Welsh Economy Research Unit
Yr Uned Ymchwil i Economi Cymru

Superfast Broadband Business Exploitation Project

Horizon Scanning Report

Digital technologies and future opportunities for the foundational economy in Wales

September 2018

Cronfa Datblygu Rhanbarthol Ewrop
European Regional Development Fund

Contents

Summary

This *Horizon Scanning Report* considers the potential role of broadband-enabled digital technology for Wales' SMEs operating within the foundational economy. The findings are broken down into three areas. First, the scope of the foundational economy in Wales is outlined. Second, an assessment of the role of broadband-enabled technologies when producing and delivering products and services for foundational sectors is presented. Finally, the possible implications of digital resources for foundational occupations are considered.

The findings suggest:

- The foundational economy in Wales covers all the essential products and services that we use every day. Despite its prevalence, the indigenous nature of the foundational economy places a number of restrictions on its success; including constrained resources, skills and market reach.
- The foundational economy is gaining recognition as an integral part of the Welsh economy, which can no longer be omitted from business and policy intervention. Fixed and mobile superfast broadband and its enabled digital resources provide a potential way to support foundational businesses and workers when overcoming pre-existing obstacles.
- The Welsh Government has already begun to recognise the importance of the foundational economy and the role of digital innovation in supporting its success.
- Increasing access to broadband resources provides potential benefits for businesses when delivering foundational products and services. These benefits can be both radical and incremental. Radical benefits include the introduction of artificial intelligence into social care, whereas incremental benefits look to improvements in productivity, efficiency, sales and flexibility.
- While there are signs of positive advances, more is needed to distribute the benefits to smaller and locally-based businesses.
- There is a growing need to consider the quality of employment offered by foundational SMEs. At present, the occupations providing the foundational services are low-paid, low-skilled, and with little access to career progression opportunities.
- Broadband resources may provide an avenue of enhancing skill development and career progression. This can relate to the dissemination of knowledge, resources and shared opportunities across the foundational occupations.
- Collaboration is key to achieving these occupational benefits, therefore an area of current and future business and policy intervention should look to the investment in virtual teams and co-working hubs that promote the pooling of assets across foundational occupations.
- A holistic approach to the foundational economy is needed, looking at how digital connectivity and resources can impact the pursuit of an inclusive economy that supports businesses, workers and society.

1. Introduction

The foundational economy is the "grand name for those business activities that we use every day and see all around us.[1]" The businesses covered offer goods and services that are essential for everyday living (Leaver and Williams, 2014). While principally perceived as unglamorous and indigenous, these businesses account for nearly 30% of weekly household expenditure (Johal et al., 2017) and make up four out of every ten jobs in Wales (Bentham et al., 2013).

The foundational economy has received heightened attention in recent years. The focus emerges, in part, from rising criticism of fiscal austerity and concerns over a previous emphasis on manufacturing as the solution to the country's economic crisis (Leaver and Williams, 2014). Coupled with these criticisms, is the disjuncture between the economy and society, with the economy being seen as something separate to be evaluated in terms of competition and market demand. Commentators call for this disjuncture to be re-evaluated and for the economy to be considered alongside societal needs (Leaver and Williams, 2014). As a result, there has been a push to consider what businesses and policy can do to support a more inclusive economy in Wales (Bevan Foundation, 2018).

Supporters of a greater focus on the foundational economy highlight the possible benefits for local economic resilience, quality of life and employment creation in a post-Brexit Wales (Bevan Foundation, 2018; Green, 2017). Yet, there remains uncertainty about the inclusion of these locally-based businesses at the centre of current economic policy. A further difficulty is the precarious employment opportunities across the foundational sectors, sourcing jobs that are disproportionately low-skilled and low-paid, with little scope for career progression (Parken, 2017). Responding to these concerns, this report explores the potential implications of broadband-enabled digital technologies on Welsh SMEs operating within foundational sectors. Broadband resources may provide a way for foundational SMEs to improve efficiency, productivity and networking, helping businesses, workers and local communities. This report also considers the implications of digital integration when encouraging skill development, resource sharing, co-working and career progression across foundational occupations.

