

Arts Alive Wales and BBC Connected Studio

Can we use enhanced digital connectivity to present artists' work in new ways to attract a larger and more diverse audience for contemporary art, whilst being sensitive to our local ecological and cultural context?

— **Arts Alive Wales** is an educational arts charity based in Crickhowell, Powys. We use the arts to engage, inspire and enhance the quality of life of people in our local rural communities.

— **BBC Connected Studio**, as part of the BBC's Research and Development department, provides the inspiration, support and platform to help keep the BBC at the cutting-edge of online innovation, and a world leader at delivering engaging, digital broadcast experiences.

— **The Digital Innovation Fund for the Arts in Wales** is a strategic partnership between Arts Council of Wales and Nesta. It is the successor to the Digital R&D Fund for the Arts in Wales that ran from 2013-2015. The fund has supported arts organisations to experiment using digital technology to enhance audience reach or to develop their business model.

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Introduction

Can we use enhanced digital connectivity to present artists' work in new ways to attract a larger and more diverse audience for contemporary art, whilst being sensitive to our local ecological and cultural context?

Here in the Black Mountains and Brecon Beacons National Park, we work with a lot of talented artists creating site-specific work in beautiful, remote places. The mountains – although a real source of inspiration for our artists – provide a challenge for us. In rural areas, it's harder to get the work seen by a wider audience, and online solutions are made trickier by limited internet connectivity. So, we're setting out to explore broadcasting live-streamed and pre-recorded video content to galleries, festivals and online audiences.

We're exploring how we can adapt low-cost, compact, backpack-sized equipment to deliver what we need, and make sure we're offering a consistent, quality audience experience. New technologies are making the equipment needed for high quality filmed content both cheaper and more compact.

Through this process of research and development we have tested a range of available digital technologies and services for creating digital content. We have focussed on using a blend of live streamed and pre-recorded video to create immersive audience experiences. We have delivered two site-specific live streaming events from the Brecon Beacons National Park, allowing us to test the model, the technology and the audience experience of our work.

We found our initial live tests to be a considerable creative and technical challenge, and we're clear that we still have some work to do to make the experience fully satisfying for audiences. Nonetheless, in the course of this research we have been able to try out a whole range of different formats to test their effectiveness. One of the most important areas of learning has been how to use other digital content to create context around the main video being presented. When this works well, it allows us to guide the audience through the digital experience just as we guide our audiences through the natural landscape to reach the works of art in their physical location.

City-based opera houses are already livestreaming their work into village halls. With this research and development project, we would like to present contemporary art created in rural Wales to new audiences beyond our immediate location. In doing so we believe we can challenge perceptions of 'the rural' and at the same time provide greater access to contemporary culture for our local community.

Our strategic challenge

Arts Alive Wales is an arts organisation and educational charity based at the The Old School, our arts venue in the small town of Crickhowell in Powys, Mid-Wales. Our mission is to enrich the lives of people in our local rural and post-industrial communities through active and meaningful participation in high quality contemporary arts and culture, employing the skills and creativity of professional artists.

We work with a wide range of site partners in delivering our work in rural locations, including local authorities, the Landmark Trust and the Canal and River Trust. They share many of our challenges in reaching broad and diverse audiences and they commission us to respond to their sites in order to engage local communities and to attract new visitors.

In the early stages of this project, we gathered initial feedback from our site partners and from artists. Our site partners described their own desire to find ecologically sensitive ways of enhancing internet connectivity to allow them to provide new audiences to engage with their work. They also expressed a desire to harness new technologies to provide educational opportunities and to provide experiences to people with limited mobility who might not be able to visit their locations.

The artists we spoke to at the beginning of this project told us about the many ways they are already using technologies but commented on the lack of hands-on training opportunities. Many of them are looking for more opportunities for nurturing their online audiences in order to reach people who might never otherwise see their work.

This project allows us to test out how audiences respond to these digital ways to present our work. We are particularly keen to explore the potential of using digital technology to provide new experiences for the vulnerable groups with whom we regularly work, in care homes, day centres, schools and homeless shelters.



Research Questions

We developed the following overarching research question:

Can we use enhanced digital connectivity to present artists' work in new ways to attract a larger and more diverse audience for contemporary art, whilst being sensitive to our local ecological and cultural context?

To answer this broader question we investigated the following:

What cost-effective technologies are available to support the production of live-streamed and pre-recorded digital content in a rural arts context?

How can we use these technologies to allow an online audience to experience the work we present in remote rural locations?

How can we work effectively with artists and with our partners to use online content to attract new audiences?

What do audiences see as the advantages and disadvantages of streaming or downloading content as a way of experiencing our work?

What scope is there for growing our local audiences, visiting audiences and online audiences by presenting our work digitally, to stream or download?



Project Delivery





We carried out the following activities as part of our research and development:

Live test 1: Noctule

Our first live test centred on Noctule, a performance by Steffan Caddick and Mark Edward Daman Thomas. This work used sound and light to respond to the setting of a cave known as Eglwys Faen.

A small ticketed audience of 10 people attended the event and we broadcast a livestream online as a means of testing a basic streaming set up. We filmed using three iPads, and broadcast this over a bonded mobile internet connection (that is, a series of mobile phones 'bonded' together), streaming the footage live via Facebook. We then re-filmed the performance and produced a version we showed at a series of festivals, using our horse box studio to create an immersive audience experience. We gathered audience feedback at the live event and online.

Live test 2: Limelight

Our second live test centred on Limelight, an artwork by Rob Smith and Charles Danby. This was a site specific artwork illuminating a limekiln in the Black Mountains which we broadcast to Cardiff Contemporary art festival.

An audience of 52 people attended the live broadcast at a venue in Cardiff, and the stream was available to view live on Facebook. The piece was filmed for the livestream using professional cameras and broadcast using a satellite broadband connection to the

Feedback via email from broadcast partners and artists

We invited feedback via e-mail from our broadcast partners about their experience of the live tests. The artists provided feedback to us about their wider experience of their projects and we have considered the points they have raised about the livestreaming aspect of their piece.

Audience surveys

In addition to the feedback gathered informally and in feedback surveys in relation to each of our live stream tests, we conducted a series of surveys with our audience. This includes a survey sent to people on our mailing list, and to a group of college students.

A full timetable and budget is included as an annex.



We made the following changes to project delivery:

Green energy:

We initially intended to use green energy as the main power source for each of the tests. Although we have used means of generating electricity using water and wind power before, our initial investigations with the equipment used for these tests found methods we had used in the past were not able to reliably provide sufficient levels of energy.

First test:

We intended to use film footage captured at the same time as the livestream to produce a simple video of the performance to show to others. However, as there was little time for planning and limited contact between different partners, we were not satisfied with the footage. In particular the lighting proved to be problematic. We therefore decided to re-stage the performance to get the quality of footage we required. As well as being an additional task, this led to higher costs for editing.

Second test:

We had planned to use a bonded mobile connection to broadcast from the Limekilns however were learned at our early site visits that the location was, despite being in a residential area, almost entirely without a mobile signal on any network. Without the time available to find an alternative location, we opted to hire a satellite broadband connection which involved a level of cost that would normally be beyond our means. The venue hosting the broadcast in Cardiff also had to change at the last minute for reasons beyond our control, which was a real logistical and creative challenge and was discouraging for us and the artists we were working with.

Third test:

We had initially planned a third live streaming test but we realised during the course of the project that the planning period needed to be longer. We realised that a longer planning period was needed to enable us to develop a stronger collaboration with both artists and the broadcast partners. This additional time is needed to adapt our ways of working to make best use of the technology and to develop a good range of content to provide a satisfying experience to audiences.

Cost-effective digital broadcasting for rural arts

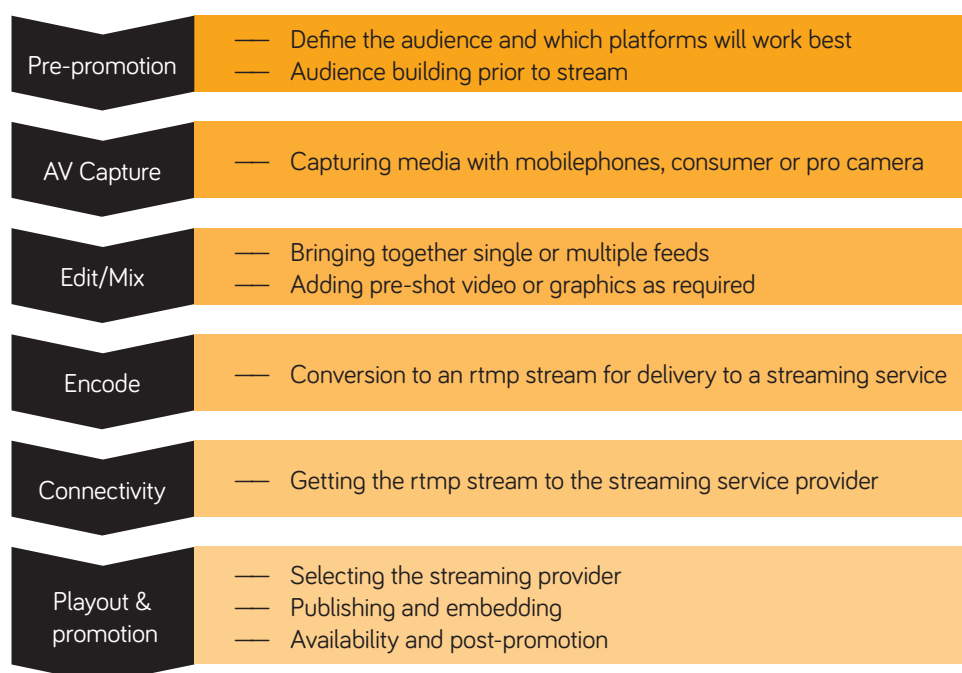
What cost-effective technologies are available to support the production of live-streamed and pre-recorded digital content in a rural arts context?

Working with colleagues at the BBC, we have developed a guide to cost-effective digital broadcasting.

The guide is based around a 'delivery chain' which sets out the steps in delivering a live streamed event (below). For each of these stages we have set out some of the most important technical and audience considerations when setting up your livestream.

We also set out a 'simple streaming' solution, which can be used for initial testing or as the basis for a very basic livestream event without any specialist equipment. These are accompanied by a 'kit bag' which includes a set of (low/no cost) equipment that we consider the minimum for a professional quality broadcast. The kit bag is based on the BBC's mobile journalism kit.

The guide is included as an annex: How to achieve lower cost, higher quality live streaming of the Arts.



Live test 1: Noctule

How can we use these technologies to allow an online audience to experience the work we present in remote rural locations?

The commission

Noctule was a special commission from Peak for the Green Man Festival 2016.

Farm Hand, the solo project of Mark Daman Thomas (member of Islet and founder of Shape Records), collaborated with artist Steffan Caddick who works in video, installation and performance. The pair created a new, site-specific live performance taking place underground in Eglwys Faen (Stone Church), a cave on the Llangatwg Escarpment, three miles from Green Man. The piece responded to the unique acoustics, history and habitat of the cave system – one of the biggest in Europe and home to a colony of Lesser Horseshoe bats.

On Tuesday 16th August a group of 10 people took part in a guided walk through the dramatic Craig Y Cilau National Nature Reserve to experience the performance in the cave and discover the unique ecology and history of the landscape along the way. This number represents the maximum that we can safely accommodate at the venue due to its remoteness and the ecological sensitivity of the site.

Kit list

We felt that this event was a good starting point for our tests due to its particularly rural and isolated location. All equipment had to be carried, as the cave is at least a mile from the nearest road access.

To broadcast this work we brought a team of 6 people to the site. We filmed using three iPads and used a 3/4G bonded connection using four mobile phone sim cards. The bonded connection combines the individual network access of multiple sim cards into one strong connection. The bonded connection then provides wireless and wired internet connections for other devices to access.

A more detailed kit list and schedule is included as an annex.

Audience response

For the purposes of this test, we didn't actively promote the livestream as we were unsure whether the technology would be able to produce a reliable and high quality stream. Several people did happen to view the stream, and the Facebook analytics suggested that they switched off after 10-20 seconds, though some then re-engaged throughout the 20 minute performance.

Elements of the performance were then restaged and filmed three weeks later to produce a shorter film (12 mins) for Peak's Vimeo platform. This version of the performance was then screened at Peak's Horsebox Studio at Green Man festival weekend, attended by more than 750 people over the course of the weekend. We dressed the interior of the horsebox with foliage and we provided viewers with headphones so that they could experience the binaural sound, to evoke a strong sense of place.

We did not formally collect feedback from audience members but we felt that they responded well to this setting. Based on our informal conversations with people we began to formulate our hypothesis about how the audience best respond to viewing an artwork in this way. Some of the points raised included the importance of quality footage, and people's preferences around when and where they might want to view an online broadcast. We also picked up comments that, for a livestream to be successful, people felt that it would have to achieve the same sense of intimacy of a live performance.

Live test 2: Limelight

What scope is there for growing our local audiences, visiting audiences and online audiences by presenting our work digitally, to stream or download?

The commission

Limelight was a project developed by collaborative artists Rob Smith and Charles Danby, based in Newcastle, and the piece was commissioned for Cardiff Contemporary festival.

Supported by Peak/Copa and the Canal & River Trust, the project researched and responded to the working landscape of canals, quarries, tramways and kilns that serviced the lime industry of the rural Black Mountains which in turn fed the nation's heavy industries that roared throughout South Wales.

For their commission, the artists used digital means to bring reflections on this history to urban audiences by streaming live illuminations at nightfall from Llangatwg Limekilns in the heart of the Brecon Beacons National Park to the Welsh capital and online.

The live stream event (22nd October) was attended by 52 people at a venue in Cardiff. It presented multiple perspectives of landscape, combining live with recorded footage, audio and performance in an immersive experience. The illuminations were created with limelight itself, an intense, pure white light generated through heating quicklime at high temperature, used in the 19th century for land survey work and stage lighting. Each live broadcast lasted as long as it took for the chemical reaction to be exhausted.

Kit list

Compared to our previous test, we had a longer planning time for Limelight. A key focus was to overcome the issues with the quality of the footage that had been an issue with Noctule. We decided to use higher specification cameras to enable them to cope with the change in light levels inherent in the piece.

To our surprise, we experienced much more severe connectivity issues with Limelight than in the previous test. The lime kilns at the centre of the piece are in a residential area with a population of around 1000 people. Yet at a visit to the site we realised that there was absolutely no mobile connectivity on any network. After exhausting other options we opted to hire a satellite truck, involving costs would normally be beyond our means. Even then, the connection wasn't perfect but by using a mixture of live and pre-recorded footage, we could be confident that the piece could go ahead even if the live stream dropped out.

A more detailed kit list and schedule is included as an annex.

Audience surveys

We conducted two audience surveys, one of the audience at the venue and one of the audience who viewed the livestream online. The venue audience survey was carried out by the invigilators at the venue, who invited audience members to complete a paper survey. It was completed by 28 of the 52 audience members present. We sent out a link to an identical survey to the online audience via a twitter link retweeted by Cardiff Contemporary Festival and each of the artists. The online survey was completed by 55 people, and we estimate from our analysis of our social media channels that this constitutes around 70 per cent of the online audience.

The results of the two surveys are summarised in the table below. The following three questions were asked, with respondents asked to rate their response on a ten point scale, with ten being the most positive response.

— Expectations: Did Limelight 2016 meet your expectations?

The response from the audience at the venue was broadly positive, with more than half (54 per cent) rating the event seven or eight out of ten and none rating the event five or below. None rated the event nine or ten out of ten. In contrast the online audience appeared generally not to have had their expectations met, with all respondents rating the event five or below.

— Live stream: Did the 'live' stream element enhance your experience?

In relation to the livestream, responses from the venue audience suggested that they did not feel this aspect of the event added to their experience, with all respondents rating this aspect of the piece five or below. The online audience, perhaps unsurprisingly, were more positive though not overwhelmingly so, suggesting room for improvement. Half (50 per cent) of the online survey respondents rating this aspect six or seven out of ten, and around one in five (22 per cent) rating it eight or above.

— Watch online: Would you watch this performance online if you couldn't attend?

Both the online audience and the venue audience showed a similar level of interest in watching a live stream of the event online if they were unable to attend, with just less than half (44 per cent and 46 per cent) rating this question eight out of ten or above, and around one in five (18 per cent and 19 per cent) rating this question five or below.

Rating	Expectations?				Livestream?				Watch online?			
	venue (#)	venue (%)	online (#)	online (%)	venue (#)	venue (%)	online (#)	online (%)	venue (#)	venue (%)	online (#)	online (%)
10	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
9	0	0%	0	0%	0	0%	1	2%	2	8%	12	22%
8	4	15%	0	0%	0	0%	11	20%	10	38%	12	22%
7	10	38%	0	0%	0	0%	15	28%	5	19%	12	22%
6	8	31%	0	0%	0	0%	12	22%	4	15%	7	13%
5	4	15%	8	15%	7	27%	13	24%	4	15%	6	11%
4	0	0%	14	26%	12	46%	2	4%	1	4%	4	7%
3	0	0%	20	37%	6	23%	0	0%	0	0%	1	2%
2	0	0%	12	22%	1	4%	0	0%	0	0%	0	0%
1	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Audience feedback comments

Both online and at the venue we were able to gather informal feedback from audience members that have helped to begin to develop further hypotheses around what would help us to achieve a more satisfying audience experience.

Some of our reflections based on our conversations with audience members include the following:

- We should have captured the setting alight of the lime as part of the broadcast, not just the illumination. Whilst this was something we included in our teaser footage, we didn't include this in the live stream on the day. A number of audience members suggested that this could have been a central feature of the piece, something that they wanted the live stream to allow them to experience.
- We felt there could have been a clearer narrative linking together the live, digital and non-digital aspects of the piece. There were some aspects of the performance in Cardiff that we feel could have been captured for the benefit of the online audience as well, whereas we broadcast only from the limekilns.

We feel that both of these points highlight the need for a longer planning time in order to ensure that the livestream element is really able to capture the essence of the piece for both the audience at the broadcast event and those viewing online.

Feedback from broadcast partners

How can we work effectively with artists and with our partners to use online content to attract new audiences?

For Limelight, we gathered feedback from the Canal and River Trust, and from Cardiff Contemporary festival, who hosted the broadcast. We also asked the artists to evaluate their experience of their project with us, and they included comments about the experience of livestreaming as well as their overall experience of working with us.

Reaching new and larger audiences

Both the Canal and River Trust and Cardiff Contemporary told us they were attracted to the opportunity of being involved with a live broadcast as a means of attracting a larger audience with what they saw as a strong concept.

The digital element seemed like a strong opportunity for the project to connect inland waterways with ports/a major city and reach a wider audiences.

— Canal and River Trust

I thought it would be very good to connect with rural environments and connect with different arts communities... I wanted people to feel immersed into green spaces, real time experiences and all being at the heart of the festival.

— Cardiff Contemporary

The Canal and River Trust, in particular, emphasised the importance of the activity being able to reach large numbers of people, and being able to reach specific target communities, as a measure of success.

We are particularly keen to target areas of low engagement with the arts that include estates along parts of Mon and Brec. canal. It is part of our Arts on the Waterways strategic plan to find new ways to connect rural communities with urban centres.

— Canal and River Trust

Planning time on site

Both Canal and River Trust and Cardiff Contemporary advised us that we would have benefited from allowing a longer planning time with site visits planned earlier into the process. Both of the following comments were received in response to the question, 'Do you have any other advice for us?'

It would make sense to factor in longer testing and lead-in time on site.

— Canal and River Trust

More time for planning and prep, more communication with the artist. More hands on with the technology and back up plans.

— Cardiff Contemporary

Cardiff Contemporary also stressed the importance that the planning time should adequately account for their own publicity schedule.

Looking back, the timings became a slight issue but again I felt confident with the organisation. The recce's could have been earlier which would have fitted into our timings better. It affected publicity and brochures.

— Cardiff Contemporary

Feedback from broadcast partners

Artist feedback

The artists also provided us with some feedback in relation to their experience of the project with us generally, and some of their comments were relevant to the experience of livestreaming.

The artists welcomed the opportunity to develop new aspects of their practice. Having never previously been supported to mix digital with performance in this way they have since continued to develop the work, and have plans to exhibit in other locations in future. They commented that commissioning them to engage in this process as a dialogue rather than commissioning an 'object' was an approach they felt was positive and that they urged us to continue.

Like the Canal and River Trust and Cardiff Contemporary, they also raised the issue of timing and felt that the short timescale meant they were not able to contribute as fully as they could have done to the process. They expressed the strong view that more time on site in Llangatwg was needed.

The last minute change of venue for the performance in Cardiff was also a major disappointment. It left them feeling somewhat detached from the final outcome and, echoing the comments from Cardiff Contemporary, meant they were less able to contribute effectively to the audience engagement before and during the livestreaming.

They felt that they also had valuable expertise and experience that they would have been able to contribute to the process, in terms of the technical choices, the presentation online, the strategies for engaging audiences and the overall evaluation of the project. However, the digital broadcast was only one element of a broader programme which was already a relatively intensive undertaking. This meant that their engagement in these other activities was limited and there would have been greater scope for involving them had there been a longer lead in time.

Audience surveys

What do audiences see as the advantages and disadvantages of streaming or downloading content as a way of experiencing our work?

To deepen our understanding of our audiences' response to the concept of experiencing our artwork online, we conducted an audience survey which we targeted at two audience groups. Firstly, we distributed the survey to our existing mailing list. Secondly we sent the survey to a group of college students who we are involving in our next live stream test.

We received a total of 40 responses, 23 from our mailing list and 17 from the college students. It is not possible to draw firm conclusions from this exercise due to the small numbers of respondents involved. However, there are a number of patterns that may be worth further exploration.

We have examined their responses to understand the online content about contemporary art that interests them, their views on the importance of quality images/video/sound, and the factors that would encourage them to attend our events.

Profile of the sample

The two groups answered the same questions, allowing us to compare their responses. The age profile of the two groups has almost no overlap, with all college students aged 24 or under whilst only one of the mailing list respondents (4 per cent) in this age group. Around half of the college students (47 per cent) had not attended any Art Alive events in the last twelve months, whilst several had attended a talk we had hosted by artist Rebecca Chesney. Almost three quarters of the mailing list respondents (74 per cent) had not attended any Arts Alive events in the last twelve months.

Online content about contemporary art

Based on the questions in this small survey, there were not clear differences between online habits between the young age group (the college students) and the older age group (our current mailing list). Whilst the small proportion who spent the highest amount of time viewing online content about contemporary art were mostly college students, in this small sample the amount of time spent online viewing content about contemporary art was not especially different between the two groups.

A smaller proportion of the college students told us that they generally do not view online content about contemporary art than the mailing list respondents (6 per cent and 22 per cent respectively). However in both cases the majority told us they spent either less than 5 hours per week (35 per cent and 35 per cent), or between 5 and 10 hours per week (35 per cent and 39 per cent).

Both groups identified major international exhibitions that they had looked at online:

Tate Modern has Robert Rauschenberg exhibition opening at the moment

– College Student

The Art of Buildings [international photography competition]

– College Student

Elbphilharmonie opening Italian Museum of Contemporary Art.

– Mailing list respondent

Tend to look at what exhibitions are on at the London galleries.

– Mailing list respondent

Both groups identified individual social media platforms as sources of content about contemporary art:

Instagram blogs and portfolios, also Instagram live feeds, videos of them drawing Art on Pinterest

– College Student

17 emerging artists to watch article on Artsy

– Mailing list respondent

Google Images, Vimeo

– Mailing list respondent

The mailing list respondents also identified some more local exhibitions they had found interesting:

Lubaina Himid exhibition preview images and interviews from Spike Island

– Mailing list respondent

The Clearing at Compton Verney

– Mailing list respondent

The college students also identified online content about creative techniques that had interested them:

Transferring Images onto Clay

— College Student

Sped up creation of digital illustrations

— College Student

Interest in livestreaming

In the survey we asked how often in the last three months they had watched a live stream. Those who regularly viewed livestreamed content were a minority in the case of each group.

In both cases there were large proportions of the sample who said they had not watched any livestreamed content over this period, 53 per cent in the case of the college students and 39 per cent in the case of the mailing list. The greater proportion of the mailing list respondents who said they had watched a live stream may be as a result of our own livestreaming event, Limelight, and several gave this as an example. In both cases, a proportion said they viewed livestreamed content once a week or more, 24 per cent in the case of the college students and 13 per cent in the case of the mailing list respondents.

We received several responses from each group about the most recent livestreamed content they had seen, including:

Artists creating illustration live

— College Student

Live tattooing session

— College Student

Live surfing

— Mailing list respondent

Royal Welsh winter fair

— Mailing list respondent

Importance of quality

We asked two questions about the importance of the quality of images/video/sound when viewing online content. The college students put a slightly greater emphasis on quality compared to our mailing list respondents but not overwhelmingly so. We asked respondents the extent to which they agreed or disagreed with the following statements:

It's important to me that images/video/sound are of the highest quality or I will look for something else.

— Quality statement 1

I think it's okay that the quality of images/video/sound are low if the content is interesting.

— Quality statement 2

In response to the first statement, 65 per cent of the college students agreed or strongly agreed compared to 52 per cent of the mailing list respondents.

In response to the second statement, 18 per cent of the college students agreed or strongly agreed compared to 22 per cent of the mailing list respondents. However fewer of the college students disagreed or disagreed strongly, with 24 per cent giving these responses compared to 52 per cent of the mailing list respondents. Over half of the college students (59 per cent) said they neither agreed nor disagreed, compared to 26 per cent of the mailing list respondents.

Factors affecting attendance

In the survey we asked 'if there was lots of interesting online content about Arts Alive Wales' programme, would this make you more likely to attend our events and workshops in rural mid-Wales?' The majority of respondents from the college students and the mailing list said this would make it more likely they would attend, 59 per cent of the college students and 74 per cent of the mailing list respondents, though a greater proportion of the college students said it would make it much more likely, 29 per cent versus 9 per cent of the mailing list.

We then asked what other factors would make them more likely to attend, to see if our plans to create live and pre-recorded broadcasts could help to address some of these other factors too. Many of these factors were mentioned by individuals from both groups. The full lists of comment we received are included here, grouped into common themes.

Cost and accessibility:

That it was free, and more local

– College Student

Easier transport

– College Student

Affording transport

– College Student

Art at a reasonable cost

– Mailing list respondent

Transportation

– Mailing list respondent

It's a long way to travel but I plan to visit next time I visit friends in the area if it coincides

– Mailing list respondent

Accessible transport, affordability

– Mailing list respondent

Health support

– Mailing list respondent

A number of the mailing list respondents also identified the factor of timing as being important to them:

Regularity of events

– Mailing list respondent

Evening rather than day events. Time for me is a big factor !

– Mailing list respondent

If time suits me

– Mailing list respondent

Evening events like talks or short courses and exhibitions?

– Mailing list respondent

A range of daytime courses

– Mailing list respondent

The dates and times of the activities

– Mailing list respondent

Information:

More information about it in places I would see it, like posters around public places

– College Student

Posters or leaflets so it's easier to find out when and where they're happening.

– College Student

Showing lots of interesting content that is there on a website or social media

– College Student

The times and locations

– College Student

More information about different workshops.

– College Student

If there's a video that has subtitle for hard hearings and written information, so I'd understand the whole content before I attend

– College Student

Newsletter about activities

– Mailing list respondent

More information/invitations via Facebook

– Mailing list respondent

That they are better advertised in advance in the areas that they are taking place, for instance I live in Rhayader and missed the artists talks as I didn't know they were happening!

– Mailing list respondent

More information in galleries of up and coming events.

– Mailing list respondent

Specific interests:

If areas of art I like are explored more, such as illustration.

— College Student

The Artist involved

— College Student

If it was an artist I am interested in

— College Student

Technology used

— College Student

If the topic is what i like

— College Student

Exciting events

— College Student

Workshops

— Mailing list respondent

A course that interests me

— Mailing list respondent

outdoor activities

— Mailing list respondent

Photographic exhibitions

— Mailing list respondent

Something connected with illustration

— Mailing list respondent

Professional and creative development:

The opportunity to talk and meet with the creators/artists themselves

— College Student

To be able to meet and talk to people

— College Student

New techniques for me to learn

— Mailing list respondent

Making contacts with others - networking opportunities - funding

— Mailing list respondent

What we've learned

Taken together, these responses present many opportunities for our digital broadcasts to help us engage a wider audience. Amongst this small sample, there was a clear sense that there is a demand for exciting new online content about Arts Alive and that the right content would encourage more of them to attend our events.

The comments around cost, accessibility, transport and timing also present a clear opportunity for digital broadcasts that would allow us take our work into new locations. The fact that many of the mailing list respondents, in particular, had not attended an Arts Alive event in the last twelve months suggest that the latent demand could be high even amongst our existing mailing list subscribers.

The comments around the need for more information about our work generally and the desire to see our programmes incorporate people's specific interests underline the need for us to enhance our digital presence. Whilst our broadcasts themselves would not directly address this need for more information, the broader digital strategy of which our broadcasts are a part can be a means of addressing it. For example, our broadcasts can provide the basis for richer content across a wide range of social media channels that can then be used as the basis for ongoing conversations with our audience.

The desire for more professional and creative development opportunities could, in theory, be a feature of our broadcasts and the content that surrounds them. Whilst these comments came from a relatively small number of respondents to this survey, we also host a creative network whose involvement with Arts Alive is centred on exactly these kind of development opportunities.

Next steps

Can we use enhanced digital connectivity to present artists' work in new ways to attract a larger and more diverse audience for contemporary art, whilst being sensitive to our local ecological and cultural context?

Our experience of our research and development has confirmed our view that digital broadcast presents an opportunity to expand and diversify audiences beyond our immediate location. However, there are still many difficulties to sharing work digitally. Each of our live tests was a real creative and technical challenge for us and we still have much to learn.

Our engagement with audiences and partners showed a strong positive interest in seeing digital representations of our work. Whilst we did not realise the powerful sense of the 'live' aspect of the work that we had hoped for, audiences and partners responded positively to the different event formats incorporating digital broadcast, complimentary online content, and the opportunity to experience rural contemporary art in locations they wouldn't expect.

We are committed to continuing our programme of digital broadcasts and we are in the process of planning for our third live test. We have included a longer lead in time to allow us to reflect on the feedback from our first two tests and we are confident this will lead to a more satisfying experience for the audience, artists and partners.

As well as giving us a deeper relationship with artists and partners, we feel that the longer time will allow us to improve the integration between the live, digital, and non-digital aspects of the piece to provide a more coherent experience for people on location and online. We feel there would also be scope for producing a wider range of digital content tailored to different audiences.

It has become clear to us through this process that there is a need for more hands-on training opportunities for artists and creative practitioners on using digital successfully in their work. Organisations like Arts Alive already provide a wide range of development opportunities for artists, but we believe that further investment is needed in developing this capacity across the sector for this work to achieve its potential to use new digital technologies to bring contemporary art to new audiences.

We are edging closer to embedding digital across all aspects of our organisation and the way we create and share new art. For us, this process of research and development has really helped inform the beginnings of a digital strategy to enable more people to experience art from our extraordinary rural location.



Project team

Gavin Johnson has spent the last 10 years developing and managing creative projects. During this 10 year period Gavin has supported the management of Swn Festival, during which time the festival won the NME award for best small festival. Gavin has spent the last few years working alongside artists such as Pete Fowler, Mark James, Gruff Rhys, Liam Hopkins, Cian Ciaran, Ryan Eddleston, Sweet Baboo and Shape Records. Gruff Rhys' American Interior was the main digital project within that portfolio and Gavin played a critical role in developing a business model, sourcing and securing finance to ensure project delivery as well as producing the creative briefs, managing partners and the digital team. The project was truly multi-platform and Gavin developed his knowledge about the digital sector, technical language and capabilities and how best to ensure each element was delivered to a high standard. Gavin has been involved with Arts Alive Wales and Peak as a consultant since 2014 and in April 2017 will commence a new staff role with AAW as Digital Manager.

Rebecca Spooner is Arts Alive Wales' Creative Director.

Rebecca is an arts professional with an MA in Fine Art. Since moving to the Black Mountains from Cardiff in 2011, Rebecca has moved fulltime into arts management and transformed the programming and profile of the organisation. Over the past two years Rebecca has led on the research and development of Peak, an initiative responding to Arts Alive's strategic theme of 'arts and environment'. Peak's first artistic programme was piloted during 2016 and was supported by an Arts Council of Wales production grant to introduce artist residencies and commissions in partnership with the Brecon Beacons National Park Authority, the Canal & River Trust and the Landmark Trust. Rebecca is currently being mentored by Gareth Evans, Curator of Film, Whitechapel Gallery, London.

Robin Moore led the technology elements to this project. Robin is Head of Innovation and Connected Studio, BBC Cymru Wales. Robin has been working in digital media for over 20 years: from hands-on designer/developer, through over 10 years as an Executive Producer running BBC Wales' websites and Social Media. As part of BBC Connected Studio, he has worked with a range of partners to pilot new experiences for digital audiences, including interactive video, new uses of Social media and mobile phone based games. Currently his main interests are Virtual Reality/360 video and binaural audio. Robin was asked by Nesta to support Arts Alive Wales on the technical delivery of streaming for this R&D project.

Timetable and budget

Month	Activity	Staff time (days)	
		GJ	RS
Jun 2016	Inception meetings	5	5
Jul-Aug 2016	Plan first livestream test for the Noctule exhibition in August	5	5
	Meet BBC Connected Studio and artists identify technology requirements, including site visits	2	2
Aug 2016	Deliver Noctule live test and gather audience feedback (face to face)	6	6
	Re-stage Noctule for high quality filming	0	1
Sep 2016	Show Noctule film and gather audience feedback	1	1
	Review audience feedback and social media data for Noctule	5	2
	Produce interim report for Noctule	4	1
	Plan second livestream test for the Limelight exhibition in October	5	5
Oct 2016	Meet BBC Connected Studio to identify technology requirements, including site visits	1	1
	Setup Cardiff Contemporary site for live stream exhibition	10	8
	Deliver Limelight live stream exhibition and gather audience feedback (face to face and online)	4	2
	Show Limelight film and gather audience feedback	1	1
Nov 2016	Review audience feedback and social media data for Limelight	4	1
	Produce interim report for Limelight	2	1
Dec-Jan 2017	Gather stakeholder feedback from broadcast partners, site partners and artists	8	2
	Conduct audience surveys	1	1
	Analysis of stakeholder feedback and survey data	5	1
	Plan third livestream test	5	5
	Prepare and submit final report	10	5

Item	Description	Cost
Staff costs: Digital Manager (GJ)	Flat freelance fee over 9 months	£12,000
Staff costs: Creative Director (RS)	Salary costs: 1 day per week over 9 months	£4,800
Staff costs: travel		£800
Staff costs: cameraman/editor		£1000
Staff costs: photographer		£600
Equipment costs	Screen, batteries, sound, peripherals	£1500
Artist Fees		£4000
Subtotal: arts partner costs		£24,700
BBC Connected Studio	Technical support, in kind contribution (estimated)	£12,500
Subtotal: technology partner costs		£12,500
Budget total		£37,200

Noctule Schedule and Kit List

Schedule	
08.30	Move kit to Cave
09.30	Set up generator and kit
10.00	Agree timing for taking cutaways, pre-roll for live experience, interviews with artists and 360. Find out where Mark with need to be for start of audience walking (and grid refs)
10.30	Live test on DevWales account with Laura watching back at base. / Could do as teaser on PEAK Facebook Account
TBC	FILMING 360 video at cave
11.00-11.30	Audience start journey from Greenman (On Par will be filming extracts of the journey) / Mark possibly to join them.
11:30	Audience Walking (Go pro time lapse from bottom)
12:30/13:00	Audience arrive near cave
13:00/13:30	LUNCH (inc. Audience)
14:00/14:30	PERFORMANCE
5 minutes before start	Go Live on Facebook – Agree pre-roll
	Audience walking up last zig-zag park iPad on top of cave or use selfie stick above cave
	Switch to internal camera looking at audience coming in
	Artwork starts
	TBC agree shot list (need hand clap in vision to help align audio for On Par)
15:00	Audience leave
15:10	Start Packing up
15:15	Exchange audio and video files with On Par.

Noctule Schedule and Kit List

Kit

NB. Wear stout walking boots, and be prepared with clothing for very warm weather and cold conditions inside the cave. Bring Sun cream, water, snacks if required. Woolly /sun hat

- Mini tripod for night vision camera
- Generator (note: very heavy)
- Fuel (Robin)
- 3 tripods from DV Solution (from 4pm on Monday)
- 3 iPad holders
- 1 iPhone holder
- 2 x LED lighting rigs + 3 batteries (Mark)
- 1 x LED Lighting rig DV solution
- Gaffer tap,
- cable ties,
- safety tap
- Gloves / Googles (for petrol handling)
- 5 x Ear defenders
- 5 x Helmets
- 5 x head-torches
- 5 x hi-vis vests
- 2 x RCDs
- Trolley (Robin)
- First-aid kit
- Fire Extinguisher
- Media Port
- 3 iPads
- 3 iPad battery packs
- 3 Lightning leads
- Mojo kit bag
- Binaural mics
- iRig audio unit
- night-vision camera
- 360 go-pro rig / larger thread.
- Sony camera and mic
- 3 x go pros and gimbal
- Walkie talkies
- Golf Umbrella (Suzy)
- laptop

Content Requirements:	Suggestions
— Title and description for teaser on Facebook	NOCTULE - Teaser Just a few hours to go until NOCTULE is performed live from a cave in the Black Mountains. A Peak special commission for Green Man festival 2016, you can watch it live here on Facebook.
— Title and Description for experience on Facebook	NOCTULE - Live Watch Now for a live underground performance from the Black Mountains.
— Intro slides to explain to viewers what they will be / are watching	Streaming LIVE from Eglwys Faen Caves in the Black Mountains NOCTULE - A Peak special commission for Green Man festival 2016, Peak.org.uk
	The audience are arriving and the performance will start shortly
	NOCTULE An underground performance by FARM HAND & STEFHAN CADDICK
— Captions in case we do show interviews (we may quickly edit some interviews on what people can expect to go on while the audience are joining us).	TBC Mark Daman Thomas, Musician Stefhan Caddick, Artist Rebecca Spooner, Creative Director Arts Alive etc
— End slides as audience leave	Thank you for joining us
	NOCTULE - An underground performance by FARM HAND & STEFHAN CADDICK
— Technical problem slide	

Limelight schedule and kitlist

Overview

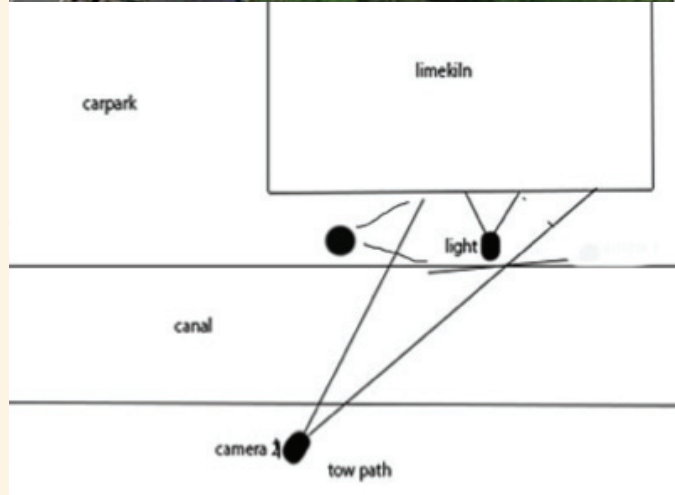
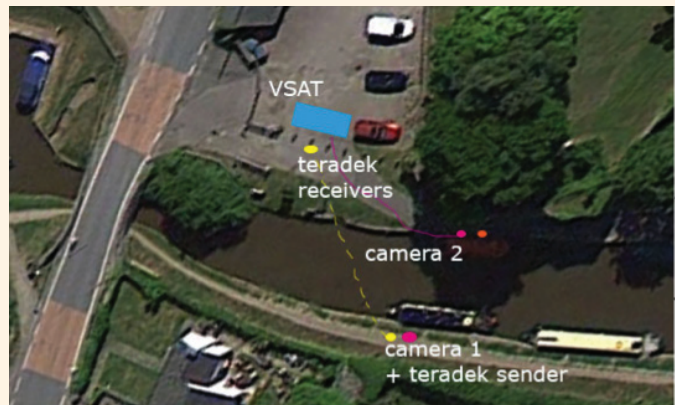
Artists Charles Danby and Rob Smith will create live illuminations connecting the historic lime industry of the Black Mountains with the Welsh capital. Limelight, most notably used in the 19th century for land survey work and stage lighting, provides an intense white light generated from heating quicklime.

The landscape illuminations will be made (in Llangattock, NP8 1LZ) at nightfall and live streamed on Saturday 22 October, 18:00 - 19:00 to audiences at the 'Brickworks', Williams Court, Trade St, CF10 5DQ. A visual record of this event will be installed at the same location from 23 October to 19 November 2016.

Filming Location - Llangattock

<https://www.google.co.uk/maps/@51.8483685,-3.1530961,3a,75y,240.27h,50.67t/data=!3m6!1e1!3m4!1sOOaqepyqTe2U0gNT9o4Ozw!2e0!7i13312!8i6656!6m1!1e1>

OS X (Eastings)	320667
OS Y (Northings)	217270
Nearest Post Code	NP8 1LZ
Lat,Long	51.848367,-3.153108
Nat Grid	SO206172 / SO2066717270



Limelight schedule and kitlist

LIVE STREAM (22/10/16)

Stream two streams from approximately 18:40, with bandwidth available from 17:30 to 17:45 for final test and 18:30 – 19:30.

This is the first time we will have streamed to the projectors so some tweaking of individual streams may take place during the afternoon.

Travel – V-SAT van from BH Cardiff			
NAME	DATE	DEPART	ARRIVE
Robin / Ian / Zac	22/10	14.45 – Back Car Park, Cardiff BH	16:00 – Llangattock
Robin / Ian / Zac	22/10	19.30 – Llangattock	21.00 – Cardiff BH
Suzy	22/10	16.30 – Home	16:45 – Brickworks Cardiff
Suzy	22/10	19:30 – Brickworks Cardiff	20.00 – Home

SCHEDULE - Llangattock (Robin / Ian)	
14.30	Meet G083. Move kit into VSAT, remove power and switch from Shore to Off. Ian pick up pool car.
14.45	Leave BH
16.00	Arrive Llangattock - Deploy Satellite / set up cameras / test Facebook streaming
16:30	22/10
17:00	Test filming from position 1 (long shot) with single camera stream. Test audio. Move camera to safe location and turn both teradeks and camera off
17:30-17:45	Test both streams with cyan/red slides and communication
18:55	Cut streams / projectors to holding slides
18:00-18:30	Check/charge Batteries / tweaking cameras as it gets darker
18:40	Go live two streams with cyan/red slides
18:45	Once confirmed by Cardiff – switch to cameras on streams and Gavin to light lime
19:15-19:20	When lime starts to go out, fade stream back to cyan/red slides. Continue streaming for a couple of minutes. Cardiff to switch projectors to holding slides), then cease stream.
19:30	Extra bandwidth finishes. Pack up and leave Llangattock
21:00	Arrive Cardiff BH and unpack V-SAT, plug in / switch to 'Shore' and keys to security.

SCHEDULE - Cardiff (Suzy)	
16.45	Arrive 'Brickworks', Williams Court, Trade St, CF10 5DQ. Unload any remaining kit (with support from Artists)
17:00 – 18:45	Manage communication with Robin/Ian on streams
18:00 – 18:30	If light levels allow record 360 video of experience.
19:00-19:30	Load kit returning to BBC (PA)
19:30	Return to base

Klt

BBC Kit for Llangattock

- Clothing for cold and wet conditions.
- Walkie talkies?
- Packed lunches
- Tent pegs
- Golf Umbrella
- Gaffer tap,
- cable ties,
- safety tape
- 2 x head-torches
- 1x camping light
- 2 x hi-vis vests
- First-aid kit
- Fire Extinguisher
- 2 x C300 kit with tripod (DV Solutions)
- 4 x Camera battery pack
- 2 x Teradek sender and receivers (DV Solutions)
- 2 x Teradek battery packs (DV Solutions)
- 2 x long STI leads
- 1 x short red STI leads
- 1 x STI lead drum
- 6 x STI connectors
- 2 x Mac Laptop (OBS and BlackMagic software installed and images for filters/slides)
- 2 x Black Magic STI to USB converters
- 1 x small tripod for Teradek receivers
- 4 x LED lights for tripods

BBC Kit for Cardiff (22/10/16)

- 2 x projectors
- 1 x PA system

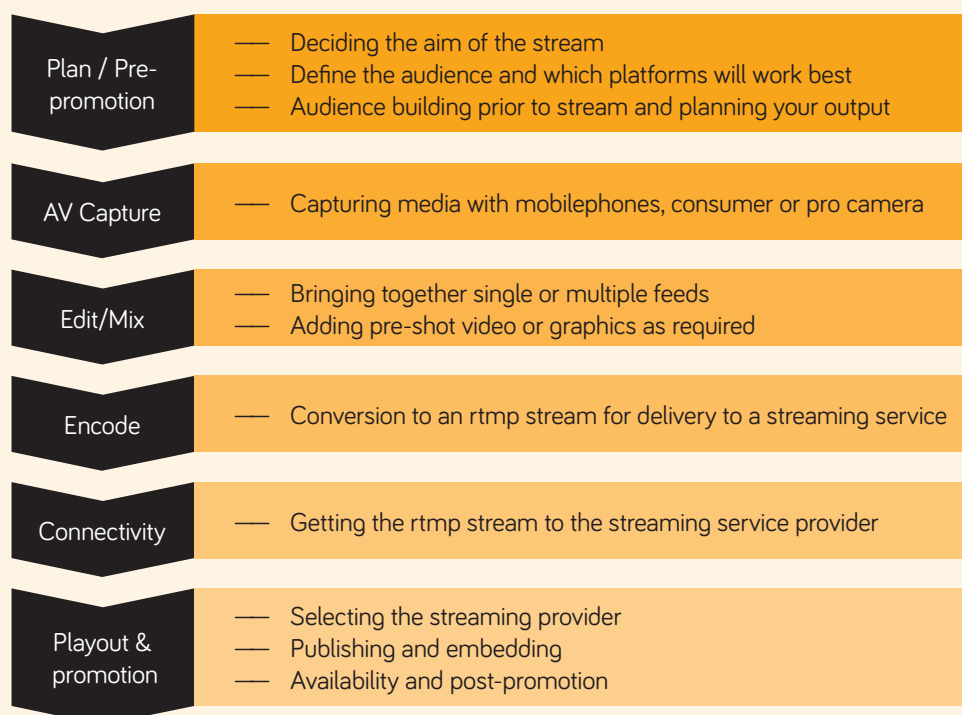
Content Requirements:	Suggestions
<ul style="list-style-type: none"> — Title and description for YouTube streams 	<p>Limelight – the live illumination of a historic limekiln in the Black Mountains using limelight, the heating of quicklime to generate an intense white light. This stream is part of an event by artists Charles Danby and Rob Smith, as part of Cardiff Contemporary. A visual record of this event will be installed at the 'Brickworks', Williams Court, Trade St, Cardiff from 23 October to 19 November 2016.</p> <p>More info / supported by: Cardiff Contemporary - http://www.cardiffcontemporary.co.uk/rob-smith-and-charles-danby Peak/Copa - https://peakart.org.uk/ Canal and River Trust - https://canalrivertrust.org.uk/enjoy-the-waterways/waterway-arts/2016-arts-on-the-waterways-programme</p>
<ul style="list-style-type: none"> — Youtube account - camera position 1 (long shot) 	<p>https://www.youtube.com/channel/UCJuh7TlM38ifgJOC8WRvLgg</p>
<ul style="list-style-type: none"> — Youtube account - camera position 2 (side shot) 	<p>Gavin to provide Arts Alive Youtube (and authenticate)</p>
<ul style="list-style-type: none"> — Back up stream - camera position 1 (long shot) 	<p>Gavin to provide PEAK Facebook</p>
<ul style="list-style-type: none"> — Back up stream - camera position 2 (side shot) 	<p>Cathy's stream - https://www.youtube.com/channel/UC2CtlesCfaPcBLineBJ3Ojw</p>
<ul style="list-style-type: none"> — Colour slides — Blue — red 	<p>https://myshare.box.com/s/vg8r29ob9ywyknkodzqv7bcp63ku3o7 https://myshare.box.com/s/3e05ieic8mcf0nubtvzjcqndycrjw2t</p>

How to achieve lower cost, higher quality live streaming of the Arts.

This section outlines a number of possible methods for extending audiences to a physically located performance or artwork through live streaming to/via social media. This can offer new creative opportunities and extend audiences by adding a live 'appointment to view' that helps promote the experience, reaching audiences online or connecting audiences in two or more locations.

This work was funded by the Digital Innovation Fund for the Arts in Wales and undertaken by BBC Connected Studio Wales in partnership with Arts Alive.

All the streaming approaches we trialled shared a common delivery chain with different options at each step dependant on varying project requirements e.g. location, quality, bandwidth, budget.



How to achieve lower cost, higher quality live streaming of the Arts.

We have suggested a simplified streaming approach below (see also the simple kit bag currently used by BBC Cymru Wales journalists in Appendix 1) followed by a more detailed analysis of each step for those with more specific requirements.

NB. This is a fast-moving, complex technology. This advice is for general information based on our limited trials and should not be treated as a substitute for your own research or expert advice. You may need to seek other advice on issues such as health & safety, rights and moderation. The BBC is not responsible or liable for the contents of any of the sites linked to in this document, nor does it endorse any commercial product or service mentioned.

Simplified streaming approach

The simplest solution to all of the steps above is to use a single social media streaming app on a smartphone (although we would recommend still reviewing Plan/Pre-promotion and Playout and Promotion steps below).

Using a social media platform's own software on a mobile device to capture and stream material is very easy providing you have access to reasonably fast wifi or 4G. The main services are:

- Facebook Live,
- Twitter (or use Periscope)
- Instagram

These services have the advantage of minimal set-up, they allow you to interact with users as they join the stream and may be best for situations where the camera is going to be moving beyond the limits of wires or a single wifi-network (providing there is good 4G coverage).

Think about the orientation – generally start the stream in the vertical or horizontal position as you mean to go on. Some tools (e.g. Periscope) will change orientation when you move your camera.

Facebook also allows you to horizontally flip the video, which is useful if there is text within the artwork, so it shows the correct way around.

However – these apps currently only allow for a single camera, the addition of graphics and overlays is limited and it assumes a good 4G or wifi connection from the mobile you are using. At the very least we found these services useful for initial testing at each location, before investigating more complete solutions.

Planning & pre-promotion

Why stream live?

There are many reasons for streaming content and more still for doing it live. But it is worth considering what your main aims are before you start. Some of the reasons we've considered are:

- Reaching new/bigger/younger audiences on social platforms is inviting, and streaming live, in particular, gives you a way of 'pushing' your work into their newsfeed or creating an 'appointment-to-view'.
- The audience's expectations of live streaming are different to other video content and, providing the content is compelling and relevant, you can get away with much lower production values and hence cost.
- Lower cost, speed and ease of use can allow you to be more experimental.
- Live streams can feel more exclusive and intimate, and of course allow those who couldn't get to event to have access.
- Streams allow you to interact with your audience, which can deliver deeper audience engagement. Generally live streams get more interaction via comments and are usually watched for 3 times longer than similar on-demand video.
- Streaming can be used to link two physical locations (although this requires testing as there is considerable variation in the delay)

However, running a stream live is not without challenges (which we will cover later) so it is worth considering whether you can get the same benefit from on-demand video or an online event e.g. gathering an audience to watch together and interact with each other but with more of the streamed material pre-shot.

How to achieve lower cost, higher quality live streaming of the Arts.

What will streaming add to the artwork?

How you approach your stream will depend on what you are hoping to achieve and the nature of the specific artwork. Streaming offers a limited window on the artwork and there are aspects of context (e.g. the feel of the venue, being part of a physical audience) or of the actual piece (e.g. subtleties of colour or movement, things happening outside the camera view), which may not be communicated at all in the stream.

You ideally need to work to the strengths of the medium and it may be that you design the streamed experience to be different to, as opposed to being a poor imitation of, the experience of those physically present. Put simply, in our pilot it became clear that the content was more important than the technology.

Who is your audience, and where / when will they be likely to be online?

Consider where your audience will come from and how they will find out about the stream. What times are they most likely to be online and able to watch, on what device, will they be using portrait or landscape video (the majority use the former) and how far in advance should it be promoted – lots of time for teasers but not so much that they get bored? What aspect of the work/performance is most likely to draw them in, given who and where they are likely to be? Use this knowledge when deciding how to title and share the stream.

Which social media platform should you use?

Try to find out which platforms are most used amongst your target audience and for what purpose. Different platforms have different strengths e.g. Twitter users are often more publically vocal, Facebook has many times the number of users. Don't just default to streaming on the account you happen to have. While this is less important, if you mainly want to reach an audience at a physical location or through your current communications channels, it is usually best to go to where the audience are rather than ask them to come to you.

How will users find the stream?

Clearly promoting on social media platforms, in particular any you are streaming on, will help, but also look at email newsletters, word of mouth etc. Promotion through the artists, performers, venue or festival social media accounts was particularly useful in our trial. It allowed us to reach, not only audiences who had a connection and were unable to come due to its location, but also those who were not necessarily aware of the project but were near/interested in the location.

If streaming to or from a physical location with an audience present, will you be promoting it to them beforehand? They may want to tell their friends that they are part of something their friends can watch too.

You also need to consider at this point, if you have to embed the stream so that it appears on partner/commissioner websites/social accounts. Embedded streams are likely to get less traffic than those promoted directly on something like Facebook, where the audience are already, but may still be a necessity.

There is excellent help on promoting live streams on YouTube or for general advice for all promoting social media events.

What will happen during the stream?

Finally, you need to plan what your stream will show. Here are some tips on what to consider when planning the stream:

- Recheck your location (be aware that the location will change at different times of day e.g. the lighting will vary)
- Permissions – do you have rights to film at the location and do the people there know you will be streaming them live
- Make sure you charge your batteries, ensure no interruptions such as phone calls
- Be clear when the stream will start, how you will start it strongly (most users on YouTube decide whether to watch a video or not in the first few seconds) and how it will set the context/tone for the rest of the stream
- What will you do if something goes wrong e.g. Light and sound issues or a drop in bandwidth – will you prepare a text message you can post?
- If you allow for comments, you may need to consider things like moderation and a profanity filter
- What will be the trigger for ending the stream and how to end it clearly and concisely?

There are also a range of risks you may wish to consider when organising Live streaming, helpfully collated by trainer Sue Llewellyn, into the mnemonic SPECTRE (Safety, Privacy, Ethics, Copyright, Trolling, Reputational risk and Emotional trauma).

AV Capture

Quality vs. convenience & cost

The defining requirements for how you capture audio & video are quality and availability/cost of equipment, although some of the other specific issues covered below may impact on your choice.

Using mobile phone cameras

At the low cost end, a smartphone with a good camera will capture well. Mobile phone cameras work best in daylight or well-lit spaces, but tend to give a poor quality picture in darker environments or evening/night-time shooting.

When streaming with a phone the camera doesn't really let you zoom much, and has a fairly small field of view (particularly if using vertical video, which is how the majority of users watch video on their phones). This means that a wobbly, handheld device or quick pans look rather annoying. Ideally use a tripod or gimbal to resolve this (see Appendix 1 for some suggestions).

Mobile devices have the advantage of being able to run streaming service provider software and directly stream over wifi or mobile networks. Be aware of busy events where the wifi network is being shared with the audience (You could ask the audience to put their phones into flight mode if you think this will be a major problem). Being wireless makes them much easier to use, and with good lighting and clever direction / camera placement (to avoid the need for zooming) they will deliver good quality video.

Why might you go with a pro-camera?

Pro-cameras do have advantages, even when filming at the fairly low resolution required for live streaming. They deal much better in low-light conditions or where zoom is required.

Pro-cameras, if you have access to one or more, will mean you can record locally and stream simultaneously, as we found artists wanted to use footage beyond the live stream (e.g. for an edited showreel after the event). Nearly all consumer and pro cameras can do this, but mobile phone cameras could only do this with specific software.

However, introducing pro-camera causes some additional challenges, as most require SDI and HDMI cables, which means running cables, and converting for input into laptops for live streaming can require specific hardware.

Capturing to meet bandwidth limitations

Higher resolution cameras mean bigger video files, requiring higher bandwidth (the speed of your connection to the internet) to stream. Ignoring bandwidth limitations for the moment, capturing at 480p is easily big enough if the end user will mainly be expected to watch in their newsfeed but may not be suitable for the subtlety of a visual arts piece or more distant subject matter, due to low resolution. If the user is likely to click on the video to open it full screen then consider 720p or if you are thinking of projecting the video you may require 1080p (although Facebook didn't support this at the time of writing).

Whatever the camera, you can make more of the available resolution through appropriate composition and frame-rate. If you have a slow moving subject then the frame-rate can be lowered. If you are using a very low resolution or expect most viewers to only view the video within their newsfeed or on mobile, cropping in tight on the subject will be more appealing.

Balancing quality and bandwidth, will be a matter of personal taste and will depend on many factors, so it is best to test what the audience will actually see on their device before making a decision. We found that streaming services' compression also changed the colour balance/contrast so it is worth a comparison test, as the end result may not be the same as what is being seen 'through the viewfinder'.

Remember to consider audio

Audio capture also needs to be considered. Most mobile phone microphones are poor for general filming particularly if moving, but this can be bypassed. We generally used iOS devices and the suggested kitbag (Appendix 1) includes additional audio equipment that can be used to attach other microphones. It is worth noting that an estimated 80% of viewers watch videos on social media with the sound-off, so on-screen text can be useful, even if just to prompt them to turn sound on.

Edit/Mix

Where you need additional cameras; the play-in of graphics or videos or control over blanking the stream, then a mixing solution is needed before encoding and sending to the streaming provider.

How to achieve lower cost, higher quality live streaming of the Arts.

Single mobile phone camera and basic graphics

If you only require one iOS camera and a limited number of graphics or pre-shot videos, you could try WirecastGo, Teradek Live Air Solo or SwitcherGo, all of which look to be good low/no cost solutions which run on a smartphone. Some also support B-roll videos (usually at extra cost) which allow you to pre-record some elements and mix in during the stream.

For these, and most systems, graphics/overlays need to be created (and tested) beforehand. It is useful to have slides to welcome the audience, for partner credits, and any other instructions or technical messages.

Adding multiple mobile phone cameras

For mixing multiple iOS cameras the simplest solution that we tested was SwitcherStudio Pro, which allows you to mix between up to 4 iOS device cameras and easily move between shots and pre-created graphics/overlays. This worked well providing there was a good wifi-network for the iOS cameras to communicate over. Another option for this is Teradek Live Air although it requires an iPad to run with the other iOS devices as cameras. Both are fairly low cost and a step up from just using a social media platform's own app.

Multiple consumer/pro-cameras

Once we introduce other types of cameras then wiring and conversion starts to become a challenge. Most cameras output using HDMI or SDI, but standard desktops/laptops do not have these as inputs without a specialist graphics card or adaptor (don't mistake a HDMI output for being an input!).

