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Research and analysis

Beyond the digital divide: realising wellbeing through a digital needs hierarchy

Published 27 November 2024

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Context

This research project was originally initiated in 2021, and undertaken to provide the Department of Digital, Culture, Media and Sport (DCMS) and Building Digital UK (BDUK) with further insights into the experiences of those living in poorly served areas. These locations were selected to supplement the findings from the Improving Broadband for the Very Hard to Reach Premises Consultation.

The chosen locations represented the limits of BDUK's current reach, yet still offered valuable baseline evidence on the challenges faced in these areas. While BDUK has made significant progress in surrounding regions and similar areas, this report highlights those that are still affected by the digital divide. According to Ofcom data, suppliers are expected to reach at least 97% of the country, and BDUK aims to increase this through targeted investments to extend delivery into areas such as those profiled in this research. Department for Science, Innovation and Technology (DSIT) policy also continues to support solutions to broader coverage.

Despite continuous progress, some premises will inevitably be reached later due to the complexity of the issues and the challenge of incentivising market expansion, even with public subsidies. This report underscores the compounded challenges faced by those still lacking connectivity, emphasising the importance of extending reliable digital infrastructure. Achieving gigabit-capable connectivity in these areas will enable individuals and communities to access the same digital opportunities increasingly available in both urban and rural locations. This is why it remains important that BDUK seek to help the market go further and reach locations such as these.

The research presented here addresses the specific needs of those at most high risk of exclusion due to their rurality. The purpose of this research is to find solutions to their specific needs and to enable BDUK to understand how to measure and monitor benefits as they become apparent in these areas. Through highlighting the severity of the impact of digital exclusion in remote farming communities, it is hoped that this research will provide a pathway to understanding how benefits can be realised in these areas, whilst also reinforcing the continued need for intervention in these areas.

1. Executive Summary

This paper discusses the digital divide and challenges faced by rural areas in accessing reliable broadband and digital technology. It highlights how the COVID-19 pandemic accelerated digitisation, exacerbating existing inequalities for marginalised communities compared to urban centres. Rural areas in the UK face specific obstacles like lower population density, difficult terrain, and exposure to adverse weather, making it challenging to provide the needed digital infrastructure for fast, reliable connectivity. The result is a visual tool to help frame how the realisation of wellbeing is achieved through digital connectivity.

A case study approach is used to delve into the experiences of rural farmers with poor broadband connectivity. The study builds on initial research fieldwork conducted in 2021 for BDUK and expands upon it with new fieldwork and analysis of findings in 2023. Small and Medium Enterprise (SME) farmers were chosen, during 2021, due to their heightened vulnerability in the face of existing uncertainties. The combination of thematic, narrative, and beat analyses offers an interpretive approach to understanding the complexities of rural farmers' experiences with poor broadband connectivity, contributing valuable insights for policy development and further social research.

The discussion explores the effect of digital exclusion on rural farmers' well-being and daily lives, drawing from the thematic and narrative analyses of the presented report. The analysis reveals how poor connectivity affects economic opportunities, personal well-being, personal health and safety, civic participation, and the pursuit of fulfilling activities. Participants' experiences highlight the hierarchy of digital needs they prioritise, ranging from business requirements to personal and community well-being.

This paper suggests a pathway to the realisation of wellbeing through digital connectivity. The Hierarchy of Digital Needs is conceptualised as a potential model by which this can be understood. Wellbeing, whilst not highlighted as a priority by respondents, is suggested as an outcome that may be achievable once other priorities have been met.

Overall, this discussion provides insights into the multiple ways poor digital connectivity affects rural farmers' well-being and quality of life. This is set out in a pyramid diagram to illustrates the hierarchy of priorities and well-being needs for digitally excluded individuals. This emphasises the significance of understanding users' priorities and the importance of skills, access to devices as integral components alongside digital infrastructure availability to address needs and overcoming digital exclusion impacts at each level. It underscores the importance of addressing digital exclusion not only for economic reasons but also for encouraging community well-being, civic engagement, and personal fulfilment.

2. Rural Connectivity in the UK

Those who struggle to access digital technology are not only economically disadvantaged but also face challenges in terms of health, citizenship, democratic involvement, and cultural engagement. While urban areas are moving towards becoming ‘smart cities’ with increased digital integration, rural areas face difficulties due to lower population density and limited broadband access. The COVID-19 pandemic accelerated digitisation across various sectors, exacerbating existing inequalities and deepening the digital divide, especially for marginalised communities. According to the latest Connected Nations report, 78% of UK residential premises currently have access to gigabit connectivity, with just less than 0.3% having access to any decent broadband (Ofcom 2024). A summary of coverage across the four nations of the UK is given in Figure 1.

2.1 Figure 1: Summary of broadband coverage at a fixed location across the UK and Nations from Ofcom Connected Nations Report 2023

	England	Northern Ireland	Scotland	Wales	UK
Gigabit-capable (residential)	78%	92%	72%	64%	78%
Full fibre (residential)	56%	91%	53%	55%	57%
Superfast (residential)	98%	98%	95%	96%	97%
Unable to get decent (all properties)	0.1%	0.3%	0.6%	0.5%	0.2%

Source: Ofcom analysis of provider data (September 2023)

In comparison to their urban counterparts, rural areas in the UK tend to be characterised by lower population density spread over a greater geographical area, with difficult topography that is more likely to be exposed to adverse weather conditions (Update on Rural Connectivity 2019). The combination of these factors presents profound challenges for providing the digital infrastructure needed to support fast, reliable connectivity.

2.2 Figure 2: Residential gigabit capable network coverage

	Total	Urban	Rural
England	78% (19.6m)	83% (18.2m)	45% (1.4m)
Northern Ireland	92% (0.8m)	97% (0.6m)	82% (0.2m)
Scotland	72% (1.9m)	80% (1.8m)	34% (0.2m)
Wales	64% (0.9m)	71% (0.8m)	41% (0.1m)
UK	**78% (23.2m)**	**83% (21.3m)**	**45% (1.9m)**

Source: Ofcom analysis of operator data (September 2023)

However, the specific challenges in rural areas mean the problem is experienced more profoundly (NFU 2023). Small and Medium Enterprises (SMEs) in rural areas are at higher risk of encountering barriers to business performance due to challenges in providing infrastructure, lack of internet access, and lower levels of digital literacy (Tiwasing et al 2022).

Broadband access has the potential to enable innovation and entrepreneurial activity (Bowen and Morris 2019) and the post pandemic economy offers a variety of opportunities to not only expand businesses, but to realise a new range of benefits from the stability that can bring (NICRE 2024). Realising these opportunities is complex, and reliable connectivity is just one piece of that puzzle, but it is an essential building block on the route to the realisation of digital benefits.

2.3 The role of BDUK

Building Digital UK is an executive agency of the Department of Science, Innovation, and Technology (DSIT) helping to bring fast and reliable broadband and mobile coverage to hard-to-reach places in the UK through programmes such as Project Gigabit and the Shared Rural Network. In February 2024, BDUK announced that 1 million premises in the UK now had access to gigabit-capable connectivity as a result of its interventions. Analysis published in April 2024 suggested that BDUK would meet its target of providing 85% coverage by the end of 2025 (Building Digital UK 2024). The remaining 15% represents the hardest communities to provide with connectivity, by virtue of their rurality and the specific challenges that this

presents. Phillip et al (2017) argue that the specific needs of such communities mean that the solutions to their poor connectivity will require more complex solutions that integrate multiple approaches in order to provide infrastructure. The role of BDUK is not only to meet these challenges, but also to adequately evaluate the effectiveness of those interventions. If the solution to providing connectivity to the hardest to reach communities is different, it can also reasonably be assumed that there may be variances in the needs and benefits of those communities. The research presented here addresses this and offers participants living in some of the hardest areas to connect the opportunity to participate in identifying their own needs and benefits from digital connectivity.

3. Research Aims and Objectives

The aim of this paper is to provide a fuller understanding of how users prioritise their wants and needs online.

This research paper draws on research that was conducted in 2021 as part of a UKRI (UK Research and Innovation) Internship scheme with BDUK and combines it with some follow-up interviews to present three case studies that were designed to improve BDUK's understanding of the impact of poor connectivity on rural farmers and their ability to operate as an SME. The aim is to begin to build a framework by which user needs and priorities can be understood through:

- understanding the impact of poor connectivity in rural farming communities
- taking a participatory approach to conceptualising and framing the benefits of reliable connectivity
- giving voice to rural farmers in the identification and understanding of digital needs

4. Methodology

This research paper describes three separate case studies as a way by which the lived experiences of rural farmers with poor broadband connectivity can be explored. The initial research for this study was conducted in 2021 as part of an evidence-gathering activity for BDUK and has been expanded upon in 2023 to draw the findings presented here. Farmers who operate their businesses as Small and Medium Enterprises (SME) were chosen as an area of study due to their increased vulnerability to the range of uncertainties that farmers currently face. As qualitative case

studies, they are designed to be exploratory in nature and are in-depth investigations into the problems experienced by farming communities unable to access broadband internet, and as such they are designed to act as a spotlight on the problems experienced by the participants. They are limited in the extent to which they can be generalised and used to represent wider communities. The findings presented here are not definitive but aimed at providing direction for further participatory research in this area.

4.1 Walking Interviews

Participants were invited by BDUK to take part in an ethnographic interview in the summer of 2021 that involved walking and spending time on the farm. Ethnographic walking interviews are an entry point to lived experiences that allow participants to use their environment as an aid to memory, and to stimulate conversation points (Bates 2018). By walking together in the participants' own environment, the researcher is given access to the world that is inhabited by the participant and is therefore able to reach beyond the boundaries of a scripted set of questions. By 'walking and talking' together, they are able to use the environment as prompts to avenues of enquiry, allowing the researcher access to the complex and elusive aspects of daily life as suggested by Law and Urry (2004). A farmer's daily life exists alongside the natural environment, and by traversing that environment, the researcher is able to enter into that relationship as both an observer and a commentator (Evans and Jones 2011). As a methodology, it has been used by academics such as Riley (2010) to enter into the lifeworld of rural farmers in the UK. Interviews lasted between an hour and a half and two hours and were often conducted with more than one member of the family present.

4.2 Follow-Up Interviews

Participants were contacted again 18 months after the initial interview to discuss how their situation had changed. Follow-up interviews were conducted by telephone and lasted up to half an hour, offering the participants the opportunity to talk about the latest developments in their broadband journey.

Case Study One A commercial farm that covered an area of 600 acres. Whilst they farmed livestock, their son also used the land to run a game bird venture.

Case Study Two A dairy and livestock farm, which also had an established farm shop, and a cafe / restaurant.

Case Study Three An arable and livestock farm, but was also diversifying into Airbnb, wild camping, a farm shop, and a Pick-Your-Own-Fruit venture.

4.3 Data Analysis

Interview transcripts were analysed using a thematic analysis. Thematic analysis is a method of extracting themes and patterns within qualitative data that organises the data into recognisable topics with a certain amount of flexibility (Braun and Clarke 2006). It is a tool for an analysis that allows the researcher to explore the depths of the 'rich' data that is gathered during ethnographic research, allowing for academic rigour in the process of interpretation (Yin 2011). The result allows for an informed interpretation of the data gathered which can be examined for their rigour by the openness and transparency of the researcher.

The data was analysed using themes suggested by the Building Digital UK benefits framework. This framework, developed by BDUK, is a way by which analysts can identify and categorise the benefits of broadband infrastructure, including:

- Driving Growth in the Economy
- Stimulating the Broadband Market
- Reducing the Digital Divide
- Enabling Public Sector Efficiency
- Reducing Impact on the Environment

Of these themes, 'driving growth in the economy,' 'reducing the digital divide,' and 'enabling public sector efficiency' were the themes that were more populated with data points, whereas 'stimulating the broadband market' and 'reducing impact on the environment' received less attention. The findings presented here therefore take driving growth in the economy, reducing the digital divide, and enabling public sector efficiency as the focal points of the thematic analysis, whilst acknowledging that these other themes were also touched upon by participants.

Following this analysis, a narrative analysis of the interview transcripts and the researcher's notes was taken to investigate aspects of rural farming that had not been captured in the thematic analysis. Narrative analysis is a way by which researchers can investigate the stories that are told in a research context in order to draw out the personal experiences of both the research subject and the researcher themselves (Parcell and Baker 2017). It is characterised by a greater deal of inductive reasoning than thematic analysis, but in doing so it allows the researcher to examine the interpreted realities present in the research texts that may not be available in a thematic analysis.

4.4 Data Materialisation

In order to investigate whether these ideas could be drawn out further, a beat analysis was undertaken of the narrative texts. Beat analysis is a dramatic tool used to help scriptwriters to move the action forward in their work. A ‘beat’ is a unit of drama that takes place within a dramatic work. It is not as big as the narrative arc overarching the drama, but it serves to move the drama from one point to the next. It usually has a beginning, a middle, and an end and can usually be recognised from a change of pace, mood, or narrative. As a technique, it is highly interpretive. It is not intended to give a full or comprehensive overview of the research, but rather as a storytelling activity that in turn will serve as an entry point to the project, allowing the reader or listener access to some of the salient points from the interview data and ethnographic notes simultaneously (Institute of Design at Stanford 2018). As such it is more of an experimental analysis technique that has been used here to explore the nature of data storytelling and its relevance to policy development and social research.

4.5 Ethics

Full written consent has been obtained from participants for the publication of this research. Due to the sensitive nature of some of the findings, participants have been anonymised and any specific details relating to their identities or locations have been removed.

5. Case Study One

5.1 BDUK Intervention in the area

Project Gigabit is active in this area, with three BDUK-approved voucher projects that address premises in and around the nearest town. There is a total of eight projects in the constituency including the three already mentioned. In addition, the county, and one of its neighbouring counties, will be part of the first contracts to be agreed under the cross-regional framework approach that is currently being procured. This is set to conclude in summer 2024, with the first contracts agreed soon after that. Progress in area:

- Jan ‘21 = 25.8% Gb-capable

- May ‘24 = 63.58% Gb-capable

5.2 Beat Analysis

Getting There

This farm wasn’t even reachable with my Satnav. I think some of that was to do with some roadworks that were taking place in the area, but, nevertheless. I had to drive to one of three places (whichever the Satnav led me to) and ring her. She answered by saying “Are you lost then?” and when I assured her confidently that I was not, she gave me directions to the farm. Needless to say, I got the directions wrong and ended up on completely the wrong farm. When I rang her, she said “You’re lost this time, aren’t you?” I merely mention this because I think that when we are talking about poorly served communities, and when we’re thinking about the effect of poor broadband connection, it needs to be contextualised. Rural farms may have poor broadband connection, but they often also have poor mobile signal, poor location tracking, poor radio and television signal. Poor broadband connectivity is just one in a long line of exclusions that people have to live with, and I think that’s important to emphasise. The internet can be slow and essential websites take ages to upload, but also if you’re expecting a phone call you can’t go out because it has to come through on the landline because there’s no mobile, and there’s just all of these things that co-exist to make rural life harder to interact with the world of digital technology.

Family Farming

I think the findings highlighted to me that farming is a multigenerational family business. The farmers had 600 acres of land in one of the most remote areas of the UK. The farm next door belonged to their son, who kept game birds. I also met their grandson while I was there as well, and it sounds like he was planning on going into farming as well. The initial interview took place against the backdrop of the COVID-19 pandemic so there were lots of points to be made about the role that digital technology has played in that. Their grandson had, to all intents and purposes, missed 18 months of schooling because his internet connection could not support home-schooling, or online classes - certainly not while his father and mother were also trying to run their business from the same connection.

Digital Imagination

The phrase digital imagination came to me when the farmer was describing some of the more disempowering things that have happened to them over the lockdown period because of their poor connectivity. By digital imagination, I mean the ability to create digital solutions to lived, real-life problems. The saddest example that they gave me was when we were

talking about the effect the lockdown had had on the local community. They told me that since March 2020, three young men in their local community had died by suicide. It was the highest number of suicides that the community had ever known in the area. They explained that their usual practice in sad circumstances like this was to visit the family, take them food, attend the funeral to show support, and to generally be present and supportive in the difficult days and months following. Lockdown meant that this could not happen of course, leaving the farmers feeling helpless. It was noticeable that there were no digital solutions to any of these problems, such as participating via Zoom or sending flowers or gifts bought online, leaving them with no way of feeling useful or getting some closure in the wake of a tragic incident.

5.3 Thematic Analysis

Driving Growth in The Economy

The farmers described how their internet connection was so slow that they had to strategically plan their online activities to take place at a time when there were many users online in the area, which had an effect on their internet speed. This meant that they could complete their tasks more efficiently, but it also meant that they had to balance the needs of the farm with the need to find time to access the internet. The result of this was a feeling that there was no point in thinking more imaginatively about the possibilities that technology could offer, because they struggled to perform basic tasks:

> “ You tend to do things you have to do at five o’clock in the morning. We can’t even do what we’re supposed to do - government forms, like the PAYE and the VAT. There’s no point in thinking about putting GPS in your sheep… when we can’t do the basics.”

They also talked about their son’s business venture, rearing wild game birds for shooting, which targeted customers living in nearby rural counties and was operated from their farmland:

> “ They’ve got a big game business, you know, pheasants and shooting. And they do all their jobs online. And it’s a terrible job with that, terrible job. Because it’s quite a bulky thing that they have to send off. And it just won’t go when you press send… the internet isn’t sort of big enough to send the files.”

Enabling Public Sector Efficiency

One of the primary areas of frustration identified was the filing of paperwork required by the government for the farm. For example, the movement of

livestock was frequently cited as something which is legally required to be recorded by farmers in a set period of time, and their poor internet exacerbated the pressure they felt to complete this task:

> “ So, every cow, every animal has a passport… and that passport will travel with it throughout its life, you know? So, if he’s moved off the hold into a different holding, then it’s got to be tracked for TB purposes or any instances like that. You’ve only got a certain number of days to do it, you know, you’ve only got those three-day windows to register it.”

If this three-day period fell during a time when the internet was particularly unreliable, it had the potential for legal ramifications for the farmers. The move to working from home that was necessitated by the pandemic also meant that other residents in the area were using their internet for work or school, resulting in a slower service for the farmer. Indeed, the concept of waiting to use the internet at ‘quieter’ times was returned to regularly:

> “ We do that at night when it gets quieter… you’re finding you have to wait until everyone else goes to bed.”

The remote and disconnected nature of the farms was also a concern for participants when faced with an emergency. The lack of connectivity, from both broadband and phone network, meant that accessing information and aid in an emergency was not a straightforward process:

> “ Yeah, there was a person quite badly injured on the road… And he came here, and he said he’d been lying on the ground, he fell off a load of hay bales. He’d been lying on the ground over half an hour, and he had one of those new phones but no signal. When he got to us, he was in quite a bad state because he had to climb into their tractor and get down here. When he got here of course we alerted the powers that be.”

Although they were not talking directly about broadband access, this particular story highlights the isolated nature of the farms, which seemed to play a significant role in their ideas about the importance of being connected. they went on to describe another system that they had installed, which he had not yet needed to use, but had very little confidence in as a result of the poor connectivity:

> “ On this system that we just bought, there’s a panic alarm. So, if somebody has an accident somewhere… you push your panic button. And that’s it, it locates you and everything. But, you know, we can’t use it, it just doesn’t work.”

Reducing the digital divide and providing public value

The farmers also described a certain amount of cultural exclusion afforded by their poor internet connections. Whilst this was not given as much importance as other factors mentioned here, it was still mentioned consistently by participants. The main complaint was being excluded from areas of cultural life such as television and streaming services. Participants mentioned that they thought that being able to watch television on demand would be something that might help them relax and unwind but that this is unavailable to them because their broadband could not support it:

> “ We don’t download films or anything like that. We couldn’t if we wanted to.”

They described how she had been enjoying a BBC series but had had to miss one episode because she was needed on the farm when it was on. She described the frustration at not being able to catch up as a minor irritation, but one in a very long line of minor irritations that she did not think was fair that she had to put up with.

One of the farmers acknowledged that their age was a factor in his ability to learn digital skills, and that they struggled both with motivation, understanding, and confidence. However, they noted that a slow internet connection played an important role in this because it made the digital environment harder to navigate and failed to build their confidence:

> “ I think sort of when I’ve been filling in a form, I’ve had someone to guide me through it but if I go filling in a form on the internet… I think having a slow connection makes that process a lot more confusing, doesn’t it? Because you think, is it me? I’m doing it wrong?”

Follow-Up Interview

In a follow-up phone call conducted in May 2023, they reported that their situation had not really changed, commenting:

> “ I’m still having to stay up at night to file my paperwork, my daughter-in-law is still having to wait until after 10pm to submit her VAT. If anything, I feel like it’s even slower than it was back then.”

6. Case Study Two

BDUK intervention in the area

The Superfast programme in this area has had three different phases and has delivered over 144,000 improved connections in the area, including some which were upgraded to gigabit-capable broadband. The area is also

impacted by two major GIS (Gigabit Infrastructure Subsidy) procurements in the county, and in the surrounding areas.

6.1 Beat Analysis

Community Hub

Of all the farms that I visited, I got the strongest sense of community from this farm. It sat just outside the local village, but it had the most beautiful cafe and restaurant that was a hub for people to come and spend time together. It was situated in the old stables and was decorated with horse tack and saddles on the walls. The barn doors had been replaced with large glass windows which looked into a byre to the South and across the yard to the right so that when people were sitting down, they could see some of the animals or they could see farm activity going on around them. The farmer told me that they usually had a lovely mix of tourists and local people coming in for a meal or afternoon tea. They also usually employed local people to work there, giving it a real sense of community.

But of course, it wasn't just about the community space that the farm provided. It was also about the farmer himself, who played various different roles within the community. The family were active in local politics and were interested in engaging with local schools for education days to bridge the gap between farming and the consumer through outreach activities. All of these things required a strong broadband connection that they just didn't have, and I could really sense their frustration at that.

6.2 Thematic Analysis

Driving Growth in The Economy

The farmer described how not having a good, fast broadband connection was affecting his business, stating quite clearly that he was losing sales because he could not take card payments:

> " We've got a cafe and restaurant as well [as a farm shop]… and we've got a card machine. But then the connection does tend to go wrong on a Thursday or Saturday when we're open… so then we're down to IOUs. Can't have a mobile card machine because you can't get a reliable signal. So, we use IOUs or cheques. We can't do internet banking, can't do any of that."

The COVID-19 pandemic had had a significant effect on this. They explained that if they had been able to use the period of lockdown as a way of building an online shop, they would like to be able to offer the management of their digital services as a job to someone local in the future but have been unable to do this:

> “ We’ve got a cafe and restaurants as well. That’s shut. Yeah, obviously. Yeah, we just don’t reopen. We haven’t reopened it from the first lockdown yet. We didn’t furlough any staff, they all went of their own accord, for shielding… But [when we open] it’s got to be somebody fairly local.”

The lack of good internet means that they were unable to create jobs for people living in the area, because they could not build the business up sufficiently. It also affected other aspects of their business development, meaning that they were unable to stabilise their business sufficiently to make more work available to local people. They explained:

> “ And then shop advertising. You do it on Facebook, so you take a video or something. You want to put it on? Forget it… There’s other things we could do - we’re gonna do - like Twitter and Instagram but we just can’t, I think I get so fed up with trying do stuff on Facebook. Sometimes I’ve managed to, and people really follow it, they love it. They love it. They love seeing a picture of a sunset … We always put a video with the cows going out in the Spring, that’s a real boost… and the big tractor, the big green tractor got 20,000 views or something.”

Given the extent of the problems faced by the farmers interviewed, investing in agricultural technology was not a driving force for getting online, because they needed their internet to perform the most basic functions first. In response to a question about technologies that they would like to use if they could, they said:

> “ We haven’t got that far, I don’t think. We haven’t got the basics, to just operate. I mean, there’s lots of modern technology, but you need the infrastructure to do it. …we can’t even do what we’re supposed to do, right. Government forms like the PAYE, the VAT. Yeah, if you can’t do that, I mean, then there’s no point in putting GPS in your sheep.”

Enabling Public Sector Efficiency

The need to complete government paperwork was once again referred to as a consistent problem that significantly shaped the farmer’s experience of being online. As with other participants, he was finding that he had to wait until other people in the areas were in bed before he could complete his legal paperwork, which meant either doing it first thing in the morning or waiting until others were in bed before attempting it:

> “ If you buy another animal, a cow, these days you’ll have to register that on the internet to the British cattle movement service. Cattle tracing system is all done on the internet. And if you buy a beast, you have to register that on the internet. Those you know, cattle movements have to be done, you’ve got two days, I think. Yeah, so you’re finding you have to wait until everyone else goes to bed.”

Significantly, he stated that access to healthcare information and services was also a concern. Both the farmer and his wife had struggled to gain access to their GP during the pandemic as the surgery had taken many of their services online, and they found that their internet could not cope with the system that they were required to use:

> “ Doctors, that’s an interesting one. The doctors, with the pandemic, they want to do everything online? They don’t answer the phone, they use Ask My GP. We can’t get it. You can’t phone them. I was trying to book our vaccination. I must have been about an hour doing that.”

He also talked about how he would like to work with local schools through web applications such as Farmer Time which connects local schools with local farmers to provide education opportunities for primary school children. He told me that he had been very eager to sign up for this but had been unable to do so because it is an entirely web-based platform, and he does not have the bandwidth to use it properly:

> “ A Farmer joins farmer time and then you get allotted to a class in a school. And then you go around once a week with your phone. Tell them what you’re doing. Yeah, it gives the kids an insight into what’s going on the farm. And farms queued up didn’t they, to do it… That option’s out, we can’t do that.”

Reducing the digital divide and providing public value

The farmer described being politically disempowered by their inability to interact with many political debates that are taking place digitally around the issue of farming and food production. For most, this included being able to access matters in their local area. He told me about an application for planning permission that was happening in their local area. He had concerns about the application but was unable to post them online because his bandwidth could not support the form he needed to fill in. In the end he had to write a letter by hand and then send it by registered mail to make sure that it was received on time. He argued that incidents like this, where a relatively simple task is made complicated by poor broadband, are frequent and are a cause of frustration:

> “ We were putting a comment in on the planning application, a local one. Yeah. And we couldn’t do that online, either. Yeah. Because our internet was non-existent. And it’s nearly the deadline, so we had to do it longhand and put it in the post. And you had to do it as registered

> post, so it definitely got there in time. Yeah. So ended up costing, you'd end up costing quite a lot. Whereas you could have just filled this in online. We couldn't do it quickly. It was just sheer frustration. "

The farmer played an active role in his community as well and was involved in various local committees. The pandemic had meant that these activities were quickly hosted online, but his poor broadband connection meant that he was excluded from many of the discussions:

> " I was a county councillor and I retired. But I'm still on one committee, the Standards Committee. Yeah. And that can be a bit [difficult] when you're on Zoom. Yeah, you know, sometimes that freezes. Yeah. So, if you were doing meetings a lot in the daytime, it'd be difficult. "

A strong theme that emerged was the fact that the farms who spoke with me were often surrounded by people who had better connectivity than they did, creating a tangible sense of the digital divide. As he explained:

> " In the next village, there's a hospital manager running the hospital from there. He's got good broadband, hasn't he? But you know, the amount of people that are working and expecting from it. I'm not sure that things are going to improve? Because I don't think people are going to go back to work, certainly not like it used to be."

Follow-Up Interview

In a follow-up telephone interview, the farmer reported that nothing had improved since our first meeting, stating that he had noticed a distinct decline in the quality of the service he was being provided:

> " The broadband is worse, if anything. We're having a really bad day with it today, the speed keeps dropping right down. I don't know what it is about today that's so bad, but it's been terrible. "

He went on to say that coverage had gotten so bad, he had gone out to buy a dongle from another supplier so that if one was particularly bad, he could try another:

> " So, at the moment, I'm swapping between two dongles from two different suppliers hoping one of them will work. The phone signal is also bad. No one's doing anything about it, nothing's improved."

When he was asked about some of the plans he had had for his farm once the pandemic had abated, he stated that he had had to abandon them because his broadband connectivity was so bad:

> " Nothing we have planned to do can happen now, none of the things we were looking forward to, because we need fast broadband to do them. Going online at the moment is useless."

He concluded that he felt very little optimism for finding resolution for the situation, which in turn was having an influence on his own sense of wellbeing:

> “ It’s isolating at the minute, really isolating. I suppose that’s just life, but I don’t think there’s any hope for it getting any better.”

7. Case Study Three

BDUK intervention in the area

Project Gigabit is active in this area, with two BDUK-approved voucher projects that address premises in the local town. There is a total of eighteen projects in the constituency, including two in the local town. In addition, the constituency and neighbouring constituency will be part of potential future contracts to be agreed under the cross-regional framework approach that is currently being procured. This is set to conclude in summer 2024, with potential future contracts currently going through market engagement and a plan to agree them with a supplier in late autumn / early winter 24/25.

Progress in area:

- Jan ‘21 = 15.6% Gb-capable
- May ‘24 = 45.45% Gb-capable

7.1 Beat Analysis

Diversification

This farm really demonstrated to me the trend of diversification in modern farming. The farmers had bought the farm about three years ago, and it was an established sheep and dairy farm when they bought it. They are experienced farmers from the south-east of England, and they know their business. They wanted to develop the business in many different ways and were so full of ideas and potential. They were in the process of setting up a farm shop, they had an Airbnb property and had put one of their fields out for wild camping. They were also exploring developing a Pick-Your-Own (PYO) venture where people could drop by and pick their own fruit and berries - they had invested in some polytunnels and was in the process of establishing the plants so that they could launch the PYO in time for next summer.

I think that the diversification that seems to take place on rural farms is a pool of business ideas that is wide but shallow. Farmers need to be reactive to current trends in order to make the most of their ideas and I think that good, stable broadband plays an important role in that. The COVID-19 pandemic has been a good example of that. It was an ideal opportunity for farmers to open up their business plans to wild camping or Airbnb, as this farm did. For this to be successful, farmers need to procure equipment quickly, they need to be able to advertise their services and promote their farms as an ideal holiday destination for those looking to get away for a week.

The other point to make here of course is that farmers need to be able to be reactive to the needs of the market. The pandemic was a good example of how the tourism industry can change quickly in response to events, such as the pandemic or rising inflation. Farmers who were able to make a success of their assets during this time were the ones who were able to react to current trends and capitalise on them.

Farmer's Voice

The farmer talked in detail about the role broadband plays in amplifying the farmer's voice in public debate. She talked about current trends towards veganism and expressed concern that the farmer's relationship with the animals has been distorted by activists online, and I think it's a really interesting point to be made. Some of the concerns about the conditions in which animals and livestock are kept were definitely not noticeable as we walked around the farm and I think she makes a very good point when she says that smaller scale farms like hers have been lumped together with the more problematic battery farms that we know also exist. These distinctions have largely not been made in the public discourse, as far as I can see and I wonder if farmers had a more active online presence if they would be able to take greater part in these debates. Of course, the usefulness of 'debates' online is hugely debatable as far as I'm concerned and in many cases I would struggle to even identify them as 'debates' in the strictest sense of the word. But I think it is also important to note that, while so many of us have the opportunity to take part in issues that affect us through digital technology, those possibilities are not necessarily available to rural farmers who don't have good broadband.

7.2 Thematic Analysis

Driving Growth in the Economy

The farmer felt that she was missing out on opportunities because her internet services were so slow, it proved to be too time consuming to be worthwhile. Her tenure at the farm had been a time of tremendous social

change, such as the COVID-19 pandemic and the UK's exit from the European Union. In such an environment, she felt she needed to be able to be reactive in order to keep up with the latest trends and developments, but as many of these required good digital connectivity, they were opportunities lost to her. For example, during the summers of 2020 and 2021, when international travel restrictions meant that more people were holidaying at home, the farmers had started to explore Airbnb as an option for her farm, but their poor connectivity meant that they were unable to move at the pace that was required to make it successful:

> " This is what we moved here for, you know, we wanted to farm but we also wanted to, well, I wanted to do things like the Airbnb. And you don't know either do you? You know, people are going to change their habits soon maybe, I don't know? But we've had all these people wanting to come to West Wales over the summer and we haven't been able to capitalise on it."

Diversification also relies on the ability to advertise business ventures, engage with audiences, and complete sales, something which is difficult to do with poor broadband connectivity. There are many ways that this can happen, such as being able to post content to social media as a way of advertising or being able to respond to messages on Airbnb promptly. This was not possible with this farm's connection:

> " I lost my first client, I missed them. I saw his email but by the time he'd replied, he'd already booked somewhere else. And he was really nice, you know, he said it looked lovely and he'd definitely think about it next time if he came back but because I hadn't answered he'd booked somewhere else, and you don't know if people are just saying that do you?"

Other ventures that they were keen to start, such as a farm shop and a Pick-Your-Own venture were being held back because they did not have the connectivity to offer contactless payments. As the move to card or device payments became normalised through the pandemic, she found that she was losing sales because she could only deal in cash:

> " We can't do internet banking, we have to phone or go into town but if we had it here, we could take card payments or people could send us the money online. But we can't do it, you wouldn't be able to. So, we're losing money there, aren't we? There are sales we could be making there."

Overall, the farmers found it incredibly frustrating because they were aware that some of the things that they wanted to do were fairly straightforward but were made difficult by their poor connectivity. So instead of being able to check their emails at a convenient time, they found that it was becoming a laborious task that she had to deal with:

> “ The broadband though is such a nightmare, it’s the emails for me. It’s terrible, we just get nothing and when we do it doesn’t do what we need it to do, and you see other people who’ve got fast broadband and they’re just able to do things and you think ‘why can’t I get that?’ you know? It’s really frustrating, yes, because I need to check my emails and they just don’t come through you know? I need to check them, I need to answer emails and sometimes they just don’t come through or they’ll all come through at once and then it takes me ages to catch up. And I don’t have time to fire up the computer every day, I just do it on my phone but I’ll check it thinking they’ll be able to come through and there’s nothing so I just think right ok, I haven’t got any emails and then I’ll find I’ve missed something really important.”

Enabling Public Sector Efficiency

Many digital public sector services were found to be too ‘heavy’ for their internet connections to deal with. This included business support offered by governmental bodies and local authorities, such as business webinars and updates. Many farmers mentioned that they would like to attend business webinars hosted by local authorities and by organisations such as Farmers Weekly but were unable to do so because their internet could not support live streaming. This left farmers feeling that they were missing out on essential business updates because they could not access these services. When asked if they ever attended online business webinars offered by the local public sector, they commented:

> “ Yeah, we’d like to do things like that. We need to do things like that really, but we wouldn’t have a chance around here. Not a chance. I think [my husband] has tried to do some. In fact, we signed up for something, something to do with coronavirus I think but when we went to watch it, it just froze. We couldn’t do anything, so we just said oh forget it.”

Reducing the digital divide and providing public value

Another political arena that received attention was surrounding current trends towards veganism. Farmers expressed concern that some of the arguments and worried they would be damaging to their own livelihoods. Concern was regularly raised about how the process of food production has been in some way ‘sanitised’ leaving people disconnected from the reality of meat and dairy production. This has left them with incorrect ideas about how farms work, and the nature of the relationships between a farmer and their livestock. The farmers expressed the idea that whilst many activists were able to use the internet to express their ideas about this, farmers have been largely excluded from offering a counterargument, making the debate very one-sided and unfair. They felt that the internet would offer them the opportunity to do more outreach work and education so that people in the UK had a better understanding of these processes:

> “ They don’t know anything about us, they just hear stories about things that go on and they probably do go on the big farms you know but it’s not all like that. We care about our animals, we have to. And we love them in a way. But there comes a time when they have to go, and we want to make that as painless and as humane as possible for them. People don’t like to think about it… I’d like to be able to tell them our side of the story, you know?”

The digital divide was also seen as something very tangible, as the farmers could describe how their neighbour was able to use drones and field sensors because their connection was faster. This was particularly important because the farms were geographically adjacent to each other, but the neighbouring farms were able to access and use developments in AgriTech because they had the confidence in their digital infrastructure to support their use. Whilst none of the examples given were broadband specific, it demonstrated that the neighbour had access to the potential that developments in agricultural technology represents:

> “ I don’t know why he can, and we can’t, it’s not that far away. It just seems unfair and it’s very frustrating.”

7.3 Follow-Up Interview

In a follow-up telephone conversation in May 2023, the farmer reported that there had been no change in her connectivity and that the problems she was experiencing were worse than ever. She explained:

> “ Worse if anything. The mobile signal on the phones is much worse, and the computer goes round and round - it eventually connects but it takes ages.”

She explained that she had two dongles and that she had to switch between them in order to access the internet, depending on the time of day. As a result, she had abandoned many of the ventures that she had hoped to start when we had last met, meaning that their only income was now through farming:

> “ It’s having a big impact on the business, it’s just messages you can’t answer. We had to come off Airbnb - you just can’t run a business on the internet like that. It’s just a heck of a job because nobody can get messages through to you. Even phone calls, you can be on the phone, and it just cuts off, you don’t have to move, and it just goes.”

She also commented that the problem was experienced by others in the area who were trying to run small enterprises but were unable to do so because their connectivity meant that it was not really worth the effort:

> “ My friend down the road is trying to run a small business selling houseplants. And she can go to the markets and things like that and it’s fine, but she can’t do anything online which is where she needs to be. She’s just struggling because you can’t run a business that way. ”

8. Discussion

The findings presented in this report give further, rich evidence of the ways in which digital exclusion is having an effect on the daily lives of rural farmers. The thematic analysis has offered valuable insights into some of the economic consequences that poor connectivity has had over the past 18 months, and it is particularly noticeable that a great deal of economic opportunity has been lost due to the poor broadband connection experienced by the participants. Ideas and plans for additional revenue generation and business diversification have been noted to be abandoned as the digital infrastructure was unable to sustain the levels of responsiveness required for ventures such as Airbnb, which rely on quick response times, social media marketing, which require a level of agility that is stilted by patchy connections, and sales, which require the ability to use hands-free payment methods. The results are examples whereby rural economies are left unable to develop in response to the current trends and the needs of the market, and to capitalise on available opportunities, but also indicates that there remains important ongoing economic potential to be unlocked in these difficult to address spaces; potential that is ready to realise when a solution for digital connectivity for these premises can be found.