The report looks specifically at how broadband-enabled resources may help these businesses and workers overcome existing hurdles and take advantage of the improvements in connectivity supported by programmes such as Superfast Cymru programme (and its successor), part-funded by the European Regional Development Fund (ERDF) through Welsh Government.

This paper forms part of a series of Horizon Scanning reports which are available on the Cardiff Business School website: http://www.cardiff.ac.uk/superfast-broadband-project/horizon-scanning

The authors of this paper are Laura Reynolds, Dylan Henderson and Neil Roche.

[1] https://www.bevanfoundation.org/commentary/wales_foundational_economy/

2. The foundational economy in Wales

The scope of the foundational economy varies depending on the definition taken. At its broadest, the foundational economy includes all goods and services that provide the social and material infrastructure for society (Bowman et al., 2013). This definition includes the primary resources (for example, health services, care and education), as well as the infrastructure that allows society to function (including utility networks, pipes, telecommunications, broadband), and the more everyday consumption activities (such as food, tourism, hospitality, retail) (Earle et al., 2017). A more restricted approach is captured by the Welsh Government when positioning current economic policy toward essential services in four chosen foundation sectors, namely tourism, retail, food and care. This report looks at the foundational economy in the wider sense for SMEs across Wales, addressing the public and private businesses that provide all levels of essential products and services.

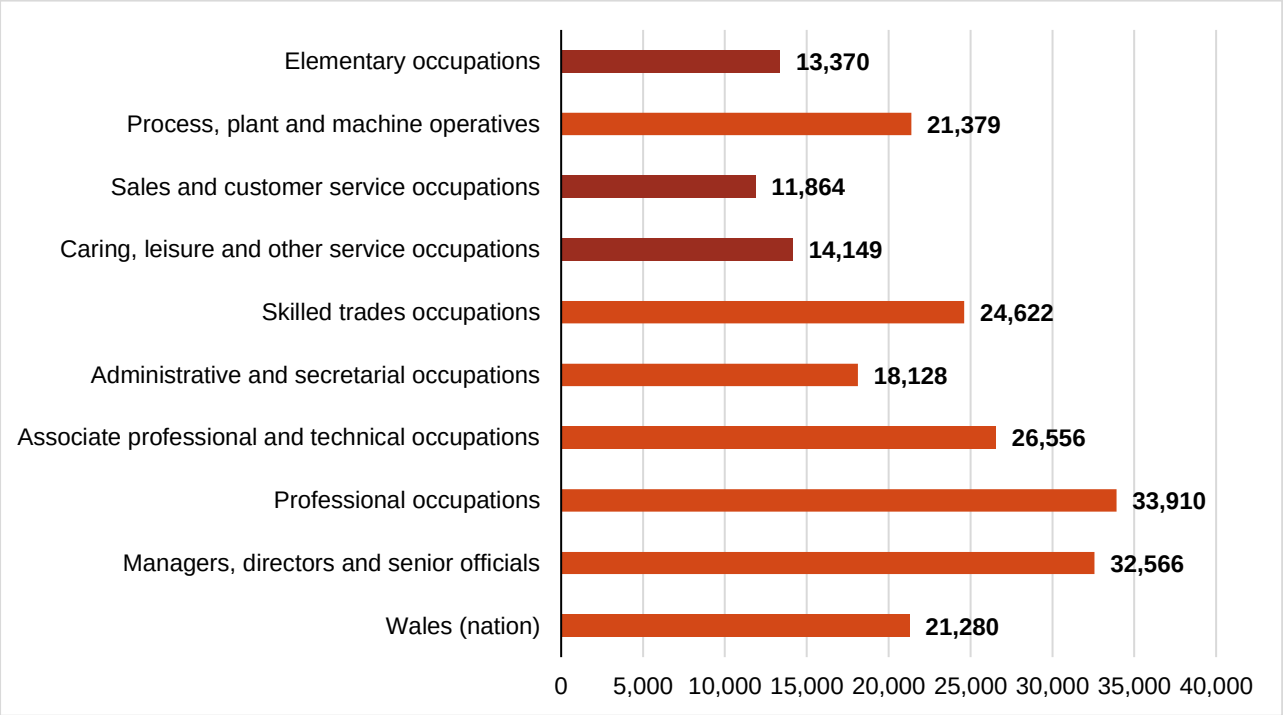
Figure 1 Foundational economy goods and services

