impact of £7,755,570.

From this turnover figure, we have calculated Clwstwr's GVA contribution as follows:

Direct GVA: Direct GVA corresponds to the remuneration of production factors i.e. salaries, wages and returns to shareholders. This latter element of direct GVA corresponds to net value added. Clwstwr-funded companies have reported in the post-Clwstwr survey that on average, they had spent approximately 33% of their turnover on salaries and 34% of their turnover corresponded to net value added. Therefore, Clwstwr's direct GVA impact through the Clwstwr-funded companies corresponded to 67% (33%+34%) of the total excess turnover attributable to Clwstwr. This gave a figure of £ 5,196,231. In addition to this sum, Clwstwr generated labour compensation via the full-time employees engaged at Cardiff University's Centre for the Creative Economy. We have taken into account the salaries of those employees that had a specific job description of directly engaging with Clwstwr-funded projects. This generated an additional £ 1,370,000 in direct GVA. Overall, therefore,

the direct GVA impact of Clwstwr was the sum of these two elements, corresponding to £6,566,231.

Indirect and induced GVA: for every additional pound of turnover generated becomes turnover and GVA elsewhere in the Welsh economy or beyond. Clwstwr-funded companies purchase inputs from other firms, which in turn is output from a third firm, etc. Salaries and shareholder compensation is also spent in Wales and beyond and generates GVA in the same iterative process. This process results in the following formula for calculating total indirect and induced GVA, which, together with direct GVA results in Clwstwr's total GVA impact.

Induced and indirect GVA = $\alpha \gamma T / (1-\alpha)$,

where T corresponds to turnover, α to the direct GVA to turnover ratio and γ to the proportion of turnover/labour/capital compensation spent locally (in Wales). We estimate α to be equal to 0.71, in line with StatsWales data https://statswales.gov.wales/Catalogue/Business-Economy-and-Labour-Market/RegionalAccounts/Gross-Value-Added-GDP/gvainwales-by-industry

This ratio is important to disentangle the percentage of turnover from purchasing input/household consumption that will be passed on as GVA. We have surveyed Clwstwr-funded companies on γ (the share of turnover spent in Wales) directly. They reported an average of 0.38, meaning that they source 38% of their consumption locally. Consequently, indirect and induced GVA directly contributed (on top of direct GVA) by Clwstwr-funded firms corresponded to

(0.71*0.38*£7,755,570) / 0.29 = £7,215,354.

In addition to this, the salaries of the Clwstwr delivery team at Cardiff University's Centre for the Creative Economy generated an additional indirect/induced GVA of

(0.71*0.54*£1,370,000) / 0.29 = £1,795,172

adding up to a total of £9,010,526 as shown in the body of the report. Note that we estimate that households source more of their consumption locally than companies (54% for households as opposed to 38% for companies).

Direct employment creation: As we show in the body of the text, each Clwstwr-funded firm created an average of 1.38 FTEs during their projects. Multiplying this figure by 85 (the number of companies supported by Clwstwr) amounts to 117 long-term new full time jobs. In addition to that, the delivery team at the Centre for the Creative Economy of Cardiff University created 20 long-term FTEs from Clwstwr to Media Cymru, totalling 137 new jobs created by Clwstwr.

Indirect employment creation in Wales: To understand how many jobs have been created through indirect and induced effects, we look at how many employees were necessary to produce the indirect and induced GVA figure of £9,010,526 in the Welsh economy. Using the turnover to GVA ratio from the induced and indirect GVA calculation section above (0.71), it took £12,690,873 of turnover to produce the indirect and induced GVA of £9,010,526 Clwstwr generated. Looking at Welsh business turnover per employee of £41,473, it took 309 FTEs to produce the turnover of £12,690,873. (Sources for the £41,473 figure: GOV.UK: Business population estimates 2019, Wales, table 21 and https://www.nomisweb.co.uk/reports/lmp/la/1946157397/report.aspx).

3.3. National sectoral statistics and Clwstwr's contribution

To collect information on the entirety of the Welsh creative economy, we have used the FAME and ORBIS datasets by Bureau van Dijk. These datasets contain firm-level information on sectors of activity, turnover, full time employment, etc. We have filtered all Welsh firms according to the DCMS' definition of creative sectors. Then, after meticulously cleaning the dataset from erroneous figures and imputing realistic estimates for missing data, we have added up turnover and employment figures for all Welsh creative firms for 2019 and 2022. The results of this process are in the body of the text. Note that our estimates for 2022 are cautious, as many relevant firms have not reported their accounting figures for 2022 at the time of drafting this report. The final numbers may therefore change in subsequent pieces of research. Note that our estimates show 10,245 active creative firms in Wales in 2022. This represents an average turnover per firm of £ 413,528 and an average of 4.35 FTEs per firm. We checked that these numbers are broadly consistent with the sample of creative firms that we have surveyed without Clwstwr funding in 2022. This was necessary, as our sample and the entire population of creative firms have shown somewhat different growth profiles between 2019 and 2022.

For a rudimentary consistency check, we have calculated the 95% confidence interval for the true average turnover and FTE per firm for 2022 from our sample. This exercise essentially means constructing a lower and an upper bound of what the true values of turnover and FTE should be, assuming that our sample of creative firms is not overly biased or skewed. According to this exercise and based on our sample, true average turnover per firm in 2022 should be between £ 202,804 and £ 434,955 based on our sample (which it well is in the ORBIS/FAME sample: £ 413,528). The 95% confidence interval based on our sample for the true average number of FTEs per firm in 2022 is between 3.34 and 5.12. The average of 4.35 FTEs per firm that we have found in the ORBIS/FAME data is congruent with this confidence interval.

Turnover and employment growth figures are straightforward to calculate, corresponding to the differences in total turnover and in the total number of FTEs in 2022 and 2019. To calculate GVA growth figures, we first had to calculate direct and indirect GVA in the Welsh CCIs in 2019 and 2022. Assuming the same direct GVA to turnover ratio as for the Clwstwr-funded firms (67%), direct GVA of the Welsh CCIs was £ 1,387,282,000 in 2019 and £ 1,674,728,000 in 2022. To calculate indirect and induced GVA, we have used the same formula as above, but we assumed that Welsh CCIs in general source 20% of their inputs from local suppliers. This resulted in indirect/induced GVA figures of £1,935,072,000 in 2019 and of £ 2,074,472,000 in 2022. Tallying these numbers up, total GVA growth between 2019 and 2022 has been £ 426,846,000.

Note that Clwstwr has generated 137 FTEs directly employed in the creative sectors. It has generated a further 309 new FTEs, but these employees are from all sectors of the economy. To calculate how many of these 309 indirectly created FTEs worked in the creative sectors, we have used the ratio of creative GVA to total Welsh GDP. According to GOV.WALES, GDP in Wales is roughly £ 79 billion. According to our estimates, CCIs contributed £ 3.75 billion of this figure, i.e. roughly 4.8% of it. We therefore assume that 4.8% of the 309 new FTEs indirectly generated through Clwstwr work in the CCIs, i.e. 15 of them. Therefore, total employment creation through Clwstwr in the Welsh CCIs corresponds to 152 FTEs. This is 5.91% of the 2,569 net new jobs created in the Welsh CCIs between 2019 and 2022.

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Stars4Media: https://stars4media.eu	pg.20
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Creative Wales: https://www.creative.wales	pg.26, 41, 62
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Notes: