



# 5G Rural Integrated Testbed

## D2.3 Final Report - Tourism Apps

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## 1 Executive Summary

Over the last one and a half years, the 5GRIT project brought together various tourism stakeholders and technology service providers in and around the North Pennines region. The interactions among these stakeholders created an opportunity to understand problems within the region and also created possibilities for innovation around enhancing the in-destination experience of tourists in the rural areas to bring in economic & social benefits within the region.

Our main research question was: how does 5G infrastructure enable the development of rural tourism focussed mobile augmented reality applications, which bring economic and social benefits to the region, especially in those areas which lack connectivity? To answer this question we decided to a) enhance an established AR application called World Around Me (WAM) to deliver video streaming of heritage content over 5G, while promoting local businesses & services to tourists in the region b) create other AR/VR applications to deliver immersive heritage content over 5G and bring the community together.

World Around Me (WAM) augmented reality based mobile app helps travellers find on-demand useful travel information like directions, opening hours, activities, local restaurants, bars & pubs, shops and other places of interest. Using augmented reality WAM helps visitors find their way around. It is the winner of Google Play award 2016 in “Early Adopter” category for its intuitive augmented reality discovery experience. It is also “Editor’s Choice app on Google Play. Over 70,000 users in the UK and over 1 million users worldwide search & discovery nearby services using WAM. Many of these users say it is “Better than Googling” & “Faster than Google Maps”.

5G infrastructure presented a huge opportunity to present network heavy augmented reality based rich immersive audio video content through WAM app to visitors in the AONB region. This content has been curated by North Pennines AONB staff and uploaded to WAM Tourism Platform (CMS) which powers the local discovery experience. We identified key locations around the North Pennines where 5G network can improve visitor experience. WAM’s AR based local discovery experience is already helping tourists find nearby services and learn about heritage with audio/video story telling.

We established a direct relationship between WAM usage in the region and its economic benefits. WAM was used by 89 users who searched 1712 times and spent 18hrs 12 mins in WAM. With this information, we can estimate that around £17,120 was brought into the region through these WAM users. If we were able to promote WAM to 10,000 people, who would have searched for about 200,000 times and brought an economic benefit of £2 million to the region.

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We also invested in co-creating three other AR/VR applications with the local community to show them the benefits of 5G for their region. The other AR/VR projects, Alston Explorer, Alston Time Traveller, and the VR experience of Alston High Mill focussed on creating a strong social impact by engaging various community members in these projects. These projects have contributed towards cohesion and local skill building along with inspiring the younger generation.

The North Pennines AONB Partnership has seen the potential of using digital technologies for sharing stories about the North Pennines and its cultural and natural history, and will use the lessons learnt from this project in future digital initiatives.

## 2 Introduction

According to VisitBritain, in 2014, there were 17.08 million trips to the countryside on domestic overnight trips in England, 18% of the total of these trips, with spend at £3.1 billion (17% of all spending on domestic overnight trips). There were also 340 million tourism day trips involving a trip to the countryside – or 25% of the total – with associated spending of £8.4 billion (19% of all spending on day visits).

Around 70-80% of tourism day-trippers come from within the region they are visiting. This is highest in North East and the North West (85%). The North Pennines AONB is uniquely positioned across the North East & North West to benefit from this trend.

The North Pennines Area of Outstanding Natural Beauty and UNESCO Global Geopark is a stunning landscape of sweeping moorland views, cascading waterfalls, colourful hay meadows, vibrant communities and spectacular wildlife. Most of the North Pennines AONB is rural. Many areas across the region still do not have a phone signal or internet access.

The AONB Partnership is always looking to develop new informative content to engage local residents and visitors to the area. Improved mobile connectivity presents an opportunity to channel rich audio and video content about natural and cultural heritage to this audience.

With the rise of the Digital Revolution, there is also a need to digitally promote the plethora of activities and places in a simple and accessible manner. Communicating digital information about places as well as rich immersive heritage content requires a high transmission network to enable dissemination of content. 5G presents an opportunity to fill this gap.

World Around Me (WAM) augmented reality based mobile app helps travellers find on-demand useful travel information like directions, opening hours, activities, local

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restaurants, bars & pubs, shops and other places of interest. Using augmented reality WAM helps visitors easily find their way around. It is the winner of Google Play award 2016 in the “Early Adopter” category for its intuitive augmented reality discovery experience. It is also “Editor’s Choice app on Google Play. Over 70,000 users in the UK and over 1 million users worldwide search & discover nearby services using WAM. 5G infrastructure presented a huge opportunity to present network heavy augmented reality based rich immersive audio video content through WAM app to visitors in the AONB region.

As part of the 5GRIT project funded by the Department for Digital, Culture, Media and Sport 5G Trials & Testbeds Programme, WAM Tourism platform (a web based Content Management System) was enhanced and provided to the North Pennines AONB Partnership, enabling them to promote local heritage storytelling with audio & video and local events information through World Around Me app in augmented reality. This tourism platform was enhanced to add information about local heritage locations. The tourism content was then delivered to the tourist through WAM app.

Thanks to the 5GRIT project the North Pennines Area of Outstanding Natural Beauty (AONB) Partnership was also able to create three new digital experiences using VR and AR designed to engage new audiences and help them learn more during their visit.

The development of these experiences has also provided an opportunity to engage with the community in Alston Moor and to learn about the potential and the limitations of using digital technology to tell the stories of the area.

Designed to immerse visitors in the hidden histories of the North Pennines AONB, the three applications developed will enhance the experience of visiting Alston Moor for many people, and will increase dwell time and spend as a result.

The three experiences developed were:

A Virtual Reality tour of The High Mill in Alston. Headsets are available at Local Links (Alston Library and Tourist Information Centre). Cardboard headsets have been made available to local shops, with which the content can be viewed on mobile phones.

Alston Time Traveller app. This mobile app enables people to watch and listen to historic characters tell their stories and report on the events of the time in the places where they lived and worked. The characters are played by actors, and the videos are triggered using visual triggers on the camera phone, such as doorways. The app was developed in conjunction with many local historians.

Alston Explorer app. This mobile app was developed using a digital mentor working with the ICT class of the local secondary school. The content and structure of the app was designed, written, filmed and recorded entirely by the students and includes historical information as well as local legends. The app includes two guided trails around Alston, and is ‘gamified’ with tasks at each location to encourage use by children and their families.

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### 3 Research Question -what we set out to achieve

Our main research question was: how does 5G infrastructure enable the development of rural tourism focussed mobile augmented reality applications, which bring economic and social benefits to the region, especially in those areas which lack connectivity?

To answer this question we identified four component aspects:

1. Which are the ideal locations within the North Pennines to provide the 5G network access which can improve the visitor experience?

**Answer:** With Alston, an attractive market town with shops and cafes catering for tourists, being the major settlement in the northern part of the AONB along with an existing tourism attraction in the shape of the South Tynedale Railway, it was judged that this town was a suitable place to test whether we could prolong visitors stay in the area and therefore increase their spend. Alston is also a jumping off point for visits into the North Pennines so nearby smaller settlements such as Nenthead, Allenheads and Ninebanks can benefit from visitors' stay in the area.

2. Which mobile AR experiences over 5G improve the promotion & discovery of local businesses and audio/video heritage content?

**Answer:** In addition to WAM, the AONB Partnership devised three experiences to engage visitors, to inform residents, and to encourage exploration of Alston and the surrounding area. These are a virtual reality exploration of Alston's High Mill, a historic building with an 18<sup>th</sup> century water wheel that cannot normally be seen by visitors; an augmented reality app that brings to life characters from the past in the locations that they lived and worked which forms a trail connecting Alston to Nenthead, Allenheads and Ninebanks; and an explorers' app designed with the local school that shares the hidden histories of Alston and which is designed to encourage visitors to spend longer, and be more active, in the town.

3. How can we measure the local economic impact of the new 5G enabled mobile AR service?

**Answer:**

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We measured the local economic impact of WAM app in the region by equating the value of each WAM search to £10 contributed locally. We can estimate that around £17,120 was brought into the region through WAM by 89 users in the region. Each user on average searched 20 times locally on WAM within the North Pennines. If we were able to promote WAM to 10,000 people, who would have searched for about 200,000 times and brought an economic benefit of £2 million to the region.

### 4. How can we measure the local social impact of the new 5G enabled mobile AR services?

**Answer:** This requires qualitative research within the town of the social impact of the AR services. Particularly with the involvement of the school it would be useful to conduct follow up sessions with the teacher as to the effect of students' involvement in the project. Other research could be conducted with the help of the Alston Moor Parish Council. It is a small community so it should be relatively easy to find a representative sample of people within the town and to determine whether these apps have had a beneficial impact.

The North Pennines AONB has a rich local heritage and bringing this heritage to life, for residents and visitors alike, is a key element of the AONB Management Plan. Good interpretation can provide an emotional engagement which is important to foster feelings of protection towards a landscape we wish to conserve and enhance. Much of this heritage is documented and interpreted in one form or another - largely in print, but also using audio and video and pdf versions of print on websites.

Tourism plays a significant part in the North Pennines local economy, and harnessing our heritage assets to support our tourism businesses is an important part of the work of the AONB Partnership. To ensure we are engaging with as wide an audience as possible and providing activities which encourage people to dwell longer or return, the AONB Partnership has recognised the need to experiment with digital forms of interpretation. With growth in the use of smartphones and changes in visitor behaviour towards on-demand access to information, traditional channels of information do not fulfil the needs of all visitors.

## 4 Implementation

The context to answer the above questions was set by developing an understanding of the tourism activity in the few areas within the North Pennines AONB.

We looked at various user personas of tourists with a view to improve their in-destination experience with 5G enabled augmented reality services, which had to be created during the

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project.

Keeping these personas in mind we designed 5G enabled AR experiences within the WAM app and the North Pennines AONB Partnership's AR/VR apps created during the project as explained below.

### **WAM App enhancement**

In earlier project discussions we looked at identified locations around the North Pennines AONB where 5G network could be made available to tourists. This helped in curating heritage audio/video content specifically for these locations, namely Nenthead Mines, Ninebanks & Alston.

The enhancement of WAM app focussed on provisioning WAM Tourism Platform for the NPAONB staff and regional partners and enabling them to promote local events & heritage locations with audio/video storytelling over 5G to users using WAM app in the region.

A geofence was set up around the North Pennines AONB to show a new section in the WAM app called "Discover North Pennines". This section has an events category, which enables content discovery about local events through WAM mobile app. It also has a heritage category which enables discovery of local heritage locations in AR along with audio/video oral histories. The content in the "Discover North Pennines" section is powered by WAM Tourism Platform.

The staff at the North Pennines AONB Partnership were given access to WAM Tourism Platform to add information about various heritage locations in text, images, audio & video format. They curated the audio/video content in partnership with local historians who participated in various audio/video shoots.

During the project the North Pennines AONB Partnership staff added heritage and events content to the WAM Tourism Platform. This content is now discoverable to tourists using WAM app within the region.

### **The NPAONB AR/VR apps & experiences**

The three NPAONB created apps use different types of interaction, one using virtual reality (VR) so visitors can explore a building of great historical interest but with difficult access; a second using augmented reality (AR) actors to bring alive stories from the past; and a third being a community project with the local school that uses digital interactions such as photographic rub-aways, trails and puzzles to reveal the historic features of the local landscape.



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### **High Mill Virtual Reality**

This immersive virtual reality experience shows what lies behind the decaying exterior of one of Alston town's most imposing but secretive buildings - the High Mill. The building still houses a 30ft waterwheel dating from 1817 but this impressive feature cannot be seen by casual visitors - the VR enables them to step inside the old cornmill's wheel-room to witness it in action. The VR also shows how the cornmill is operated by stripping away the external walls of the building to reveal its workings.

The VR experience for mobile phones can be downloaded at [www.highmillvr.com](http://www.highmillvr.com). Headsets for visitors are available at Local Links within the Town Hall alongside a display about the process of creating the VR and bringing this history to life. Local shops and businesses also have cardboard headsets which visitors can use with their phones.

### **Alston Time Traveller**

This is an augmented reality app experience where the figures of historic characters from the past come to life using their actual words in four locations with which they were associated. Using augmented reality, the characters appear as ghostly, living images on the viewer's phone. In Alston the app will bring to life Joseph Pearson – Alston's postman between 1849 – 1870s standing outside an Alston doorway and remembering events from his diary. He recalls stories of families from the area leaving for Australia and America, local entertainment, local deaths and accidents and the solving of local crimes.

Other characters include Thomas Sopwith, WB Lead's Mine Manager at Allenheads; a miner at Nenthead Mine; and Isaac Holden, the itinerant tea-seller and philanthropist who raised funds for the Ninebanks Hearse House, amongst other gifts to the community.

### **Alston Explorer**

The North Pennines AONB Partnership's appraisal of the initial personas which it created for the project showed that there was an opportunity to provide an experience that appealed to family explorers as well as more mature visitors. The AONB Partnership approached Samuel King's School in Alston and worked with the head teacher and the Year 6 ICT class, giving the students the opportunity to be involved in some real life digital design.

The students worked with a 'digital mentor' through the whole design process of app development from identifying target personas and suitable local stories right through to logo design and the user experience. The resulting app contains two town trails, each with a series of locations to visit, audio and text interpretation, and a mystery or puzzle to solve.

The development of the trails was also helped by a member of Alston Moor Parish Council and historic material was provided by two local historians.

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## 5 Key Learning Points

### WAM

Other than the North Pennines AONB Partnership, who will be the potential partners to benefit from WAM Tourism platform? Local events & heritage organisations who would like to increase footfalls are potential partners to use the service.

How to sign up tourists to 5G network and use WAM on it? Few regions in the North Pennines have 3G access and many areas have no phone signal at all. We identified a region around Ninebanks where there is no phone signal. We are exploring a potential partnership with a Youth Hostel where we set up a 5G Wi-Fi network. Hostel visitors can use the Wi-Fi to access WAM. Usage has helped us to understand 5G latency for the network setup at the youth hostel.

Too much content makes it challenging to communicate well with tourists. This is a classic information design problem which we solved by simplifying the way tourists will discover content in WAM. We focussed on creating content for those places which bring benefit to the region in terms of money flow and developing a personal relationship between the Pennines.

During a 5G workshop conducted in Penrith we learnt about interest of some regional organisations who wanted to explore ways to encourage tourists to spend more time on the local Wi-Fi setup by using WAM.

### North Pennines AONB Partnership AR/VR apps & experiences

The key learning points which the AONB Partnership would like to share relate to two main areas:

#### 1. Realism around timescales and geography

Test-bed projects relating to tourism need to take into consideration the timescale of the tourism season, which in the case of Alston is very short. Alston Moor is a remote area that has been in economic decline for decades. There are few SMEs and these tend to be dormant during the winter months. Take-up of technology is likely to be higher in the run-up to the visitor season.

A realistic amount of time needs to be allowed once 5G connectivity is installed to test the digital experiences/solutions being developed using this connectivity, then to adapt them to the variable connectivity, test again, amend and publish, train the local community business and volunteers in their use, and prepare promotional materials according to what results.

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These are all sequential activities, and in our case were all delayed by the late installation of the 5G equipment. Unfortunately this meant missing an important part of any trial, which would be to have time beyond launch (and within the tourism season) to be able to realistically measure impact on visitors.

## 2. Sensitivity to local realities

Buy-in from the local community is essential. In a community like Alston everybody knows everybody else and are suspicious of outsiders bringing in solutions. It has been a crucial part of the AONB's role to engage with the local community.

It is essential to involve bodies like local Parish Councils and business associations in the project. Tying in with these bodies' decision making process can lead to delays in project roll-out.

As the AONB Partnership has heavily invested in creating good community links it has to take a close interest in all communications coming from the project. This inevitably will cause delays in pushing out PR, especially with technology as potentially controversial as 5G.

The local secondary school is at the heart of the community, and it has proved beneficial to the wider project to involve them from the start in designing and creating outputs for the project. This will prove to be an investment of time that pays dividends. Again this involvement does require working to their time-table, which needs to be built in from the start.

## 6 Results

### WAM

**On 12th Nov 2018** we launched an update of WAM iOS app to iTunes app store with "Discover North Pennines" section powered by WAM Tourism Platform (CMS). CMS includes a fully functional heritage content management system with audio and video uploading capability. This was tested over the 5G network. The "Discover North Pennines" section in WAM app is enabled by a geofence around the North Pennines regions, so it is only visible to those tourists who are within the geofenced region.

**Between 12th Nov 2018 & 31st March 2019 we measured the economic** impact of the WAM application in the region. The economic impact is calculated the number of WAM searches in the region. Each search resembles the intent of a user to search for services such as restaurants, cafes, events, atms, heritage sites etc. We have taken a conservative value for each WAM search as of £10. From 12th Nov 2018 till 31st March 2019, 727 WAM searches happened in the region, creating an estimated local economic benefit of £7,270.

**On 28th Nov 2018**, in Penrith, a workshop to engage with Cumbrian businesses was

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organised by 5GRIT. During the workshop the WAM app on iOS with the “Discover North Pennines” section was shown to the audience. They were shown how heritage locations could be discovered using the WAM app and how tourists could engage with oral histories in audio / video format. We shared details of the 5G use case with the audience and how local businesses and activities could be promoted using WAM.

Since Penrith was within the geofence of the Discover North Pennines section was visible to all iPhone users who downloaded WAM.

Attendees who represented local authorities were impressed by the usability and various search possibilities with WAM. They asked about the specifics of how long it would take to setup WAM Tourism platform for their specific region. They found the camera discovery feature very intuitive.

Others were looking at ways to encourage tourists to spend more time on the local Wi-Fi setup by using WAM, since people spend a lot more time while searching on the camera as opposed to searching on a map. This is because while searching on the camera, people learn more about their surroundings since information on WAM is overlaid on the real world.

Other participants were surprised to find how local services like a “chip shop” or “chippy” could be found on WAM, including information about their opening hours and location. They liked that WAM could serve both as a local search engine and also help people find information which even Google doesn’t provide.

**On 28th Jan 2019** a workshop was organised for local tourism businesses to train them to use WAM Tourism platform so they can add information about local events and more heritage locations with audio/video content. Also they were trained to create / update their “Google My Business profile” so they are easily discoverable by tourists using WAM. We received a good attendance from local businesses including Harbut Law Cottages, Ryder House BnB, The Top Cafe, Alston Wholefoods, Nenthead Arts & Visitor Center and Sunrise Cottage Nenthead. The theme of the workshop was to give businesses an overview of the WAM app, WAM Tourism Platform to add events and heritage content (audio/video) and Google My Business profile management for local businesses.

The session started with a demonstration of WAM app to find local cafes and search for local businesses like Whole foods cafe. The visual orientation capability appealed to the local businesses and all of them downloaded WAM on their devices to have a go at it. They found it intuitive and were keen to explore how their businesses could be discovered on WAM.

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This was followed by a demo of the web CMS highlighting the heritage content already added by the North Pennines AONB Partnership. There were no live events on the system, but businesses who organise events were keen to add them. The businesses were interested in using the events capability to draw visitor footfalls to their businesses. Harbut Law Cottages suggested they will mention WAM events capability to a friend who runs a golf course which organises events throughout the year. Nenthead Arts & Visitor Centre were keen to add their events on WAM.

They have been given access to the system along with the owner of The Top Cafe. They found the system intuitive and user friendly.

We checked that not all information about Harbut Law Cottages & Sunrise Cottage was showing up on WAM - so we conducted a one to one session with these businesses to update their Google My Business profiles. This was done to ensure that correct information about them appeared to WAM users in the region.

WAM promo leaflets were shared with all the attendees who then shared them with their customers, encouraging them to use WAM in the region.

During the session we launched a new promo video about engaging with local heritage content (audio/video) in the North Pennines. A representative from Alston Wholefoods really liked the video and offered to share it with their subscribers on their website, email and social media.

The local businesses saw the benefit of being discoverable on WAM, so we focussed on increasing WAM adoption in the region through the workshop attendees, their customers, partners and also various PR channels.

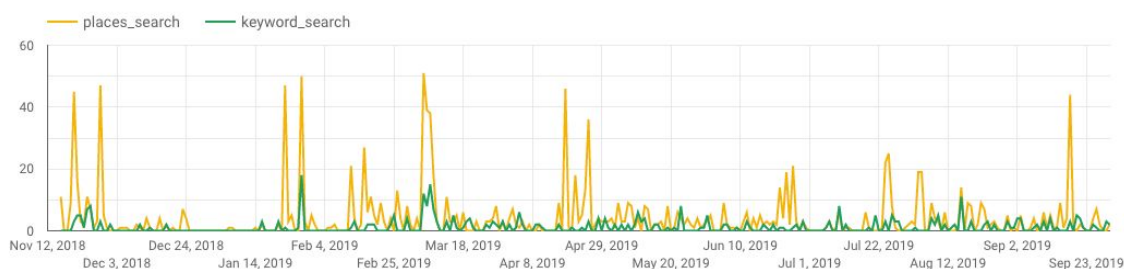
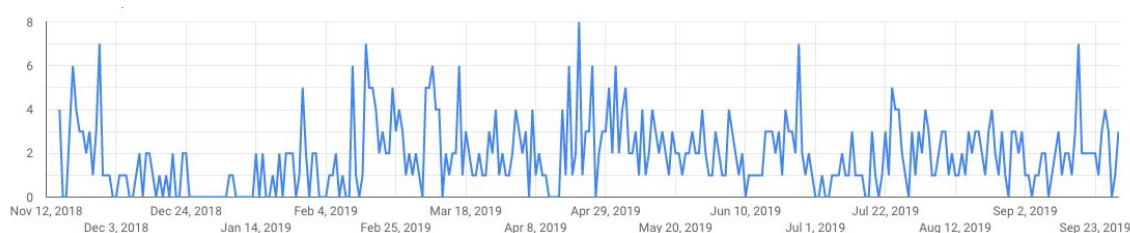
**Between Jan & March 2019** we identified & established a partnership for setting up a 5G hotspot to conduct controlled user trials with WAM usage, especially to measure latency with video streaming. The location of the Youth Hostel in Ninebanks in a region within the North Pennines AONB with no network coverage whatsoever. There is no phone network at all and some local buildings have a very low speed Wi-Fi network. Some of the heritage locations with audio/video content are located around this region, which is walkable.

About 250 WAM promo leaflets were given for distribution at YHA Ninebanks, the local visitor information centre, local B&B's and local cafes to promote WAM to their visitors.

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**Between March & September 2019** we monitored the usage and adoption of WAM in the region. We regularly reported the number of searches in the region and the corresponding user adoption. This is shown below from 12th November 2018 when the Events & Heritage searches feature went live in WAM app.

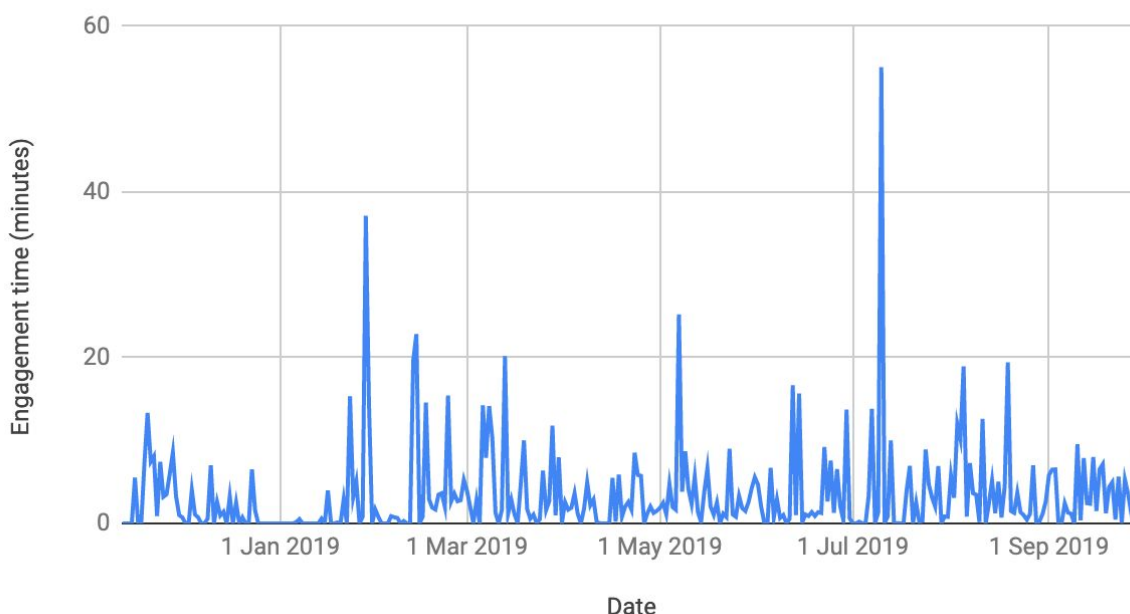
89 users searched 1712 times for nearby places on WAM during this period as shown in the time series graph below.



These users altogether spent 18.2 hours which is 1090 minutes in the app during the course of the project. Each user on average spent 12 mins 15 seconds in the app. Their daily engagement (in minutes) is shown below.

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## User engagement on WAM over time



### **Did the WAM app and its related tourism events increase tourism spend? Increase the spend / benefits to individual local businesses?**

WAM helped 89 tourists search 1712 times for nearby places on WAM during this period. We equate each search with a £10 value. So 1712 times £10 is £17120 spent locally in the region through WAM. We noticed that each user searches on average 20 times. This is 4 times the global searchers/user value, for WAM which is 5.

We can confirm that because of WAM more places were discovered in the region. Visitors found their way to new places, learnt about heritage places and spent time listening to audio video. However we haven't discussed with the various businesses about how tourists found them.