The foundational economy includes a high proportion of non-tradeable goods and services. These economic activities can provide shelter from economic uncertainty (Bentham et al., 2013), and extend across Wales' urban and rural regions (Bevan Foundation, 2017). Foundational

organisations include public and private bodies, with a mixture of direct and outsourced state services, SMEs, as well as Multi-National Companies (MNCs) located outside of Wales (National Assembly for Wales, 2017). These everyday products and services accounts for up to 30% of weekly household expenditure (Johal et al., 2017) and almost four out of every ten jobs in Wales (Brill et al., 2015).

Despite employing a large volume of the Welsh workforce, the opportunities are predominately low-skilled, low-tech and low-wage (Brill et al., 2015; Figure 2-2). The main occupations, such as sales, customer service, service, and personal care all feature at the lower end of the standard occupational classification[2]. These are identified in Figure 2-2 as the elementary, sales and customer service, and caring, leisure and service occupational classifications. While foundational workers can fall within the other groupings, these three groups have been selected due to the propensity of these groups to fulfil foundational occupations.

Figure 2-2 Median Annual Salaries for Wales by Occupation (£)



Source: ONS, 2017

Figure 2-2 uses the recent Annual Survey of Hours and Earnings (ASHE) 2017 to show the annual median wage for *all employees* in Wales within given occupational classifications. While these figures are skewed in part by the propensity of the foundational occupations to partake in part time or zero hours employment (for example, 48% of the 109,000 elementary workers in Wales are part-time), they help to indicate the wage discrepancies experienced by foundational workers. Moreover, we see occupational segregation based on gender, with a disproportionate number of women located within these low-paid and low-skill occupations (Parken, 2017). More widely, low skilled workers in non-tradeable industries earn approximately 86 pence an hour less than those

[2] https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassificationsoc

in tradeable industries (Lee and Clarke, 2017). These financial disparities are compiled with the lack of opportunity, with these workers having little access to career progression and skill development. This creates employees that are hard to reach with low morale (Parken, 2017). The stark nature of the employment gap warrants business and policy intervention.

The Welsh Government has begun to adopt some of the principles associated with the Foundational Economy in its *Prosperity for All Economic Action Plan*[3]. The 2018 Economic Action Plan focuses on four foundation sectors, namely care, tourism, food and retail. One of the motivations for these changes looks to the need to deliver better jobs closer to home and spark regional economic development (Welsh Government, 2017). When adopting these principles, the Welsh Government expresses the need to look for new models of support and partnership building, helping Welsh SMEs engaged in the aforementioned foundation sectors to increase productivity, promote skill progression and develop more sustainable business models (Welsh Government, 2017). The economic policy coordinates with the Wellbeing of Future Generations Act, aiming to deliver on business prosperity while also tackling inequality and promoting fair work for all. Collectively, these policies demonstrate a shift toward a more inclusive economy, which promotes the development of the foundational economy alongside a need to support fair work and the social business sector (Bevan Foundation, 2018).

Technical innovation is seen as an important facilitator of these changes, providing opportunities for the mundane parts of economy as well as the traditional high value areas (Miles, 2017). This report builds on these implementations and recommendations, looking at how superfast broadband and its associated digital technologies can help to advance these claims and benefit businesses and workers in foundational SMEs across Wales. These potential benefits are seen in relation to the delivery of the products and services for Wales' foundational SMEs and in terms of the building and sharing of skills across foundational occupations.

3. Integrating digital connectivity into the delivery of Wales' foundational products and services

Technology is changing the way businesses operate. It is most celebrated in the high value and innovation driven parts of the economy. However, the rewards can be achieved for the seemingly more mundane parts too (Miles, 2017). The Welsh Government's *2018 Economic Action Plan* highlights the potential role that digital resources may play in helping to support the prosperity of the foundational economy. Our report addresses some of the opportunities and hurdles of utilising technical advancements for foundational businesses and workers.

An area for concern is the divide between the digitally mature businesses and those that are less digitally engaged. Across the sectors, digitally mature businesses are benefiting from integrating digital technology into business processes (WERU, 2018), with digital technology being integrated into employment practices, business processes and the organisational culture (Kiron et al., 2016). In line with these benefits is the need for businesses to respond through investment in provisions of digital resources, opportunities and training to their employees (Kiron et al., 2016). However, not all businesses have the required access, skills or resources to implement digital resources

[3] https://gov.wales/docs/det/publications/171213-economic-action-plan-en.pdf

across the business model. At present, the Welsh Government is investing significantly in equipping SMEs with the necessary infrastructure to respond to this challenge. This is a positive transition, which is supported by the recent *Digital Maturity Survey* 2017, which demonstrates the improved digital maturity for SMEs across Wales (WERU, 2017).

One priority area identified in the Economic Action Plan is that of **health and social care**. The Welsh Government has already begun to utilise digital technologies to transform modern models of care, therefore improving efficiency and access to scarce resources (Welsh Government, 2018). Some examples of digital technologies in use include smartphone apps, diagnostic and support systems, robotics, digital therapeutics, data analytics, AI and genome sequencing (Welsh Government, 2018). A number of examples can be found across Wales of these technology-enabled care initiatives in operation, including diabetes and cardiac monitoring and virtual clinical networks (Welsh Government, 2018). The box provides an example of a healthcare business' experience of incorporating digital technology. These advancements demonstrate the potential for digital technologies to be integrated into the foundational sector and overcome a fiscal deficit. While important improvements are being made, the sector would benefit from consolidation of these approaches across Wales.

Signum Health Ltd – Caerphilly, South Wales: A healthcare start-up that launched in 2016, following support from the Development Bank of Wales, provides a snapshot of the benefits of incorporating digital resources at the heart of the business model. The Caerphilly-based SME uses artificial intelligence and cloud-based technology to aid the delivery of care and support to remote communities (Davies, 2018). By working in partnership with health and social care providers, Signum Health is able to remotely diagnose, triage and refer patients (MediWales, 2018). The Social Prescribing Platform provides patients with convenient access to medical attention and saves NHS resources. The digital start-up recently won the Best Application of Tech award at the ESTnet Wales Technology Awards (MediWales, 2018b).

An additional priority area where digital technology is showing signs of transferring benefits is in relation to **retail**. For example, big data is transforming the profiling of consumers, advanced machine learning is helping to devise more efficient business processes and pricing can be altered in real time (Retailer, 2016). Retailers' interactions are also being made more efficient by digitalising the supply chain. For example, radio frequency identification allows businesses to transmit and store data about a product as it passes through the supply chain (Owunwanne and Goel, 2010). Moreover, retailers are also maximising market reach by incorporating online retailing. While social technologies is helping smaller retailers (for example Facebook Marketplace) to implement these benefits (Turban et al., 2018), there remains large discrepancies in uptake for these locally-based retailers. Therefore, the success stories speak to the national and multinational businesses that have access to the capital and resources required to invest in these digital alternatives, rather than providing supporting local foundational activities that bring social and economic benefits.

Digital advancements are also starting to benefit **tourism**. When setting tourism (and branding) aims for the years leading up to 2020, the Welsh Government has incorporated digitalisation as a central component. A significant proportion of the digital technology focus previously looked to using the internet to promote Wales to the outside world (Welsh Government, 2016a). Moreover, digital technologies are being used to boost visitor experiences at many of the main attractions across Wales. There are encouraging signs that digital technology is also being used as a means of support for smaller businesses, seen through a push to provide online resources that encourage tourism businesses to improve skills and a greater focus on online support for the industry to encourage place building and partnerships (Welsh Government, 2016b).

Gelli Aur – Llandeilo, West Wales: The family farm has been employing precision farming for several years. Practical examples of digitally enabled precision farming include GPS fertiliser application and the resultant optimisation of sprays, fertilisers and seeds. The processes prompt application costs and reductions to energy related input (DDC, 2014). Additionally, satellite imagery has been used to measure field sizes and assign grazing allowances, increasing milk production while decreasing outputs (Wales Online, 2016). However, significant initial capital investment was required before the economic benefits from improved agronomic performance could be attained (DDC, 2014).

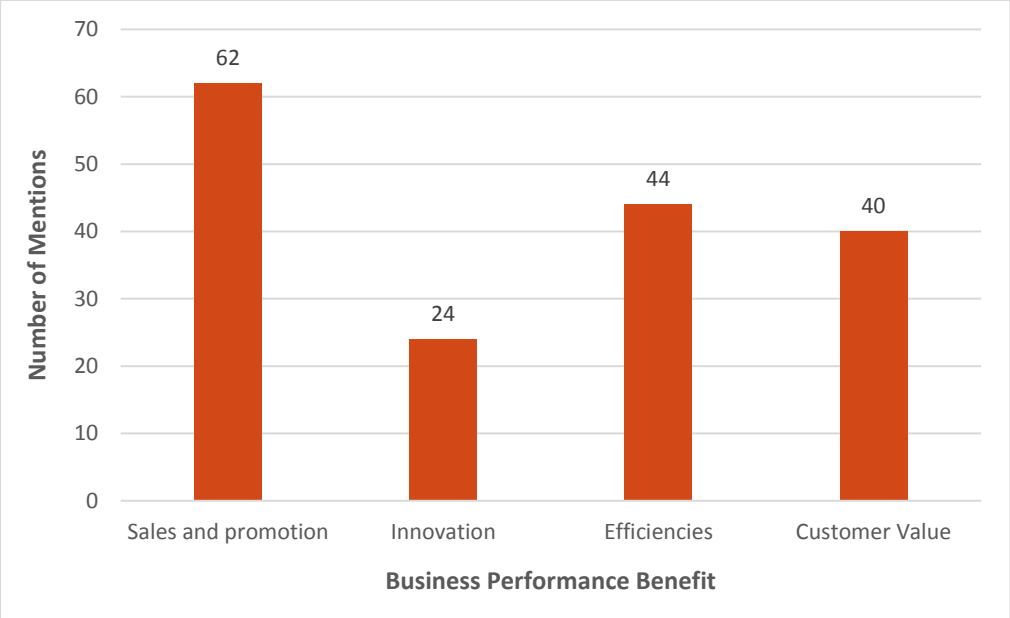
While a caveat in terms of tradability, **agriculture,** provides an essential product supporting local communities and the wider economy**.** Commentators recognise the importance of technologies, such as the Internet of Things (IoT), big data, and artificial intelligence (AI) in securing a future for agriculture.[4] Digital farming sees the implementation of automated tractors, drones for aerial imagery, satellite imaging, advanced sensors for data collection, combining within Decision Support Systems (DSSs) boosting precision agriculture (Pavón-Pulido et al., 2017). These systems receive a further benefit when operating through cloud-based applications that allow for real time access, reduced economic outputs and shared pooling of data, networks, applications and processes (Pavón-Pulido et al., 2017). For small producers these digital technologies enable time and input to be adjusted based on real time and accurate measures, tackling obstacles created by Wales' spatial dimensions (Earle at al., 2017). However, these often-large scale initiatives require investment in equal measures, which is difficult for many SME farmers to attain.

The digital technology used by businesses need not be as technically advanced as AI or precision agriculture, benefits can also be achieved through utilising cloud-based programmes, digitalised businesses processes and enhanced communication tools. WERU's case study programme includes ten foundational businesses out of the 25 businesses studied to date. The business performance benefits for these SMEs were analysed and collated using the qualitative data analysis software NVivo. Many of these foundational businesses discuss the incremental benefits from broadband enabled technologies (1). The sales and promotion benefits received a large number of mentions (n=62), followed by the

[4] http://www.fao.org/e-agriculture/news/power-digital-technologies-future-agriculture-and-food-security-agenda-2030

increased value for the customer (n=40) and improved time and cost reductions through greater efficiency (n=44).

Figure 3-1 Broadband resources and business performance for foundational businesses



As a result, there are positive signs that digital technologies provide a way of overcoming the financial and resource-based hurdles for foundational SMEs. In particular, there are certain sectors and businesses within them where we are beginning to see flagship examples of the benefits that can be derived from technical innovation. One notable example is care, wherein we are seeing digital advancements that respond to a potentially looming economic, social and political crisis. Moreover, throughout the other sectors there are signs of incremental benefits, with prospects of greater efficiency and reduced costs when delivering essential products and services. However, gaps in adoption and benefits of these digital resources remain. Continued financial support, knowledge dissemination and promotion of digitally-enabled benefits is needed to extend these benefits to smaller and remote businesses.

The potential for foundational SMEs to develop their use of digital technologies may be seen in data extracted from responses to the Digital Maturity Survey for Wales 2017 (WERU, 2017). Analysis[5] indicates that foundational economy businesses are associated with lower levels of digital maturity than non-foundational economy businesses. Table 3-1 shows the breakdown of businesses in the survey by their level of digital maturity, identified in four clusters (from highest to lowest levels of digital maturity): Digitally Embedded; Active Exploiters; Passive Exploiters; and Digitally Disengaged.

Whereas nearly one-in-four foundational economy businesses (22.8%) were found in the lowest category of digital maturity (Digitally Disengaged), Table 3-1 highlights that only one-in-six non-foundational economy businesses (16.3%) were in the same category. The Digital Maturity Survey

[5] Analysis was based on the allocation of Standard Industrial Codes (SIC) developed by Karel Williams and the team at the Centre for Research on Socio Cultural Change (CRESC): https://foundationaleconomy.com/

for Wales 2017 indicated that higher digital maturity is associated with better business performance in terms of turnover, profitability, employment and innovation activity (e.g. introduction of new products, processes or services).

Table 3.1 Foundational economy and non-foundational economy businesses in Wales by level of Digital Maturity (%)

	Digitally Disengaged	Passive Exploiters	Active Exploiters	Digitally Embedded	All
Foundational economy businesses	22.8	37.0	34.0	6.2	100.0
Non-foundational economy businesses	16.3	39.4	29.2	15.2	100.0
All	19.0	39.0	31.7	12.7	100.0

Source: WERU, 2017 (Analysis supplementary to the Digital Maturity Survey report).

4. Integrating digital technology into the advancement of skills and quality of work across the foundational occupations

As outlined above, digital technologies are not just an asset for innovative businesses and can support businesses providing everyday products and services. A crucial building block involves using these technological resources to support precarious occupations at the heart of foundational SMEs. Building on the push toward an inclusive economy, this section considers how these foundational occupations may be influenced by broadband resources and the potential gains that can be achieved for Welsh SMEs, government policy and the wellbeing of Welsh workers.

A common concern levied at the digitisation of the economy is the restructuring of the workplace, and with it the replacement of many routine jobs with an automated or digital alternative (Berger and Frey, 2015). It is estimated that between 45 to 65% of all jobs are a 'high risk' of being automated over the coming decades (Frey and Osbourne, 2017; Bowles, 2014). At present, a lot of these substitutes have been in middle-income manufacturing and clerking occupations. However, the changes are now steering toward the lower end of the skill distribution, with a range of unstructured and routine tasks disappearing. In response to these workplace changes, there is a push for new jobs types to be championed using problem-solving, creative and social skills (Berger and Fray, 2015). While the restructuring may present a problem for some of the occupations found across the foundational economy, it may present an opportunity since many of the foundational economy's customer facing roles also require social and intra-personal skills.

Moreover, instead of replacing jobs, digital connectivity can offer new prospects for skill development and career progression, augmenting the low-paid and low-skilled jobs with skills that complement the digital technologies (Berger and Frey, 2015). Therefore, businesses and policy directives may benefit from focusing on digital and broadband-enabled resources that look to fulfil the skills gap. Foundational workers could benefit from using high-speed broadband to access a multitude of online resources. The growing number of learning media include webinars, podcasts, digital libraries, and in-house or off-the-shelf online training, which can be undertaken individually, in support networks or as a part of a wider workplace region (Chang and Guetol, 2007). These platforms provide an accessible and convenient option for skill development, and there may be potential for support to be targeted at precarious occupations.

As well as looking within SMEs, there may also be potential to look across SMEs at similar occupations, using digital technologies to promote shared knowledge, resources and opportunities. Creating sustainable and collaborative networks allows businesses and workers to be more resilient and capable, while encouraging shared ownership across foundational sectors (Earle et al., 2017). One way to encourage this is through the establishment of virtual teams that are coordinated by a designated intermediary (Siebdrat et al., 2009). Virtual teams provide a means through which SMEs and workers from across the foundational sectors can pool resources, submitting joint tenders for larger projects (Earle et al., 2017). These virtual teams may also help encourage the advancement of entrepreneurial and creative skills (Berger and Frey, 2015), helping to encourage skill progression across foundational occupations. Virtual teams would require investment in broadband-enabled communication services that promote interaction across SMEs in real time. For example, the increasing investment in video communications (such as Skype), shared cloud-based data storage (for example, Drobox and Microsoft Teams), and social media platforms (Facebook, LinkedIn) provides the digital and practical resources to encourage the

successful implementation of virtual teams. These benefits may be particularly crucial for SMEs and workers within the more remote regions.

There may also be an opportunity to support public and private initiatives that advance bottom-up approaches to networking and knowledge sharing across foundational sectors. These networks would benefit from a change in culture toward a greater acceptance of foundational principles (Williams, 2017) and a willingness to experiment (Earle et al. 2017). Similar to virtual teams, these larger networks require support from intermediaries, tasked with implementing changes and providing necessary training, resources and support (Williams, 2017). This could involve appointing lead institutions with access to digital tools, resources and knowledge that can be disseminated across the network. One way to achieve this is through local authorities being granted greater economic responsibilities, allowing them the resources to support anchor institutions (Miles, 2017).

A further way to encourage collaboration could be through an investment in co-working spaces or digital hubs that bring together clusters of foundational partners (Bevan Foundation, 2018). The co-working spaces provide a low-cost solution to getting small businesses across the foundational economy to work together (Miles, 2017). These hubs are networked on broadband and mobile connectivity and encourage team working, collaboration, and the sharing of knowledge and resources.

These findings point to the importance of the foundation economy, identifying the potential benefits of improving connectivity and uptake of digital resources when strengthening foundational sectors. Moreover, the report details the opportunities that may be afforded by using broadband-enabled technologies to encourage collaboration and resource sharing access foundational businesses and occupations. While the Welsh Government and partners are helping to address these opportunities through programmes such as Superfast Cymru's successor and the Superfast Broadband Business Exploitation Project, the importance of the foundational economy to Wales suggests that policy support may need to continue this agenda beyond the end of the EU Structural Funding period.

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Welsh Economy Research Unit

Cardiff Business School

Cardiff University

Aberconway Building

Colum Drive

Cardiff CF10 3EU

For enquiries or to find out more please get in touch:

superfast@cardiff.ac.uk

https://www.cardiff.ac.uk/superfast-broadband-project/horizon-scanning

https://www.linkedin.com/company/welsh-economy-research-unit/

https://twitter.com/CUWERU