8.1 Towards a hierarchy of digital needs?

The attitudes and actions detected by the beat analysis have suggested that participants organised their digital needs into a hierarchy that prioritises some aspects of their connectivity over others. However, in order for a sense of wellbeing to be achieved, all of these needs need to be met. The best example of this is the list which one of the farmers provided in which he provided an ordinal list of the problems that he was encountering. The production of this list was clearly an organic process whereby he noted down his concerns as they occurred to him. However, it is notable that the structure of his list was echoed in the encounters with the other participants. The benefits to be derived from fast and reliable connectivity had varying levels of urgency, ranging from things that caused frustration and made life slightly harder, to things that were considered urgent and of detriment to the lives and wellbeing of the participants.

Central urgency was given to the needs of the business when thinking about the uses and benefits of broadband connectivity. Participants' primary concerns were the ways in which their business was suffering because they could not get online easily, whether this was to comply with legal obligations on behalf of the business, to attend seminars and training opportunities, or to expand the ways and means by which they were able to make a profit. The advent of the COVID-19 highlighted two aspects of this which are of primary interest here.

Firstly, the pandemic and subsequent social distancing measures expedited the 'digital first' approach which has meant that both businesses and consumers have higher expectations of receiving the information and services that they require online. The extent to which this has happened is still under investigation, but Contreras' illuminating analysis (2021) suggests that the way in which this has happened has both length and breadth to it. Goods and services are now offered on a wider scale across a broader range of digital platforms as a result of the 'digital first' approach necessitated by the pandemic. Secondly, business resilience in times of uncertainty requires a certain level of reactivity, whereby business owners can recognise a trend and mobilise to both meet it and capitalise on it. The farms who took part in this research expressed numerous ideas they had for driving economic growth by capitalising on recent, emerging, and potentially short-lived trends, and had the motivation to try and make the most of them, if their connectivity allowed them. A stable, reliable connection offers a level of certainty that could counteract volatility in the market.

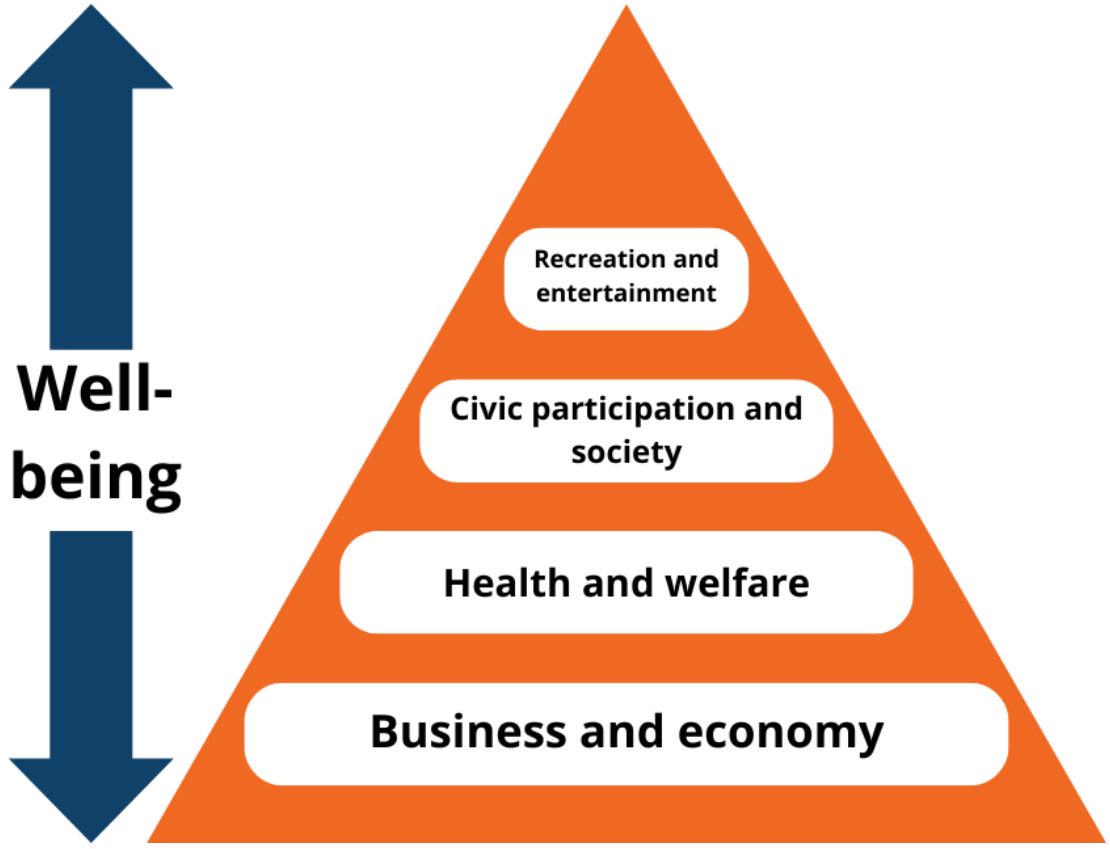
Following closely were a number of concerns related to health, safety, and personal wellbeing of people living in more remote areas. Participants related a number of situations whereby they were worried for the health and safety of themselves or others because of their lack of connectivity. The example of dealing with an accident on the farm is a good example of this. Firstly, because it neatly demonstrates the barriers presented to a quick and efficient emergency response in remote areas, and secondly because it highlights how farmers are required to step in and take action when help is not available. The farmers provided the aid and interventions necessary until help could be made available without complaint, but it was demonstrable through the beat analysis that dangers of working on a remote farm were not far from their minds. This was especially noticeable through their reference to the personal alarm system that they were unable to use because of poor mobile coverage in the area. Similarly, the farmer who noted that since his local surgery had started using the digital platform Ask My Gp to organise their services, he struggled to access primary health care because his connectivity was insufficient. The immediacy of these barriers to healthcare access gave them a sense of urgency, particularly in situations that were not necessarily at high risk of happening, but at risk of having a high impact if they were to occur.