### **Increase in time tourists spend in NP?**

WAM users altogether spent 18.2 hours only using WAM to search and interact with heritage places. They learnt about various services and interacted with places through video & audio using the app.

Without WAM, users would have searched for places using websites and flyers. But with WAM they found a lot more places, hence we can conclude they spent more time in the region. However, we are not in a position to comment on how much time they exactly spent in the region.

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### **How might the digital experiences developed by the North Pennines AONB Partnership benefit tourism businesses in future?**

The activities developed for Alston Moor have added to the tourism offer and provide new activities for a number of different audiences. A number of local businesses have told us that they are delighted with the new apps, for example Ninebanks Youth Hostel who can see the potential for additional activities in and around Alston which will encourage family groups to stay for longer periods.

There is clearly more potential for this kind of interpretation to enhance the visitor experience and increase dwell time elsewhere in the North Pennines. The AONB Partnership will take their experience from this piece of work into the next digital projects they are planning which will be AONB wide.

### **How did the knowledge gained create new opportunities to transfer lessons learned to other AONBs across the UK.**

At a dissemination event the Silverdale AONB learnt about WAM and how it benefits the region. They approached WAM after the event to explore how they could benefit from it. They will be sharing with stakeholders on 20th October during the Get Online Week at Silverdale Village Institute.

### **North Pennines AONB Partnership AR/VR apps & experiences**

Two new apps were developed providing additional activities for visitors of all ages and telling the key heritage stories of the Alston Moor area. Additionally, the local school was instrumental in the design and build of one of the apps, allowing the students to tell their stories to residents and visitors alike.

A new VR experience has also provided additional tourism potential through a partnership with Eden District Council who provide the Tourist Information point in the Town Hall. The library and tourism staff are now responsible for guiding people through the use of the VR headsets and the discovery of a piece of hidden history in Alston.

The VR and the apps were built relatively early on in the project but for various reasons (issues with hardware and risk assessment in the case of the VR, delays to the network installation in the case of the apps) meant that they were not available to the public until later on in the project. The usage figures are, therefore, only for the final 3 months and 1 month of the project respectively. See below:

VR website visits: 01/07/19 - 10/10/19 : 840

Alston Explorer app downloads: 01/09/19 - 10/10/19 : 118



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Alston Time Traveller app downloads: 01/09/19 - 10/10/19 : 78

Another positive result of the building of the three experiences has been community engagement with the town, its community bodies and businesses. The main contacts, with their activities relating to this project, are listed below:

### **Alston Moor Parish Council**

The Parish Council provided the forum in which to present the three planned apps to the local community to pick up on any areas of concern. At the time of the first presentation there was interest but no real concern and the presentation lead to a useful partnership with one of the councillors who provided useful guidance - described below.

### **Nenthead Chapel**

This contact proved to be a very helpful conduit into the community and town of Alston as they knew its geography and issues. She was particularly helpful in designing the second trail for the schools app which takes visitors around the outer edge of the town.

### **Alston Historical Society**

This contact was invaluable in providing archive films and photographs that could be used in the school app and in sharing his knowledge about the recent history of the town. His archive photographs will enable us to provide digital 'rubaways' where a contemporary view of the town is rubbed away on screen to reveal an archive picture of life in the past below,

Another contact provided an important resource in the diaries of Joseph Pearson, Alston's postman between 1847 - 68, a subject of one of the augmented reality historic reconstructions. He also provided information through the Historical Society website which greatly helped with the stories of the workhouse and police station.

### **Headteacher, Samuel King's School**

We are grateful to the Headteacher of Samuel King's School in allowing us to lead the Year 6 ICT class through the process of designing and creating a mobile phone app.

### **ICT teacher, Samuel King's School**

The ICT teacher allowed this project to work closely with his Year 6 ICT class, has been a great enabler - seeing the potential of an app to share the story of his town with visitors.

### **Year 6 ICT – Samuel King's School**

These are the 11/12 year old students who totally engaged with this project and taught us as much as we taught them. Their voices appear on the audio clips that guide tell visitors the stories of different locations in the town.

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### **Alston High Mill**

We were given access to the mill, its archive and recent architectural surveys that greatly sped up the process and ensured the accuracy of the eventual project.

### **Eden Council**

The High Mill VR will be the subject of a small display in Alston Tourist Information Centre and four VR headsets will also be available here for tourists to enjoy.