We used Black Magic Ultrastudio SDI and HDMI converters to get video signals into laptops for mix/encoding. This allows direct connection from a professional Camera such as a Canon XF305 with embedded Audio and avoided lip sync issues. Remember if you do use these capture devices, of which there are others available, then they usually comes with their own software drivers.

We found lip Sync issues were common throughout non-iOS broadcasts and it's a matter of identifying where the issue is. Sometimes its obvious such as a wireless Mic, but sometimes its becomes very frustrating. Users though seem to be acceptable of issues like this, at least at the moment!

For desktop/laptop mixing of a wider range of types of cameras/inputs, we used open source desktop solution OBS Studio project. While the mixing interface is simplistic, it does allow multiple sources, pre-created graphics and overlays, deals with encoding and is cost free. This was our preferred solution for

more flexibility at low cost.

A hardware solution with a more refined mixing experience, if you are using pro cameras, can be achieved using a Vision Mixer such as the Roland VR-50HD (or the previous SD version Roland VR-3EX), which will also deal with encoding. We have found that with this kit there are occasional lip sync issues and adding an audio delay in the mixer usually can correct this.

For more complex vision mixing on desktop/laptop you might want to look at the following TV style edit solutions: vMixGo or Wirecast. The vMix Go can take in 8 SDI connections and it's an extremely flexible and powerful system but at a cost. Teradek Live Air can also mix iOS cameras and pro-cameras but this requires more Teradek hardware.

Encoding

Once you have your mix it will need to be encoded using rtmp (Real-Time Messaging Protocol) to deliver to a streaming service, which will then re-encode as necessary for the target platform(s).

Generally for the simplest option the encoding is done by social media platform app (e.g. Facebook, Periscope app) or streaming software (e.g. Switcher or Teradek software) on the device you are using. However, YouTube doesn't do this, so they offer a list of separate encoding software, which could also be used to deliver to other platforms.

Using Streaming Keys

If you are not using a social network for capture and mix you will need an rtmp stream Key or ID so that your can send the stream to your account. You can obtain this within your account information on the social network. In some cases you need to register for Live Streaming on the account and/or have a business page or similar for the social media service and not just an individual page. It's worth noting that Facebook and YouTube generate a new stream key when doing each Live, but with Periscope the stream key remains constant unless you manually refresh it.

Balancing Quality and bandwidth

Your primary concern when setting up the encoding software will be matching video size and quality to the available bandwidth as measured by the bitrate (usually measured in kilobits per second Kbps or Megabits per second Mbps).

The larger the video resolution/lower the compression/higher the frame rate then the larger the bandwidth required. For

How to achieve lower cost, higher quality live streaming of the Arts.

instance, for simple talking-head video you could manage with a 1Mbps upload speed, but to stream HD video, as you would watch on TV, you would need an internet connection of 5Mbps+. You might be able to achieve that on a perfect 4G mobile connection but you will need to test this before streaming. You can tweak the encoding to reduce the Kbps required e.g. reduce the frame rate or increase the compression. YouTube make these bitrate recommendations for live streaming which you can compare with the bitrate you are able to get from your internet connection (see connectivity below for how to find this out).

Testing

It is probably best to set up a non-public facing area on the various platforms you plan to use, where you can experiment on what works and where, for example, you can test reducing the frame rate or bit rate if the bandwidth of your internet connection is not fast enough. A fast moving object or person requires a big frame rate but may not require a big bit rate so experiment on what works.

Connectivity

Whatever software you are using, you will need an Internet connection to get the stream to the streaming provider.

Check your location

One of the first things you should do when planning a stream is check connectivity at the location you will be streaming from (and streaming to, if appropriate). For streaming, it is the upload speed that is important and NOT the download.

Wired/Wifi connections

This is usually the best option, however always check as venues sometimes advertise that they have fantastic broadband speeds, when the upload is capped at a very low bandwidth. The Speedtest app (available on desktop, Android and iOS) is very useful for testing wired or wifi connections. If you want to rely on a local network and the wifi doesn't look good enough (or may be slowed when your audience are also using it), then see if the venue will give you a wired connection or a separate wifi-router.

Using 3G/4G

Where wired or wifi isn't available, you can get an idea of 3G/4G coverage at possible locations using Ofcom's broadband and

mobile checker to help narrow down best locations and which mobile provider has best coverage in that area. However always do a speed check at the location to verify.

In buildings, speed can be improved by placing a mobile or 4G dongle against a window or outside on a window sill (carefully secured!). Also, if using your phone be aware that receiving a phone call can knock you off air (look at using 'Do not disturb' settings).

Bonded 3G/4G

If 4G appears not to have quite enough bandwidth for the quality you require, then a 'bonded' unit, which uses multiple 3G or 4G connections, may give enough bandwidth. We successfully trialled a Wired Broadcast Mediaport (one a number of different units available). The Mediaport also acted as a wifi hotspot to connect iOS devices together, which is key for software such as the Studio Switcher app.

Using 4 mobile provider SIM cards, we were able to stream from the edge of a cave in the Black Mountains. At that time the unit cost <£200 per day to hire which seemed reasonable for a much better quality stream. This cost included the use of the sim cards and the data used.

Satellite

If no wifi or 4G is available then the next option is to hire satellite equipment. This is more expensive and complicated to set-up and requires a location that has a line of sight to an available satellite (most of which are in the Southwestern sky). To use satellite you will need to test the line of sight is clear i.e. there are no buildings or trees obstructing the view. Satellite equipment also give out RF radiation, so you need to follow whatever precautions come with the equipment and allow for a safe area around the dish

We found the Dishpointer site useful for judging the clearance needed to see the satellite at a location and if you know which satellite you can use an appropriate mobile phone app at the location, of which there are many in the app store.

To find out exactly which satellite you'll need to speak to the supplier, for something like the KA flyaway kits e.g Sematron (NB. We haven't used and can't specifically endorse this supplier).

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Playout and Promotion

Get familiar with all of the options

Your stream will playout on the social media platform you have selected. There are additional settings within these platforms allowing you to promote the stream when it goes live, deal with interaction, tailor the quality, and determine whether the stream will be offered on-demand after you finish streaming.

Familiarise yourself with the support info for the service before you stream, as you often can't change settings or tweak the stream once it is running without restarting and potentially losing many of your audience.

Use other Social platforms

Where possible prepare posts for other social media, websites and your wider network for when you go live. Be careful to use the correct URL for where your live streams will playout from on your account as this can change per stream.

You may wish to embed the stream into another site, although this was not available on all social media platforms during the trial. We also trialed projecting a YouTube stream on a large screen at a venue and this was effective. Clearly you need to check you have the appropriate bandwidth at the venue and allow for a time delay – we had a delay of 45+ seconds.

Post-promotion works

On-demand audiences catching up after a live stream finishes can be significant – often amounting to two thirds of the total audience. Good descriptions which give context to the stream and adding search engine optimization, and a bit of post-promotion, will help. For instance, we included Greenman in the keywords for one the pilots connected with the festival and posted to their timeline, leading them to share on their account, helping drive a new audience.

Appendix 1 – Simple streaming kit bag

Your stream will play out on the social media platform you have chosen. Based on the experience of streaming garnered during this pilot we suggest the following kit list as suitable for most simple streaming requirements. This kit was originally put together by Guto Thomas for general use by journalists in-the-field. For streaming this kit would complement the use of native social media apps, Studio switcher pro or Teredak Live Air Solo, with other iOS devices borrowed for use as additional cameras.

What's in my BBC Wales Mojo kitbag?

For more details about all of this kit, mojo apps, and how to use them go to: gutothomas.wordpress.com

- iPhone 6sPlus – 128Gb memory, with a protective Olloclip case
- Olloclip clip-on lens (Telephoto / Wide-angle)
- MeFoto Roadtrip Travel Tripod (also turns into Monopod)
- Manfrotto Pixi Tripod
- MeFoto 360 Sidekick and MeFoto 360 Sidekick Plus
- Smartphone Holders
- Shoulderpod Smartphone grip / holder
- Shoulderpod Pro Rig (Wooden handles, mounting bar and adapters – example image below)
- Sennheiser MKE400 Gun Mic, with Rode stereo to smartphone adapter
- Beyer M58 Reporter Stick Microphone and three pin XLR cable
- iRig Pro pre-amp to connect XLR microphones to smartphone audio
- 2 x Rode SmartLav+ lapel mics, with extension cable and 3.5mm adapter
- Headphones, and various BBC Wales branded windshields and microphone flag
- Manfrotto LED Light
- Sandisk iXpand Flash Drive memory stick (64Gb)
- Three Mifi
- Power pack and various chargers & cables
- Lots of apps – see site for suggestions.