Following on from this, and indeed closely related, were matters concerning civic and democratic participation. Participants discussed the ways in which

they felt disenfranchised and excluded from a number of civil matters, such as matters of local democracy which now take place online, exclusion from discussion spaces that include matters pertinent to farming, and lack of access to education and training. This is of particular importance when considering the ‘digital by default’ approach to civic engagement. A concerted effort has been made to digitise government services, including local authorities, and in doing so enact a process of ‘digital citizenship.’ The term ‘digital citizenship’ refers to (amongst other things) the digitised relationship between the citizen and the State. It concentrates on the ways in which aspects of our legal identity and citizenship rights are now conducted digitally. Participants referred to their frustration at their exclusion from this arena, and their inability to take part in activities that would affect their lives. The example of taking part in public debates around veganism are a good example of this. She expressed frustration at her perceived misrepresentation on some social media platforms and her inability to take action to address this. Similarly, one of the farmer’s difficulties in registering his objections to a planning application that he felt would affect his farm demonstrates the sense of disenfranchisement that digital exclusion can imbue.

Finally, participants made reference to a number of activities that they felt would make their lives better and more fulfilling if they could access them. This might include being able to livestream films and television or use catch-up services provided by television channels, being able to easily use social media channels to connect with friends and family, or being able to shop for items online if they were unavailable locally. For example, the farmer who described her inability to enjoy a meaningful video chat with her young granddaughter is an example of how personal connections are being made more difficult by unreliable broadband. In doing so, they add another layer of exclusion to a community already feeling disconnected and, in this case, prevented them from taking part in an activity that brought her joy and contentment.

8.2 Visualising the steps to realising wellbeing needs



A hierarchy of digital needs

The pyramid diagram presented here is a visual representation of some of the points made here, with business and the economy as a baseline need, followed by health and wellbeing needs, followed by civic participation and society, and finally recreation and entertainment. Realising wellbeing needs should not be de-prioritised by virtue of being at the tip of the pyramid but instead perhaps viewed as an achievable outcome in terms of benefits realisation. By visualising the priorities that were apparent in this study, it is perhaps possible to build a framework by which wellbeing can be conceptualised and achieved through provision of digital infrastructure.

Business and the Economy: The baseline tier relates to being able to sustain a business. Poor broadband connectivity leads to missed economic opportunities, hindering revenue generation, business diversification (e.g., Airbnb), social media marketing, and agile responsiveness required by market trends.

Health and Welfare: The secondary tier represents personal health and wellbeing. Participants express concerns over the inability to access emergency services efficiently due to remote locations and lack of connectivity. Health care services like Ask My GP are inaccessible, affecting timely access to primary health care.

Civic Participation and Society: The third tier describes civic and political participation. The ‘digital by default’ approach to public services means that communities with poor broadband risk facing barriers to civic engagement.

Not only does this risk leaving participants feeling excluded from local democracy, but the shift to the digital public sphere also means that they risk not being able to participate in relevant public debates and discussions.

Recreation and Entertainment: The top tier relates to recreation and relaxation. Inability to livestream films, use social media, and connect with family online contributes to a sense of disconnection and exclusion. These matters of wellbeing, whilst not being prioritised by respondents, are instead seen as an outcome once other needs had been met.

8.3 Limitations

It should of course be noted that overcoming digital exclusion involves more than providing infrastructure. Whilst there is no clear, concise definition of the term, research by the Good Things Foundation (2023) suggests that it typically will include access to digital infrastructure, access to data, access to digital devices, and the digital skills necessary to stay safe online. This research addresses only one of these aspects and it is unclear as to whether, once the infrastructure is in place, participants would then be able to maximise its benefits for themselves. This limitation in this research is linked to BDUK's scope as an Executive Agency tasked with bringing gigabit-capable broadband and 4G mobile access to hard-to-reach areas across the UK. However, it is useful as a way of demonstrating the complexity of the issues involved around supporting excluded communities into using digital devices and highlights the continued need for a multi-agency approach as a solution to tackling the digital divide.

The hierarchy suggested here is based on a small number of in-depth interviews that were not intended to be generalisable to a wider population. As a model for understanding a pathway to wellbeing through digital connectivity, it would need to undergo further scrutiny before being applied more broadly. One of the notable, and perhaps surprising, aspects of it might perhaps come from drawing comparisons with Maslow's hierarchy of needs (in particular, the 1987 revision), a five-tier model widely used within psychological theory as a demonstration of human needs. In Maslow's original hierarchy, the base of the pyramid represents physiological needs such as food, warmth, and shelter, and are commonly regarded as some of the most basic and important of human needs. The hierarchy presented in this research places business needs at the base of the pyramid as the foundational need to be met, based on the importance attributed to it in the interviews. Business needs could be understood as the means by which the participants were able to provide for their most basic needs - a successful farm will be able to provide food, warmth, and shelter for its inhabitants and is therefore representative. However, reflexively, it should also be noted that this research did not set out to construct such a hierarchy based on its

findings. The focus on business needs may also arise from bias towards business and industry that arose from the design of the research itself. The potential for this is countered by the fact that the interviews themselves were largely unstructured. The prompt for each discussion point was the farm itself, and the landscape that we encountered as we walked. The connection between this and the business needs of the farm is one that was largely made by the farmers themselves, and arose organically through discursive conversation, rather than from a more structured set of questions. However, these points suggest that the model presented here would need further scrutiny in order to become more useful.

9. Conclusion

This paper suggests a pathway to the realisation of wellbeing through digital connectivity. The hierarchy of digital needs that has been suggested here is based on in-depth analysis of interviews with rural farmers who run their businesses as a small or medium enterprise. This means that its context is highly specific and requires further development in order to be applied to wider scenarios. However, it has identified the themes that participants felt would improve their sense of wellbeing. It is perhaps interesting to note that business needs were felt to be more important than health and safety needs, something which may appear at odds with other similar models such as Maslow's hierarchy of needs which place physiological needs at the very base of the pyramid. However, there is a difference between these models that needs to be recognised. This model is designed to be applied to wellbeing through digital access and as such it is highly specific and contextualised. It does not make reference to other aspects of digital wellbeing, such as staying safe online or healthy digital behaviours. It is engaged with the benefits of having reliable broadband connection and with the harms associated with being digitally excluded. It is therefore presented here as one way by which wellbeing can be realised through digital connectivity with the understanding that it exists within a wider matrix of wellbeing needs.

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