### **Blueberry's cafe**

This contact supplied us with a host of local stories, some of which were included in the Schools app.

### **Market Cross Alston, shop owner**

This shop owner is kindly allowing us to use the doorway next to her shop as the site for Joseph Pearson, one of the AR historical characters. She is supportive of this venture as she thinks that it will be good for local business.

### **Cybermoor/Quickline/ Pennine Ways Alston**

Cybermoor and Quickline have supported us in providing booster equipment to Nenthead Mines and the Ninebanks Youth Hostel.

### **Nenthead Mines Conservation Society**

The Nenthead Mines Conservation Society has given us access to film underground to share the experience of the normally inaccessible parts of the mine with a wider audience. A selection of these films are available via the WAM app and the whole suite will be available through an interactive map information panel with RFID/NFC triggers later in the year. These films are enabled by a booster installed on the site by Quickline as part of this project.

### **Top Cafe**

The Year 6 ICT students are keen that prizes are given to visitors who successfully complete the trail challenges. The cafe offered to give prizes and we anticipate that once one local business is taking part others will follow.

### **Angel Inn**

A ghost story related to us by staff within the Angel Inn forms the subject of a short film and narrative that will appear on the school app. We are grateful to the manager of the Angel - and his staff for giving us access to film this story over a busy lunchtime.

### **Ninebanks YHA**

D2.3

As well as hosting one of Quickline's boosters, the Youth Hostel at Ninebanks are allowing the hostel to be one of the sites on the augmented reality Ghostlines trail.

### **Nenthead Mines volunteer**

One of the volunteers at Nenthead Mines is also one of the actors on the augmented reality trail. By involving local people at all stages in the process we hope that take up of the various digital experiences will gain local traction through 'word of mouth'.

### **Local historian**

This contact is a major local contact for historical stories about the town having published a series of books on the town's history. His support in wanting to make history engaging will help us bring local support of a more traditional audience to the use of the apps.

### **Local historian**

This contact was the driving force behind Isaac's Tea Trail - a local long distance walk - his support of including Isaac Holden with the augmented reality app will help drive its appeal to the walking/rambling audience.

### **South Tynedale Railway**

We intend to create a further trail for the school app in the future that will start at Alston station. We anticipate filming local volunteers and the steam engines, both in the repair shed and on the track, to add to the appeal of this important visitor destination.

## **7 Future Work**

### **WAM**

The North Pennines AONB Partnership is considering using WAM Tourism Platform as space to upload text, images, audio and video content as part of its ongoing work to provide interpretive content to visitors. Local businesses are now better informed about how to promote themselves on WAM and get discovered by tourists.

### **North Pennines AONB Partnership AR/VR apps & experiences**

The AONB Partnership continues to look at innovative ways to tell important stories about the North Pennines to a diverse audience. As part of an INTERREG funded project the Partnership is currently mid-way through a tender process for a €130,000 contract to procure a digital app which will function across 13 different UNESCO Global Geoparks, in 6 different European territories. It will take the many lessons learnt from the 5GRIT project into this new work.

D2.3

The AONB Partnership has seen the potential of these technologies for storytelling in certain situations, in particular the potential of VR to immerse people in places or times which are not accessible to us now. It has also recognised the current limitations imposed on the technology by the existing mobile connectivity which currently hampers lightweight / cloud-based solutions.

## 8 Conclusion

Over the last one and a half years, the 5GRIT project has brought together various tourism stakeholders and technology service providers in and around the North Pennines region. The interactions among these stakeholders created an opportunity to understand problems within the region and also created possibilities for innovation around enhancing the in-destination experience of tourists in the rural areas to bring in economic & social benefits within the region.

From a WAM perspective, we have identified key locations around the North Pennines where a 5G network can improve visitor experience. WAM's AR based local discovery experience is already helping tourists find nearby services and learn about heritage with audio/video story telling. We have established a direct relationship between WAM usage in the region and its economic and social benefits, which we regularly reported in the benefits realisation template for the project.

During the last 6 months of the project we tested WAM usage by tourists over the 5G network and continued to monitor and report its economic and social benefits to the North Pennines region. We can estimate that about £17,120 was brought into the region through WAM. If we were able to promote WAM to 10,000 people, who would have searched for about 200,000 times, there is a potential economic benefit of £2 million to the region.

The AONB Partnership has seen the potential of using digital technology to communicate with a wider audience and to support the local tourism economy. They will take the lessons from this project into future digital initiatives.